Attachment 8

San Diego Integrated Regional Water Management

Implementation Grant Proposal

Water Quality and Other Expected Benefits

Attachment 8 consists of the following items:

- ✓ **Water Quality and Other Expected Benefits.** The body of this attachment provides an overview of the water quality and other expected benefits of this proposed funding package, as well as the benefits associated with each individual project.
- ✓ **Appendix 8-1.** Appendix 8-1 of this attachment contains information regarding the qualitative and quantitative non-water supply benefits of each individual project contained within this proposal.

This attachment provides information regarding benefits that may be derived from projects within this *San Diego IRWM Implementation Grant Proposal*, which extend beyond the water supply benefits described in Attachment 7. Table 8-1 contains a summary of the costs and benefits for all projects.

Section 1 provides a summary of the regional water quality background of the San Diego region.

Section 2 contains a narrative description of the expected water quality and other benefits of each project. Where possible, each benefit was quantified and presented in physical or economic terms. In cases where quantitative analyses were not feasible, this attachment provides complimentary qualitative analyses. In addition, this attachment provides a description of economic factors that may affect or qualify the amount of economic benefits to be realized. This attachment also includes a discussion regarding uncertainties about the future that might affect the level of benefit received. Appendix 8-1 contains detailed information regarding the benefits anticipated to occur as a result of this proposal.

1. Regional Water Quality Background

The San Diego IRWM region lies entirely within the jurisdiction of the San Diego Regional Water Quality Control Board (RWQCB), which regulates water quality and discharges to surface waters. Municipal stormwater runoff within the region is regulated through a single National Pollutant Elimination System (NPDES) Municipal Separate Storm Sewer System Permit (MS4 Permit), which is issued by the San Diego RWQCB to 21 Copermitees (Order No. R9-2007-0001, NPDES CAS0108758) with the County of San Diego. The County of San Diego is designated as the Principal Copermitee.

The San Diego RWQCB has identified over 40 inland surface water bodies, located in ten of the region's eleven hydrologic units as not attaining applicable water quality objectives. Primary water quality constituents of concern for the region's surface waters include coliform bacteria, sediment, nutrients, salinity, metals, and toxic organic compounds. The RWQCB has completed Total Daily Maximum Loads (TMDLs) for several of these non-complying waters, and has initiated TMDLs for a number of additional impaired waters.

Table 8-1: Water Quality and Other Costs and Benefits Summary

#	Project	Project Sponsor	Total Present Value Project Costs	Total Present Value Water Quality and Other Benefits
1	Sustainable Landscapes Program	San Diego County Water Authority	$1,157,709	$2,398,775
2	North San Diego County Regional Recycled Water Project	Olivenhain Municipal Water District	$17,199,249	$0
3	North San Diego County Cooperative Demineralization Project	San Elijo Joint Powers Authority	$27,802,301	$0
4	Rural Disadvantaged Community (DAC) Partnership Project	Rural Community Assistance Corporation	$707,463	$0
5	Lake Hodges Water Quality and Quagga Mitigation Measures	San Diego County Water Authority	$1,517,868	$12,113,701
6	Implementing Nutrient Management in the Santa Margarita River Watershed	County of San Diego	$1,534,082	$0
7	Bannock Avenue Neighborhood Streetscape Enhancements for Tecolote Creek Watershed Protection	City of San Diego - Storm Water	$4,168,512	$1,072,816
8	Pilot Concrete Channel Infiltration Project	City of Santee	$281,294	$1,809,240
9	San Diego Regional Water Quality Assessment and Outreach Project	San Diego Coastkeeper	$924,578	$698,146
10	Chollas Creek Integration Project	Jacobs Center for Neighborhood Innovation	$1,018,096	$0
11	Regional Water Data Management	County of San Diego	$540,043	$0
	TOTAL		**$56,851,195**	**$18,092,678**

2. Water Quality and Other Benefits of Proposed Projects

The following sections provide information about the water quality and other benefits associated with each proposed project within this *San Diego IRWM Implementation Grant Proposal*. The summary of total project costs is based on Table 16 in DWR's Implementation Grant Proposal Solicitation Package (DWR 2010). Appendix 8-1 contains the complete Table 16 exports for each proposed project.

The projects within this proposal are anticipated to result in significant water quality and other benefits to the region. Five projects specifically focus on water quality benefits: *Lake Hodges Water Quality and Quagga Mitigation Measures, Implementing Nutrient Management in the Santa Margarita River Watershed, Bannock Avenue Neighborhood Streetscape Enhancements for Tecolote Creek Watershed Protection, Pilot Concrete Channel Infiltration Project,* and *San Diego Regional Water Quality Assessment and Outreach Project*. While these projects are anticipated to directly result in significant water quality benefits, the remaining project would also have indirect or complementary benefits to the region's water quality.

Project 1: Sustainable Landscapes Program

The water quality and other benefits that are anticipated to result from implementation of the *Sustainable Landscapes Program* are summarized below in Table 8-2, and the cost-benefit overview is summarized in Table 8-3. This project would generate monetized and qualitative water quality and other benefits. Detailed cost and benefit information associated with the project, including present value calculations, is provided in Appendix 8-1.

Table 8-2: Benefits Summary
Sustainable Landscapes Program

Type of Benefit	Assessment Level	Beneficiaries
Water Quality and Other Benefits		
Avoided Wastewater Treatment	Monetized	Local and regional
Reduced Ocean Pollution Discharge	Qualitative	Local and regional
Power Cost Savings	Monetized	Local, regional, and statewide
Reduction in Runoff	Physical Quantification	Local and regional
Green Waste Reduction	Physical Quantification	Local, regional, and statewide
CO_2 Emissions Reduction	Physical Quantification	Local, regional, and statewide

Table 8-3: Benefit-Cost Analysis Overview
Sustainable Landscapes Program

	Present Value ($2009)
Costs – Total Capital and O&M	**$1,157,709**
Monetizable Benefits	
Avoided Wastewater Treatment	$2,019,207
Power Cost Savings	$379,568
Qualitative Benefits	**Qualitative Indicator***
Reduced Ocean Pollution Discharge	+
Green Waste Reduction	+
Reduction in Runoff	+
CO_2 Emissions Reduction	+

* Magnitude of effect on net benefits:
+/- (negligible or unknown); + (moderate positive); ++ (significant positive); - (moderate negative); -- (significant negative)

The "Without Project" Baseline

If this project were not implemented, current water use efficiency, water demand, and stormwater runoff would remain at current levels. Additionally, there would be no benefit received from reduced water demand, increased water supply reliability, improved water quality, or other conservation-related benefits.

Water Quality and Other Benefits

This project would provide several water quality and other expected benefits. These benefits are described in detail below and are summarized in Table 8-2.

Avoided Wastewater Treatment

Within the next year, total maximum daily loads (TMDLs) may be established for the majority of receiving waters in the San Diego region. TMDLs require receiving waters (ocean, creeks, bays, etc.) to be in attainment of water quality standards within a specified timeframe (usually 10 to 20 years). While treatment of runoff from residential areas is not explicitly required by existing water quality regulations, to meet the TMDLs and other water quality standards, treatment may be required to reduce solids, nitrate, chloride, dissolved copper, and dissolved cadmium. Source reduction programs that would be provided by this project, such as landscape conversions, are anticipated to reduce the overall amount of runoff that

enters receiving waters, thereby reducing the amount of treatment that would be required to achieve compliance with TMDLs and other water quality standards.

The water quality benefits that would occur as a result of the *Sustainable Landscapes Program* are expected to be equivalent to water quality benefits that would occur from implementing other water treatment mechanisms. Treatment costs were estimated from cost per square mile of developed area estimations, and were based on the total project area of 6.25 acres. Published reports estimate treatment costs to be between $18.5 million and $72.8 million per developed square miles of watershed.[1] In terms of costs per acre, these costs would translate to an average of $70,312 per acre. Once the project is fully implemented it would cover 6.25 acres, and accrue approximately $438,453 per year.

Avoided water treatment costs from the project would increase over time with respect to the amount of land area covered by the project. Therefore, the avoided water treatment costs associated with the project are estimated to be $32,474 in 2012, $64,948 in 2013, $145,484 from 2014 to 2015, and $439,453 from 2016 to 2022. In total, the discounted avoided water treatment cost would be $2,019,207 over the lifetime of the project. Note that these monetized benefits are an estimate, and would potentially change if water quality benefits associated with the project do not occur within the same watershed.

Table 8-4: Avoided Wastewater Treatment Costs
Sustainable Landscapes Program

	Unit Cost ($/acre)	Project Area	Years	Total Cost
Avoided Wastewater Treatment Costs (2012)	$70,312	.5	1	$32,474
Avoided Wastewater Treatment Costs (2013)	$70,312	1	1	$64,948
Avoided Wastewater Treatment Costs (2014-2015)	$70,312	2	2	$290,968
Avoided Wastewater Treatment Costs (2015-2022)	$70,312	6.25	7	$3,076,171
Total Avoided Wastewater Treatment Costs				**$3,464,561**
Total Avoided Wastewater Treatment Costs after Discounting				**$2,019,207**

Notes: For further information regarding how these numbers were calculated, please refer to Appendix 8-1, Table 16 Annual Water Quality and Other Expected Benefits.

Reduced Ocean Pollution Discharge

The *Sustainable Landscapes Program* would include low impact development (LID) features, would promote on-site water retention measures such as rain harvesting, and would include source reduction programs, all of which would reduce urban runoff from entering watersheds within the Project area. Many of the San Diego region's watersheds drain into the Pacific Ocean, so it is possible that reducing stormwater runoff into regional watersheds would ultimately reduce the amount of stormwater that enters the ocean. Stormwater runoff associated with landscaping activities that would be addressed by the Project may include pollutants such as solids, nitrate, chloride, dissolved copper, and dissolved cadmium. By implementing the project and reducing stormwater runoff, the *Sustainable Landscapes Program* would potentially provide water quality benefits associated with reducing these stormwater-related pollutants from entering the ocean. This water quality benefit has not been quantified or monetized.

Power Cost Savings

The *Sustainable Landscapes Program* would reduce power consumption associated with landscape maintenance by 136,768 kWh (in 2012), 273,518 kWh (in 2013), and 612,720 kWh per year (from 2014 to 2022). These power cost savings were monetized using approximate unit values for power of $0.10/kWh. Based on these approximate unit values of power, the project would result in annual power savings of $14,292 in 2012, $28,583 in 2013, and $64,029 from 2014 to 2022, which would result in a total discounted power benefit of $379,568 over the lifetime of the Project.

[1] Los Angeles County Department of Public Works. 2004. *Sun Valley Watershed Management Plan Environmental Impact Report*. Available at: http://www.sunvalleywatershed.org/ceqa_docs/plan.asp

Table 8-5: Power Cost Savings
Sustainable Landscapes Program

	Units (kWh)	Unit Cost ($/kWh)	Years	Total Cost
Power Cost Savings (2012)	136,768	$0.10	1	$14,292
Power Cost Savings (2013)	273,518	$0.10	1	$28,583
Power Cost Savings (2014-2022)	612,720	$0.10	9	$576,263
Total Power Cost Savings				**$619,138**
Total Power Cost Savings after Discounting				**$379,568**

Notes: For further information regarding how these numbers were calculated, please refer to Appendix 8-1, Table 16 Annual Water Quality and Other Expected Benefits

Green Waste Reduction

This project has the potential to reduce green waste by 53%, which would correspond to approximately 33,000 pounds per year. These green waste reductions were based on the City of Santa Monica's Garden\Garden Case Study[2]. This benefit has not been monetized.

Reduction in Runoff

Based on information obtained from the Center for Watershed Protection and the Chesapeake Stormwater Network[3], higher runoff coefficients are anticipated in areas that have been graded. This project is expected to reduce runoff conditions by restoring landscapes to more natural conditions, which would improve soil retention. The project is anticipated to reduce runoff coefficients within project site locations by a factor of 0.10 to 0.20. This benefit has not been monetized.

CO_2 Emissions Reduction

The *Sustainable Landscapes Program* has the potential to reduce labor hours associated with maintaining landscapes, because native landscapes that would be implemented as part of the project require less labor to maintain. Reducing labor hours associated with mowing, blowing, driving, and other activities would potentially reduce CO_2 emissions provided that these labor activities require energy to complete. Information regarding this potential benefit was derived from the City of Santa Monica's Garden\Garden Case Study.[4] This benefit has not been monetized.

Distribution of Project Benefits and Identification of Beneficiaries

Table 8-6 summarizes the anticipated beneficiaries of water quality benefits that would be provided by this Project. The water quality and other improvements would benefit local, regional, and statewide stakeholders.

Local water purveyors would benefit from reduced wastewater treatment costs, and could potentially pass those cost savings on to local water ratepayers. Other water quality benefits such as benefits associated with reducing CO_2 would accrue to society as a whole, including local residents, residents throughout the San Diego region, and residents throughout California.

Table 8-6: Project Beneficiaries Summary
Sustainable Landscapes Program

Local	Regional	Statewide
Local water purveyors and local residents	Regional residents	Statewide residents

[2] Sustainable Site Initiative, A Comparison in Santa Monica http://www.sustainablesites.org/cases/show.php?id=1, accessed December 28, 2010.

[3] Technical Memorandum: The Runoff Reduction Method , Center for Watershed Protection, April 18, 2008. http://www.vwrrc.vt.edu/swc/documents/pdf/TechnicalMemo.pdf, accessed December 28, 2010.

[4] Sustainable Site Initiative, A Comparison in Santa Monica http://www.sustainablesites.org/cases/show.php?id=1, accessed December 28, 2010.

Project Benefits Timeline Description

Water quality benefits from this project associated with avoided wastewater treatment costs, avoided stormwater discharge to the ocean, power cost savings, green waste reductions, reductions in runoff, and reduced CO2 emissions would accrue from 2012 to 2022.

Potential Adverse Effects from the Project

No short-term or long-term adverse effects are expected as a result of this project.

Uncertainty of Benefits

Uncertainties relating to the water quality benefits of the *Sustainable Landscapes Program* are summarized below in Table 8-7. Uncertainties relating to water quality benefits that could not be monetized, water quality benefits associated with avoided stormwater discharge, green waste reduction, pollution reduction, and CO_2 emissions reduction, would have very little impact on the net water quality benefits associated with this project. These uncertainties would be minimal, because these values were not quantified and/or monetized. Uncertainties regarding monetized water quality benefits could potentially have a significant negative impact on the net benefits associated with this Project. The probability of constructing a treatment facility to address pollution within the Project area is unknown, therefore the certainty of achieving these monetized benefits is also unknown.

Table 8-7: Omissions, Biases, and Uncertainties and their Effect on the Project
Sustainable Landscapes Program

Benefit or Cost Category	Likely Impact on Net Benefits*	Comment
Avoided Wastewater Treatment	--	The probability of treatment costs being required without the project is unknown.
Avoided Ocean Pollution Discharge	+	Not monetized. The success of landscape conservation efforts in reducing pollutants is dependent on property owner maintenance practices.
Power Cost Savings	+/-	Potential changes in power costs over time could affect the amount of cost savings accrued.
Green Waste Reduction	+	Not monetized. The success of landscape conservation efforts in reducing green waste is dependent on property owner maintenance practices.
Reduction in Runoff	+	Not monetized. The success of landscape conservation efforts in reducing runoff and erosion is dependent on property owner maintenance practices.
CO_2 Emissions Reduction	+	Not monetized. Labor hours associated with landscape maintenance are dependent on property owners.

* Magnitude of effect on net benefits
+/- (negligible or unknown); + (moderate positive); ++ (significant positive); - (moderate negative); -- (significant negative)

Project 2: North San Diego County Regional Recycled Water Project

The benefits that are anticipated to result from implementation of the *North San Diego County Regional Recycled Water Project* are summarized below in Table 8-8, and the cost-benefit overview is summarized in Table 8-9. This project would generate quantifiable and monetized other benefits. Detailed cost and benefit information associated with the project, including present value calculations, is provided in Appendix 8-1.

Table 8-8: Benefits Summary
North San Diego County Regional Recycled Water Project

Type of Benefit	Assessment Level	Beneficiaries
Water Quality and Other Benefits		
Reduction in Wastewater Discharges	Physical Quantification	Regional
Habitat Protection	Qualitative	Regional / Statewide

Table 8-9: Benefit-Cost Analysis Overview
North San Diego County Regional Recycled Water Project

	Present Value ($2009)
Costs – Total Capital and O&M	$17,199,249
Monetizable Benefits	
N/A	N/A
Qualitative Benefits	**Qualitative Indicator***
Reduction in Wastewater Discharges	+/-
Regional Habitat Protection	+/-
Bay–Delta Habitat Protection	+

* Magnitude of effect on net benefits

+/- (negligible or unknown); + (moderate positive); ++ (significant positive); - (moderate negative); -- (significant negative)

The "Without Project" Baseline

If the *North San Diego County Regional Recycled Water Project* were not implemented, there would be continued use of potable water for municipal and industrial (M&I) purposes that could use recycled water. Additionally, there would be no benefit received from increased water supply reliability or the additional sales revenue associated with recycled water purchases.

Expected Benefits of Project

This project would provide several water quality and other expected benefits. These benefits are described in detail below and are summarized in Table 8-8.

Reduction in Wastewater Discharges

The *North San Diego County Regional Recycled Water Project* would increase recycled water production capacity by 5,000 AFY. In turn, the proposed project reduces the discharge of wastewater from the existing secondary treatment facility into the Pacific Ocean by 5,000 AFY. The annual quantity of wastewater discharge reduced by the project is a physical quantification of benefits resulting from the proposed project and was not monetized.

Habitat Protection

Regional

Habitat protection benefits that would occur from implementing the project would protect and enhance water quality at beaches downstream of the project area. These benefits would be a result of water quality benefits described above, relating to the project's anticipated benefit of reducing the amount of pollutants discharged to the ocean. These benefits are qualitative and were therefore not monetized.

Bay-Delta

Assuming existing supply and demand assumptions, the project would indirectly reduce the demand for SWP water supplies by reducing demand for SDCWA potable water supplies. The Bay-Delta ecosystem is sensitive to water levels and pumping activities associated with water exports for the SWP and Central Valley Project (CVP). Reduced water exports from the Bay-Delta may increase habitat quality and associated services provided by the ecosystem (e.g., floodplain management, water quality improvement). The ecosystem benefits that would be provided by the project have not been monetized.

Distribution of Project Benefits and Identification of Beneficiaries

Table 8-10 summarizes the anticipated beneficiaries of water quality benefits that will be provided by this project. Due to San Diego County's role as a vacation destination, residents and visitors from throughout the State would benefit from water quality and ecosystem improvements.

Table 8-10: Project Beneficiaries Summary
North San Diego County Regional Recycled Water Project

Local	Regional	Statewide
Residents and visitors to North San Diego County beaches	Visitors to North San Diego County beaches and Bay-Delta wetland habitat	Visitors to North San Diego County beaches and Bay-Delta wetland habitat

Project Benefits Timeline Description

This project would provide water quality and other expected benefits beginning in 2016 and continuing in excess of the 50-year project lifetime.

Potential Adverse Effects from the Project

Any potential short-term impacts associated with project construction will be mitigated through the CEQA compliance process. No long-term adverse effects are expected as a result of the proposed project.

Uncertainty of Benefits

Projected savings through the expanded use of recycled water represent best estimates based on the latest available data. Actual water savings will vary.

Table 8-11: Omissions, Biases, and Uncertainties and their Effect on the Project
North San Diego County Regional Recycled Water Project

Benefit or Cost Category	Likely Impact on Net Benefits	Comment
Reduction in Wastewater Discharges	+/-	Improper irrigation techniques may result in recycled water runoff into storm drain and ultimately to the ocean. However, such overflow would have small impact on overall benefit of reduced wastewater discharges.
Habitat Protection	-	SDCWA sources water from MWD, IID and local sources, among others. MWD sources water from the SWP, the Colorado River, and local sources. Some or all of the 5,000 AFY reduction in demand for SDCWA water may be sourced with non-SWP supplies and in turn, the benefit to Bay-Delta habitat would be reduced.

* Magnitude of effect on net benefits
+/- (negligible or unknown); + (moderate positive); ++ (significant positive); - (moderate negative); -- (significant negative)

Project 3: North San Diego County Cooperative Demineralization Project

The benefits that are anticipated to result from implementation of the *North San Diego County Cooperative Demineralization Project* are summarized below in Table 8-12, and the cost-benefit overview is summarized in Table 8-13. This project would result in water quality benefits associated with reduction in wastewater discharges to the Pacific Ocean, and other benefits associated with increased operating efficiency and habitat protection. Detailed cost and benefit information associated with the Project, including present value calculations, is provided in Appendix 8-1.

Table 8-12: Benefits Summary
North San Diego County Cooperative Demineralization Project

Type of Benefit	Assessment Level	Beneficiaries
Water Quality and Other Benefits		
Avoided Costs of Treatment Facility	Quantitative	Local / Regional
Reduction in Pollutants to San Elijo Lagoon	Qualitative	Local / Regional / Statewide
Reduction in Wastewater Discharges	Physical Quantification	Regional
Increased Operational Efficiency (SEWRF)	Qualitative	Regional
Habitat Protection (Regional and Bay-Delta)	Qualitative	Regional / Statewide
Increase in Recreational Opportunities	Qualitative	Local / Regional / Statewide

Table 8-13: Benefit-Cost Analysis Overview
North San Diego County Cooperative Demineralization Project

	Present Value ($2009)
Costs – Total Capital and O&M	$27,802,301
Monetizable Benefits	
N/A	N/A
Qualitative Benefits	**Qualitative Indicator***
Avoided Costs of Treatment Facility	+/-
Reduction in Pollutants to San Elijo Lagoon	+
Reduction in Wastewater Discharges	+/-
Regional Habitat Protection	+/-
Bay–Delta Habitat Protection	+
Increased Operational Efficiency (SEWRF)	+/-
Increase in Recreational Opportunities	+/-

*Magnitude of effect on net benefits:
+/- (negligible or unknown); + (moderate positive); ++ (significant positive); - (moderate negative); -- (significant negative)

The "Without Project" Baseline

If the *North San Diego County Cooperative Demineralization Project* were not implemented, there would be potential shut down of the SEWRF due to regulatory non-compliance with the facility's Master Recycled Water Permit, which prohibits the distribution of effluent that does not comply with certain numeric values, including TDS. If the facility were shut down, approximately 1,200 AFY of reclaimed water currently produced at the SEWRF would no longer be available to the water purveyors: SFID, SDWD, and the City of Del Mar. These purveyors currently use or sell reclaimed water to customers including golf courses, school districts, homeowners associations, and others.

Water Quality and Other Benefits

The *North San Diego County Cooperative Demineralization Project* would result in water quality benefits associated with reduction in wastewater discharges to the Pacific Ocean, and other benefits associated with increased operating efficiency and habitat protection. None of these costs were monetized. Detailed cost and benefit information associated with the project, including present value calculations, is provided in Appendix 8-1.

Reduction in Pollutants to San Elijo Lagoon

The *North San Diego County Cooperative Demineralization Project* is anticipated to result in reductions in the amount of indicator bacteria, TDS, TSS, and nutrients being discharged in urban runoff and first flush storm water to San Elijo Lagoon. These improvements would divert urban runoff and first flush storm water at the Seascape storm drain (Solana Beach), which has a chronic history exceeding REC-1 water quality bacterial standards. Further, a second storm water diversion structure to San Elijo Lagoon would be constructed. These structures would divert two identified sources of polluted runoff to the SEWRF for treatment in the near-term and additional locations in the future.

Stormwater is known to contain bacteria, nitrates, TDS, and other constituents of concern; during large storm events, stormwater flows containing wastewater within the project area can flow downstream into the San Elijo Lagoon, which flows to the Pacific Ocean. Stormwater diversion that would be provided by the project would potentially reduce the amount of wastewater contained within local stormwater, thereby potentially reducing the number of days that stormwater with bacteria levels that violate receiving water bacteria thresholds for the San Elijo Lagoon or Pacific Ocean. These water quality benefits were not monetized.

Avoided Costs of Treatment Facility

Implementation of the *North San Diego County Cooperative Demineralization Project* is anticipated to improve water quality by reducing indicator bacteria, TDS, TSS, and nutrients being discharged in urban runoff and first flush storm water to San Elijo Lagoon. The SEJPA estimates that currently high-bacteria stormwater reaches the Pacific Ocean every day (365 days a year). Bacteria in stormwater can potentially cause water quality issues, rendering ocean water unsafe to swim in due to high bacteria levels. With the project, SEJPA anticipates that high-bacteria stormwater would reach the Pacific Ocean only 65 days a year, thereby substantially reducing the amount of days that polluted stormwater reaches the ocean. The water quality improvements that would occur as a result of this project are expected to be equivalent to water quality benefits that would occur from constructing a conceptual treatment facility. These water quality benefits were not monetized.

Reduction in Wastewater Discharges

The project is also anticipated to reduce TDS levels at the SEWRF to ensure compliance with permitted TDS levels set forth by SEJPA's Master Water Recycled Water Permit.[5] As a result, it is estimated that through the beneficial creation of recycled water, the project would avoid 3,340 AFY of secondary effluent discharges to the Pacific Ocean. These figures are a physical quantification of benefits that would result from implementation of the project, but were not monetized.

Increased Operational Efficiency (SEWRF)

The *North San Diego County Cooperative Demineralization Project* may reduce the operational costs of the existing SEWRF. The 560 AFY increase in recycled water production capacity anticipated as a result of this project would reduce TDS concentration for all units of water produced, thereby reducing operating cost. These reduced operating costs may be internalized, or distributed to SEJPA customers through reduced recycled water rates.

This benefit has not been monetized because the 300 mg/L reduction in TDS concentration at the SEWRF has not been translated into per unit operating costs. This information is required in conjunction with capacity utilization to monetize the benefit.

[5] San Elijo Joint Powers Authority Website, "Water Reclamation", Available at: http://www.sejpa.org/index.php?parent_id=26&page_id=29 [Accessed December 2010].

Habitat Protection

Regional

Habitat protection benefits that would occur from implementing the *North San Diego County Cooperative Demineralization Project* would specifically protect and enhance water quality at beaches downstream of the project area, near the City of Solana Beach and the wetlands at San Elijo Lagoon. These benefits would be a result of water quality benefits described above, relating to the project's anticipated benefit of reducing TDS and other constituents of concern by decreasing wastewater within local stormwater runoff. These benefits are qualitative and were therefore not monetized.

Bay-Delta

Assuming existing supply and demand assumptions, the project would indirectly reduce the demand for SWP water supplies by reducing demand for SDCWA water supplies. The Bay-Delta ecosystem is sensitive to water levels and pumping activities associated with water exports for the SWP and Central Valley Project. Reduced water exports from the Bay-Delta may increase habitat quality and associated services provided by the ecosystem (e.g., floodplain management, water quality improvement). These habitat protection benefits that would be provided by the project have not been monetized.

Increase in Recreational Opportunities

Reducing indicator bacteria, TDS, TSS, and nutrients within San Elijo Lagoon will also reduce these constituents from entering the Pacific Ocean. The pollutant load reduction of this project directly impacts local beaches. Reducing the pollutant loading to local beaches will allow for continuous use of the beaches for swimming, surfing, and other recreation; whereas those beaches are often posted as closed immediately following large storm events due to bacterial contamination. Increases in recreational opportunities specific to this project could not be calculated, and were therefore not monetized.

Distribution of Project Benefits and Identification of Beneficiaries

Table 8-14 summarizes the anticipated beneficiaries of water quality and other benefits that would be provided by the *North San Diego County Cooperative Demineralization Project*. The water quality improvements would benefit local, regional, and statewide beneficiaries.

Regional habitat protection benefits would be provided to local beneficiaries, including local residents who utilize Solana Beach and proximate beaches, as well as local residents who visit the San Elijo Lagoon. Increased operation efficiency of the SEWRF would potentially benefit local SEJPA customers if reduced operating costs are distributed to those customers through reduced recycled water rates.

Regional habitat protection benefits would be provided to regional beneficiaries, including regional users of Solana Beach and proximate beaches, as well as regional residents who visit the San Elijo Lagoon Ecological Reserve. Increased operation efficiency of the SEWRF would potentially benefit regional customers of the SEJPA if reduced operating costs are distributed to those customers through reduced recycled water rates.

Regional habitat protection benefits would be provided to statewide beneficiaries, including residents of California who use Solana beach and San Elijo Lagoon Ecological Reserve, as well as statewide residents who utilize the Bay-Delta wetland habitat.

Table 8-14: Project Beneficiaries Summary
North San Diego County Cooperative Demineralization Project

Local	Regional	Statewide
Visitors to project area beaches and San Elijo Lagoon Ecological Reserve, Customers of the SEJPA	Visitors to project area beaches and San Elijo Lagoon Ecological Reserve, Customers of the SEJPA	Visitors to project area beaches and San Elijo Lagoon Ecological Reserve, Users of the Bay-Delta wetland habitat

Project Benefits Timeline Description

All water quality and other benefits expected as a result of implementation of this project would occur from 2012 to 2060.

Potential Adverse Effects from the Project

Any potential short-term impacts associated with this project will be mitigated during the CEQA compliance process. No long-term adverse effects are expected as a result of this project.

Uncertainty of Benefits

Uncertainties relating to the water quality and other benefits of the *North San Diego County Cooperative Demineralization Project* are summarized below in Table 8-15. As described in detail below, uncertainties regarding other benefits include uncertainties regarding regional and Bay-Delta habitat protection and uncertainties regarding the increased operating efficiency of the SEWRF.

Table 8-15: Omissions, Biases, and Uncertainties and their Effect on the Project
North San Diego County Cooperative Demineralization Project

Benefit or Cost Category	Likely Impact on Net Benefits	Comment
Reduction in Pollutants to San Elijo Lagoon	+	Reduction in pollutants to San Elijo Lagoon will have positive effect on water quality; however, these impacts have not been monetized.
Avoided Costs of Treatment Facility	+/-	Reduction in bacterial loading to San Elijo Lagoon may be addressed through a number of structural or nonstructural BMPs, so the probability of treatment facility construction is unknown.
Reduction in Wastewater Discharges	+/-	Improper irrigation techniques may result in recycled water runoff into storm drain and ultimately to the ocean. However, such overflow would have small impact on overall benefit of reduced wastewater discharges.
Habitat Protection • Wetland habitat functions	-	Wetlands at the San Elijo Lagoon Ecological Reserve may effectively clean secondary effluent discharges of 3,340 AFY. In this case, there is no change in recreational opportunities at the San Elijo Ecological Reserve.
• Source of SDCWA Imported Water	-	SDCWA sources water from MWD, IID and local sources, among others. MWD primarily sources water from the SWP, CRA, and local sources. Some or all of the 3,340 AFY reduction in demand for SDCWA water may be sourced with non-SWP supplies and in turn, the benefit to Bay-Delta habitat would be reduced.
Increased Operating Efficiency of the SEWRF	-	Without necessary distributional capacity or demand for reclaimed water in place, the SEWRF may not actually increase recycled water production to the full capacity created by the proposed project. Operating costs of the SEWRF may not be reduced.
Increase in Recreational Opportunities	+/-	These benefits were not monetized, so their exact benefits are uncertain.

* Magnitude of effect on net benefits:
+/- (negligible or unknown); + (moderate positive); ++ (significant positive); - (moderate negative); -- (significant negative)

Project 4: Rural Disadvantaged Community (DAC) Partnership Project

The benefits that are anticipated to result from implementation of the *Rural DAC Partnership Project* are summarized below in Table 8-16, and the cost-benefit overview is summarized in Table 8-17. This project would result in qualitative and quantitative water quality and other benefits. Detailed cost and benefit information associated with the project, including present value calculations, is provided in Appendix 8-1.

Table 8-16: Benefits Summary
Rural DAC Partnership Project

Type of Benefit	Assessment Level	Beneficiaries
Water Quality and Other Benefits		
Improvements to Drinking Water Beneficial Use	Qualitative	Local
Improvements to Wastewater Beneficial Use	Physical Quantification	Local and regional
Avoided Public Health Impacts Related to Drinking Water	Physical Quantification	Local
Avoided Public Health Impacts Related to Wastewater	Physical Quantification	Local
Avoided Loss of Economy and Community	Qualitative	Local

Table 8-17: Benefit-Cost Analysis Overview
Rural DAC Partnership Project

	Present Value ($2009)
Costs – Total Capital and O&M	**$707,463**
Monetizable Benefits	
N/A	N/A
Qualitative Benefits	**Qualitative Indicator***
Improvements to Drinking Water Beneficial Use	+
Improvements to Wastewater Beneficial Use	+
Avoided Public Health Impacts	++
Avoided Loss of Economy and Community	+

* Magnitude of effect on net benefits

+/- (negligible or unknown); + (moderate positive); ++ (significant positive); - (moderate negative); -- (significant negative)

The "Without Project" Baseline

If this project were not implemented, the RCAC would not have funding for rural DAC projects that address critical water supply and wastewater needs of rural DACs. Therefore, without this project, the identified benefits to water supply, water quality, and other water-related factors would not be realized.

Water Quality and Other Benefits

The proposed project would provide several water quality and other expected benefits. These benefits are described in detail below and are summarized in Table 8-16.

Improvements Related to Beneficial Uses

The *Rural DAC Partnership Project* would potentially involve multiple small projects that address critical infrastructure improvement projects for rural DACs. For purposes of this analysis, two potential critical water resources projects were selected as proxies by which to estimate the potential benefits that would be a result of implementation of this project (*Sample Project 1: MGB Well Rehab and Treatment Plant Renovation* and *Sample Project 2: SCWWD Robbins Wastewater Rehabilitation* are discussed below).

Sample Project 1: MGB Well Rehab and Treatment Plant Renovation would modify a sole source well for increased production and improved treatment of potable drinking water. In total, this project would produce approximately 24 gallons per minute of potable drinking water from 2011 to 2030. Increasing water production and improving treatment of well water would protect the beneficial use of drinking water. These water quality benefits were not monetized.

Sample Project 2: SCWWD Robbins Wastewater Rehabilitation would replace an existing wastewater treatment system with package recirculation bed filters, which would allow for treatment of an additional 30,000 gallons per day of wastewater to standards designated by the facility's discharge permit requirements. The current wastewater treatment system has failing filters that exceed discharge nitrate levels, and flows that possibly capacity limitations that cause overflows in the sewer system. Rehabilitating this facility would reduce nitrate discharges and could potentially prevent sewer system overflows. These benefits would protect the beneficial use of wastewater, and would occur from 2011 to 2060. These water quality benefits were not monetized.

Avoided Public Health Impacts

The *Rural DAC Partnership Project* would potentially involve multiple small projects that address critical infrastructure improvement projects for rural DACs. For purposes of this analysis, two potential critical water resources projects were selected as proxies by which to estimate the potential benefits that would be a result of implementation of this project (*Sample Project 1: MGB Well Rehab and Treatment Plant Renovation* and *Sample Project 2: SCWWD Robbins Wastewater Rehabilitation* are discussed below).

Sample Project 1: MGB Well Rehab and Treatment Plant Renovation would occur in a rural DAC where drinking water chlorine residuals have not been maintained, and bacteria contamination of the drinking water is a potential issue. The drinking water also contains high iron and manganese levels, which cause operational issues including low pressure conditions within the well. If low pressure of the well occurs during peak use, this could allow water contaminated with iron and bacteria to enter the distribution systems. Iron and bacteria within the well may cause further issues with maintaining disinfection residual within the well, which is a barrier that protects public health under ideal conditions.

This project would improve treatment within the well in order to reduce levels of constituents of concern and therefore prevent public health issues. This project would potentially improve treatment of approximately 18,250 gallons of water per year. This is based on the estimate that the project would serve 50 residents served by the well facility who consume 365 gallons of water per year. These benefits would potentially occur from 2011 to 2030, but have not been monetized.

Sample Project 2: SCWWD Robbins Wastewater Rehabilitation would occur in an area where public health is currently impacted by health and safety issues associated with inadequate wastewater treatment and discharge from the aforementioned wastewater facility. The rehabilitation project would replace the existing wastewater treatment system with package recirculation bed filters, and treat wastewater to conditions allowable by the facility's permit requirements before the water is discharged to the ground. This project would be expected to benefit 350 residents within the project area served by the wastewater facility from 2011 to 2060; however, these benefits were not monetized.

Avoided Loss of Economy and Community

The *Rural DAC Partnership Project* would potentially involve multiple small projects that will address critical infrastructure improvement projects for rural DACs. For purposes of this analysis, two potential critical water resources projects were selected as proxies by which to estimate the potential benefits that would be a result of implementation of this project (*Sample Project 1: MGB Well Rehab and Treatment Plant Renovation* and *Sample Project 2: SCWWD Robbins Wastewater Rehabilitation* are discussed below).

In the project area of *Sample Project 1: MGB Well Rehab and Treatment Plant Renovation*, the local community has inadequate drinking water supplies both due to low capacity and poor water quality. Poor drinking water conditions could potentially result in a loss of community members as residents are more likely to move out of a community with inadequate drinking water supplies, and future residents are less likely to move into such a community. The project would benefit the community by providing increased capacity and treating drinking water to acceptable water quality standards. These benefits would occur

from 2011 to 2030, but because growth data for the community was not available, these benefits were not monetized.

In the project area of *Sample Project 2: SCWWD Robbins Wastewater Rehabilitation*, the local economy is stagnant due to a building moratorium resulting from a lack of wastewater treatment plant capacity. The project would potentially benefit the local economy by increasing the wastewater treatment plant capacity, and lifting the building moratorium. These benefits would occur from 2011 to 2060, but because the economic growth rate for this community was not available, these benefits were not monetized.

Distribution of Project Benefits and Identification of Beneficiaries

This project would improve the local water quality and other benefits within rural San Diego County, thereby benefitting local residents.

Table 8-18: Project Beneficiaries Summary
Rural DAC Partnership Project

Local	Regional	Statewide
Local residents	*Not Applicable*	*Not Applicable*

Project Benefits Timeline Description

The water quality and other benefits associated with *Sample Project 1: MGB Well Rehab and Treatment Plant Renovation* would occur from 2011 to 2030, and the water quality and other benefits associated with *Sample Project 2: SCWWD Robbins Wastewater Rehabilitation* would occur from 2011 to 2060.

Potential Adverse Effects from the Project

Any potential short-term impacts associated with project construction will be mitigated through the CEQA compliance process. No long-term adverse effects are expected as a result of the proposed project.

Uncertainty of Benefits

Uncertainties relating to the water quality and other benefits of this project are summarized below in Table 8-19. Uncertainties exist for all water quality and other benefits, because these benefits were not quantified or monetized. Actual water quality and other benefits will vary.

Table 8-19: Omissions, Biases, and Uncertainties and their Effect on the Project
Rural DAC Partnership Project

Benefit or Cost Category	Likely Impact on Net Benefits	Comment
Improvements Related to Beneficial Uses	+/-	Not monetized. Long-term improvements to beneficial use are dependent on facility owner maintenance.
Avoided Public Health Impacts	++	Not monetized. Long-term improvements to beneficial use are dependent on facility owner maintenance.
Avoided Loss of Economy and Community	+/-	The impact drinking water and wastewater constraints have on the local economy and community are difficult to quantify.

* Magnitude of effect on net benefits

+/- (negligible or unknown); + (moderate positive); ++ (significant positive); - (moderate negative); -- (significant negative)

Project 5: Lake Hodges Water Quality and Quagga Mitigation Measures

The benefits that are anticipated to result from implementation of the *Lake Hodges Water Quality and Quagga Mitigation Measures* project are summarized below in Table 8-20, and the cost-benefit overview is summarized in Table 8-21. This project would not result in water quality benefits, and would generate quantifiable and monetized other benefits. Detailed cost and benefit information associated with the Project, including present value calculations, is provided in Appendix 8-1.

Table 8-20: Benefits Summary
Lake Hodges Water Quality and Quagga Mitigation Measures

Type of Benefit	Assessment Level	Beneficiaries
Water Quality and Other Benefits		
Avoided O&M Costs Due to Quagga Infestation	Monetized	Local and Regional
Fish and Wildlife Enhancements	Qualitative	Local and Regional
Avoided Losses in Power Production	Monetized	Local, Regional, and Statewide

Table 8-21: Benefit-Cost Analysis Overview
Lake Hodges Water Quality and Quagga Mitigation Measures

	Present Value ($2009)
Costs – Total Capital and O&M	**$1,517,868**
Monetizable Benefits	
Avoided Repair Costs Due to Quagga Infestation Avoided Losses in Power Production	$3,284,626 $8,829,075
Qualitative Benefits	**Qualitative Indicator***
Fish and Wildlife Enhancements	+

*Magnitude of effect on net benefits
+/- (negligible or unknown); + (moderate positive); ++ (significant positive); - (moderate negative); -- (significant negative)

The "Without Project" Baseline

If this project were not implemented, the Quagga infestation would not be controlled and the benefits of avoided repairs due to Quagga infestation would not be realized. Additionally, the enhancements for fish and wildlife would not occur and additional power would not be generated.

Water Quality and Other Benefits

The proposed project would provide several water quality and other expected benefits. These benefits are described in detail below and are summarized in Table 8-20.

Avoided Repairs due to Quagga Infestations

The *Lake Hodges Water Quality and Quagga Mitigation Measures* project would result in avoided repairs and shutdown costs typically associated with Quagga infestations. As shown in Table 8-22, these costs are estimated to be $250,000 annually. These benefits would extend from 2013 through the life of the project in 2060. The total present value of avoided repair costs over life of project would be $3,284,626 (in 2009 dollars).

Table 8-22: Avoided Repair Costs Due to Quagga Infestation
Lake Hodges Water Quality and Quagga Mitigation Measures

	Annual Repair Cost	Years	Total Cost
Avoided Repair Costs Due to Quagga Infestation	$250,000	48	**$12,000,000**
Total Avoided Costs after Discounting			**$3,284,626**

Notes: For more information regarding how these avoided costs were calculated please refer to Appendix 8-1, Table 16 Water Quality and Other Expected Benefits

Fish and Wildlife Enhancements

The *Lake Hodges Water Quality and Quagga Mitigation Measures* project would elevate dissolved oxygen levels, which has the potential to decrease fish mortality rates associated with hypolimnion, the dense, bottom layer of water in a thermally-stratified lake. The days with elevated dissolved oxygen levels (above 0 mg/l) in hypolimnion would increase from 270 to 335 under the proposed project, an increase of 65 days per year. These watershed improvements would also be expected to increase bird and frog populations through improved habitat conditions. These fish and wildlife benefits anticipated from the project have not been monetized.

Power Production

SDCWA is paid by SDG&E for the availability and capability to generate power at the Lake Hodges Pumped Storage Facility. This power is then sold to SDCWA at a contracted rate of $70/MWh. Without the *Lake Hodges Water Quality and Quagga Mitigation Measures* project, it is estimated that ten days would be lost per year to system repairs, which equates to 240 hours annually. As a result, the avoided losses in power production are estimated at $672,000 annually for a total present value power production benefit of $8,829,075 (in 2009 dollars).

Table 8-23: Avoided Losses in Power Production
Lake Hodges Water Quality and Quagga Mitigation Measures

	Lost Units (hours)	Unit Cost	Total Annual Cost	Years	Total Cost
Avoided Losses in Power Production	240	$70/MWh	$672,000	48	**$32,256,000**
Total Avoided Costs after Discounting					**$8,829,075**

Source: SDCWA Contract Rate with SDG&E.

For more information regarding how these avoided costs were calculated please refer to Appendix 8-1, Table 16 Water Quality and Other Expected Benefits

Distribution of Project Benefits and Identification of Beneficiaries

Table 8-24 summarizes the anticipated beneficiaries of water quality and other benefits that will be provided by the project. The water quality and other improvements would benefit both SDCWA and local residents. Local residents that depend on local water supplies would benefit from the avoided costs of repairs and the fish and wildlife enhancements. Regional and statewide electrical ratepayers and residents would benefit from the power production benefits associated with this project.

Table 8-24: Project Beneficiaries Summary
Lake Hodges Water Quality and Quagga Mitigation Measures

Local	Regional	Statewide
SDCWA and local residents	Electrical ratepayers; regional residents	Electrical ratepayers; statewide residents

Project Benefits Timeline Description

This project would provide water quality and other expected benefits beginning in 2013 and continuing in excess of the 50-year project lifetime.

Potential Adverse Effects from the Project

Any potential short-term impacts associated with project construction will be mitigated through the CEQA compliance process. No long-term adverse effects are expected as a result of the proposed project.

Uncertainty of Benefits

Projected savings through the reduction of Quagga infestation represent best estimates based on the latest available data. Actual water savings will vary.

Table 8-25: Omissions, Biases, and Uncertainties and their Effect on the Project
Lake Hodges Water Quality and Quagga Mitigation Measures

Benefit or Cost Category	Likely Impact on Net Benefits	Comment
Avoided Repair Costs Due to Quagga Infestation	+	Repair costs could be greater than the estimate based on Quagga growth rate.
Fish and Wildlife Enhancements	+	Water quality improvements are expected to have positive impacts on fish and wildlife.
Power Production	+/-	Facility down time could be greater or less than the estimated 240 hours annually.

* Magnitude of effect on net benefits
+/- (negligible or unknown); + (moderate positive); ++ (significant positive); - (moderate negative); -- (significant negative)

Project 6: Implementing Nutrient Management in the Santa Margarita River Watershed

The benefits that are anticipated to result from implementation of the *Implementing Nutrient Management in the Santa Margarita River Watershed* project are summarized below in Table 8-26, and the cost-benefit overview is summarized in Table 8-27. This project would result in qualitative water quality benefits and qualitative other benefits. Detailed cost and benefit information associated with the project, including present value calculations, is provided in Appendix 8-1.

Table 8-26: Benefits Summary
Implementing Nutrient Management in the Santa Margarita River Watershed

Type of Benefit	Assessment Level	Beneficiaries
Water Quality and Other Benefits		
Avoided Costs of Regulatory Compliance	Physical Quantification	Local and Regional
Protection of Beneficial Uses	Qualitative	Local and Regional
Improve Impaired Water Bodies and Sensitive Habitats	Qualitative	Local and Regional
Increase In-Stream Flows	Qualitative	Local and Regional
Fish and Wildlife Enhancements	Qualitative	Local, Regional, and Statewide

Table 8-27: Benefit-Cost Analysis Overview
Implementing Nutrient Management in the Santa Margarita River Watershed

	Present Value ($2009)
Costs – Total Capital and O&M	**$1,534,082**
Monetizable Benefits	
N/A	N/A
Qualitative Benefits	**Qualitative Indicator***
Avoided Costs of Regulatory Compliance	++
Protection of Beneficial Uses	+
Improve Impaired Water Bodies and Sensitive Habitats	+
Increase In-Stream Flows	+
Fish and Wildlife Enhancements	+

* Magnitude of effect on net benefits
+/- (negligible or unknown); + (moderate positive); ++ (significant positive); - (moderate negative); -- (significant negative)

The "Without Project" Baseline

If this project were not implemented, the Rancho California Water District (RCWD) would continue to deliver an average of 4,000 acre feet per year (AFY) of imported water from the Metropolitan Water District of Southern California (MWD) to the Santa Margarita River watershed in order to augment flows in accordance with an agreement between RCWD and the Santa Margarita Watermaster.

If this project were not implemented, the Santa Margarita River estuary would continue to be impaired by eutrophication and portions of the Santa Margarita River and its tributaries would remain on the 303(d) list of impaired water bodies due to elevated levels of nutrients within the watershed. In addition, without this project, there would continue to be a lack of data in the Nutrient Numeric Endpoint (NNE) framework, which prevents the San Diego RWQCB from establishing total maximum daily loads (TMDLs) for the Santa Margarita River and the watershed.

Water Quality and Other Benefits

This project would provide water quality and other expected benefits. These benefits are described in detail below and are summarized in Table 8-26.

Avoided Costs of Regulatory Compliance

The *Implementing Nutrient Management in the Santa Margarita River Watershed* project will involve the establishment of water quality objectives (WQOs), which will be based on the level of nutrients in the Santa Margarita River and will determine what additional nutrients the watershed can sustainably assimilate. The establishment of new WQOs based on sound science will allow a broader array of water management strategies to be employed within the watershed. For example, the WQOs may be updated to reflect current watershed conditions and therefore allow delivery of recycled water to the Santa Margarita River to augment streamflow.

To estimate the cost of achieving WQOs in the San Diego region, the Water Quality Working Group (WQWG) was organized by the County of San Diego under the Quality of Life Initiative.6 The WQWG developed a cost estimation for a pilot watershed, the San Diego River watershed. Assuming that only urban and agricultural land uses contribute to pollution in storm water and urban runoff, each local watershed was classified by similar land uses, water quality issues, and BMP needs. A normalized cost value was determined for each watershed class (i.e., millions of dollars per developed square mile).

In the San Luis Rey Class, the normalized cost for the pilot watershed can be extrapolated to the Santa Margarita River watershed based on the developed area (i.e., multiplying $16.3 million by 31.3 miles^2 equals $508 million). The total 40-year cost of water quality programs for the Santa Margarita River watershed would be $477.5 million (in 2009 dollars) to achieve compliance with the current WQOs. However, this value was not used in the economic analysis because it would override all other proposal benefits due to its sheer size.

Protection of Beneficial Uses

The *Implementing Nutrient Management in the Santa Margarita River Watershed* project will involve the establishment of water quality objectives (WQOs), which will be based on the level of nutrients in the Santa Margarita River and will determine what additional nutrients the watershed can sustainably assimilate. The project will include data collection that will support modeling in the estuary and watershed in order to develop and implement nutrient reduction and water conservation best management practices (BMPs) that will be required to achieve the TMDL for nutrients that will be issued by the San Diego RWQCB. Implementation of the proposed project is anticipated to impart economic water quality benefits, because it will take place in a manner that improves water quality in the Santa Margarita River watershed and that is protective of the beneficial uses provided by these water bodies. The water quality benefits that protect beneficial uses were not quantified and/or monetized.

[6] County of San Diego. 2010. Quality of Life Funding Strategy, San Diego Region. Needs Assessment and Cost Estimate for the Water Quality Enhancement Element. Draft.

Improve Impaired Water Bodies and Sensitive Habitats

The *Implementing Nutrient Management in the Santa Margarita River Watershed* project will involve data collection, monitoring, and analysis that will address data gaps inherent in the NNE framework and refine nutrient WQOs for the Santa Margarita River watershed. The results of these studies would allow the San Diego RWQCB to issue a TMDL to begin implementation of BMPs, which would reduce nutrient levels, and potentially resolve nutrient-related water quality issues. Reduction of nutrient levels would potentially improve impaired water bodies and sensitive habitats, including water bodies currently listed on the 303(d) list, in the Santa Margarita River estuary. These water quality benefits were not quantified and/or monetized.

Increase In-stream Flow

The establishment of WQOs could potentially find that a broader range of water sources, such as recycled water, could be naturally sustained by the Santa Margarita River watershed. If this project finds that recycled water can be delivered to the Santa Margarita River, then other water purveyors in addition to RCWD may choose to augment river flows in this manner. Currently, some water purveyors within the project area divert their recycled water flows to the Santa Ana River watershed, because they are not permitted to deliver recycled water to Santa Margarita River watershed. If this was to change, it would substantially increase in-stream flows within the Santa Margarita River watershed. These econsystem benefits were not quantified and/or monetized.

Fish and Wildlife Enhancements

Increases in in-stream flows to Santa Margarita River watershed, as described previously, could potentially be a result of the *Implementing Nutrient Management in the Santa Margarita River Watershed* project. Increased river flows within the project area would enhance the habitat for fish and wildlife within the region, including the southern steelhead trout, which is a listed species pursuant to the Endangered Species Act. These ecosystem benefits were not quantified and/or monetized.

Distribution of Project Benefits and Identification of Beneficiaries

Table 8-28 summarizes the anticipated beneficiaries of water quality and ecosystem benefits that would be provided by this project. Anticipated benefits from this project would benefit stakeholders at the local, regional, and statewide levels. Local and regional residents that live and/or work adjacent to the Santa Margarita River watershed will benefit from improved surface water quality through avoided health and safety impacts. Further, all local residents would benefit from less agency spending on regulatory compliance when not founded in scientific analysis. Local water users, regional residents, and statewide residents will also benefit due to general ecosystem improvements, which benefit society as a whole.

Table 8-28: Project Beneficiaries Summary
Implementing Nutrient Management in the Santa Margarita River Watershed

Local	Regional	Statewide
Local residents	Regional residents	Statewide residents

Project Benefits Timeline Description

The project would provide water quality and other expected benefits, but because these benefits are qualitative, they would not be accrued during a specific timeframe.

Potential Adverse Effects from the Project

Any potential short-term impacts associated with project construction will be mitigated through the CEQA compliance process. No long-term adverse effects are expected as a result of the proposed project.

Uncertainty of Benefits

Uncertainties relating to the water quality and other benefits of this project are summarized below in Table 8-29. Uncertainties exist regarding the potential water quality benefits of protecting beneficial uses and improving impaired water bodies and sensitive habitat, and uncertainties exist relating to the potential other benefits of increasing in-stream flows and creating fish and wildlife enhancements. All of the

uncertainties regarding the potential water quality and other benefits of this Project are either negligible or unknown. These uncertainties are all based on the fact that benefits were estimated under the premise that Phase II of the Project gets completed and results in the establishment of TDMLs, and that the TDMLs allow water purveyors to deliver recycled water to the Santa Margarita River.

Table 8-29: Omissions, Biases, and Uncertainties and their Effect on the Project
Implementing Nutrient Management in the Santa Margarita River Watershed

Benefit or Cost Category	Likely Impact on Net Benefits	Comment
Avoided Costs of Regulatory Compliance	++	Benefits based on the Quality of Life Initiative's Needs Assessment resulted in extremely high cost ($477.5 million ($2009)) to achieve compliance with the current WQOs.
Protection of Beneficial Uses	+/-	Benefits were estimated with the assumption that Phase II gets completed and results in the establishment of TDMLs, and that the TDMLs allow water purveyors to deliver recycled water to the Santa Margarita River.
Improve Impaired Water Bodies and Sensitive Habitats	+/-	Benefits were estimated with the assumption that Phase II gets completed and results in the establishment of TDMLs, and that the TDMLs allow water purveyors to deliver recycled water to the Santa Margarita River.
Increase In-Stream Flow	+/-	Benefits were estimated with the assumption that Phase II gets completed and results in the establishment of TDMLs, and that the TDMLs allow water purveyors to deliver recycled water to the Santa Margarita River.
Fish and Wildlife Enhancements	+/-	Benefits were estimated with the assumption that Phase II gets completed and results in the establishment of TDMLs, and that the TDMLs allow water purveyors to deliver recycled water to the Santa Margarita River.

* Magnitude of effect on net benefits
+/- (negligible or unknown); + (moderate positive); ++ (significant positive); - (moderate negative); -- (significant negative)

Project 7: Bannock Avenue Neighborhood Streetscape Enhancements for Tecolote Creek Watershed Protection

The benefits that are anticipated to result from implementation of the *Bannock Ave Neighborhood Streetscape Enhancements for Tecolote Creek Watershed Protection* project are summarized below in Table 8-30, and the cost-benefit overview is summarized in Table 8-31. This project would result in water quality benefits associated with avoiding construction of a water treatment facility, reducing pollutant discharges, and associated increases in recreational use. Detailed cost and benefit information associated with the project, including present value calculations, is provided in Appendix 8-1.

Table 8-30: Benefits Summary
Bannock Ave Neighborhood Streetscape Enhancements for Tecolote Creek Watershed Protection

Type of Benefit	Assessment Level	Beneficiaries
Water Quality and Other Benefits		
Avoided Costs of Treatment Facility	Monetized	Local and Regional
Reduction in TSS and TDS	Physical Quantification	Local and Regional
Increase in Recreational Opportunities	Qualitative	Local and Regional

Table 8-31: Benefit-Cost Analysis Overview
Bannock Ave Neighborhood Streetscape Enhancements for Tecolote Creek Watershed Protection

	Present Value ($2009)
Costs – Total Capital and O&M	$4,168,512
Monetizable Benefits	
Avoided Costs of Treatment Facility	$1,072,816
Qualitative Benefits	**Qualitative Indicator***
Reduction in TSS and TDS	+
Increase in Recreational Opportunities	+

* Magnitude of effect on net benefits
+/- (negligible or unknown); + (moderate positive); ++ (significant positive); - (moderate negative); -- (significant negative)

The "Without Project" Baseline

The without Project baseline for the *Bannock Ave Neighborhood Streetscape Enhancements for Tecolote Creek Watershed Protection* project would consist of existing conditions associated with water quality violations in the project area. Information from the City of San Diego demonstrates that on average, total suspended solids (TSS) within the project area measure at 105 kg/year and total dissolved solids (TDS) measure at 2 kg/year. Without implementation of the project, the TSS and TDS levels would remain at current levels and these constituents of concern would continue to flow into Tecolote Creek and into west Mission Bay, which is a primary recreational asset within the City.

Water Quality and Other Benefits

Water quality and other benefits associated with the *Bannock Ave Neighborhood Streetscape Enhancements for Tecolote Creek Watershed Protection* project were calculated based on the assumption that the project will reduce TSS and TDS from entering Tecolote Creek and west Mission Bay. These water quality improvements will result in benefits associated with the avoidance of building a water treatment facility, direct benefits associated with improving TDS and TSS, and recreational benefits in Mission Bay associated with improving water quality.

Avoided Costs of Treatment Facility

Implementation of the Bannock Ave Neighborhood Streetscape Enhancements for Tecolote Creek Watershed Protection project is anticipated to improve water quality by reducing TSS and TDS in Tecolote Creek and in west Mission Bay. The water quality improvements that would occur as a result of this project are expected to be equivalent to water quality benefits that would occur from constructing a conceptual treatment facility.

The Chollas Creek Dissolved Metals Total Maximum Daily Load (TMDL) Implementation Plan (Implementation Plan)[7] was prepared for the entire Chollas Creek Watershed, which estimated the type of water treatment facility that would be required to obtain total maximum daily load (TMDL) compliance for various constituents of concern throughout the watershed. Quantified water quality benefits for this Bannock Ave Neighborhood Streetscape Enhancements for Tecolote Creek Watershed Protection project were based on the Implementation Plan and scaled down to fit the water quality benefits anticipated to occur from implementation of this project alone. It is anticipated that a 3 acre-foot per day treatment facility would need to be constructed at the mouth of Tecolote Creek to obtain TMDL compliance for indicator bacteria, TSS, nitrates, and metals within the project area by 2020.

Costs associated with the conceptual treatment facility include construction and financing costs, startup and material costs, facility improvement/upgrade costs, and ongoing operations and maintenance (O&M) costs. The estimated cost to construct the watershed level facility would be $21,137,500, which would include financing, bonding, design, and construction. The total avoided treatment costs associated with the project were estimated to be approximately 2.5% of the total $21,137,500 treatment facility cost based

[7] Chollas Creek Dissolved Metals Total Maximum Daily Load (TMDL) Implementation Plan, City of San Diego, October 2009.

on the urbanized drainage area of the project site, which is approximately 2.5% of the Tecolote Creek watershed. This represents a net present value of $1,072,816 (in 2009 dollars).

Table 8-32: Avoided Treatment Facility Costs
Bannock Ave Neighborhood Streetscape Enhancements for Tecolote Creek Watershed Protection

	Watershed-Scale Capital Cost	Scaled by 2.5% for Project Benefits	Total Capital and O&M Costs
Avoided Treatment Facility Construction and Operation	$21,137,500	$1,120,610	$2,139,346
Total Avoided Treatment Facility Costs after Discounting			**$1,072,816**

For more information regarding how these avoided costs were calculated please refer to Appendix 8-1, Table 16 Water Quality and Other Expected Benefits

Reduction in TSS and TDS

The *Bannock Ave Neighborhood Streetscape Enhancements for Tecolote Creek Watershed Protection* project is anticipated to provide watershed improvements that would result in reductions in the amount of TSS and TDS discharged into Tecolote Creek, and therefore into west Mission Bay. These benefits would occur, because the project would implement the following BMPs:

- Divert stormwater from Bannock Avenue to bioretention and treatment planters,
- Increase infiltration of storm flows through pervious pavement, and
- Divert stormwater flows through a trash segregation unit and a series of bacterial treatment systems.

In sum, these actions are estimated by the City of San Diego to reduce solids loading by approximately 85%. TSS will be reduced from 105 kilograms (kg)/year to approximately 15 kg/year. TDS will be reduced from 2 kg/year to 0.25 kg/year. These water quality benefits were not monetized.

Increase in Recreational Opportunities

Reducing TSS and TDS within Tecolote Creek will also reduce these constituents from entering water bodies downstream of Tecolote Creek, including west Mission Bay. The pollutant load reduction of this project directly impacts Mission Bay, which is the most widely used aquatic resource in the region. Reducing the pollutant loading to these surface water bodies will allow for wider and more continuous use of the Tecolote Creek Natural Park and west Mission Bay. Based on internal calculations from the City of San Diego, it is anticipated that improving water quality in west Mission Bay may increase recreation from 10,000 to 15,000 visitor days per year. Improved water quality in west Mission Bay would allow for additional aquatic activities in this water body, including fishing and swimming. Increases in recreational opportunities specific to this project could not be calculated, and were therefore not monetized.

Distribution of Project Benefits and Identification of Beneficiaries

Table 8-33 summarizes the anticipated beneficiaries of water quality benefits that would be provided by the *Bannock Ave Neighborhood Streetscape Enhancements for Tecolote Creek Watershed Protection* project. The water quality improvements would benefit both local water users and regional residents. Local water users that work and/or live in Tecolote Creek watershed will benefit from improved water quality through avoided health impacts and increased recreational quality. Residents in the region will benefit from improved water quality through avoided health impacts and increased recreational quality in Mission Bay.

Table 8-33: Project Beneficiaries Summary
Bannock Ave Neighborhood Streetscape Enhancements for Tecolote Creek Watershed Protection

Local	Regional	Statewide
Local residents in Tecolote Creek watershed	Regional residents that utilize Tecolote Creek and/or west Mission Bay for recreational purposes	Not applicable

Project Benefits Timeline Description

Water quality benefits from this project associated with avoiding the cost of constructing a treatment facility would occur from 2011 to 2046. Water quality benefits from this project associated with reducing TSS and TDS from entering Tecolote Creek would occur during facility operation from 2014 to 2046. Water quality benefits associated with increasing recreational opportunities do not have a timeline, because these benefits cannot be quantified or monetized.

Potential Adverse Effects from the Project

Any potential short-term impacts associated with this project will be mitigated through the CEQA compliance process, if necessary. No long-term adverse effects are expected as a result of this project.

Uncertainty of Benefits

Uncertainties relating to the water quality benefits of the *Bannock Ave Neighborhood Streetscape Enhancements for Tecolote Creek Watershed Protection* project are summarized below in Table 8-34. Uncertainties relating to water quality benefits that could not be monetized, water quality benefits associated with reducing TSS and TDS and increased recreational use would have very little impact on the net water quality benefits associated with this project. These uncertainties would be minimal, however, because the project would reduce TSS and TDS discharges and improve water quality in Tecolote Creek and West Mission Bay. In addition, the project's direct influence on recreational use is unknown, and the value associated with recreation of west Mission Bay is unknown because these values were not quantified and/or monetized.

Table 8-34: Omissions, Biases, and Uncertainties and their Effect on the Project
Bannock Ave Neighborhood Streetscape Enhancements for Tecolote Creek Watershed Protection

Benefit or Cost Category	Likely Impact on Net Benefits	Comment
Avoided Costs of Treatment Facility	-	The probability of a treatment facility being constructed without the project is unknown.
Reduction in TSS and TDS	+/-	Discharge reduction values not monetized.
Increase in Recreational Opportunities	+/-	The project's influence on recreational use is unknown. Recreation values not monetized.

*Magnitude of effect on net benefits
+/- (negligible or unknown); + (moderate positive); ++ (significant positive); - (moderate negative) -- (significant negative)

Project 8: Pilot Concrete Channel Infiltration Project

The benefits that are anticipated to result from implementation of the *Pilot Concrete Channel Infiltration Project* are summarized below in Table 8-35, and the cost-benefit overview is summarized in Table 8-36. This project would result in water quality benefits associated with avoiding construction of a water treatment facility and reducing pollutant discharges. Detailed cost and benefit information associated with the project, including present value calculations, is provided in Appendix 8-1.

Table 8-35: Benefits Summary
Pilot Concrete Channel Infiltration Project

Type of Benefit	Assessment Level	Beneficiaries
Water Quality and Other Benefits		
Avoided Costs of UV Treatment Facility	Monetized	Local and Regional
Reduction in Nitrate Discharge	Physical Quantification	Local and Regional
Reduction in Bacteria Discharge	Physical Quantification	Local and Regional

Table 8-36: Benefit-Cost Analysis Overview
Pilot Concrete Channel Infiltration Project

	Present Value ($2009)
Costs – Total Capital and O&M	$281,294
Monetizable Benefits	
Avoided Costs of UV Treatment Facility	$1,809,240
Qualitative Benefits	**Qualitative Indicator***
Groundwater Recharge	+/-
Reduction in Nitrate Discharge	+
Reduction in Bacteria Discharge	+

*Magnitude of effect on net benefits
+/- (negligible or unknown); + (moderate positive); ++ (significant positive); - (moderate negative); -- (significant negative)

The "Without Project" Baseline

The without project baseline for this project would consist of 2009 conditions associated with dry weather discharges into Woodglen Vista Creek. Information from the City of Santee demonstrates that the project would divert and infiltrate approximately 2,160 gallons of water per day. This amount of water, along with associated pollutants (0.67 kg of nitrate, 440 million fecal coliform cells, and 13.6 billion enterococci cells per day), would continue to flow into Woodglen Vista Creek without implementation of the project.

Water Quality and Other Benefits

Water quality benefits associated with this project are derived from the estimate that this project would eliminate dry weather discharges at a rate of 2,160 gallons per day if 100 percent of flows are diverted and infiltrated in the constructed channel. As described below, this reduction of dry weather flows would reduce discharges of nitrogen and bacteria (fecal coliform and enterococci) into nearby surface waters, and will therefore eliminate the need to construct an ultra violet (UV) treatment facility to address surface water quality issues in the vicinity of the project area.

Avoided Costs of UV Treatment Facility

The reduction of nitrates and bacteria which would result from implementation of the *Pilot Concrete Channel Infiltration Project* is expected to provide water quality benefits comparable to construction and operation of a UV treatment facility. UV treatment facilities provide state-of-the-art water quality treatment for addressing bacteria-related water quality issues in surface waters. The project would provide comparable water quality benefits to a UV treatment facility, and would therefore eliminate the need to build such a facility to address water quality concerns within the project area.

The capital costs for building a UV treatment facility are an estimated $3,000,000. This estimate was obtained using scaled-down values for construction of a similar facility (the Loma Alta Creek UV Treatment Facility) in the City of Oceanside, which also lies within San Diego County. Although the water flow through the Loma Alta Creek UV Treatment Facility is greater than the estimated flow for this project, maintenance costs to run UV treatment facilities are similar for facilities of varying sizes. As such, annual operations and maintenance (O&M) costs that would be avoided by construction of a UV facility were estimated at $16,000 (the actual Loma Alta Creek UV Treatment Facility O&M cost). This is considered to be a fair comparison, because the Loma Alta Creek UV Treatment Facility has been in operation for several years, therefore it is assumed that most available efficiencies have been identified and incorporated into the operator's procedures.

These costs have been monetized, and the total water quality benefits based on avoided treatment costs is $1,809,240.

Table 8-37: Avoided UV Treatment Facility Costs
Pilot Concrete Channel Infiltration Project

	Cost	Years	Total Cost
Avoided UV Treatment Facility Construction	$3,000,000	N/A	$3,000,000
Avoided Annual O&M Costs	$16,000	41	$656,000
Total Avoided Costs (Sum)			**$3,656,000**
Total Avoided UV Treatment Facility Costs after Discounting			**$1,809,240**

*For further information regarding how these costs were calculated please refer to Appendix 8-1 Table 13 Annual Costs of Avoided Projects

Reduction of Nitrate Discharges

The *Pilot Concrete Channel Infiltration Project* would eliminate dry weather discharges at a rate of 2,160 gallons per day if 100 percent of flows are diverted and infiltrated in the channel constructed as part of the project. Using this flow data and information regarding the nitrogen loading in Woodglen Vista Creek from 2009, it can be estimated that approximately 0.67 kg per day of nitrate (nitrogen) would be prevented from entering surface water bodies within the project area. This water quality benefit was not monetized, because information regarding the reduction of nitrates was based on limited data.

Reduction of Bacteria Discharges

The *Pilot Concrete Channel Infiltration Project* would eliminate dry weather discharges at a rate of 2,160 gallons per day if 100 percent of flows are diverted and infiltrated in the channel constructed as part of the project. Using this flow data and calculating a discharge load from 2009 dry weather monitoring data, it can be estimated that up to 440 million fecal coliform cells per day and 13.6 billion enterococci cells per day could be eliminated from being discharged into nearby surface water bodies. This water quality benefit was not monetized, because information regarding the reduction of bacteria was based on limited data.

Distribution of Project Benefits and Identification of Beneficiaries

Table 8-38 summarizes the anticipated beneficiaries of water quality benefits that will be provided by this project. The water quality improvements would benefit both local and regional residents. Local residents that live and/or work adjacent to Woodglen Vista Creek would benefit from improved surface water quality, including avoided health and safety impacts.

Table 8-38: Project Beneficiaries Summary
Pilot Concrete Channel Infiltration Project

Local	Regional	Statewide
Local residents	Regional residents	*Not Applicable*

Project Benefits Timeline Description

Water quality benefits from this project associated with reducing nitrate and bacteria discharges would begin occurring after completion of project construction in 2012. Water quality benefits associated with avoiding the cost of constructing a UV treatment facility would begin occurring in 2019.

Potential Adverse Effects from the Project

Any potential short-term impacts associated with this project would be mitigated during the CEQA compliance process. No long-term adverse effects are expected as a result of this project.

Uncertainty of Benefits

Uncertainties relating to the water quality benefits of this project are summarized below in Table 8-39. Uncertainties relating to water quality benefits that could not be monetized (reduction in discharges of nitrates and bacteria) would have very little impact (either negligible or unknown) on the net water quality benefits associated with this project. These uncertainties are because the discharge reduction estimates were based on a limited data set of one year. These uncertainties would be minimal, because while it is uncertain what the amount of reduced discharge would be, it is certain that the project would reduce nitrate and bacteria discharges.

Uncertainties regarding monetized water quality benefits could potentially have a significant negative impact on the net benefits associated with this project, because the probability of constructing a UV treatment facility is unknown in comparison to implementation of alternate structural BMPs.

Table 8-39: Omissions, Biases, and Uncertainties and their Effect on the Project
Pilot Concrete Channel Infiltration Project

Benefit or Cost Category	Likely Impact on Net Benefits	Comment
Reduction in Nitrate Discharge	+/-	Reduction estimates are based on limited data.
Reduction in Bacteria Discharge	+/-	Reduction estimates are based on limited data.
Avoided Costs of UV Facility	--	The probability of a treatment facility being constructed without the project is unknown in comparison to implementation of alternate structural BMPs.

* Magnitude of effect on net benefits
+/- (negligible or unknown); + (moderate positive); ++ (significant positive); - (moderate negative); -- (significant negative)

Project 9: San Diego Regional Water Quality Assessment and Outreach Project

The benefits that are anticipated to result from implementation of the *San Diego Regional Water Quality Assessment and Outreach Project* are summarized below in Table 8-40, and the cost-benefit overview is summarized in Table 8-41. This project would result in physically quantified water quality benefits associated with beneficial uses, improving impaired water bodies/sensitive habitats, and ecosystem improvements. The project would also result in monetized other benefits associated with avoiding regulatory monitoring. Detailed cost and benefit information associated with the project, including present value calculations, is provided in Appendix 8-1.

Table 8-40: Benefits Summary
San Diego Regional Water Quality Assessment and Outreach Project

Type of Benefit	Assessment Level	Beneficiaries
Water Quality and Other Benefits		
Protect, Restore, or Enhance Beneficial Uses	Physical Quantification	Local and Regional
Improve Impaired Water Bodies and Sensitive Habitats	Physical Quantification	Local and Regional
Ecosystem Improvements and Preservation Through Trash Collection	Monetized	Local and Regional
Avoided Regulatory Monitoring	Monetized	Local and Regional

Table 8-41: Benefit-Cost Analysis Overview
San Diego Regional Water Quality Assessment and Outreach Project

	Present Value ($2009)
Costs – Total Capital and O&M	**$924,578**
Monetizable Benefits	
Avoided Regulatory Monitoring	$667,315
Avoided Trash Collection	$30,831
Qualitative Benefits	**Qualitative Indicator***
Protect, Restore, or Enhance Beneficial Uses	+
Improve Impaired Water Bodies and Sensitive Habitats	+

*Magnitude of effect on net benefits
+/- (negligible or unknown); + (moderate positive); ++ (significant positive); - (moderate negative); -- (significant negative)

The "Without Project" Baseline

If this project were not implemented, the watershed monitoring, clean-up, and data collection efforts proposed in the Work Plan (see Attachment 3) would not occur. In instances where these efforts are mandated within the San Diego IRWM region, it is assumed that a government agency would have to incur the resources and costs to complete mandated efforts that would otherwise be provided as part of the project.

Expected Water Quality & Other Benefits of Project

Detailed cost and benefit information associated with the *San Diego Regional Water Quality Assessment and Outreach Project*, including present value calculations, is provided in Appendix 8-1.

Protecting, Restoring, or Enhancing Beneficial Uses

The *San Diego Regional Water Quality Assessment and Outreach Project* will include monthly monitoring by San Diego Coastkeeper, which will provide increased temporal resolution of water quality data. These samples will be collected and analyzed in accordance with standard operating procedures and a DWR-approved Project Assessment and Evaluation Plan (PAEP). In total, monitoring efforts expected as part of the project are estimated to increase water quality samples in receiving water bodies from one sample per year to ten samples per year, which corresponds to a 1,000 percent increase. This increased sampling effort will increase information regarding the status of water bodies within the San Diego region, and will assist regulatory and responsible agencies in protecting, restoring, and/or enhancing beneficial uses throughout the region. These water quality benefits were not monetized.

Improving Impaired Water Bodies and Sensitive Habitats

As described above, actions expected to take place as part of the *San Diego Regional Water Quality Assessment and Outreach Project* are estimated to increase water quality samples in receiving water bodies from one sample per year to ten samples per year, which corresponds to a 1,000 percent

increase. This increased sampling effort will increase information regarding the status of impaired water bodies within the San Diego region, which will improve regulatory and responsible agency knowledge regarding the sensitive habitats within the region. These water quality benefits were not monetized.

Avoided Costs of Trash Collection

As part of this project, Coastkeeper would continue to coordinate inland trash removal events, sponsor corporate clean up events, and coordinate and plan the annual Coastal Clean-Up Day events. Continued and expanded actions regarding the aforementioned efforts are expected to increase the total pounds of trash removed from 495,264 lbs per year to 680,401 lbs per year, which corresponds to a 34.4 percent increase. These efforts will generate an avoided trash removal cost to cities, the County, and other municipalities.

The value of avoided trash collection was calculated based in-house monitoring costs incurred by the City of San Diego Stormwater Department for similar efforts. Avoided operational costs for community cleanup events totaled $164,765 in 2010. Approximately 1,150 tons of trash was collected during 104 clean-up events, for an average cost of $143.27 per ton, or $0.07 per pound. The project is anticipated to reduce 185,137 pounds of trash per year (680,401 - 495,256)over a three-year period (2012-2014). The total present value of these benefits is estimated to total $30,831 (in 2009 dollars).

Table 8-42: Avoided Trash Collection
San Diego Regional Water Quality Assessment and Outreach Project

	Pounds Reduced	Cost per Pound	Years	Total Cost
Avoided Trash Collection	185,137	$0.07	3	$38,879
Total Avoided Trash Collection Costs after Discounting				**$30,831**

Source: In-house Monitoring Costs from San Diego Coastkeeper.

For more information regarding how these costs were calculated, please refer to Appendix 8-1, Table 16 Water Quality and Other Expected Benefits.

Avoided Regulatory Monitoring

The *San Diego Regional Water Quality Assessment and Outreach Project* would include water quality monitoring efforts, which would otherwise be taken on by state, county, city, or other government agencies. Avoided costs of monitoring efforts would save these government entities money associated with higher overhead and paid employees to conduct equivalent monitoring efforts. In addition, data provided by this project may increase agency access to data, which would potentially reduce staff time to uncover and analyze data from disparate sources or eliminate data collection expenses.

The value of avoided regulatory monitoring was calculated based in-house monitoring costs incurred by Coastkeeper for similar efforts. Avoided capital costs range from $90,843 to $181,680 annually, while avoided O&M costs range from $119,600 to $239,200 annually. These benefits are expected to last over a three-year period (2012-2014), and are estimated to total $667,315.

Table 8-43: Avoided Regulatory Monitoring
San Diego Regional Water Quality Assessment and Outreach Project

	Capital Cost (Average)	Annual O&M Cost (Average)	Years	Total Cost
Avoided Regulatory Monitoring (2012 & 2014)	$90,843	$119,600	2	$420,886
Avoided Regulatory Monitoring (2013)	$181,680	$239,200	1	$420,886
Total Avoided Regulatory Monitoring Costs				**$841,772**
Total Avoided Regulatory Monitoring Costs after Discounting				**$667,315**

Source: In-house Monitoring Costs from San Diego Coastkeeper.

For more information regarding how these costs were calculated, please refer to Appendix 8-1, Table 16 Water Quality and Other Expected Benefits.

Distribution of Project Benefits and Identification of Beneficiaries

Table 8-44 summarizes the anticipated beneficiaries of water quality and other benefits that would be provided by this project. The water quality improvements would benefit local, regional, and statewide stakeholders and residents by improving and expanding the volume of water quality data that helps regulatory agencies to manage surface water supplies. These ultimate improvements in surface water will improve health and safety conditions for residents and wildlife living adjacent to the water bodies.

Table 8-44: Project Beneficiaries Summary
San Diego Regional Water Quality Assessment and Outreach Project

Local	Regional	Statewide
Local stakeholders and residents	Regional stakeholders and residents	Statewide stakeholders and residents

Project Benefits Timeline Description

The timeline for water quality benefits is dependent upon actions taken as a result of data review. As a result, a timeline for water quality benefits was not established for this project. The other benefits associated with avoided regulatory monitoring would accrue from 2012 to 2014.

Potential Adverse Effects from the Project

Potential short-term impacts associated with this project will be identified and mitigated, if necessary. No long-term adverse effects are expected as a result of this project.

Uncertainty of Benefits

Uncertainties relating to the water quality and other benefits of this *San Diego Regional Water Quality Assessment and Outreach Project* are summarized below in Table 8-45. As described in detail below, there are uncertainties regarding all of the potential water quality benefits because full implementation is dependent on actions taken as a result of data review.

Table 8-45: Omissions, Biases, and Uncertainties and their Effect on the Project
San Diego Regional Water Quality Assessment and Outreach Project

Benefit or Cost Category	Likely Impact on Net Benefits	Comment
Protect, Restore, or Enhance Beneficial Uses	+	Benefits are dependent upon the analysis of data generated by the Project and therefore are not monetized.
Improve Impaired Water Bodies and Sensitive Habitats	+	Benefits are dependent upon the analysis of data generated by the Project and therefore are not monetized.

*Magnitude of effect on net benefits

+/- (negligible or unknown); + (moderate positive); ++ (significant positive); - (moderate negative); -- (significant negative)

Project 10: Chollas Creek Integration Project

The water quality and other benefits that are anticipated to result from implementation of the *Chollas Creek Integration Project* are summarized below in Table 8-46, and the cost-benefit overview is summarized in Table 8-47. This project would result in water quality benefits associated with reduction in pollutants, and other benefits associated with increased recreation opportunities, improvements to habitat, habitat restoration, ecosystem improvements, and fish and wildlife species enhancements. Detailed cost and benefit information associated with the project, including present value calculations, is provided in Appendix 8-1.

Table 8-46: Benefits Summary
Chollas Creek Integration Project

Type of Benefit	Assessment Level	Beneficiaries
Water Quality and Other Benefits		
Reduction in Pollutants	Physical Quantification	Local and Regional
Increase in Recreation Opportunities	Qualitative	Local
Habitat Restoration	Physical Quantification	Local
Ecosystem Improvements	Qualitative	Local and Regional
Fish and Wildlife Species Enhancements	Physical Quantification	Local, Regional, and Statewide

Table 8-47: Benefit-Cost Analysis Overview
Chollas Creek Integration Project

	Present Value ($2009)
Costs – Total Capital and O&M	$1,018,096
Monetizable Benefits	
N/A	N/A
Qualitative Benefits	**Qualitative Indicator***
Reduction in Pollutants	+
Increase in Recreation Opportunities	+
Habitat Restoration	+
Ecosystem Improvements	+
Fish and Wildlife Species Enhancements	+

*Magnitude of effect on net benefits
+/- (negligible or unknown); + (moderate positive); ++ (significant positive); - (moderate negative); -- (significant negative)

The "Without Project" Baseline

If the *Chollas Creek Integration Project* were not implemented, there would be no restoration of native floodplain habitat or associated flood hazard reductions within Chollas Creek. Additionally, without this project, an Opportunities Assessment would not be developed for Chollas Creek and associated benefits related to improving water quality, reducing flooding, and identifying land use opportunities for preserving open space and habitat would not be realized. Specifically, without the project, Chollas Creek Section 2A within the project area would continue to support disturbed riparian scrub habitat with many invasive plant species and be subject to dumping of trash and debris.

Water Quality and Other Benefits

The *Chollas Creek Integration Project* would result in several water quality and ecosystem benefits. Detailed cost and benefit information associated with the project, including present value calculations, is provided in Appendix 8-1.

Reduction in Pollutants

Current water quality conditions for Chollas Creek necessitate TMDLs for Diazinon, and the creek is also considered impaired due to the presence and concentration of bacteria and metals (zinc and copper). Project creek restoration activities would widen Chollas Creek by removing an existing asphalt pad on the east side of the creek that is currently being used to store metal products. The project proposes to reduce the size of the asphalt pad from 1.7 acres to 1.4 acres, which would potentially improve water quality by reducing the source of pollutants and encouraging development with a lower potential for pollutants.

Further, once established, the restoration of native riparian vegetation within the channel will contribute to the uptake and removal of pollutants. Because riparian vegetation intercepts surface runoff, it has been

shown to be effective in controlling nonpoint source pollution by removing nutrients, especially nitrogen, and sediment.[8] This water quality benefit has not been monetized.

Increase in Recreation Opportunities

The Opportunities Assessment that would be conducted as part of the *Chollas Creek Integration Project* would develop a watershed recreational trail element for the project area. The Opportunities Assessment will include an Existing Conditions Report, through which approximately 20,000 linear feet of existing and proposed trail segments would be analyzed to create baseline documentation. Further, this project would identify a multi-modal creek trail system that would connect with two previously restored/enhanced areas through a pedestrian connector and recreational pathway. This trail system would facilitate access for students and residents to Market Creek Plaza and nearby schools, and would provide health and environmental benefits to the community.

The ratio of parkland and open space available for the residents of this community (the Euclid and Market hubs) has been inadequate for decades. Whereas 20 park acres of parkland typically should be available per 1,000 residents, in the half-mile radius surrounding the project, there are only 3.91 park acres per 1,000 residents. The *Chollas Creek Integration Project* would provide additional open space with multiple benefits for DACs in the project area. Additional recreation benefits that would be provided by the project are associated with non-contact water recreation activities such as picnicking, sunbathing, hiking, sightseeing, or aesthetic enjoyment. These benefits have not been quantified and/or monetized.

Habitat Restoration

Habitat and water quality improvements that would result from the *Chollas Creek Integration Project* would support both water and terrestrial ecosystems. Specifically, the project would promote beneficial uses of water for warm water ecosystems, such as preservation or enhancement of aquatic habitats, vegetation, and fish or wildlife (including invertebrates). The project would also promote beneficial uses of water for terrestrial ecosystems such as preservation and enhancement of terrestrial habitats, vegetation, wildlife, and wildlife water and food sources.

This *Chollas Creek Integration Project* is anticipated to involve a restoration and enhancement plan for 1 acre of native riparian scrub habitat, at a ratio of 2:1 with native riparian species. The native riparian scrub habitat would be restored through container plantings and hydroseeding, and would be maintained and monitored. In addition, the project would work to remove 100% of non-native species within the habitat restoration area, including species such as *arundo donax* that contribute to flooding and prevent the establishment of riparian species. These restoration activities would meet the intent of the 2002 Chollas Creek Enhancement Program, and would be measured for success based on the survivorship of container plants and the percentage of vegetative cover.

In addition, it is the aim of the *Chollas Creek Integration Project* that restored native habitat would support additional wildlife species, and that eliminating invasive plant species would curtail the spread of these species to already restored areas downstream. The project also aims to increase ecological functions and values through the Chollas Creek riparian corridor. These benefits have not been monetized.

Ecosystem Improvements

The restoration of native habitat within Chollas Creek as proposed by the *Chollas Creek Integration Project* meets the intent of the 2002 Chollas Creek Enhancement Program. As described within the Program, native habitat, such as that proposed by the project, supports a healthier and higher-functioning ecosystem. The native habitat that would be created by the *Chollas Creek Integration Project* would be preserved in perpetuity as open space. These benefits have not been quantified and/or monetized.

Fish and Wildlife Species Enhancements

The Opportunities Assessment that would be conducted as part of the *Chollas Creek Integration Project* would involve development of an Existing Conditions Report, through which all watershed biological

[8] U.S. Department of Agriculture. Riparian Forest Buffer Handbook for the Chesapeake Bay Watershed. United States Department of Agriculture, Environmental Protection Agency, Forest Service and Northeastern Area State & Private Forestry, NA-TT-02-97. Washington, DC.

survey data would be compiled and analyzed. The project would also involve additional surveys to fill any data gaps, with particular attention to recommendations for the sustainability of at least three species designated within the Multiple Species Conservation Plan. Specifically, the project would aim at protecting the Coastal California Gnatcatcher, Coastal Barrel Cactus, and California Cactus Wren. These benefits have not been quantified and/or monetized.

Distribution of Project Benefits and Identification of Beneficiaries

Table 8-48 summarizes the anticipated beneficiaries of water quality and other benefits that would be provided by this Project. The water quality improvements would benefit local, regional, and statewide beneficiaries. Local residents would benefit from water quality improvements in Chollas Creek and the overall watershed (the Pueblo Hydrologic Unit). Local and regional residents would benefit from increased recreational opportunities throughout the project area. Local, regional, and statewide residents would benefit from ecosystem improvements, which benefit society as a whole.

Table 8-48: Project Beneficiaries Summary
Chollas Creek Integration Project

Local	Regional	Statewide
Local residents	Regional residents	Statewide residents

Project Benefits Timeline Description

All water quality and other benefits expected as a result of implementation of the *Chollas Creek Integration Project* were not monetized, and therefore do not have specific timelines over which they would occur.

Potential Adverse Effects from the Project

Any potential short-term impacts associated with this project will be addressed and mitigated during the CEQA compliance process. No long-term adverse effects are expected as a result of this project.

Uncertainty of Benefits

Uncertainties relating to the water quality and other benefits of this project are summarized below in Table 8-49. As shown in the table below, uncertainties regarding water quality and other benefits would occur because none of these benefits were monetized.

Table 8-49: Omissions, Biases, and Uncertainties and their Effect on the Project
Chollas Creek Integration Project

Benefit or Cost Category	Likely Impact on Net Benefits	Comment
Reduction in Pollutants	+	Not monetized. Reduction in pollutant depends on materials storage continued on concrete pad.
Increase in Recreation Opportunities	+	Not monetized. Recreational benefits depend on implementation of trail system per Opportunities Assessment.
Habitat Restoration	++	Not monetized. Purpose of project is to restore native riparian habitats in Section 2A.
Ecosystem Improvements	+	Not monetized. Success of ecosystem depends on restoration of additional creek lineage.
Fish and Wildlife Species Enhancement	+	Not monetized. Fish and wildlife enhancement depend on implementation of additional habitat improvements per Opportunities Assessment.

* Magnitude of effect on net benefits
+/- (negligible or unknown); + (moderate positive); ++ (significant positive); - (moderate negative); -- (significant negative)

Project 11: Regional Water Data Management Program

The benefits that are anticipated to result from implementation of the *Regional Water Data Management Program* are summarized below in Table 8-50, and the cost-benefit overview is summarized in Table 8-51. This project would result in qualitative other benefits associated with avoiding regulatory monitoring and increasing efficiencies. Detailed cost and benefit information associated with the project, including present value calculations, is provided in Appendix 8-1.

Table 8-50: Benefits Summary
Regional Water Data Management Program

Type of Benefit	Assessment Level	Beneficiaries
Water Quality and Other Benefits		
Avoided Regulatory Monitoring	Qualitative	Local, Regional, and Statewide
Increased Water Management Efficiencies	Qualitative	Local, Regional, and Statewide

Table 8-51: Benefit-Cost Analysis Overview
Regional Water Data Management Program

	Present Value ($2009)
Costs – Total Capital and O&M	**$540,043**
Monetizable Benefits	
N/A	N/A
Qualitative Benefits	**Qualitative Indicator***
Avoided Regulatory Monitoring	+
Increased Water Management Efficiencies	+

* Magnitude of effect on net benefits
+/- (negligible or unknown); + (moderate positive); ++ (significant positive); - (moderate negative); -- (significant negative)

The "Without Project" Baseline

If the *Regional Water Data Management Program* were not implemented, there would be a continued duplication of water resources-related data collection efforts, and/or a failure to identify and address significant gaps in data collection and analysis within the San Diego IRWM region. As such, without implementation of the project, there would be continued efficiencies related to duplicative efforts, and a lack of information regarding the availability of and need for regional water resources data.

Water Supply and Other Benefits

Detailed cost and benefit information associated with the project, including present value calculations, is provided in Appendix 8-1.

Avoided Regulatory Monitoring

The *Regional Water Data Management Program* would include an analysis of regional data collection efforts, and will produce an online database that collects and stores regional water-related data. The result of these efforts would be to compile data from various regional monitoring and sampling programs, in an attempt to reduce duplication efforts and potentially avoid future monitoring efforts when found that such efforts could be fulfilled by existing data. As such, this project would potentially avoid future regulatory monitoring efforts, which would otherwise be taken on by state, county, city, or other government agencies. Avoided costs of monitoring efforts would save these government entities money associated with higher overhead and paid employees to conduct equivalent monitoring efforts. In addition, data compiled and made available by this project may increase agency access to data, which would potentially reduce staff time to uncover and analyze data from disparate sources or eliminate data collection expenses. The value of avoided regulatory monitoring was not monetized.

Increased Water Management Efficiencies

The *Regional Water Data Management Program* would create a stakeholder group and a web-based regional data management system, which together would provide a platform for regional water managers and the general public to access and use data for management and planning purposes. This platform would assist in eliminating duplicative efforts, reveal any gaps in data collection and analysis, and assist in the assessment of water management issues throughout the region in the most efficient manner possible.

As such, the project would potentially increase the efficiency of information dissemination and analysis by any entity interested in San Diego water management data. This increase in efficiency would potentially reduce overhead, research, or regulatory costs by local, regional, and even statewide stakeholders. This benefit was not monetized.

Distribution of Project Benefits and Identification of Beneficiaries

Table 8-52 summarizes the anticipated beneficiaries of water quality and other benefits that would be provided by this project. The regulatory and water management efficiency benefits would accrue to local, regional, and statewide beneficiaries since the data management system would be available to all interested parties through an online web-based platform.

Table 8-52: Project Beneficiaries Summary
Regional Water Data Management Program

Local	Regional	Statewide
Local stakeholders interested in or required to report water data	Regional stakeholders interested in or required to report water data	Statewide stakeholders interested in or required to report water data

Project Benefits Timeline Description

The timeline for other benefits was not established for this project, because these benefits were not monetized, and therefore did not necessitate timeline assumptions.

Potential Adverse Effects from the Project

No short-term or long-term adverse effects are expected as a result of this project.

Uncertainty of Benefits

Uncertainties relating to other benefits of this project are summarized below in Table 8-53. As described in detail below, there are uncertainties regarding all of the potential other benefits, because they were not monetized.

Table 8-53: Omissions, Biases, and Uncertainties and their Effect on the Project
Regional Water Data Management Program

Benefit or Cost Category	Likely Impact on Net Benefits	Comment
Avoided Regulatory Monitoring	+	Not monetized. Agencies subject to monitoring requirements may opt to fund their own monitoring due to concerns about sampling quality.
Increased Water Management Efficiencies	+	Not monetized. Agencies may be reluctant to share some types of water management data, therefore decreasing the value of the data management system and its possibilities for efficiencies.

* Magnitude of effect on net benefits
+/- (negligible or unknown); + (moderate positive); ++ (significant positive); - (moderate negative); -- (significant negative)

Appendix 8-1: Economic Analysis Tables

- ✓ **Project 1: Sustainable Landscapes Program**
  - Table 16 – Water Quality and Other Expected Benefits ..... Attached
- ✓ **Project 2: North San Diego County Regional Recycled Water Project**
  - Table 16 – Water Quality and Other Expected Benefits ..... Not Applicable
- ✓ **Project 3: North San Diego County Cooperative Demineralization Project**
  - Table 16 – Water Quality and Other Expected Benefits ..... Not Applicable
- ✓ **Project 4: Rural Disadvantaged Community (DAC) Partnership Project**
  - Table 16 – Water Quality and Other Expected Benefits ..... Not Applicable
- ✓ **Project 5: Lake Hodges Water Quality and Quagga Mitigation Measures**
  - Table 16 – Water Quality and Other Expected Benefits ..... Attached
- ✓ **Project 6: Implementing Nutrient Management in the Santa Margarita River Watershed**
  - Table 16 – Water Quality and Other Expected Benefits ..... Not Applicable
- ✓ **Project 7: Bannock Avenue Neighborhood Streetscape Enhancements for Tecolote Creek Watershed Protection**
  - Table 16 – Water Quality and Other Expected Benefits ..... Attached
- ✓ **Project 8: Pilot Concrete Channel Infiltration Project**
  - Table 16 – Water Quality and Other Expected Benefits ..... Attached
- ✓ **Project 9: San Diego Regional Water Quality Assessment and Outreach Project**
  - Table 16 – Water Quality and Other Expected Benefits ..... Attached
- ✓ **Project 10: Chollas Creek Integration Project**
  - Table 16 – Water Quality and Other Expected Benefits ..... Not Applicable
- ✓ **Project 11: Regional Water Data Management Program**
  - Table 16 – Water Quality and Other Expected Benefits ..... Not Applicable

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Table 16 - Water Quality and Other Expected Benefits (2009 dollars)

Project: Sustainable Landscapes Program

(a) Year	(b) Type of Benefit: *Avoided wastewater treatment costs* — (C) Measure of Benefit [Unit]: *Annual cost (S)* — (d) Without Project	(e) With Project	(f) Change Resulting from Project [e - d]	(g) Unit $ Value	(h) Annual $ Value [f x g]	(b) Type of Benefit: *Power Cost Savings* — (C) Measure of Benefit [Unit]: *KWH per year* — (d) Without Project	(e) With Project	(f) Change Resulting from Project [e - d]	(g) Unit $ Value	(h) Annual $ Value [f x g]
2009			0		$0			0		$0
2010			0		$0			0		$0
2011			0		$0			0		$0
2012	-1	0	1	$32,474	$32,474	-136,768	0	136,768	$0.10	$14,292
2013	-1	0	1	$64,948	$64,948	-273,518	0	273,518	$0.10	$28,583
2014	-1	0	1	$145,484	$145,484	-612,720	0	612,720	$0.10	$64,029
2015	-1	0	1	$145,484	$145,484	-612,720	0	612,720	$0.10	$64,029
2016	-1	0	1	$439,453	$439,453	-612,720	0	612,720	$0.10	$64,029
2017	-1	0	1	$439,453	$439,453	-612,720	0	612,720	$0.10	$64,029
2018	-1	0	1	$439,453	$439,453	-612,720	0	612,720	$0.10	$64,029
2019	-1	0	1	$439,453	$439,453	-612,720	0	612,720	$0.10	$64,029
2020	-1	0	1	$439,453	$439,453	-612,720	0	612,720	$0.10	$64,029
2021	-1	0	1	$439,453	$439,453	-612,720	0	612,720	$0.10	$64,029
2022	-1	0	1	$439,453	$439,453	-612,720	0	612,720	$0.10	$64,029
2023			0		$0			0		$0
2024			0		$0			0		$0
2025			0		$0			0		$0
2026			0		$0			0		$0
2027			0		$0			0		$0
2028			0		$0			0		$0
2029			0		$0			0		$0
2030			0		$0			0		$0
2031			0		$0			0		$0
2032			0		$0			0		$0
2033			0		$0			0		$0
2034			0		$0			0		$0
2035			0		$0			0		$0
2036			0		$0			0		$0
2037			0		$0			0		$0
2038			0		$0			0		$0
2039			0		$0			0		$0
2040			0		$0			0		$0
2041			0		$0			0		$0
2042			0		$0			0		$0
2043			0		$0			0		$0
2044			0		$0			0		$0
2045			0		$0			0		$0
2046			0		$0			0		$0
2047			0		$0			0		$0
2048			0		$0			0		$0
2049			0		$0			0		$0
2050			0		$0			0		$0
2051			0		$0			0		$0
2052			0		$0			0		$0
2053			0		$0			0		$0
2054			0		$0			0		$0
2055			0		$0			0		$0
2056			0		$0			0		$0
2057			0		$0			0		$0
2058			0		$0			0		$0
2059			0		$0			0		$0
2060			0		$0			0		$0
TOTAL	**(11)**	**-**	**11**	**3,464,561**	**3,464,561**	**(5,924,766)**	**-**	**5,924,766**	**1**	**619,138**

(a) Year	(b) Type of Benefit: *Reduced Emissions from Greenwaste Reduction* — (C) Measure of Benefit [Unit]: *Pounds of Greenwaste [not monetized]* — (d) Without Project	(e) With Project	(f) Change Resulting from Project [e - d]	(g) Unit $ Value	(h) Annual $ Value [f x g]	(b) Type of Benefit: *Reduction in runoff* — (C) Measure of Benefit [Unit]: *Reduction in runoff coefficient [not monetized]* — (d) Without Project	(e) With Project	(f) Change Resulting from Project [e - d]	(g) Unit $ Value	(h) Annual $ Value [f x g]
2009			0		$0			0		$0
2010			0		$0			0		$0
2011			0		$0			0		$0
2012	-33,000	0	33,000	$0	$0	-0.15	0	0.15	$0	$0
2013	-33,000	0	33,000	$0	$0	-0.15	0	0.15	$0	$0
2014	-33,000	0	33,000	$0	$0	-0.15	0	0.15	$0	$0
2015	-33,000	0	33,000	$0	$0	-0.15	0	0.15	$0	$0
2016	-33,000	0	33,000	$0	$0	-0.15	0	0.15	$0	$0
2017	-33,000	0	33,000	$0	$0	-0.15	0	0.15	$0	$0
2018	-33,000	0	33,000	$0	$0	-0.15	0	0.15	$0	$0
2019	-33,000	0	33,000	$0	$0	-0.15	0	0.15	$0	$0
2020	-33,000	0	33,000	$0	$0	-0.15	0	0.15	$0	$0
2021	-33,000	0	33,000	$0	$0	-0.15	0	0.15	$0	$0
2022	-33,000	0	33,000	$0	$0	-0.15	0	0.15	$0	$0
2023			0		$0			0		$0
2024			0		$0			0		$0
2025			0		$0			0		$0
2026			0		$0			0		$0
2027			0		$0			0		$0
2028			0		$0			0		$0
2029			0		$0			0		$0
2030			0		$0			0		$0
2031			0		$0			0		$0
2032			0		$0			0		$0
2033			0		$0			0		$0
2034			0		$0			0		$0
2035			0		$0			0		$0
2036			0		$0			0		$0
2037			0		$0			0		$0
2038			0		$0			0		$0
2039			0		$0			0		$0
2040			0		$0			0		$0
2041			0		$0			0		$0
2042			0		$0			0		$0
2043			0		$0			0		$0
2044			0		$0			0		$0
2045			0		$0			0		$0
2046			0		$0			0		$0
2047			0		$0			0		$0
2048			0		$0			0		$0
2049			0		$0			0		$0
2050			0		$0			0		$0
2051			0		$0			0		$0
2052			0		$0			0		$0
2053			0		$0			0		$0
2054			0		$0			0		$0
2055			0		$0			0		$0
2056			0		$0			0		$0
2057			0		$0			0		$0
2058			0		$0			0		$0
2059			0		$0			0		$0
2060			0		$0			0		$0
TOTAL	**(363,000)**	**-**	**363,000**	**-**	**-**	**(2)**	**-**	**2**	**-**	**-**

(a) Year	(b) Type of Benefit: *CO2 Emissions Reduction (due to reduction in water demand)* — (C) Measure of Benefit [Unit]: *Metric tons of CO2 [not monetized]* — (d) Without Project	(e) With Project	(f) Change Resulting from Project [e - d]	(g) Unit $ Value	(h) Annual $ Value [f x g]	(b) Type of Benefit: *CO2 Emissions Reduction (due to labor reduction)* — (C) Measure of Benefit [Unit]: *Labor Hours [not monetized]* — (d) Without Project	(e) With Project	(f) Change Resulting from Project [e - d]	(g) Unit $ Value	(h) Annual $ Value [f x g]	Discounting Calculations for Economic Benefits — (h) Total Annual Benefits ($)	(i) Discount Value	(j) Discounted Benefits [h x i]
2009			0		$0			0		$0	**$0**	**1.000**	**$0**
2010			0		$0			0		$0	**$0**	**0.943**	**$0**
2011			0		$0			0		$0	**$0**	**0.890**	**$0**
2012	-205	0	205		$0	-11,000	0	11,000		$0	**$46,766**	**0.840**	**$39,284**
2013	-205	0	205		$0	-11,000	0	11,000		$0	**$93,531**	**0.792**	**$74,076**
2014	-205	0	205		$0	-11,000	0	11,000		$0	**$209,513**	**0.747**	**$156,506**
2015	-205	0	205		$0	-11,000	0	11,000		$0	**$209,513**	**0.705**	**$147,707**
2016	-205	0	205		$0	-11,000	0	11,000		$0	**$503,482**	**0.665**	**$334,816**
2017	-205	0	205		$0	-11,000	0	11,000		$0	**$503,482**	**0.627**	**$315,683**
2018	-205	0	205		$0	-11,000	0	11,000		$0	**$503,482**	**0.592**	**$298,061**
2019	-205	0	205		$0	-11,000	0	11,000		$0	**$503,482**	**0.558**	**$280,943**
2020	-205	0	205		$0	-11,000	0	11,000		$0	**$503,482**	**0.527**	**$265,335**
2021	-205	0	205		$0	-11,000	0	11,000		$0	**$503,482**	**0.497**	**$250,231**
2022	-205	0	205		$0	-11,000	0	11,000		$0	**$503,482**	**0.469**	**$236,133**
2023			0		$0			0		$0	**$0**	**0.442**	**$0**
2024			0		$0			0		$0	**$0**	**0.417**	**$0**
2025			0		$0			0		$0	**$0**	**0.390**	**$0**
2026			0		$0			0		$0	**$0**	**0.371**	**$0**
2027			0		$0			0		$0	**$0**	**0.350**	**$0**
2028			0		$0			0		$0	**$0**	**0.331**	**$0**
2029			0		$0			0		$0	**$0**	**0.312**	**$0**
2030			0		$0			0		$0	**$0**	**0.294**	**$0**
2031			0		$0			0		$0	**$0**	**0.278**	**$0**
2032			0		$0			0		$0	**$0**	**0.262**	**$0**
2033			0		$0			0		$0	**$0**	**0.247**	**$0**
2034			0		$0			0		$0	**$0**	**0.233**	**$0**
2035			0		$0			0		$0	**$0**	**0.220**	**$0**
2036			0		$0			0		$0	**$0**	**0.207**	**$0**
2037			0		$0			0		$0	**$0**	**0.196**	**$0**
2038			0		$0			0		$0	**$0**	**0.185**	**$0**
2039			0		$0			0		$0	**$0**	**0.174**	**$0**
2040			0		$0			0		$0	**$0**	**0.164**	**$0**
2041			0		$0			0		$0	**$0**	**0.155**	**$0**
2042			0		$0			0		$0	**$0**	**0.146**	**$0**
2043			0		$0			0		$0	**$0**	**0.138**	**$0**
2044			0		$0			0		$0	**$0**	**0.130**	**$0**
2045			0		$0			0		$0	**$0**	**0.123**	**$0**
2046			0		$0			0		$0	**$0**	**0.116**	**$0**
2047			0		$0			0		$0	**$0**	**0.109**	**$0**
2048			0		$0			0		$0	**$0**	**0.103**	**$0**
2049			0		$0			0		$0	**$0**	**0.097**	**$0**
2050			0		$0			0		$0	**$0**	**0.092**	**$0**
2051			0		$0			0		$0	**$0**	**0.087**	**$0**
2052			0		$0			0		$0	**$0**	**0.082**	**$0**
2053			0		$0			0		$0	**$0**	**0.077**	**$0**
2054			0		$0			0		$0	**$0**	**0.073**	**$0**
2055			0		$0			0		$0	**$0**	**0.069**	**$0**
2056			0		$0			0		$0	**$0**	**0.065**	**$0**
2057			0		$0			0		$0	**$0**	**0.061**	**$0**
2058			0		$0			0		$0	**$0**	**0.058**	**$0**
2059			0		$0			0		$0	**$0**	**0.054**	**$0**
2060			0		$0			0		$0	**$0**	**0.051**	**$0**
TOTAL	**(2,255)**	**-**	**2,255**	**-**	**-**	**(121,000)**	**-**	**121,000**	**-**	**-**	**4,083,699**	**14**	**2,398,776**

Total Present Value of Discounted Benefits over Project Life (Monetized Benefits):	$2,398,776
Project Allocation:	100.0%
Total Present Value of Discounted Benefits (Monetized Benefits):	**$2,398,776**

Narrative description of benefits: *Although dry and wet weather run-off is not typically treated prior to reaching the ocean in the cases where it is, the benefit is measurable. Treated water must meet acceptable ranges of TMDLs. Reduction of run-off results in a reduction in waterwaste treatment. Treatment for reduced solids, nitrate, chloride, dissolved copper, and dissolved cadmium*

Narrative description of benefits: *This project is anticipated to reduce kWh used by 612,720 by 2014. Calculations are based on SDG&E's emission factor of 739.05 lbs CO2/kWh).*

Narrative description of benefits: *Based on the City of Santa Monica's GardenGarden Case Study results, this project has the potential to reduce greenwaste by 53% or 33,000 pounds per year. The benefits extend beyond just GREENWASTE PRODUCTION; the project results in reduced CO2 emissions due to reduced waste. Although economic benefits are realized as result of this project, our team is unable to quantify the economic value of the reduction.*

Narrative description of benefits: *Based on information obtained from the Center for Watershed Protection & Chesapeake Stormwater Network a higher runoff coefficient is anticipated in areas that have been graded. Restoration to more natural conditions may improve the soil retention on sites by factor of .10 to .20.*

Narrative description of benefits: *The reduction in water demand associated with this project is anticipated to reduce production of CO2 by 205 metric tons. This calculation assumes 3,404 kWh/AF)*

Narrative description of benefits: *Based on the City of Santa Monica's GardenGarden Case Study results, this project has the potential to reduce labor hours associated with maintenance of lanscapes. Reduced labor hours associated with reduced mowing, blowing, driving etc. results in a reduction of CO2 emissions.*

Comments: *Source for Greenwaste and Labor Reduction: City of Santa Monica GardenGarden Program. http://www.smgov.net/departments/ose/categories/content.aspx?id=4082 Source for CO2 Emissions Reduction: California Center for Sustainable Energy. Andrea Cook. Sourde for Runoff Reduction: Technical Memorandum: The Runoff Reduction Method. Center for Watershed Protection & Chesapeake Stormwater Network. April 18, 2008. Source for Avoided Cost of Waste Water Treatment and Waste Water Discharge: 1.) LADPW (County of Los Angeles, Department of Public Works). 2004. Sun Valley Watershed Management Plan. May 2004. 2.) Leadership Committee. 2006. Greater Los Angeles County Integrated Regional Water Management Plan. December 2006. Source for Power Cost Savings and Production: California Center for Sustainable Energy. Andrea Cook. Source for Type of Pollutants: http://scitation.aip.org/getabs/servlet/GetabsServlet?prog=normal&id=JHYEFF000015000002000123000001&idtype=cvips&gifs=yes&ref=no*

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Table 16 - Water Quality and Other Expected Benefits (2009 dollars)
Project: Lake Hodges Water Quality and Quagga Mitigation Measures

	(b) Type of Benefit: Avoided costs of facility shutdown and repair due to quagga mussel infestation					*(b) Type of Benefit: Water quality benefits on fish and wildlife*					*(b) Type of Benefit: Avoided loss in power generaqtion*							
	(C) Measure of Benefit [Unit]: Annual O&M cost ($)					*(C) Measure of Benefit [Unit]: Days with dissolved oxygen levels in hypolimnion above 0 mg/l [not monetized]*					*(C) Measure of Benefit [Unit]: Annual power value ($)*					*Discounting Calculations for Economic Benefits*		
(a) Year	(d) Without Project	(e) With Project	(f) Change Resulting from Project [e - d]	(g) Unit $ Value	(h) Annual $ Value [f x g]	(d) Without Project	(e) With Project	(f) Change Resulting from Project [e - d]	(g) Unit $ Value	(h) Annual $ Value [f x g]	(d) Without Project	(e) With Project	(f) Change Resulting from Project [e - d]	(g) Unit $ Value	(h) Annual $ Value [f x g]	(h) Total Annual Benefits ($)	(i) Discount Value	(j) Discounted Benefits [h x i]
2009																**$0**	**1.000**	**$0**
2010																**$0**	**0.943**	**$0**
2011																**$0**	**0.890**	**$0**
2012																**$0**	**0.840**	**$0**
2013	-1	0	1	$250,000	$250,000						-1	0	1	$672,000	$672,000	**$922,000**	**0.792**	**$730,224**
2014	-1	0	1	$250,000	$250,000						-1	0	1	$672,000	$672,000	**$922,000**	**0.747**	**$688,734**
2015	-1	0	1	$250,000	$250,000	270	335	65		$0	-1	0	1	$672,000	$672,000	**$922,000**	**0.705**	**$650,010**
2016	-1	0	1	$250,000	$250,000	270	335	65		$0	-1	0	1	$672,000	$672,000	**$922,000**	**0.665**	**$613,130**
2017	-1	0	1	$250,000	$250,000	270	335	65		$0	-1	0	1	$672,000	$672,000	**$922,000**	**0.627**	**$578,094**
2018	-1	0	1	$250,000	$250,000	270	335	65		$0	-1	0	1	$672,000	$672,000	**$922,000**	**0.592**	**$545,824**
2019	-1	0	1	$250,000	$250,000	270	335	65		$0	-1	0	1	$672,000	$672,000	**$922,000**	**0.558**	**$514,476**
2020	-1	0	1	$250,000	$250,000	270	335	65		$0	-1	0	1	$672,000	$672,000	**$922,000**	**0.527**	**$485,894**
2021	-1	0	1	$250,000	$250,000	270	335	65		$0	-1	0	1	$672,000	$672,000	**$922,000**	**0.497**	**$458,234**
2022	-1	0	1	$250,000	$250,000	270	335	65		$0	-1	0	1	$672,000	$672,000	**$922,000**	**0.469**	**$432,418**
2023	-1	0	1	$250,000	$250,000	270	335	65		$0	-1	0	1	$672,000	$672,000	**$922,000**	**0.442**	**$407,524**
2024	-1	0	1	$250,000	$250,000	270	335	65		$0	-1	0	1	$672,000	$672,000	**$922,000**	**0.417**	**$384,474**
2025	-1	0	1	$250,000	$250,000	270	335	65		$0	-1	0	1	$672,000	$672,000	**$922,000**	**0.390**	**$359,580**
2026	-1	0	1	$250,000	$250,000	270	335	65		$0	-1	0	1	$672,000	$672,000	**$922,000**	**0.371**	**$342,062**
2027	-1	0	1	$250,000	$250,000	270	335	65		$0	-1	0	1	$672,000	$672,000	**$922,000**	**0.350**	**$322,700**
2028	-1	0	1	$250,000	$250,000	270	335	65		$0	-1	0	1	$672,000	$672,000	**$922,000**	**0.331**	**$305,182**
2029	-1	0	1	$250,000	$250,000	270	335	65		$0	-1	0	1	$672,000	$672,000	**$922,000**	**0.312**	**$287,664**
2030	-1	0	1	$250,000	$250,000	270	335	65		$0	-1	0	1	$672,000	$672,000	**$922,000**	**0.294**	**$271,068**
2031	-1	0	1	$250,000	$250,000	270	335	65		$0	-1	0	1	$672,000	$672,000	**$922,000**	**0.278**	**$256,316**
2032	-1	0	1	$250,000	$250,000	270	335	65		$0	-1	0	1	$672,000	$672,000	**$922,000**	**0.262**	**$241,564**
2033	-1	0	1	$250,000	$250,000	270	335	65		$0	-1	0	1	$672,000	$672,000	**$922,000**	**0.247**	**$227,734**
2034	-1	0	1	$250,000	$250,000	270	335	65		$0	-1	0	1	$672,000	$672,000	**$922,000**	**0.233**	**$214,826**
2035	-1	0	1	$250,000	$250,000	270	335	65		$0	-1	0	1	$672,000	$672,000	**$922,000**	**0.220**	**$202,840**
2036	-1	0	1	$250,000	$250,000	270	335	65		$0	-1	0	1	$672,000	$672,000	**$922,000**	**0.207**	**$190,854**
2037	-1	0	1	$250,000	$250,000	270	335	65		$0	-1	0	1	$672,000	$672,000	**$922,000**	**0.196**	**$180,712**
2038	-1	0	1	$250,000	$250,000	270	335	65		$0	-1	0	1	$672,000	$672,000	**$922,000**	**0.185**	**$170,570**
2039	-1	0	1	$250,000	$250,000	270	335	65		$0	-1	0	1	$672,000	$672,000	**$922,000**	**0.174**	**$160,428**
2040	-1	0	1	$250,000	$250,000	270	335	65		$0	-1	0	1	$672,000	$672,000	**$922,000**	**0.164**	**$151,208**
2041	-1	0	1	$250,000	$250,000	270	335	65		$0	-1	0	1	$672,000	$672,000	**$922,000**	**0.155**	**$142,910**
2042	-1	0	1	$250,000	$250,000	270	335	65		$0	-1	0	1	$672,000	$672,000	**$922,000**	**0.146**	**$134,612**
2043	-1	0	1	$250,000	$250,000	270	335	65		$0	-1	0	1	$672,000	$672,000	**$922,000**	**0.138**	**$127,236**
2044	-1	0	1	$250,000	$250,000	270	335	65		$0	-1	0	1	$672,000	$672,000	**$922,000**	**0.130**	**$119,860**
2045	-1	0	1	$250,000	$250,000	270	335	65		$0	-1	0	1	$672,000	$672,000	**$922,000**	**0.123**	**$113,406**
2046	-1	0	1	$250,000	$250,000	270	335	65		$0	-1	0	1	$672,000	$672,000	**$922,000**	**0.116**	**$106,952**
2047	-1	0	1	$250,000	$250,000	270	335	65		$0	-1	0	1	$672,000	$672,000	**$922,000**	**0.109**	**$100,498**
2048	-1	0	1	$250,000	$250,000	270	335	65		$0	-1	0	1	$672,000	$672,000	**$922,000**	**0.103**	**$94,966**
2049	-1	0	1	$250,000	$250,000	270	335	65		$0	-1	0	1	$672,000	$672,000	**$922,000**	**0.097**	**$89,434**
2050	-1	0	1	$250,000	$250,000	270	335	65		$0	-1	0	1	$672,000	$672,000	**$922,000**	**0.092**	**$84,824**
2051	-1	0	1	$250,000	$250,000	270	335	65		$0	-1	0	1	$672,000	$672,000	**$922,000**	**0.087**	**$80,214**
2052	-1	0	1	$250,000	$250,000	270	335	65		$0	-1	0	1	$672,000	$672,000	**$922,000**	**0.082**	**$75,604**
2053	-1	0	1	$250,000	$250,000	270	335	65		$0	-1	0	1	$672,000	$672,000	**$922,000**	**0.077**	**$70,994**
2054	-1	0	1	$250,000	$250,000	270	335	65		$0	-1	0	1	$672,000	$672,000	**$922,000**	**0.073**	**$67,306**
2055	-1	0	1	$250,000	$250,000	270	335	65		$0	-1	0	1	$672,000	$672,000	**$922,000**	**0.069**	**$63,618**
2056	-1	0	1	$250,000	$250,000	270	335	65		$0	-1	0	1	$672,000	$672,000	**$922,000**	**0.065**	**$59,930**
2057	-1	0	1	$250,000	$250,000	270	335	65		$0	-1	0	1	$672,000	$672,000	**$922,000**	**0.061**	**$56,242**
2058	-1	0	1	$250,000	$250,000	270	335	65		$0	-1	0	1	$672,000	$672,000	**$922,000**	**0.058**	**$53,476**
2059	-1	0	1	$250,000	$250,000	270	335	65		$0	-1	0	1	$672,000	$672,000	**$922,000**	**0.054**	**$50,054**
2060	-1	0	1	$250,000	$250,000	270	335	65		$0	-1	0	1	$672,000	$672,000	**$922,000**	**0.051**	**$47,221**
TOTAL	**(48)**	**-**	**48**	**12,000,000**	**12,000,000**	**12,420**	**15,410**	**2,990**	**-**	**-**	**(48)**	**-**	**48**	**32,256,000**	**32,256,000**	**44,256,000**	**13**	**12,113,701**
																	Total Present Value of Discounted Benefits over Project Life (Monetized Benefits):	$12,113,701
																	Project Allocation:	100.0%
																	Total Present Value of Discounted Benefits (Monetized Benefits):	**$12,113,701**

Narrative description of benefits: *Shutdown costs to repair system components as a result of quagga infestation or other damage.*

Narrative description of benefits: *Annual mortality rate for fish may decrease as a result of elevated dissolved oxygen within the hypolimnion in Lake Hodges. Watershed improvements may increase bird and frog population.*

Narrative description of benefits: Proponet estimated 10 days of downtime without the project. 10 days * 24 hours = 240 hours per year*These values indicate operation power produced in generation mode when operating 8 hours per day throughout the year. Actual may be higher or lower depending on regional needs. Contract allows 504 hours outage time. Increased outage time will incur penalties in addition to lowering revenue from power generation. Unit value is $70/MWh*

Comments: *There may be additional avoided project costs that become evident after the feasibility study and prioritization process are concluded. Subsequent phases of this project will increase the avoided project costs as we begin to better understand what is possible to achieve following full scale implementation of water quality and quagga control measures. Costs for chemical application have not been included in the numbers provided and need to be evaluated further.*

Table 16 - Water Quality and Other Expected Benefits (2009 dollars)

Project: Bannock Ave. Neighborhood Streetscape Enhancements for Tecolote Creek Watershed Protection

	(b) Type of Benefit: Avoided cost of treatment plant (Water Quality)				*(b) Type of Benefit: Recreation (due to WQ Improvements)*					*(b) Type of Benefit: Reduction in Pollutants (TSS)*					*(b) Type of Benefit: Reduction in Pollutants (TDS)*					*Discounting Calculations for Economic Benefits*		
	(C) Measure of Benefit [Unit]: Capital and O&M Costs ($)				*(C) Measure of Benefit [Unit]: [qualitative]*					*(C) Measure of Benefit [Unit]: KG per year [not monetized]*					*(C) Measure of Benefit [Unit]: KG per year [not monetized]*							
(a) Year	(d) Avoided Capital Costs	(e) Avoided Replacement Costs	(f) Avoided O&M Costs	(e) Total Avoided Costs [d + e + f]	(d) Without Project	(e) With Project	(f) Change Resulting from Project [e - d]	(g) Unit $ Value	(h) Annual $ Value [f x g]	(d) Without Project	(e) With Project	(f) Change Resulting from Project [e - d]	(g) Unit $ Value	(h) Annual $ Value [f x g]	(d) Without Project	(e) With Project	(f) Change Resulting from Project [e - d]	(g) Unit $ Value	(h) Annual $ Value [f x g]	(h) Total Annual Benefits ($)	(i) Discount Value	(j) Discounted Benefits [h x i]
2009	$0	$0	$0	$0			0		$0			0		$0			0.00		$0	**$0**	**1.000**	**$0**
2010	$0	$0	$0	$0			0		$0			0		$0			0.00		$0	**$0**	**0.943**	**$0**
2011	$85,619	$0	$0	$85,619			0		$0			0		$0			0.00		$0	**$85,619**	**0.890**	**$76,201**
2012	$90,400	$0	$0	$90,400			0		$0			0		$0			0.00		$0	**$90,400**	**0.840**	**$75,936**
2013	$88,536	$0	$0	$88,536			0		$0	-105	-15	90		$0	-2.00	-0.25	1.75		$0	**$88,536**	**0.792**	**$70,121**
2014	$102,500	$0	$0	$102,500			0		$0	-105	-15	90		$0	-2.00	-0.25	1.75		$0	**$102,500**	**0.747**	**$76,568**
2015	$62,500	$0	$0	$62,500			0		$0	-105	-15	90		$0	-2.00	-0.25	1.75		$0	**$62,500**	**0.705**	**$44,063**
2016	$88,875	$0	$0	$88,875			0		$0	-105	-15	90		$0	-2.00	-0.25	1.75		$0	**$88,875**	**0.665**	**$59,102**
2017	$12,500	$17,967	$62,500	$92,967			0		$0	-105	-15	90		$0	-2.00	-0.25	1.75		$0	**$92,967**	**0.627**	**$58,290**
2018	$530,930	$17,356	$25,000	$573,286			0		$0	-105	-15	90		$0	-2.00	-0.25	1.75		$0	**$573,286**	**0.592**	**$339,385**
2019	$0	$16,766	$16,250	$33,016			0		$0	-105	-15	90		$0	-2.00	-0.25	1.75		$0	**$33,016**	**0.558**	**$18,423**
2020	$0	$16,196	$16,250	$32,446			0		$0	-105	-15	90		$0	-2.00	-0.25	1.75		$0	**$32,446**	**0.527**	**$17,099**
2021	$0	$15,645	$16,250	$31,895			0		$0	-105	-15	90		$0	-2.00	-0.25	1.75		$0	**$31,895**	**0.497**	**$15,852**
2022	$6,250	$15,113	$31,250	$52,613			0		$0	-105	-15	90		$0	-2.00	-0.25	1.75		$0	**$52,613**	**0.469**	**$24,676**
2023	$0	$14,599	$16,250	$30,849			0		$0	-105	-15	90		$0	-2.00	-0.25	1.75		$0	**$30,849**	**0.442**	**$13,635**
2024	$0	$14,103	$16,250	$30,353			0		$0	-105	-15	90		$0	-2.00	-0.25	1.75		$0	**$30,353**	**0.417**	**$12,657**
2025	$0	$13,623	$16,250	$29,873			0		$0	-105	-15	90		$0	-2.00	-0.25	1.75		$0	**$29,873**	**0.390**	**$11,651**
2026	$0	$13,160	$16,250	$29,410			0		$0	-105	-15	90		$0	-2.00	-0.25	1.75		$0	**$29,410**	**0.371**	**$10,911**
2027	$8,750	$12,713	$31,250	$52,713			0		$0	-105	-15	90		$0	-2.00	-0.25	1.75		$0	**$52,713**	**0.350**	**$18,449**
2028	$0	$12,281	$16,250	$28,531			0		$0	-105	-15	90		$0	-2.00	-0.25	1.75		$0	**$28,531**	**0.331**	**$9,444**
2029	$0	$11,863	$16,250	$28,113			0		$0	-105	-15	90		$0	-2.00	-0.25	1.75		$0	**$28,113**	**0.312**	**$8,771**
2030	$0	$11,460	$16,250	$27,710			0		$0	-105	-15	90		$0	-2.00	-0.25	1.75		$0	**$27,710**	**0.294**	**$8,147**
2031	$0	$11,070	$16,250	$27,320			0		$0	-105	-15	90		$0	-2.00	-0.25	1.75		$0	**$27,320**	**0.278**	**$7,595**
2032	$12,500	$10,694	$31,250	$54,444			0		$0	-105	-15	90		$0	-2.00	-0.25	1.75		$0	**$54,444**	**0.262**	**$14,264**
2033	$0	$10,330	$21,250	$31,580			0		$0	-105	-15	90		$0	-2.00	-0.25	1.75		$0	**$31,580**	**0.247**	**$7,800**
2034	$0	$9,979	$21,250	$31,229			0		$0	-105	-15	90		$0	-2.00	-0.25	1.75		$0	**$31,229**	**0.233**	**$7,276**
2035	$0	$9,640	$21,250	$30,890			0		$0	-105	-15	90		$0	-2.00	-0.25	1.75		$0	**$30,890**	**0.220**	**$6,796**
2036	$0	$9,312	$21,250	$30,562			0		$0	-105	-15	90		$0	-2.00	-0.25	1.75		$0	**$30,562**	**0.207**	**$6,326**
2037	$18,750	$8,995	$31,250	$58,995			0		$0	-105	-15	90		$0	-2.00	-0.25	1.75		$0	**$58,995**	**0.196**	**$11,563**
2038	$0	$8,689	$21,250	$29,939			0		$0	-105	-15	90		$0	-2.00	-0.25	1.75		$0	**$29,939**	**0.185**	**$5,539**
2039	$0	$8,394	$21,250	$29,644			0		$0	-105	-15	90		$0	-2.00	-0.25	1.75		$0	**$29,644**	**0.174**	**$5,158**
2040	$0	$8,109	$21,250	$29,359			0		$0	-105	-15	90		$0	-2.00	-0.25	1.75		$0	**$29,359**	**0.164**	**$4,815**
2041	$0	$7,833	$21,250	$29,083			0		$0	-105	-15	90		$0	-2.00	-0.25	1.75		$0	**$29,083**	**0.155**	**$4,508**
2042	$12,500	$7,567	$31,250	$51,317			0		$0	-105	-15	90		$0	-2.00	-0.25	1.75		$0	**$51,317**	**0.146**	**$7,492**
2043	$0	$7,309	$21,250	$28,559			0		$0	-105	-15	90		$0	-2.00	-0.25	1.75		$0	**$28,559**	**0.138**	**$3,941**
2044	$0	$7,061	$21,250	$28,311			0		$0	-105	-15	90		$0	-2.00	-0.25	1.75		$0	**$28,311**	**0.130**	**$3,680**
2045	$0	$6,821	$21,250	$28,071			0		$0			0		$0			0.00		$0	**$28,071**	**0.123**	**$3,453**
2046	$0	$6,589	$21,250	$27,839			0		$0			0		$0			0.00		$0	**$27,839**	**0.116**	**$3,229**
2047				$0			0		$0			0		$0			0.00		$0	**$0**	**0.109**	**$0**
2048				$0			0		$0			0		$0			0.00		$0	**$0**	**0.103**	**$0**
2049				$0			0		$0			0		$0			0.00		$0	**$0**	**0.097**	**$0**
2050				$0			0		$0			0		$0			0.00		$0	**$0**	**0.092**	**$0**
2051				$0			0		$0			0		$0			0.00		$0	**$0**	**0.087**	**$0**
2052				$0			0		$0			0		$0			0.00		$0	**$0**	**0.082**	**$0**
2053				$0			0		$0			0		$0			0.00		$0	**$0**	**0.077**	**$0**
2054				$0			0		$0			0		$0			0.00		$0	**$0**	**0.073**	**$0**
2055				$0			0		$0			0		$0			0.00		$0	**$0**	**0.069**	**$0**
2056				$0			0		$0			0		$0			0.00		$0	**$0**	**0.065**	**$0**
2057				$0			0		$0			0		$0			0.00		$0	**$0**	**0.061**	**$0**
2058				$0			0		$0			0		$0			0.00		$0	**$0**	**0.058**	**$0**
2059				$0			0		$0			0		$0			0.00		$0	**$0**	**0.054**	**$0**
2060				$0			0		$0			0		$0			0.00		$0	**$0**	**0.051**	**$0**
TOTAL	**1,120,610**	**341,236**	**677,500**	**2,139,346**	-	-	-	-	-	**(3,360)**	**(480)**	**2,880**	-	-	**(64)**	**(8)**	**56**	-	-	**2,139,346**	**17**	**1,072,816**

Total Present Value of Discounted Benefits over Project Life (Monetized Benefits): $1,072,816

Project Allocation: 100.0%

Total Present Value of Discounted Benefits (Monetized Benefits): **$1,072,816**

Narrative description of benefits: Large 3Acre feet /Day Treatment Facility Financing. Construction and Fincancing Costs. Startup & Material Cost/Operations & Maint Cost. Operations & Maint Cost. Facility Improvement/Upgrades, Major Maint & Operations Cost. Estimated cost to construct a large 3 Acre foot/day max capacity basin wide treatment facility to treat the 85th percentile strom 5year sotm ecen ($21.1375 M including financing bonding, to start design and construction in 2016 and be completed in 2020) system at the mouth of theTecolote Creek to obtain TMDL comliance for Indicator Bacteria, TSS, Nitrate and Metals by 2020. Attributable portion of these cost is 2.5 % of the the urbanized water shed drainds into the project LIB/BMP improvements (Bannnock Street Project).

Capital costs are for large 3 acrefeet/day treatment facility construction and financing cost through 2017 and then facility improvements/upgrades at 5-year intervals through 2046. Replacement costs are for standard O&M costs with major O&M costs at 5-year intervals from 2017 through 2046.

Narrative description of benefits: *Calculated increase in vistorship ffrom watershed side improvements to the water quaility of Tecolote Creek and West Mission Bay*

Narrative description of benefits: *Watershed side improvements to the water quaility of Tecolote Creek and West Mission Bay*

Narrative description of benefits: *Watershed side improvements to the water quaility of Tecolote Creek and West Mission Bay*

Comments:

San Diego Integrated Regional Water Management
Implementation Grant Proposal
Appendix 8-1

Table 16 - Water Quality and Other Expected Benefits (2009 dollars)

Project: Pilot Concrete Channel Infiltration Project

	(b) Type of Benefit: Avoided Cost of UV Facility (Water Quality) *(C) Measure of Benefit [Unit]: Cost of Project ($)*				*(b) Type of Benefit: Reduction in NO3 discharge (Water Quality)* *(C) Measure of Benefit [Unit]: KG per day [not monetized]*					*(b) Type of Benefit: Reduction in fecal coliform disharge (water quality)* *(C) Measure of Benefit [Unit]: Number of cells [not monetized]*					*(b) Type of Benefit: Reduction in enterococci disharge (water quality)* *(C) Measure of Benefit [Unit]: Number of cells [not monetized]*					*Discounting Calculations for Economic Benefits*		
(a) Year	(d) Avoided Capital Costs	(e) Avoided Replacement Costs	(f) Avoided O&M Costs	(g) Total Avoided Costs [d + e + f]	(d) Without Project	(e) With Project	(f) Change Resulting from Project [e - d]	(g) Unit $ Value	(h) Annual $ Value [f x g]	(d) Without Project	(e) With Project	(f) Change Resulting from Project [e - d]	(g) Unit $ Value	(h) Annual $ Value [f x g]	(d) Without Project	(e) With Project	(f) Change Resulting from Project [e - d]	(g) Unit $ Value	(h) Annual $ Value [f x g]	(h) Total Annual Benefits ($)	(i) Discount Value	(j) Discounted Benefits [h x i]
2009	$0	$0	$0	$0			0		$0			0		$0			0		$0	**$0**	**1.000**	**$0**
2010	$0	$0	$0	$0			0		$0			0		$0			0		$0	**$0**	**0.943**	**$0**
2011	$0	$0	$0	$0			0		$0			0		$0			0		$0	**$0**	**0.890**	**$0**
2012	$0	$0	$0	$0	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$0**	**0.840**	**$0**
2013	$0	$0	$0	$0	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$0**	**0.792**	**$0**
2014	$0	$0	$0	$0	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$0**	**0.747**	**$0**
2015	$0	$0	$0	$0	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$0**	**0.705**	**$0**
2016	$0	$0	$0	$0	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$0**	**0.665**	**$0**
2017	$0	$0	$0	$0	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$0**	**0.627**	**$0**
2018	$0	$0	$0	$0	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$0**	**0.592**	**$0**
2019	$3,000,000	$0	$0	$3,000,000	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$3,000,000**	**0.558**	**$1,674,000**
2020	$0	$0	$16,000	$16,000	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$16,000**	**0.527**	**$8,432**
2021	$0	$0	$16,000	$16,000	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$16,000**	**0.497**	**$7,952**
2022	$0	$0	$16,000	$16,000	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$16,000**	**0.469**	**$7,504**
2023	$0	$0	$16,000	$16,000	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$16,000**	**0.442**	**$7,072**
2024	$0	$0	$16,000	$16,000	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$16,000**	**0.417**	**$6,672**
2025	$0	$0	$16,000	$16,000	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$16,000**	**0.390**	**$6,240**
2026	$0	$0	$16,000	$16,000	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$16,000**	**0.371**	**$5,936**
2027	$0	$0	$16,000	$16,000	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$16,000**	**0.350**	**$5,600**
2028	$0	$0	$16,000	$16,000	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$16,000**	**0.331**	**$5,296**
2029	$0	$0	$16,000	$16,000	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$16,000**	**0.312**	**$4,992**
2030	$0	$0	$16,000	$16,000	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$16,000**	**0.294**	**$4,704**
2031	$0	$0	$16,000	$16,000	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$16,000**	**0.278**	**$4,448**
2032	$0	$0	$16,000	$16,000	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$16,000**	**0.262**	**$4,192**
2033	$0	$0	$16,000	$16,000	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$16,000**	**0.247**	**$3,952**
2034	$0	$0	$16,000	$16,000	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$16,000**	**0.233**	**$3,728**
2035	$0	$0	$16,000	$16,000	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$16,000**	**0.220**	**$3,520**
2036	$0	$0	$16,000	$16,000	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$16,000**	**0.207**	**$3,312**
2037	$0	$0	$16,000	$16,000	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$16,000**	**0.196**	**$3,136**
2038	$0	$0	$16,000	$16,000	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$16,000**	**0.185**	**$2,960**
2039	$0	$0	$16,000	$16,000	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$16,000**	**0.174**	**$2,784**
2040	$0	$0	$16,000	$16,000	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$16,000**	**0.164**	**$2,624**
2041	$0	$0	$16,000	$16,000	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$16,000**	**0.155**	**$2,480**
2042	$0	$0	$16,000	$16,000	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$16,000**	**0.146**	**$2,336**
2043	$0	$0	$16,000	$16,000	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$16,000**	**0.138**	**$2,208**
2044	$0	$0	$16,000	$16,000	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$16,000**	**0.130**	**$2,080**
2045	$0	$0	$16,000	$16,000	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$16,000**	**0.123**	**$1,968**
2046	$0	$0	$16,000	$16,000	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$16,000**	**0.116**	**$1,856**
2047	$0	$0	$16,000	$16,000	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$16,000**	**0.109**	**$1,744**
2048	$0	$0	$16,000	$16,000	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$16,000**	**0.103**	**$1,648**
2049	$0	$0	$16,000	$16,000	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$16,000**	**0.097**	**$1,552**
2050	$0	$0	$16,000	$16,000	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$16,000**	**0.092**	**$1,472**
2051	$0	$0	$16,000	$16,000	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$16,000**	**0.087**	**$1,392**
2052	$0	$0	$16,000	$16,000	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$16,000**	**0.082**	**$1,312**
2053	$0	$0	$16,000	$16,000	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$16,000**	**0.077**	**$1,232**
2054	$0	$0	$16,000	$16,000	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$16,000**	**0.073**	**$1,168**
2055	$0	$0	$16,000	$16,000	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$16,000**	**0.069**	**$1,104**
2056	$0	$0	$16,000	$16,000	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$16,000**	**0.065**	**$1,040**
2057	$0	$0	$16,000	$16,000	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$16,000**	**0.061**	**$976**
2058	$0	$0	$16,000	$16,000	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$16,000**	**0.058**	**$928**
2059	$0	$0	$16,000	$16,000	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$16,000**	**0.054**	**$869**
2060	$0	$0	$16,000	$16,000	-0.67	0	0.67		$0	-440,000,000	0	440,000,000		$0	-13,600,000,000	0	13,600,000,000		$0	**$16,000**	**0.051**	**$819**
TOTAL	**3,000,000**	**-**	**656,000**	**3,656,000**	**(33)**	**-**	**33**	**-**	**-**	**(21,560,000,000)**	**-**	**21,560,000,000**	**-**	**-**	**(666,400,000,000)**	**-**	**666,400,000,000**	**-**	**-**	**3,656,000**	**17**	**1,809,240**

Total Present Value of Discounted Benefits over Project Life (Monetized Benefits): $1,809,240

Project Allocation: 100.0%

Total Present Value of Discounted Benefits (Monetized Benefits): **$1,809,240**

Narrative description of benefit: *UV facility at one location. Similar facility to those used by the Cities of Encinitas and Oceanside.*

Narrative description of benefit: *Elimination of dry weather flows to avoid pollutant discharges*

Narrative description of benefit: *Elimination of dry weather flows to avoid pollutant discharges*

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Comments:

San Diego Integrated Regional Water Management
Implementation Grant Proposal
Appendix 8-1

Table 16 - Water Quality and Other Expected Benefits (2009 dollars)

Project: San Diego Regional Water Quality Assessment and Outreach Project

	(b) Type of Benefit: Avoided regulatory monitoring					*(b) Type of Benefit: WQ improvements related to protecting, restoring or enhancing beneficial uses*					*(b) Type of Benefit: WQ improvements for impaired water bodies and sensitive habitats*					*(b) Type of Benefit: Ecosystem improvements and preservation (including quality of habitat)*					*Discounting Calculations for Economic Benefits*		
	(C) Measure of Benefit [Unit]: Annual cost ($)					*(C) Measure of Benefit [Unit]: Annual number of water quality samples per receiving water body [not monetized]*					*(C) Measure of Benefit [Unit]: Annual number of water quality samples per receiving water body [not monetized]*					*(C) Measure of Benefit [Unit]: Pounds of trash removed per year [not monetized]*							
(a) Year	(d) Without Project	(e) With Project	(f) Change Resulting from Project [e - d]	(g) Unit $ Value	(h) Annual $ Value [f x g]	(d) Without Project	(e) With Project	(f) Change Resulting from Project [e - d]	(g) Unit $ Value	(h) Annual $ Value [f x g]	(d) Without Project	(e) With Project	(f) Change Resulting from Project [e - d]	(g) Unit $ Value	(h) Annual $ Value [f x g]	(d) Without Project	(e) With Project	(f) Change Resulting from Project [e - d]	(g) Unit $ Value	(h) Annual $ Value [f x g]	(h) Total Annual Benefits ($)	(i) Discount Value	(j) Discounted Benefits [h x i]
2009																					$0	1.000	$0
2010																					$0	0.943	$0
2011																					$0	0.890	$0
2012	-1	0	1	$210,443	$210,443	1	10	9		$0	1	10	9		$0	495,264	680,401	185,137	$0.07	$12,960	**$223,403**	**0.840**	**$187,658**
2013	-1	0	1	$420,886	$420,886	1	10	9		$0	1	10	9		$0	495,264	680,401	185,137	$0.07	$12,960	**$433,846**	**0.792**	**$343,606**
2014	-1	0	1	$210,443	$210,443	1	10	9		$0	1	10	9		$0	495,264	680,401	185,137	$0.07	$12,960	**$223,403**	**0.747**	**$166,882**
2015																					$0	0.705	$0
2016																					$0	0.665	$0
2017																					$0	0.627	$0
2018																					$0	0.592	$0
2019																					$0	0.558	$0
2020																					$0	0.527	$0
2021																					$0	0.497	$0
2022																					$0	0.469	$0
2023																					$0	0.442	$0
2024																					$0	0.417	$0
2025																					$0	0.390	$0
2026																					$0	0.371	$0
2027																					$0	0.350	$0
2028																					$0	0.331	$0
2029																					$0	0.312	$0
2030																					$0	0.294	$0
2031																					$0	0.278	$0
2032																					$0	0.262	$0
2033																					$0	0.247	$0
2034																					$0	0.233	$0
2035																					$0	0.220	$0
2036																					$0	0.207	$0
2037																					$0	0.196	$0
2038																					$0	0.185	$0
2039																					$0	0.174	$0
2040																					$0	0.164	$0
2041																					$0	0.155	$0
2042																					$0	0.146	$0
2043																					$0	0.138	$0
2044																					$0	0.130	$0
2045																					$0	0.123	$0
2046																					$0	0.116	$0
2047																					$0	0.109	$0
2048																					$0	0.103	$0
2049																					$0	0.097	$0
2050																					$0	0.092	$0
2051																					$0	0.087	$0
2052																					$0	0.082	$0
2053																					$0	0.077	$0
2054																					$0	0.073	$0
2055																					$0	0.069	$0
2056																					$0	0.065	$0
2057																					$0	0.061	$0
2058																					$0	0.058	$0
2059																					$0	0.054	$0
2060																					$0	0.051	$0
TOTAL	**-3**	**0**	**3**	**841,772**	**841,772**	**3**	**30**	**27**	**0**	**0**	**3**	**30**	**27**	**0**	**0**	**1,485,792**	**2,041,203**	**555,411**	**0**	**38,879**	**880,651**	**14**	**698,146**

Total Present Value of Discounted Benefits over Project Life (Monetized Benefits): $698,146

Project Allocation: 100.0%

Total Present Value of Discounted Benefits (Monetized Benefits): **$698,146**

Narrative description of benefits: *Each year of the project, 6 to 12 times increase in receiving water sampling frequency, analyses and associated presentation of data, and outreach to watershed groups, and trash removal*

Narrative description of benefits: *Monthly monitoring by Coastkeeper provides increased temporal resolution of water quality data. Samples are collected and analyzed in accordance with standard operating procedures and a state approved Quality Assurance Project Plan (QAPP)*

Narrative description of benefits: *Monlthly monitoring by Coastkeeper provides increased temporal resolution of water quality data. Samples are collected and analyzed in accordance with standard operating procedures and a state approved Quality Assurance Project Plan (QAPP)*

Narrative description of benefits: *In this project Coastkeeper will continue to coordinate inland trash removal events, sponsor corporate clean up events, and coordinate and plan the annual Coastal Clean Up Day events. http://www.sdwatersheds.org/wiki/Cleanups*

Comments: