

Attachment 7

Economic Analysis – Water Supply Costs and Benefits

Attachment 7 provides required economic analysis associated with the water supply costs and benefits the projects included in the Implementation Grant Proposal.

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ATTACHMENT 7

ECONOMIC ANALYSIS – WATER SUPPLY COSTS AND BENEFITS

**UPPER SANTA MARGARITA WATERSHED PLANNING REGION
 PROP 84, IMPLEMENTATION GRANT, ROUND 1 PROPOSAL**

**Section 1
 Economic Costs**

Narrative Description of Proposal’s Economic Costs and Cost Details

The following presents the costs for each of the five projects that are being submitted for the USMW Planning Region, Prop 84, Implementation Grant – Round 1. The capital and other initial costs presented here are identical to those presented in Attachment 4 (Budget) except where additional or previously funded phases have been included and noted. However, the following economic cost tables also account for: (1) the timing of expenditures; (2) additional administration, O&M, and replacement costs (where applicable); and (3) discounting of costs back to present value using the specified requirements set forth in the PSP.

1. Vail Lake Stabilization and Conjunctive Use Project

Capital and other initial costs are included from the beginning of the project in late 2005, with grant funded activities beginning in mid-2011 and completed by mid-2012, inclusive of project design, construction, and environmental mitigation. Costs for operations and maintenance of the project improvements are included through the year 2060 (50-year life for the Vail Lake Transmission Main and Pump Station, and 30-year life for the Quagga Mussel Control Facilities).

Phase	Cost
Previous Capital & Other Initial Costs and Future O&M Costs for Transmission Main and Pump Station Elements	\$9,944,427
Capital & Other Initial Costs and O&M Costs for Quagga Mussel Control Facilities Element as well as Transmission Main and Pump Station Elements	\$18,138,920
Total Project Costs	\$28,083,347
Total Present Value of Discounted Costs	\$20,093,982

*See Table 11-A at the end of this section for detailed present value calculations.

2. Agricultural Irrigation Efficiency Program

Capital and other initial costs are expected to occur over a three year period from 2011 to 2014 as marketing, installations, and monitoring actually occurs. The project has a 15-year life based on the average life of system retrofits, and there are no operation and maintenance costs for the project after implementation of the initial three-year activities.

Phase	Cost
Capital & Other Initial Costs for Agricultural Irrigation Efficiency Program (no O&M costs are anticipated)	\$1,289,760
Total Present Value of Discounted Costs	\$1,051,181

*See Table 11-B at the end of this section for detailed present value calculations.

3. WR-34 Hydroelectric Power Generation Project

Capital and other initial costs are included from the year 2011 to 2013, during project design and construction. Costs for operations and maintenance of the project improvements are included through the year 2038, which represents the end of the project’s useful life (25-year life).

Phase	Cost
Capital & Other Initial Costs and Future O&M Costs for Hydroelectric Power Generation Project	\$1,641,392
Total Present Value of Discounted Costs	\$1,305,800

*See Table 11-C at the end of this section for detailed present value calculations.

4. Water Quality Enhancements in Riverside County

This project is a study to determine the location and potential for various water quality projects, such as stormwater BMPs, restoration and other multi-purpose, multi-beneficial water quality projects. The study will take place from 2011 to 2014.

Phase	Cost
Other Initial Costs for Water Quality/Watershed Assessment Study	\$456,925
Total Present Value of Discounted Costs	\$371,743

*See Table 11-D at the end of this section for detailed present value calculations.

5. Implementing Nutrient Management in the Santa Margarita River Watershed – Phase II, Additional Monitoring

The total estimated budget for Phase 1 of the Implementing Nutrient Management in the Santa Margarita River Watershed project is \$690,000. In order to fully implement the project a second phase would be required with a cost of \$1,534,082 (in 2009 dollars). Capital costs would be expended from 2011 to 2014 for Phase 1, and would extend into 2018 for Phase II. The project would not require operations and maintenance costs.

Phase	Cost
Implementing Nutrient Management in the Santa Margarita River Watershed Capital Costs (Phase I)	\$690,000
Phase II Capital Costs (Additional monitoring, special studies, and development of proposed nutrient WQOs for Santa Margarita River based on the NNE approach)	\$1,510,000
Total Project Costs	\$2,200,000
Total Present Value of Discounted Costs	\$1,534,082

*See Table 11-E at the end of this section for detailed present value calculations.

Table 11-A. Annual Cost of Project									
Project: Vail Lake Stabilization and Conjunctive Use Project									
	Initial Costs	Operations and Maintenance Costs ⁽¹⁾						Discounting Calculations	
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
YEAR	Total From Table 7	Admin	Operation	Maintenance	Replacement	Other	Total Costs (a) + ... + (f)	Discount Factor	Discounted Costs (g) x (h)
2005	\$ 4,740	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 4,740	1.100	\$ 5,214
2006	\$ 582,871	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 582,871	1.060	\$ 617,843
2007	\$ 312,216	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 312,216	1.040	\$ 324,705
2008	\$ 217,405	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 217,405	1.010	\$ 219,579
2009	\$ 651,170	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 651,170	1.000	\$ 651,170
2010	\$ 10,413,677	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 10,413,677	0.943	\$ 9,820,097
2011	\$ 4,038,508	\$ -	\$ 158,226	\$ 11,333	\$ 11,333	\$ -	\$ 4,219,400	0.890	\$ 3,755,266
2012	\$ 2,374,250	\$ -	\$ 160,375	\$ 13,958	\$ 13,958	\$ -	\$ 2,562,541	0.840	\$ 2,152,534
2013	\$ -	\$ -	\$ 162,523	\$ 16,583	\$ 16,583	\$ -	\$ 195,689	0.792	\$ 154,986
2014	\$ -	\$ -	\$ 162,523	\$ 16,583	\$ 16,583	\$ -	\$ 195,689	0.747	\$ 146,180
2015	\$ -	\$ -	\$ 162,523	\$ 16,583	\$ 16,583	\$ -	\$ 195,689	0.705	\$ 137,961
2016	\$ -	\$ -	\$ 162,523	\$ 16,583	\$ 16,583	\$ -	\$ 195,689	0.665	\$ 130,133
2017	\$ -	\$ -	\$ 162,523	\$ 16,583	\$ 16,583	\$ -	\$ 195,689	0.627	\$ 122,697
2018	\$ -	\$ -	\$ 162,523	\$ 16,583	\$ 16,583	\$ -	\$ 195,689	0.592	\$ 115,848
2019	\$ -	\$ -	\$ 162,523	\$ 16,583	\$ 16,583	\$ -	\$ 195,689	0.558	\$ 109,194
2020	\$ -	\$ -	\$ 162,523	\$ 16,583	\$ 16,583	\$ -	\$ 195,689	0.527	\$ 103,128
2021	\$ -	\$ -	\$ 162,523	\$ 16,583	\$ 16,583	\$ -	\$ 195,689	0.497	\$ 97,257
2022	\$ -	\$ -	\$ 162,523	\$ 16,583	\$ 16,583	\$ -	\$ 195,689	0.469	\$ 91,778
2023	\$ -	\$ -	\$ 162,523	\$ 16,583	\$ 16,583	\$ -	\$ 195,689	0.442	\$ 86,495
2024	\$ -	\$ -	\$ 162,523	\$ 16,583	\$ 16,583	\$ -	\$ 195,689	0.417	\$ 81,602
2025	\$ -	\$ -	\$ 162,523	\$ 16,583	\$ 16,583	\$ -	\$ 195,689	0.394	\$ 77,101
2026	\$ -	\$ -	\$ 162,523	\$ 16,583	\$ 16,583	\$ -	\$ 195,689	0.371	\$ 72,601
2027	\$ -	\$ -	\$ 162,523	\$ 16,583	\$ 16,583	\$ -	\$ 195,689	0.350	\$ 68,491
2028	\$ -	\$ -	\$ 162,523	\$ 16,583	\$ 16,583	\$ -	\$ 195,689	0.331	\$ 64,773
2029	\$ -	\$ -	\$ 162,523	\$ 16,583	\$ 16,583	\$ -	\$ 195,689	0.312	\$ 61,055
2030	\$ -	\$ -	\$ 162,523	\$ 16,583	\$ 16,583	\$ -	\$ 195,689	0.294	\$ 57,533
2031	\$ -	\$ -	\$ 162,523	\$ 16,583	\$ 16,583	\$ -	\$ 195,689	0.278	\$ 54,402
2032	\$ -	\$ -	\$ 162,523	\$ 16,583	\$ 16,583	\$ -	\$ 195,689	0.262	\$ 51,271
2033	\$ -	\$ -	\$ 162,523	\$ 16,583	\$ 16,583	\$ -	\$ 195,689	0.247	\$ 48,335
2034	\$ -	\$ -	\$ 162,523	\$ 16,583	\$ 16,583	\$ -	\$ 195,689	0.233	\$ 45,596
2035	\$ -	\$ -	\$ 162,523	\$ 16,583	\$ 16,583	\$ -	\$ 195,689	0.220	\$ 43,052
2036	\$ -	\$ -	\$ 162,523	\$ 16,583	\$ 16,583	\$ -	\$ 195,689	0.207	\$ 40,508
2037	\$ -	\$ -	\$ 162,523	\$ 16,583	\$ 16,583	\$ -	\$ 195,689	0.196	\$ 38,355
2038	\$ -	\$ -	\$ 162,523	\$ 16,583	\$ 16,583	\$ -	\$ 195,689	0.185	\$ 36,202
2039	\$ -	\$ -	\$ 162,523	\$ 16,583	\$ 16,583	\$ -	\$ 195,689	0.174	\$ 34,050
2040	\$ -	\$ -	\$ 162,523	\$ 16,583	\$ 16,583	\$ -	\$ 195,689	0.164	\$ 32,093
2041	\$ -	\$ -	\$ 162,523	\$ 16,583	\$ 16,583	\$ -	\$ 195,689	0.155	\$ 30,332
2042	\$ -	\$ -	\$ 160,375	\$ 13,958	\$ 13,958	\$ -	\$ 188,291	0.146	\$ 27,490
2043	\$ -	\$ -	\$ 158,226	\$ 11,333	\$ 11,333	\$ -	\$ 180,892	0.138	\$ 24,963
2044	\$ -	\$ -	\$ 158,226	\$ 11,333	\$ 11,333	\$ -	\$ 180,892	0.130	\$ 23,516
2045	\$ -	\$ -	\$ 158,226	\$ 11,333	\$ 11,333	\$ -	\$ 180,892	0.123	\$ 22,250
2046	\$ -	\$ -	\$ 158,226	\$ 11,333	\$ 11,333	\$ -	\$ 180,892	0.116	\$ 20,983
2047	\$ -	\$ -	\$ 158,226	\$ 11,333	\$ 11,333	\$ -	\$ 180,892	0.109	\$ 19,717
2048	\$ -	\$ -	\$ 158,226	\$ 11,333	\$ 11,333	\$ -	\$ 180,892	0.103	\$ 18,632
2049	\$ -	\$ -	\$ 158,226	\$ 11,333	\$ 11,333	\$ -	\$ 180,892	0.097	\$ 17,547
2050	\$ -	\$ -	\$ 158,226	\$ 11,333	\$ 11,333	\$ -	\$ 180,892	0.092	\$ 16,642
2051	\$ -	\$ -	\$ 158,226	\$ 11,333	\$ 11,333	\$ -	\$ 180,892	0.087	\$ 15,738
2052	\$ -	\$ -	\$ 158,226	\$ 11,333	\$ 11,333	\$ -	\$ 180,892	0.082	\$ 14,833
2053	\$ -	\$ -	\$ 158,226	\$ 11,333	\$ 11,333	\$ -	\$ 180,892	0.077	\$ 13,929
2054	\$ -	\$ -	\$ 158,226	\$ 11,333	\$ 11,333	\$ -	\$ 180,892	0.073	\$ 13,205
2055	\$ -	\$ -	\$ 158,226	\$ 11,333	\$ 11,333	\$ -	\$ 180,892	0.069	\$ 12,482
2056	\$ -	\$ -	\$ 158,226	\$ 11,333	\$ 11,333	\$ -	\$ 180,892	0.065	\$ 11,758
2057	\$ -	\$ -	\$ 158,226	\$ 11,333	\$ 11,333	\$ -	\$ 180,892	0.061	\$ 11,034
2058	\$ -	\$ -	\$ 158,226	\$ 11,333	\$ 11,333	\$ -	\$ 180,892	0.058	\$ 10,492
2059	\$ -	\$ -	\$ 158,226	\$ 11,333	\$ 11,333	\$ -	\$ 180,892	0.055	\$ 9,949
2060	\$ -	\$ -	\$ 158,226	\$ 11,333	\$ 11,333	\$ -	\$ 180,892	0.052	\$ 9,406
Total	\$ 18,594,837	\$ 17,695,010	\$ 8,040,210	\$ 724,150	\$ 724,150	\$ -	\$ 27,002,628		
Total Present Value of Discounted Costs (Sum of Column (i))									\$ 20,093,982
Transfer to Table 20, column (c), Exhibit F: Proposal Costs and Benefits Summaries									
Comments:									
The Vail Lake Transmission Main and Pump Station has a 50- year life, while the Quagga Mussel Control Facilities has a 30 year life.									

Table 11-B. Annual Cost of Project									
Project: Agricultural Irrigation Efficiency Program									
	Initial Costs	Operations and Maintenance Costs ⁽¹⁾					Discounting Calculations		
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
YEAR	Total From Table 7	Admin	Operation	Maintenance	Replacement	Other	Total Costs (a) + ... + (f)	Discount Factor	Discounted Costs (g) x (h)
2009	\$0	\$0	\$0	\$0	\$0	\$0	\$0	1.000	\$0
2010	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.943	\$0
2011	\$188,327	\$0	\$0	\$0	\$0	\$0	\$188,327	0.890	\$167,611
2012	\$440,573	\$0	\$0	\$0	\$0	\$0	\$440,573	0.840	\$370,081
2013	\$440,573	\$0	\$0	\$0	\$0	\$0	\$440,573	0.792	\$348,934
2014	\$220,287	\$0	\$0	\$0	\$0	\$0	\$220,287	0.747	\$164,554
2015	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.705	\$0
2016	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.665	\$0
2017	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.627	\$0
2018	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.592	\$0
2019	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.558	\$0
2020	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.527	\$0
2021	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.497	\$0
2022	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.469	\$0
2023	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.442	\$0
2024	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.417	\$0
2025	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.394	\$0
2026	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.371	\$0
2027	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.350	\$0
Total	\$1,289,760	\$0	\$0	\$0	\$0	\$0	\$1,289,760		
Total Present Value of Discounted Costs (Sum of Column (i))									\$1,051,181
Transfer to Table 20, column (c), Exhibit F: Proposal Costs and Benefits Summaries									
Comments:									

(1) The incremental change in O&M costs attributable to the project.

Table 11-C. Annual Cost of Project									
Project: WR-34 Hydroelectric Power Generation Project									
	Initial Costs	Operations and Maintenance Costs ⁽¹⁾					Discounting Calculations		
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
YEAR	Total From Table 7	Admin	Operation	Maintenance	Replacement	Other	Total Costs (a) + ... + (f)	Discount Factor	Discounted Costs (g) x (h)
2009	\$0	\$0	\$0	\$0	\$0	\$0	\$0	1.000	\$0
2010	\$150,000	\$0	\$0	\$0	\$0	\$0	\$150,000	0.943	\$141,450
2011	\$695,696	\$0	\$0	\$0	\$0	\$0	\$695,696	0.890	\$619,169
2012	\$495,696	\$0	\$0	\$0	\$0	\$0	\$495,696	0.840	\$416,385
2013	\$0	\$0	\$12,000	\$0	\$0	\$0	\$12,000	0.792	\$9,504
2014	\$0	\$0	\$12,000	\$0	\$0	\$0	\$12,000	0.747	\$8,964
2015	\$0	\$0	\$12,000	\$0	\$0	\$0	\$12,000	0.705	\$8,460
2016	\$0	\$0	\$12,000	\$0	\$0	\$0	\$12,000	0.665	\$7,980
2017	\$0	\$0	\$12,000	\$0	\$0	\$0	\$12,000	0.627	\$7,524
2018	\$0	\$0	\$12,000	\$0	\$0	\$0	\$12,000	0.592	\$7,104
2019	\$0	\$0	\$12,000	\$0	\$0	\$0	\$12,000	0.558	\$6,696
2020	\$0	\$0	\$12,000	\$0	\$0	\$0	\$12,000	0.527	\$6,324
2021	\$0	\$0	\$12,000	\$0	\$0	\$0	\$12,000	0.497	\$5,964
2022	\$0	\$0	\$12,000	\$0	\$0	\$0	\$12,000	0.469	\$5,628
2023	\$0	\$0	\$12,000	\$0	\$0	\$0	\$12,000	0.442	\$5,304
2024	\$0	\$0	\$12,000	\$0	\$0	\$0	\$12,000	0.417	\$5,004
2025	\$0	\$0	\$12,000	\$0	\$0	\$0	\$12,000	0.394	\$4,728
2026	\$0	\$0	\$12,000	\$0	\$0	\$0	\$12,000	0.371	\$4,452
2027	\$0	\$0	\$12,000	\$0	\$0	\$0	\$12,000	0.350	\$4,200
2028	\$0	\$0	\$12,000	\$0	\$0	\$0	\$12,000	0.331	\$3,972
2029	\$0	\$0	\$12,000	\$0	\$0	\$0	\$12,000	0.312	\$3,744
2030	\$0	\$0	\$12,000	\$0	\$0	\$0	\$12,000	0.294	\$3,528
2031	\$0	\$0	\$12,000	\$0	\$0	\$0	\$12,000	0.278	\$3,336
2032	\$0	\$0	\$12,000	\$0	\$0	\$0	\$12,000	0.262	\$3,144
2033	\$0	\$0	\$12,000	\$0	\$0	\$0	\$12,000	0.247	\$2,964
2034	\$0	\$0	\$12,000	\$0	\$0	\$0	\$12,000	0.233	\$2,796
2035	\$0	\$0	\$12,000	\$0	\$0	\$0	\$12,000	0.220	\$2,640
2036	\$0	\$0	\$12,000	\$0	\$0	\$0	\$12,000	0.207	\$2,484
2037	\$0	\$0	\$12,000	\$0	\$0	\$0	\$12,000	0.196	\$2,352
Total	\$1,341,392	\$0	\$300,000	\$0	\$0	\$0	\$1,641,392		
Total Present Value of Discounted Costs (Sum of Column (i))									\$1,305,800
Transfer to Table 20, column (c), Exhibit F: Proposal Costs and Benefits Summaries									
Comments:									

(1) The incremental change in O&M costs attributable to the project.

Table 11-D. Annual Cost of Project									
Project: Water Quality Enhancements in Riverside County									
	Initial Costs	Operations and Maintenance Costs ⁽¹⁾					Discounting Calculations		
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
YEAR	Total From Table 7	Admin	Operation	Maintenance	Replacement	Other	Total Costs (a) + ... + (f)	Discount Factor	Discounted Costs (g) x (h)
2009	\$0	\$0	\$0	\$0	\$0	\$0	\$0	1.000	\$0
2010	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.943	\$0
2011	\$96,925	\$0	\$0	\$0	\$0	\$0	\$96,925	0.890	\$86,263
2012	\$120,000	\$0	\$0	\$0	\$0	\$0	\$120,000	0.840	\$100,800
2013	\$120,000	\$0	\$0	\$0	\$0	\$0	\$120,000	0.792	\$95,040
2014	\$120,000	\$0	\$0	\$0	\$0	\$0	\$120,000	0.747	\$89,640
2015	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.705	\$0
2016	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.665	\$0
2017	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.627	\$0
2018	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.592	\$0
2019	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.558	\$0
2020	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.527	\$0
2021	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.497	\$0
2022	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.469	\$0
2023	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.442	\$0
2024	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.417	\$0
2025	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.394	\$0
2026	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.371	\$0
2027	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.350	\$0
Total	\$456,925	\$0	\$0	\$0	\$0	\$0	\$456,925		
Total Present Value of Discounted Costs (Sum of Column (i))									\$371,743
Transfer to Table 20, column (c), Exhibit F: Proposal Costs and Benefits Summaries									
Comments:									

(1) The incremental change in O&M costs attributable to the project.

Table 11-E. Annual Cost of Project									
Project: Implementing Nutrient Management in the Santa Margarita River Watershed									
	Initial Costs	Operations and Maintenance Costs ⁽¹⁾					Discounting Calculations		
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
YEAR	Total From Table 7	Admin	Operation	Maintenance	Replacement	Other	Total Costs (a) + ... + (f)	Discount Factor	Discounted Costs (g) x (h)
2009	\$0	\$0	\$0	\$0	\$0	\$0	\$0	1.000	\$0
2010	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.943	\$0
2011	\$98,601	\$0	\$0	\$0	\$0	\$0	\$98,601	0.890	\$87,755
2012	\$197,133	\$0	\$0	\$0	\$0	\$0	\$197,133	0.840	\$165,592
2013	\$197,133	\$0	\$0	\$0	\$0	\$0	\$197,133	0.792	\$156,129
2014	\$197,133	\$0	\$0	\$0	\$0	\$0	\$197,133	0.747	\$147,258
2015	\$377,500	\$0	\$0	\$0	\$0	\$0	\$377,500	0.705	\$266,138
2016	\$377,500	\$0	\$0	\$0	\$0	\$0	\$377,500	0.665	\$251,038
2017	\$377,500	\$0	\$0	\$0	\$0	\$0	\$377,500	0.627	\$236,693
2018	\$377,500	\$0	\$0	\$0	\$0	\$0	\$377,500	0.592	\$223,480
2019	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.558	\$0
2020	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.527	\$0
2021	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.497	\$0
2022	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.469	\$0
2023	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.442	\$0
2024	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.417	\$0
2025	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.394	\$0
2026	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.371	\$0
2027	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.350	\$0
2028	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.331	\$0
2029	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.312	\$0
2030	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.294	\$0
2031	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.278	\$0
2032	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.262	\$0
2033	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.247	\$0
2034	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.233	\$0
2035	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.220	\$0
2036	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.207	\$0
2037	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.196	\$0
2038	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.185	\$0
2039	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.174	\$0
2040	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.164	\$0
2041	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.155	\$0
2042	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.146	\$0
2043	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.138	\$0
2044	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.130	\$0
2045	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0.123	\$0
Total	\$2,200,000	\$0	\$0	\$0	\$0	\$0	\$2,200,000		
Total Present Value of Discounted Costs (Sum of Column (i))									\$1,534,082
Transfer to Table 20, column (c), Exhibit F: Proposal Costs and Benefits Summaries									
Comments:									
Includes not only this proposed project of \$690,000 but also additional implementation costs of \$1,510,000.									

(1) The incremental change in O&M costs attributable to the project.

Section 2 Water Supply Benefits

Narrative Description of Proposal’s Expected Water Supply Benefits

Rancho California Water District (RCWD), the region’s main water supplier, obtains its water supply from local groundwater (55%); imported water from the Metropolitan Water District (MWD), which in turn gets its water from the Sacramento-San Joaquin Delta and Colorado River (41%); and recycled water (4%). A gap analysis was conducted to determine current and future levels of water supply reliability. This gap analysis indicated that potential water shortages as great as 12,000 AFY could occur by 2020 and increase to over 25,000 AFY by 2050 if no new actions were taken.

In 2005, RCWD completed a comprehensive Integrated Resources Plan (IRP) to identify strategies for reducing imported water and improving water supply reliability, within the constraints of being cost-effective and maintaining the region’s high quality of life and natural resources.

This plan resulted in a preferred strategy that included the following projects and programs:

1. Increase water conservation and water use efficiency, particularly for agricultural customers
2. Increase groundwater recharge and groundwater production by enhanced use of Vail Lake, through conjunctive use of imported water
3. Increase use of recycled water through advanced treatment
4. Seek water transfers where and when necessary to avoid any potential remaining water shortages

Through modeling of the system, it was shown that this strategy not only increased supply reliability over the planning period (through 2035), but also reduced water imports and overall costs to the region’s urban and agricultural customers.

In addition to the projects evaluated in RCWD’s 2005 IRP, several other projects in the Upper Santa Margarita Watershed region were identified during the IRWM process that would achieve various water supply benefits. The five projects that are being proposed for Round 1 Grant Implementation are shown in the following table along with their estimated water supply benefits.

**Upper Santa Margarita Watershed IRWM Implementation Proposal
Projects and Benefits Summary**

Water Supply Benefits	1. Vail Lake Stabilization and Conjointive Use Project	2. Agricultural Irrigation Efficiency Program	3. WR-34 Hydroelectric Power Generation Project	4. Water Quality Enhancements in Riverside County	5. Implementing Nutrient Management in the Santa Margarita River Watershed
Quantified					
Reduced Imported Water Purchases	X	X		X ¹	X
Reduced Need for Emergency Storage Capacity	X	X			
Reduced Groundwater Pumping		X			
Increased water supply reliability	X		X		
Increased Local Recycled Water Supply					X
Enhanced Groundwater Recharge	X			X ¹	
Stabilized Water Rates			X		
Qualified (not quantified)					
Reduced Likelihood of Water Shortage Impacts	X	X		X ¹	X

¹The purpose of this project is to determine the location and types of multipurpose water quality projects that could be implemented. Therefore at this time all water supply benefits can only be assessed at a qualitative level.

Although many of the supply benefits listed in the previous table can be quantified, for the purposes of the economic analysis and to ensure no double-counting of benefits is made, only the avoided water supply was quantified in economic terms. Because MWD is the regional water wholesaler that imports water from the Bay Delta and Colorado River, its water rates are a perfect proxy for estimating avoided water supply.

MWD has different types of water, firm and replenishment, treated and untreated, and Tier 1 and Tier 2. Tier 2 represents the marginal cost of imported water. Each member agency gets an allocation of Tier 1 water. If an agency goes above that allocation, it must purchase water from MWD at the higher Tier 2 rate. This helps pay for MWD to secure additional water from transfers and groundwater banking programs. RCWD is currently purchasing an average of about 7,000 AFY at the Tier 2 rates. As RCWD service area is growing, all future water demands will require more Tier 2 imported water. Therefore, any increase in local supplies or reduction in water demand (through conservation) will offset the higher marginal cost of MWD water (Tier 2). In addition, MWD levies a peaking charge on peak usage of water. Again, any increase in local supply or reduction in water demand will offset that peaking charge.

In July 2010, MWD presented its projection of Tier 2 (plus peaking) water rates to its member agencies as part of its long-range finance plan. The rate projections are through 2020. After 2020, MWD anticipates water rates will increase only at the rate of inflation. The rate projections through 2020 not only include inflation but increases in costs due to new capital projects and water supply purchases. To convert the nominal year water rates into a constant 2009 dollar equivalent, the nominal year values were discounted by 3% each year (the assumed amount of inflation). The following table shows MWD’s water rate projections and the conversion to constant 2009 dollars.

MWD Projected Water Rates for Imported Supply			
Year	Tier 2 Treated Rate Plus Peaking Charge in Nominal Year \$ (\$/AF)	Discount Factor to Convert Nominal Year to 2009 \$ (assumes 3% infl)	Tier 2 Treated Rate Plus Peaking Charge in 2009 \$ (\$/AF)
2010	\$821	0.971	\$797
2011	\$879	0.943	\$829
2012	\$930	0.915	\$851
2013	\$963	0.888	\$856
2014	\$1,010	0.863	\$872
2015	\$1,060	0.837	\$887
2016	\$1,118	0.813	\$909
2017	\$1,155	0.789	\$912
2018	\$1,198	0.766	\$918
2019	\$1,234	0.744	\$919
2020	\$1,271	0.722	\$919

Source: Metropolitan Water District of Southern California, MWD Member Agency Manager Meeting on the Long Range Finance Plan (July 2010).

The following Sections present the quantification and narrative of water supply benefits for each of the five projects.

Section 3

Water Supply Benefits for Project 1: Vail Lake Stabilization and Conjunctive Use Project – Rancho California Water District

Avoided Water Supply

Water supply benefits resulting from implementation of the Vail Lake Stabilization and Conjunctive Use Project (Project) will include reduced imported water purchases (especially during droughts), avoided water supply projects (such as water treatment), and avoided water shortage impacts. Benefits also include enhanced groundwater replenishment. The following are details regarding project costs, expected water supply benefits, and supporting information.

The project facilities include a 70 cubic feet per second (cfs) pump station located at the Upper Valle De Los Caballos (VDC) Recharge Ponds, and approximately 14,000 lineal feet of 48-inch diameter transmission pipeline. The Project facilities will convey imported untreated water acquired from the MWD for storage in Vail Lake and subsequent groundwater recharge in the VDC Recharge Ponds. It is anticipated that these MWD purchases will be made during surplus conditions, when water withdrawals from the Bay Delta are less impacting on the environment. The Project is a recommended water resource improvement from the RCWD's Regional Integrated Resources Plan and Water Facilities Master Plan.

RCWD currently stores only local runoff in Vail Lake and has a surface water storage permit in Vail Lake for up to 40,000 AF from November 1 to April 30. During these months, RCWD releases available water from Vail Lake to the VDC spreading basins, about 1.5 miles downstream, for groundwater recharge. From May through October, existing State permits prohibit storage and require inflow to pass through Vail Lake to Temecula Creek. The amount of local runoff reaching the lake can vary widely depending on hydrological conditions. From 1962 to 2000, flows into Vail Lake ranged from 218 AFY to 29,570 AFY, with an average flow of 5,150 AFY.

The storage capacity of Vail Lake is approximately 40,000 AFY with a surface area of 1,000 acres. The historical available storage has varied widely. Historically, RCWD was only able to use Vail Lake to store local runoff; however, the lake has the capacity to store imported water or highly-treated recycled water.

Additionally, RCWD has increased groundwater pumping over the past 15 years to meet increased demands. Groundwater recharge from Vail Lake after 1999 has been unavailable due to local drought conditions, and RCWD has increased recharge by purchasing additional imported water.

The Project will convey 4,521 AFY of raw-untreated MWD water from turnout EM-21 to Vail Lake for seasonal storage and for groundwater replenishment. One of the goals of the Project is to reduce the overall cost of imported water to the District. The Project would allow increased use of Vail Lake for seasonal storage at a discounted rate for raw water offsetting the purchase of treated imported water deliveries for agriculture, thereby reducing the overall cost of water to the District.

MWD water rates include full service and discounted rates (for groundwater replenishment and agricultural water). Full service rate water includes two more tiers, with the second tier being set at MWD's marginal cost for new supplies. Therefore, the more full service water that RCWD purchases from WMD, the greater the costs because more of that water will be at the Tier 2 pricing levels. If treated water is purchased from MWD, there is a treatment surcharge added, which is projected to increase faster than raw water rates. Therefore, when RCWD can maximize deliveries from raw water and replenishment water by using Vail Lake for storage, significant savings result.

In addition, because this project will allow for increased groundwater production, especially during peak periods, a new local water treatment plant will not be needed. Without additional local supplies, RCWD

will run out of treated water capacity in 2025. By 2050, RCWD could experience a short-fall in water treatment capacity by as much as 125 cfs (RCWD IRP, 2005). The following table presents a summary of the present value discounted benefits using MWD’s water rates to determine avoided water supply.

Type of Benefit	Supply Yield Benefit (AFY)	Avoided MWD Water (\$/AF)	Years of Benefit	Total Dollar Benefit
Avoided Imported Water	4,521	\$851-\$919	50	\$202,463,914
Total PV Avoided Water Import Costs after Discounting				\$57,285,607

*See Table 12-A at the end of this section to detailed present value calculations.

Avoided O&M Costs

The VLTM&PS, which will provide a means to supplement the District’s water supply by conveying surplus raw water from the MWD San Diego Pipeline No. 6 to Vail Lake. Since MWD’s raw water supply contains quagga mussels and since Vail Lake is currently uninfested, RCWD has been actively studying quagga mussel control strategies during operation of the VLTM&PS. The Quagga Mussel Control Facilities Project is intended to supplement the current quagga mussel control program operated by MWD, which consists of inspections of water conveyance systems, investigative studies to assess mussel transport and settling, vulnerability assessment of facilities at risk for quagga mussel settlement, studies of managing lake recreational facilities, control strategies to control quagga mussel spread from Colorado River Aqueduct, evaluate screen designs at pumping plants, extensive chlorination, proposed isolation barriers and evaluation of integrated pest management.

If the Quagga Mussel Control Facilities were not construction, Vail Lake could potentially become infested with quagga mussels. Based on discussions with other agencies that operate lakes having quagga mussel infestations, the following O&M activities are anticipated at Vail Lake if quagga mussels control systems are not implemented at the VLTM&PS:

1. Routine maintenance inspections of lake, pipelines and associated facilities;
2. Water sampling and lab analysis of quagga mussel concentrations;
3. Real-time video camera monitoring (via remote operated vehicles {ROVs}) and/or diver inspections of underwater lake inlets/outlets, pipeline and facilities;
4. Draining and/or isolating lake, pipeline and facilities for dessication/removal of mussels;
5. Stratifying lake to create oxygen deficient zones;
6. Use of biological (predators, parasites) and non-oxidative (molluscicides) controls to damage or kill quagga mussels;
7. Use of physical or mechanical processes (powerwashing, scrubbing) to remove quagga mussels; and
8. Installation of materials that discourage or prevent mussel attachment (copper).

The costs associated with quagga mussel infestations have been estimated as a minimum of \$200,000 annually based on the following information:

- As described by nearby agencies:
 - » Inspection of lakes, pipelines and facilities for mussels via Remote Operated Vehicles (ROVs) and/or divers (~\$10,000/year);
 - » Sampling and lab analysis of lake water for veliger counts (~\$15,000/year); and
 - » Lake and facility maintenance activities to eradicate quagga mussels \$75,000/year.
- Estimated cost for additional RCWD labor to coordinate and manage quagga mussel O&M activities: one (full-time equivalent) RCWD employee with benefits (~\$110,000/year).
- The potential use of biological and/or non-oxidative controls, special materials, etc. are expected to increase the annual cost associated with a lake infestation.

Avoided Water Shortage Costs (Not Quantified)

Because of the additional storage in Vail Lake, RCWD will have a local source of water that can be used to help mitigate water shortages during times when MWD imposes allocations of imported water. In 2009 and 2010, MWD had to cut its imported water deliveries by 15 to 20% in response to prolonged drought and environmental flow restrictions in the Bay Delta. This resulted in water agencies, such as RCWD, to impose mandatory water use restrictions that resulted in untold economic impacts.

Identification and Distribution of Beneficiaries

The beneficiaries of this project are statewide, regional and local. Local water customers would receive higher supply reliability and lower costs. Because during droughts RCWD would take less MWD water, MWD's other member agencies would potentially have more water to use creating a regional benefit. During peak summer months or droughts, less water would be imported as a result of this project thereby providing state benefits in reducing environmental impacts in the Bay Delta.

Timing of Benefits

Benefits would start to occur by 2012 and continue for the life of the full project (50 years).

Uncertainty of Benefits

The largest uncertainty is availability of surplus water from MWD. However, even though MWD may not officially declare surplus conditions for an entire year (like they have done many times in the past), there will always be times during a given year in which MWD has more water than demands. A project like this will give MWD a place to store that water within the region.

Potential Adverse Effects

This project is not expected to have any adverse effects over the long-run life of the project. Any near-term impacts due to construction of facilities will be mitigated through the CEQA process.

Section 4

Water Supply Benefits for Project 2: Agricultural Irrigation Efficiency Program – Rancho California Water District

Water supply benefits resulting from implementation of the Agricultural Irrigation Efficiency Program (Project) will include reduced imported water purchases (especially during droughts), avoided water supply projects (such as water treatment), and avoided water shortage impacts. Benefits also include reduced groundwater pumping to meet agricultural demands. The following are details regarding project costs, expected water supply benefits, and supporting information.

Avoided Water Supply Purchases

The region's agriculture is highly dependent on imported water supplies. These imported water supply purchases can be avoided by reducing the site-specific water requirements for local agricultural properties. Data from agricultural irrigation system audits conducted by the Mission Resource Conservation District for the San Diego County Water Authority over the past five years indicates an average per acre distribution uniformity (i.e. efficiency) for agricultural irrigation systems in the local growing region of 68%. System audits conducted following the implementation of measures for increasing system efficiency indicate a per acre improved distribution uniformity of 85%. Utilizing this data in conjunction with historical ETo in local growing regions, and standard crop coefficients for avocados, citrus, and wine grapes, which represent the great majority of local irrigated agriculture, reduced water requirements for local agricultural properties can be calculated using the following equation:

$$((ETo \times Kc) / DU) / 12 \times IA$$

Where,

- ETo = average yearly ETo for the local growing region
- Kc = crop coefficient
- DU = Distribution Uniformity
- IA = Irrigated Acres
- 12 = Acre inches in one acre foot

Furthermore:

Avocados

Of the three major crop types, avocados make up an estimated 71% of the irrigated acreage. Therefore, of the 2000 acres targeted for this program, it is estimated that 1420 acres will be avocado acreage.

$$((54.99 \times 0.86) / 0.68) / 12 \times 1420 = 8,229.6 \text{ AF current estimated water requirement for avocados,}$$

$$((54.99 \times 0.86) / 0.85) / 12 \times 1420 = 6,583.8 \text{ AF reduced water requirement for avocados,}$$

$$8,229.6 - 6,583.8 \text{ AF} = 1,645.8 \text{ AF in Water Supply Benefits}$$

Citrus

Of the three major crop types, citrus makes up an estimated 19% of the irrigated acreage. Therefore, of the 2000 acres targeted for this program, it is estimated that 380 acres will be citrus acreage.

$$((49.54 \times 0.75) / 0.68) / 12 \times 380 = 1,730.2 \text{ AF current estimated water requirement for citrus}$$

$$((49.54 \times 0.75) / 0.85) / 12 \times 380 = 1,384.2 \text{ AF reduced water requirement for citrus}$$

$$1,730.2 \text{ AF} - 1,384.2 = 346 \text{ AF in Water Supply Benefits}$$

Winegrape

Of the three major crop types, citrus makes up an estimated 10% of the irrigated acreage. Therefore, of the 2000 acres targeted for this program, it is estimated that 200 acres will be winegrape acreage.

$$((49.54 * 0.51) / 0.68) / 12 \times 200 = 619.2 \text{ AF current estimated water requirement for winegrapes}$$

$$((49.54 * 0.51) / 0.85) / 12 \times 200 = 495.4 \text{ AF current estimated water requirement for winegrapes}$$

$$619.2 \text{ AF} - 495.4 \text{ AF} = 123.8 \text{ AF in Water Supply Benefits}$$

Avocado, Citrus, and Winegrape Crops Combined

Based on the preceding calculations, the potential initial water supply benefits at build-out (2015) for this Project over 1,000 irrigated acres are:

Avocados:	1,645.8 AF
Citrus:	346.0 AF
Winegrapes:	123.8 AF
TOTAL	2,115.6 AF over a three-year period

Over the 15-year life of the Project, the Project will realize a total of nearly 27,000 AF of avoided imported water purchases. The following table summarizes the water supply benefit.

Type of Benefit	Supply Yield Benefit (AFY)	Avoided MWD Water (\$/AF)	Years of Benefit	Total Dollar Benefit
Avoided Imported Water	2,115	\$851-\$919	15	\$24,389,294
Total PV Avoided Water Import Costs after Discounting				\$13,291,248

*See Table 12-B at the end of this section to detailed present value calculations.

Avoided Water Shortage Costs (Not Quantified)

The Project provides this benefit in a number of ways. The Project helps reduce the region’s need for both local water supplies and imported water supplies from Metropolitan. These lower water requirements will help ease the strain on supplies if a catastrophic event impacts the regional or MWD system. The reduced water requirements will allow stored water supplies to last longer through the emergency and forestall the threat of greater impacts.

The lower requirements that result from this Project will also have a beneficial effect on storage levels going into a catastrophic scenario. Regional agricultural water requirements will be reduced by more than 27,000 AF (average 2,115 AFY) over the life of the Project. This water requirement reduction will lead to higher storage levels. Higher storage levels will allow delivery of more water in a crisis scenario, thus improving supply reliability in a shortage scenario.

Identification and Distribution of Beneficiaries

The beneficiaries of this project are statewide, regional and local. Local water customers would receive higher supply reliability and lower costs. Because during droughts RCWD would take less MWD water, MWD’s other member agencies would potentially have more water to use creating a regional benefit. During peak summer months or droughts, less water would be imported as a result of this project thereby providing state benefits in reducing environmental impacts in the Delta.

Timing of Benefits

Benefits would start to occur by 2012 and continue for the life of the full project (15 years).

Uncertainty of Benefits

Agricultural irrigation efficiencies and the science and application beyond them is becoming very reliable. Therefore, there is little uncertainty in the benefits estimated here.

Potential Adverse Effects

This project is not expected to have any adverse effects over the long-run life of the project. Any near-term impacts due to construction of facilities will be mitigated through the CEQA process.

Section 5

Water Supply Benefits for Project 3: WR-34 Hydroelectric Power Generation Project – Rancho California Water District

Avoided Water Supply

The substantial cost savings and rate relief that the project provides by reducing the cost of having to purchase energy, allows RCWD to invest in conservation and local supplies, as well as meet its settlement agreement for the Santa Margarita River.

The WR-34 Hydroelectric Power Generation Project will ensure water reliability for the benefit of the Santa Margarita River and Camp Pendleton in compliance with the Santa Margarita River Cooperative Water Resource Management Agreement between RCWD and the United States on behalf of Camp Pendleton Marine Corps Base. RCWD is required by the agreement to discharge water into the River at an annual rate to ensure groundwater replenishment, environmental and ecological enhancement to a critical natural waterway, and water supply to Camp Pendleton. The Project will ensure a sustainable supply of water over the long-term through operational cost savings by the sale of safe and reliable electrical energy. The historical flow rate from WR-34 turnout typically ranges from 4 to 10 cfs, 2,896 AFY to 7,240 AFY, respectively. The Project's financial benefit provides the ability to keep the cost of water stable, ensuring a reliable water supply as required by the Agreement.

Avoided O&M Costs

The Project's pre-design evaluation provided a refined assessment of the technical and economic feasibility of the Project to formulate the basis of final design activities. The pre-design evaluation (Black & Veatch, July 2010) demonstrated the following favorable results:

- The preferred hydropower turbine unit is the 13.1 cfs pump-turbine.
- A modified water discharge regime (i.e. maximum flows during on-peak electric periods) maximizes revenue generation potential.
- Economic evaluation revealed the following:
 - a. Project cost is projected at \$1,341,392.
 - b. Average annual energy revenues of approximately \$166,000.*
 - c. Payback period would be approximately eight years.

Revenue from the sale of reliable electrical energy reduces the overall O&M costs to the project, which will assist in stabilizing water rates by reducing the net cost of water to the Project. O&M costs are currently estimated approximately \$13,000 per year, which includes an offset from energy revenues.

*Energy revenues were based on an analysis of the Southern California Edison program for Eligible Public Water Agencies, as defined in the Water Tariff for Eligible Renewables Schedule WATER, in which SCE purchased total generation output up to 1.5 MW. The total generation output is purchased based on the Market-Price-Referent (MPR), Time of Use (TOU) Periods, and Energy Allocation Factors. The MPR defines the unit price (\$/kWh) at which the energy is purchased. The TOU periods are associated with periods of the day/night and seasons and are defined as On-Peak, Mid-Peak, Off-Peak and Super-off-peak. Based on the TOU period, the generation output is assigned an energy allocation factor, which indicates the relative value of energy during a defined period and are multiplied by the MPR to obtain actual energy rates for the TOU period. For the purposes of the economic evaluation, the applicable energy rates were based on the TOU Periods and assuming a contract period of 25 years at the 2012 MPR of 0.10852 \$/kWh. Average annual energy generation of 1,281 MWh for the 13.1 cfs pump-turbine equals \$166,000/year.

Identification and Distribution of Beneficiaries

The beneficiaries of this project are statewide, regional and local. Local water customers would receive rate relief allowing for more conservation and local supplies to be funded, regional and state beneficiaries would see lower greenhouse gas emissions as this project produces clean, renewable energy.

Timing of Benefits

Benefits would start to occur by 2012 and continue for the life of the full project (25 years).

Uncertainty of Benefits

There is little uncertainty of the estimated benefits. Hydroelectric power generation, especially at this size, is very common.

Potential Adverse Effects

This project is not expected to have any adverse effects over the long-run life of the project. Any near-term impacts due to construction of facilities will be mitigated through the CEQA process.

Section 6

Water Supply Benefits for Project 4: Water Quality Enhancements in Riverside County – Riverside County Flood Control and Conservation District

Implementation of the Water Quality Enhancements for Riverside County - Phase 1 includes pieces of three larger projects included originally in the IRWMP: (1) Retrofit public property with water quality measures - \$10.3 million, (2) Funding for NPDES related public education - \$320,000, and (3) Plan to enhance Master Drainage Plans (MDPs) to incorporate water quality and water conservation aspects as well as construct those facilities - 13.5 million. These projects total to approximately \$24 million dollars.

However, before any of this can be implemented, a study is needed to assess, identify, educate and prepare guidance documents in order to implement physical projects to enhance water quality and conservation throughout the Santa Margarita Watershed. The watershed based analysis will allow for the best sites and most critical sites to be chosen for retrofit projects and stream restoration from hydromodification impacts.

Therefore, while it is expected that this study will eventually lead to water supply benefits, they cannot be quantified at this time.

Section 7

Water Supply Benefits for Project 5: Implementing Nutrient Management in the Santa Margarita River Watershed – Riverside County Flood Control and Conservation District

Avoided Water Supply

This project could result in avoided water imports by RCWD if found that they could use recycled water instead of imported raw water to augment flows in the Santa Margarita River. The proposed project would study and refine water quality objectives for the Santa Margarita River watershed, which could possibly find that a broader range of water sources, such as recycled water, may be naturally sustained to the Santa Margarita River.

RCWD currently delivers an average of 4,000 AFY of imported water from MWD to meet legal requirements for discharge into the Santa Margarita River, and these costs are anticipated to increase over time. If recycled water could be used to meet RCWD’s delivery requirements, the cost for this water would be lower than the cost of using MWD untreated Tier 1 supplies.

The cost for production of recycled water by RCWD is estimated to be \$525/AF in 2009 dollars. The cost for recycled water takes into account current costs of recycled water, which are \$225/AF, and then assumes that the recycled water would need to be desalinated to meet the TDS standard of 500 ppm. This desalination effort would cost approximately \$300/AF, thereby rendering the cost of recycled water at approximately \$525/AF.

The price of MWD Tier 2 water is currently \$821/AF and expected to increase to over \$1,200 by 2020 (in nominal dollars). When adjusted for inflation, MWD water is expected to be \$919/AF by 2020 in constant 2009 dollars. The difference between the cost of MWD water and the cost of recycled water represents the water supply benefit for this project. The following table presents the summary of present value, discounted benefits.

Cost Category	Units	Unit Cost	Years	Total Cost
Avoided Water Import Costs	4,000 AFY	\$851-\$919	30	\$110,156,470
Costs of Recycled Water	4,000 AFY	\$525/AF	30	-\$63,000,000
Total Avoided Water Import Costs				\$47,156,470
Total PV Avoided Water Import Costs after Discounting				\$15,232,606

*See Table 12-C for details on present value calculations.

Identification and Distribution of Beneficiaries

The beneficiaries of this project are statewide, regional and local. Local water customers would receive higher supply reliability and lower costs. Because during droughts RCWD would take less MWD water, MWD’s other member agencies would potentially have more water to use creating a regional benefit. During peak summer months or droughts, less water would be imported as a result of this project thereby providing state benefits in reducing environmental impacts in the Delta.

Timing of Benefits

Benefits would start to occur by 2016 and continue for the life of the full project (30 years).

Uncertainty of Benefits

The potential water supply benefit would only occur after approval by the San Diego RWQCB to use

recycled water instead of imported raw water to augment flows in the Santa Margarita River. It would have to be proven that the water quality met all nutrient standards.

Potential Adverse Effects

This project is not expected to have any adverse effects over the long-run life of the project. Any near-term impacts due to construction of facilities will be mitigated through the CEQA process.

Section 8 Overall Summary of Water Supply Benefits

In total, these five projects will produce an estimated water supply benefits of almost \$86 million in discounted, present value dollars. Table 15 summarizes these benefits.

Table 15. Total Present Value Water Supply Benefits				
Project	Discounted Water Supply Benefits (a)	Discounted Avoided Project Costs (b)	Other Discounted Water Supply Benefits (c)	Total Discounted Benefits (d)
1. Vail Lake Stabilization and Conjunctive Use Project	\$57,285,607	\$0	\$0	\$57,285,607
2. Agricultural Irrigation Efficiency Program	\$13,291,248	\$0	\$0	\$13,291,248
3. WR-34 Hydroelectric Power Generation Project	\$0	\$0	\$0	\$0
4. Water Quality Enhancements in Riverside County	Not quantifiable at this time	Not quantifiable at this time	Not quantifiable at this time	Not quantifiable at this time
5. Implementing Nutrient Management in the Santa Margarita River Watershed	\$15,232,606	\$0	\$0	\$15,232,606
Total	\$85,809,461	\$0	\$0	\$85,809,461

Table 12-A. Annual Water Supply Benefits									
Project: Vail Lake Stabilization and Conjunctive Use Project									
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
Year	Type of Benefit	Measure of Benefit (Units)	Without Project	With Project	Change Resulting from Project (e) – (d)	Unit \$ Value (1)	Annual \$ Value (f) x (g) (1)	Discount Factor (1)	Discounted Benefits (h) x (i) (1)
2009	Avoided Supply Purchase	AFY					\$0	1.000	\$0
2010	Avoided Supply Purchase	AFY				\$797	\$0	0.943	\$0
2011	Avoided Supply Purchase	AFY				\$829	\$0	0.890	\$0
2012	Avoided Supply Purchase	AFY			4,521	\$851	\$3,849,016	0.840	\$3,233,173
2013	Avoided Supply Purchase	AFY			4,521	\$856	\$3,869,464	0.792	\$3,064,616
2014	Avoided Supply Purchase	AFY			4,521	\$872	\$3,940,598	0.747	\$2,943,627
2015	Avoided Supply Purchase	AFY			4,521	\$887	\$4,011,878	0.705	\$2,828,374
2016	Avoided Supply Purchase	AFY			4,521	\$909	\$4,110,282	0.665	\$2,733,338
2017	Avoided Supply Purchase	AFY			4,521	\$912	\$4,123,610	0.627	\$2,585,503
2018	Avoided Supply Purchase	AFY			4,521	\$918	\$4,150,964	0.592	\$2,457,371
2019	Avoided Supply Purchase	AFY			4,521	\$919	\$4,152,574	0.558	\$2,317,136
2020	Avoided Supply Purchase	AFY			4,521	\$919	\$4,152,574	0.527	\$2,188,406
2021	Avoided Supply Purchase	AFY			4,521	\$919	\$4,152,574	0.497	\$2,063,829
2022	Avoided Supply Purchase	AFY			4,521	\$919	\$4,152,574	0.469	\$1,947,557
2023	Avoided Supply Purchase	AFY			4,521	\$919	\$4,152,574	0.442	\$1,835,438
2024	Avoided Supply Purchase	AFY			4,521	\$919	\$4,152,574	0.417	\$1,731,623
2025	Avoided Supply Purchase	AFY			4,521	\$919	\$4,152,574	0.394	\$1,636,114
2026	Avoided Supply Purchase	AFY			4,521	\$919	\$4,152,574	0.371	\$1,540,605
2027	Avoided Supply Purchase	AFY			4,521	\$919	\$4,152,574	0.350	\$1,453,401
2028	Avoided Supply Purchase	AFY			4,521	\$919	\$4,152,574	0.331	\$1,374,502
2029	Avoided Supply Purchase	AFY			4,521	\$919	\$4,152,574	0.312	\$1,295,603
2030	Avoided Supply Purchase	AFY			4,521	\$919	\$4,152,574	0.294	\$1,220,857
2031	Avoided Supply Purchase	AFY			4,521	\$919	\$4,152,574	0.278	\$1,154,416
2032	Avoided Supply Purchase	AFY			4,521	\$919	\$4,152,574	0.262	\$1,087,974
2033	Avoided Supply Purchase	AFY			4,521	\$919	\$4,152,574	0.247	\$1,025,686
2034	Avoided Supply Purchase	AFY			4,521	\$919	\$4,152,574	0.233	\$967,550
2035	Avoided Supply Purchase	AFY			4,521	\$919	\$4,152,574	0.220	\$913,566
2036	Avoided Supply Purchase	AFY			4,521	\$919	\$4,152,574	0.207	\$859,583
2037	Avoided Supply Purchase	AFY			4,521	\$919	\$4,152,574	0.196	\$813,904
2038	Avoided Supply Purchase	AFY			4,521	\$919	\$4,152,574	0.185	\$768,226
2039	Avoided Supply Purchase	AFY			4,521	\$919	\$4,152,574	0.174	\$722,548
2040	Avoided Supply Purchase	AFY			4,521	\$919	\$4,152,574	0.164	\$681,022
2041	Avoided Supply Purchase	AFY			4,521	\$919	\$4,152,574	0.155	\$643,649
2042	Avoided Supply Purchase	AFY			4,521	\$919	\$4,152,574	0.146	\$606,276
2043	Avoided Supply Purchase	AFY			4,521	\$919	\$4,152,574	0.138	\$573,055
2044	Avoided Supply Purchase	AFY			4,521	\$919	\$4,152,574	0.130	\$539,835
2045	Avoided Supply Purchase	AFY			4,521	\$919	\$4,152,574	0.123	\$510,767
2046	Avoided Supply Purchase	AFY			4,521	\$919	\$4,152,574	0.116	\$481,699
2047	Avoided Supply Purchase	AFY			4,521	\$919	\$4,152,574	0.109	\$452,631
2048	Avoided Supply Purchase	AFY			4,521	\$919	\$4,152,574	0.103	\$427,715
2049	Avoided Supply Purchase	AFY			4,521	\$919	\$4,152,574	0.097	\$402,800
2050	Avoided Supply Purchase	AFY			4,521	\$919	\$4,152,574	0.092	\$382,037
2051	Avoided Supply Purchase	AFY			4,521	\$919	\$4,152,574	0.087	\$361,274
2052	Avoided Supply Purchase	AFY			4,521	\$919	\$4,152,574	0.082	\$340,511
2053	Avoided Supply Purchase	AFY			4,521	\$919	\$4,152,574	0.077	\$319,748
2054	Avoided Supply Purchase	AFY			4,521	\$919	\$4,152,574	0.073	\$303,138
2055	Avoided Supply Purchase	AFY			4,521	\$919	\$4,152,574	0.069	\$286,528
2056	Avoided Supply Purchase	AFY			4,521	\$919	\$4,152,574	0.065	\$269,917
2057	Avoided Supply Purchase	AFY			4,521	\$919	\$4,152,574	0.061	\$253,307
2058	Avoided Supply Purchase	AFY			4,521	\$919	\$4,152,574	0.058	\$240,849
2059	Avoided Supply Purchase	AFY			4,521	\$919	\$4,152,574	0.055	\$228,392
2060	Avoided Supply Purchase	AFY			4,521	\$919	\$4,152,574	0.052	\$215,934
Total					221,529		\$202,463,914		
Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)									\$57,285,607

Comments: Unit values (\$/AF) are based on MWD's projected Tier 2 water rates plus peaking charges, discounted by 3% per year (assumed inflation) in order to convert nominal years to 2009 dollars.

(1) Complete these columns if dollar value is being claimed for the benefit.

Table 12-B. Annual Water Supply Benefits									
Project: Agricultural Irrigation Efficiency Program									
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
Year	Type of Benefit	Measure of Benefit (Units)	Without Project	With Project	Change Resulting from Project (e) – (d)	Unit \$ Value (1)	Annual \$ Value (f) x (g) (1)	Discount Factor (1)	Discounted Benefits (h) x (i) (1)
2009	Avoided Supply Purchase	AFY			-		\$0	1.000	\$0
2010	Avoided Supply Purchase	AFY			-	\$797	\$0	0.943	\$0
2011	Avoided Supply Purchase	AFY			-	\$829	\$0	0.890	\$0
2012	Avoided Supply Purchase	AFY			705.2	\$851	\$600,382	0.840	\$504,321
2013	Avoided Supply Purchase	AFY			705.2	\$856	\$603,571	0.792	\$478,029
2014	Avoided Supply Purchase	AFY			705.2	\$872	\$614,667	0.747	\$459,156
2015	Avoided Supply Purchase	AFY			2,115.6	\$887	\$1,877,356	0.705	\$1,323,536
2016	Avoided Supply Purchase	AFY			2,115.6	\$909	\$1,923,405	0.665	\$1,279,064
2017	Avoided Supply Purchase	AFY			2,115.6	\$912	\$1,929,641	0.627	\$1,209,885
2018	Avoided Supply Purchase	AFY			2,115.6	\$918	\$1,942,442	0.592	\$1,149,926
2019	Avoided Supply Purchase	AFY			2,115.6	\$919	\$1,943,195	0.558	\$1,084,303
2020	Avoided Supply Purchase	AFY			2,115.6	\$919	\$1,943,195	0.527	\$1,024,064
2021	Avoided Supply Purchase	AFY			2,115.6	\$919	\$1,943,195	0.497	\$965,768
2022	Avoided Supply Purchase	AFY			2,115.6	\$919	\$1,943,195	0.469	\$911,359
2023	Avoided Supply Purchase	AFY			2,115.6	\$919	\$1,943,195	0.442	\$858,892
2024	Avoided Supply Purchase	AFY			2,115.6	\$919	\$1,943,195	0.417	\$810,312
2025	Avoided Supply Purchase	AFY			2,115.6	\$919	\$1,943,195	0.394	\$765,619
2026	Avoided Supply Purchase	AFY			705.2	\$919	\$647,732	0.371	\$240,308
2027	Avoided Supply Purchase	AFY			705.2	\$919	\$647,732	0.350	\$226,706
Total					26,798		\$24,389,294		
Total Present Value of Discounted Benefits Based on Unit Value									\$13,291,248
(Sum of the values in Column (j) for all Benefits shown in table)									
Comments: Unit values (\$/AF) are based on MWD's projected Tier 2 water rates plus peaking charges, discounted by 3% per year (assumed inflation) in order to convert nominal years to 2009 dollars.									

(1) Complete these columns if dollar value is being claimed for the benefit.

Economic Analysis – Water Supply Costs and Benefits

Table 12-C. Annual Water Supply Benefits									
Project: Implementing Nutrient Management in the Santa Margarita River Watershed									
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
Year	Type of Benefit	Measure of Benefit (Units)	Without Project	With Project	Change Resulting from Project (e) – (d)	Unit \$ Value (1)	Annual \$ Value (f) x (g) (1)	Discount Factor (1)	Discounted Benefits (h) x (i) (1)
2009	Avoided Supply Purchase	AFY					\$0	1.000	\$0
2010	Avoided Supply Purchase	AFY				\$272	\$0	0.943	\$0
2011	Avoided Supply Purchase	AFY				\$304	\$0	0.890	\$0
2012	Avoided Supply Purchase	AFY				\$326	\$0	0.840	\$0
2013	Avoided Supply Purchase	AFY				\$331	\$0	0.792	\$0
2014	Avoided Supply Purchase	AFY				\$347	\$0	0.747	\$0
2015	Avoided Supply Purchase	AFY				\$362	\$0	0.705	\$0
2016	Avoided Supply Purchase	AFY			4,000	\$384	\$1,536,614	0.665	\$1,021,848
2017	Avoided Supply Purchase	AFY			4,000	\$387	\$1,548,405	0.627	\$970,850
2018	Avoided Supply Purchase	AFY			4,000	\$393	\$1,572,607	0.592	\$930,983
2019	Avoided Supply Purchase	AFY			4,000	\$394	\$1,574,031	0.558	\$878,309
2020	Avoided Supply Purchase	AFY			4,000	\$394	\$1,574,031	0.527	\$829,514
2021	Avoided Supply Purchase	AFY			4,000	\$394	\$1,574,031	0.497	\$782,294
2022	Avoided Supply Purchase	AFY			4,000	\$394	\$1,574,031	0.469	\$738,221
2023	Avoided Supply Purchase	AFY			4,000	\$394	\$1,574,031	0.442	\$695,722
2024	Avoided Supply Purchase	AFY			4,000	\$394	\$1,574,031	0.417	\$656,371
2025	Avoided Supply Purchase	AFY			4,000	\$394	\$1,574,031	0.394	\$620,168
2026	Avoided Supply Purchase	AFY			4,000	\$394	\$1,574,031	0.371	\$583,966
2027	Avoided Supply Purchase	AFY			4,000	\$394	\$1,574,031	0.350	\$550,911
2028	Avoided Supply Purchase	AFY			4,000	\$394	\$1,574,031	0.331	\$521,004
2029	Avoided Supply Purchase	AFY			4,000	\$394	\$1,574,031	0.312	\$491,098
2030	Avoided Supply Purchase	AFY			4,000	\$394	\$1,574,031	0.294	\$462,765
2031	Avoided Supply Purchase	AFY			4,000	\$394	\$1,574,031	0.278	\$437,581
2032	Avoided Supply Purchase	AFY			4,000	\$394	\$1,574,031	0.262	\$412,396
2033	Avoided Supply Purchase	AFY			4,000	\$394	\$1,574,031	0.247	\$388,786
2034	Avoided Supply Purchase	AFY			4,000	\$394	\$1,574,031	0.233	\$366,749
2035	Avoided Supply Purchase	AFY			4,000	\$394	\$1,574,031	0.220	\$346,287
2036	Avoided Supply Purchase	AFY			4,000	\$394	\$1,574,031	0.207	\$325,824
2037	Avoided Supply Purchase	AFY			4,000	\$394	\$1,574,031	0.196	\$308,510
2038	Avoided Supply Purchase	AFY			4,000	\$394	\$1,574,031	0.185	\$291,196
2039	Avoided Supply Purchase	AFY			4,000	\$394	\$1,574,031	0.174	\$273,881
2040	Avoided Supply Purchase	AFY			4,000	\$394	\$1,574,031	0.164	\$258,141
2041	Avoided Supply Purchase	AFY			4,000	\$394	\$1,574,031	0.155	\$243,975
2042	Avoided Supply Purchase	AFY			4,000	\$394	\$1,574,031	0.146	\$229,809
2043	Avoided Supply Purchase	AFY			4,000	\$394	\$1,574,031	0.138	\$217,216
2044	Avoided Supply Purchase	AFY			4,000	\$394	\$1,574,031	0.130	\$204,624
2045	Avoided Supply Purchase	AFY			4,000	\$394	\$1,574,031	0.123	\$193,606
Total					120,000		\$47,156,470		
Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)									\$15,232,606
Comments: Unit values (\$/AF) represent the difference between MWD's Tier 2 water rates and the cost of recycled water (\$525/AF), expressed in year 2009 dollars.									

(1) Complete these columns if dollar value is being claimed for the benefit.