8 Benefits and Cost Analysis

Filename: Att8_IG2_BenCost_1of5

8.1 Hi-Desert Water District Wastewater Treatment and Water Reclamation Project

8.1.1 *Introduction*

The Hi-Desert Water District (HDWD) is proposing to construct a wastewater treatment plant and eliminate septic system discharges. The Colorado River RWQCB is scheduled to impose a septic prohibition in March 2016 to protect the drinking water supply.

Benefits of the project include:

- Removal of nitrates, suspended solids, and other contaminants from the waste stream and preventing their entry to the drinking water aquifer. This benefit is not monetized but is expected to be significant.
- Recharge of the aquifer system with 1,400 acre-feet per year of reclaimed tertiary-treated water, avoiding the need for additional water supply imports from the Bay-Delta through the State Water Project. This benefit maintains the current water volume recharging the aquifer system through septic tanks. There is no additional net water recharged and this benefit is not monetized.

Phase 1 of the project will sewer the eastern portion of the Town of Yucca Valley and convey and treat an average of 1.25 mgd. Phase 1 is a portion of the ultimate project that will collect up to 4 mgd of sewage. Not implementing the Hi-Desert wastewater treatment plant project would result in RWQCB enforcement. Such enforcement for the similar Los Osos area included fines of up to $500 per day per connection and a moratorium of new septic systems. Such punitive measures would have severe near-term and long-term impacts on the local economy. These potential fines and the economic consequences are <u>not</u> included in this analysis.

8.1.2 *Monetized Benefits Analysis*

Be sure to include a discussion that maintains consistency with previously presented data, with-project and without-project comparisons, the period of analysis, economic cost, sunk costs, opportunity costs, discount rate, and the dollar value base year.

8.1.2.1 Project Costs

Describe all costs that will be incurred to implement and operate the project and to achieve benefits from the project.

8.1.3 *Costs*

Detailed capital cost estimates are presented in Chapter 4.

Detailed estimates of operations and maintenance costs are displayed in Table 8-1 and its accompanying tables. The project capital and operation cost are presented in DWR Table 19 format below. Costs presented in DWR Table 19 have been updated to 2012 dollars using the escalation factors proscribed in the PSP.

Table 8-1 - O&M Cost Summary, HDWD Wastewater Treatment Plant

HI-DESERT WATER DISTRICT
WASTEWATER COLLECTION AND TREATMENT
OPERATIONS AND MAINTENANCE COSTS

Item	Phase 1a	Phase 1*	Phase 2*
Water Reclamation Facility	$ 967,000	$ 1,473,000	$ 1,911,000
Collection System	$ 461,000	$ 569,000	$ 691,000
Total (2008$)	**$ 1,428,000**	**$ 2,042,000**	**$ 2,602,000**
Total (2009$)	**$ 1,471,000**	**$ 2,103,000**	**$ 2,680,000**
Total (2010$)	**$ 1,510,000**	**$ 2,170,000**	**$ 2,760,000**

*cumulative costs

Unit Costs

HI-DESERT WATER DISTRICT
OPERATIONS AND MAINTENANCE COSTS
Unit Costs

Labor			
	Raw Salary	30.00	$/hr
	Overhead Multiplier	2.00	
	Burdened Cost	60	$/hr
	Hours per Year	2,080	hr/yr
	Burdened Cost per Year	124,800	$/yr/person
Power			
	Unit of Power	1	hp
	Conversion to kW-h/yr	6,537	kWh/yr/hp
	Annual Power Use	6,537	kWh/hp
	Unit Power Cost	0.15	$/kWh
	Annual Power Cost	981	$/yr/hp
	Unit of Power	1	kW
	Hours per Year	8,766	hr/yr
	Annual Power Use	8,766	kWh/yr
	Unit Power Cost	0.15	$/kWh
	Annual Power Cost	1,315	$/yr/kW

O&M Cost Detail

HI-DESERT WATER DISTRICT
WATER RECLAMATION COSTS
OPERATIONS AND MAINTENANCE COSTS

	Motor Rating	Number Running	Load Fraction	Run Time Fraction	Average Load	Units	Unit Cost/year	Fraction for 0.125 mgd	Annual Cost Phase 1a	Annual Cost Phase 2
Labor										
Operations & Maintenance Staff										
Superintendent					50%	FTE	130,000	100%	$ 65,000	$ 65,000
Operators/Maintenance					2	FTE	130,000	100%	$ 260,000	$ 260,000
SCADA/Electrical					1	FTE	130,000	100%	$ 130,000	$ 130,000
Annual Labor Costs									$ 455,000	$ 455,000
Power										
Headworks										
Bar Screens	3	1	90%	50%	1.35	hp	981	100%	$ 1,000	$ 1,000
Washer Compactor	12	1	90%	100%	10.80	hp	981	100%	$ 11,000	$ 11,000
Grit Chamber Mechanism	2	1	90%	100%	1.80	hp	981	100%	$ 2,000	$ 2,000
Grit Pumping	5	1	90%	100%	4.50	hp	981	100%	$ 4,000	$ 4,000
Grit Classifier	1	1	90%	100%	0.90	hp	981	100%	$ 1,000	$ 1,000
Grit Sump Pumps	2	1	90%	50%	0.90	hp	981	100%	$ 1,000	$ 1,000
Biofilter Fans	15	1	90%	100%	13.50	hp	981	100%	$ 13,000	$ 13,000
Biological Treatment										
Aerators	--	--	--	--	160	hp	981	6%	$ 10,000	$ 157,000
Mixers	4	4	90%	100%	14.40	hp	981	6%	$ 1,000	$ 14,000
Clarifiers	1	2	90%	100%	1.80	hp	981	6%	$ -	$ 2,000
RAS/WAS Pump Station										
RAS Pumps	15	2	90%	100%	27.00	hp	981	6%	$ 2,000	$ 26,000
WAS Pumps	15	1	90%	33%	4.46	hp	981	6%	$ -	$ 4,000
Filters										
Flash Mix Pump	3	1	90%	100%	2.70	hp	981	100%	$ 3,000	$ 3,000
Air Compressors	40	1	90%	50%	18.00	hp	981	25%	$ 4,000	$ 18,000
UV Disinfection					41	kW	1,315	25%	$ 13,000	$ 54,000
Sludge Dewatering										
Belt Filter Presses	3	1	90%	33%	0.89	hp	981	6%	$ -	$ 1,000
Belt Wash Booster Pumps	5	1	90%	33%	1.49	hp	981	6%	$ -	$ 1,000
Utility Water Pumps	15	1	90%	100%	13.50	hp	981	100%	$ 13,000	$ 13,000
Plant Drain Pump Station	10	1	90%	50%	4.50	hp	981	25%	$ 1,000	$ 4,000
Miscellaneous					40	kW	1,315	100%	$ 53,000	$ 53,000
Annual Power Costs									$ 133,000	$ 383,000
Chemical Usage										
Filtration Polymer					10,000	lb	5	6%	$ 3,000	$ 50,000
Dewatering Polymer					10,000	lb	5	6%	$ 3,000	$ 50,000
Annual Chemical Costs									$ 6,000	$ 100,000
Sludge Disposal Costs					4,800	wet ton	75	6%	$ 23,000	$ 360,000
Annual Sludge Disposal Costs									$ 23,000	$ 360,000
Maintenance and Replacements					Equip Value		Annual Mnt			
Headworks					600,000		10%	100%	$ 60,000	$ 60,000
Odor Control					25,000		10%	100%	$ 3,000	$ 3,000
Biological Reactor					700,000		10%	6%	$ 4,000	$ 70,000
Clarifiers					350,000		10%	100%	$ 35,000	$ 35,000
RAS/WAS Pump Station					175,000		10%	25%	$ 4,000	$ 18,000
Filters					550,000		10%	25%	$ 14,000	$ 55,000
UV Disinfection					950,000		20%	25%	$ 48,000	$ 190,000
Solids Handling (Belt Filter Presses)					950,000		10%	100%	$ 95,000	$ 95,000
Utility Water Pump Station					75,000		10%	100%	$ 8,000	$ 8,000
Plant Drain Pump Station					25,000		10%	100%	$ 3,000	$ 3,000
Operation Building/Shop					90,000		1%	100%	$ 1,000	$ 1,000
Power Supply and SCADA					1,500,000		5%	100%	$ 75,000	$ 75,000
Maintenance Costs									$ 350,000	$ 613,000
								Annual Operating Cost	$ 967,000	$ 1,911,000

HI-DESERT WATER DISTRICT
COLLECTION SYSTEM
OPERATIONS AND MAINTENANCE COSTS

	Motor Rating	Number Running	Load Fraction	Run Time Fraction	Average Load	Units	Unit Cost/year	Fraction for 0.125 mgd	Annual Cost Phase 1a	Annual Cost Phase 2
Labor										
Operations & Maintenance Staff										
Superintendent					50%	FTE	130,000	100%	$ 65,000	$ 65,000
Collection System Maintenance					2	FTE	130,000	100%	$ 260,000	$ 260,000
Annual Labor Costs										$ 325,000
Power										
Paxton Pump Station					250	hp	981	6%	$ 15,000	$ 245,000
Odor Control					15	hp	981	100%	$ 15,000	$ 15,000
Miscellaneous					5	kW	1,315	100%	$ 7,000	$ 7,000
Annual Power Costs									$ 37,000	$ 267,000
Maintenance and Replacements					Equip Value		Annual Mnt			
Vactor Truck Maintenance								100%	$ 50,000	$ 50,000
Paxton Pump Station (see WRF)					275,000		10%	100%	$ 28,000	$ 28,000
Kickapoo Pump Station					150,000		10%	100%	$ 15,000	$ 15,000
Odor Control					25,000		10%	100%	$ 3,000	$ 3,000
Electrical Building, Lighting, Controls, Power Tools					25,000		10%	100%	$ 3,000	$ 3,000
Maintenance Costs									$ 99,000	$ 99,000
								Annual Operating Cost	$ 461,000	$ 691,000

Table 19 – Annual Costs of Project

(All costs should be in 2012 Dollars)

Project: Hi-Desert Water District Wastewater Treatment and Reclamation Project

	Initial Costs Grand Total Cost from Table 7	Adjusted Grant Total Cost[1]	Annual Costs [2]						Discounting Calculations	
			Admin	Operation	Maintenance	Replacement	Other	Total Costs (a) +…+ (g)	Discount Factor	Discounted Project Costs (h) x (i)
Year	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
2009	$63,448	$0						$63,448	1.030	$65,352
2010	$125,862	$0						$125,862	1.020	$128,379
2011	$246,558	$0						$246,558	1.010	$249,024
2012	$4,649,891	$0						$4,649,891	1.000	$4,649,891
2013	$67,833	$0						$67,833	0.943	$63,993
2014	$52,104,470	$0						$52,104,470	0.890	$46,372,793
2015	$48,488,558	$0						$48,488,558	0.840	$40,711,929
2016	$20,128,379	$0		$707,890	$353,950			$21,190,219	0.792	$16,784,638
2017	$0	$0		$1,415,790	$707,890			$2,123,680	0.747	$1,586,937
2018				$1,415,790	$707,890			$2,123,680	0.705	$1,497,111
2019				$1,415,790	$707,890			$2,123,680	0.665	$1,412,368
2020				$1,415,790	$707,890			$2,123,680	0.627	$1,332,423
2021				$1,415,790	$707,890			$2,123,680	0.592	$1,257,003
2022				$1,415,790	$707,890			$2,123,680	0.558	$1,185,852
2023				$1,415,790	$707,890			$2,123,680	0.527	$1,118,728
2024				$1,415,790	$707,890			$2,123,680	0.497	$1,055,404
2025				$1,415,790	$707,890			$2,123,680	0.469	$995,664
2026				$1,415,790	$707,890			$2,123,680	0.442	$939,306
2027				$1,415,790	$707,890			$2,123,680	0.417	$886,137
2028				$1,415,790	$707,890			$2,123,680	0.394	$835,979
2029				$1,415,790	$707,890			$2,123,680	0.371	$788,659
2030				$1,415,790	$707,890			$2,123,680	0.350	$744,018
2031				$1,415,790	$707,890			$2,123,680	0.331	$701,904
2032				$1,415,790	$707,890			$2,123,680	0.312	$662,173
2033				$1,415,790	$707,890			$2,123,680	0.294	$624,692
2034				$1,415,790	$707,890			$2,123,680	0.278	$589,332
2035				$1,415,790	$707,890			$2,123,680	0.262	$555,974
2036				$1,415,790	$707,890			$2,123,680	0.247	$524,503
2037				$1,415,790	$707,890			$2,123,680	0.233	$494,815
2038				$1,415,790	$707,890			$2,123,680	0.220	$466,806
2039				$1,415,790	$707,890			$2,123,680	0.207	$440,383
2040				$1,415,790	$707,890			$2,123,680	0.196	$415,456
2041				$1,415,790	$707,890			$2,123,680	0.185	$391,939
2042				$1,415,790	$707,890			$2,123,680	0.174	$369,754
2043				$1,415,790	$707,890			$2,123,680	0.164	$348,825
2044				$1,415,790	$707,890			$2,123,680	0.155	$329,080
2045				$1,415,790	$707,890			$2,123,680	0.146	$310,453
2046				$1,415,790	$707,890			$2,123,680	0.138	$292,880
2047				$1,415,790	$707,890			$2,123,680	0.130	$276,302
2048				$1,415,790	$707,890			$2,123,680	0.123	$260,662
2049				$1,415,790	$707,890			$2,123,680	0.116	$245,908
2050				$1,415,790	$707,890			$2,123,680	0.109	$231,988
2051				$1,415,790	$707,890			$2,123,680	0.103	$218,857
2052				$1,415,790	$707,890			$2,123,680	0.097	$206,469
2053				$1,415,790	$707,890			$2,123,680	0.092	$194,782
2054				$1,415,790	$707,890			$2,123,680	0.087	$183,757
2055				$1,415,790	$707,890			$2,123,680	0.082	$173,355
2056				$1,415,790	$707,890			$2,123,680	0.077	$163,543
2057				$1,415,790	$707,890			$2,123,680	0.073	$154,286
2058				$1,415,790	$707,890			$2,123,680	0.069	$145,552
2059				$1,415,790	$707,890			$2,123,680	0.065	$137,314
2060				$1,415,790	$707,890			$2,123,680	0.061	$129,541
2061				$1,415,790	$707,890			$2,123,680	0.058	$122,209
2062				$1,415,790	$707,890			$2,123,680	0.054	$115,291
2063				$1,415,790	$707,890			$2,123,680	0.051	$108,765
2064				$1,415,790	$707,890			$2,123,680	0.048	$102,609
2065				$1,415,790	$707,890			$2,123,680	0.046	$96,801
Total	$0	$0	$0	$69,373,710	$34,686,610	$0	$0	$104,060,320	…	
								Total Present Value of Discounted Costs (Sum of column (j)) Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries		$135,448,546

Comments:

(1) If any, based on opportunity costs, sunk costs and associated costs

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

8.1.4 *Project Benefits*

Display and describe the economic benefits of the project. Provide monetary value to the physical benefits listed in Attachment 7: Technical Justification Physical Benefits Section.

Benefits from implementing the Hi-Desert Water District Wastewater Treatment and Water Reclamation Project include, but are not limited to:

- Water Quality Improvements
- Water Supply/Groundwater Replenishment

8.1.4.1 Water Quality Improvements

Hi-Desert Water District will construct Phase 1 to begin implementation of the District's ultimate wastewater collection, treatment, and disposal system. The intent is to provide a blueprint for the multi-phase sewer service to the Town of Yucca Valley. Phase 1will provide 5,500 sewer connections in the Town of Yucca Valley and convey and treat an average of 1.25 million gallons per day (mgd). The project will be expanded in stages to collect up to 4 mgd. The wastewater will be treated to meet Title 22 recycled water standards and discharge to percolation basins to recharge the treated effluent into the Warren Valley groundwater basin.

The first phase of the wastewater treatment and collection system will provide service to the most densely populated area in Yucca Valley, which is also the location of the majority of the District's groundwater wells. The Town of Yucca is disadvantaged community based on 80 percent of year 2010 statewide median household income and is listed on the DWR website as such. A wastewater system will result in the elimination of septic systems, as customers will be required to connect. The effluent from the treatment facility will be percolated into the District's recharge basin. Diversion of a portion of the effluent to parks and the local golf course is being considered as a future option, but currently there are no immediate plans for this.

The Colorado River Basin Region of California Regional Water Quality Control Board passed Resolution No. R7-2011-0004 in May 2011 (see Att7_IG2_TechJust_2of8). This Resolution prohibits the discharge from septic tanks after 2016. The Regional Board's objective is to protect public health by ensuring that groundwater supplies meet water quality objectives.

The January 2009 Hi-Desert Water District Water Reclamation Facility Preliminary Design Report[33] reports nitrogen effluent loadings of 510 pounds per day in a Phase 1 influent flow of 1.0 mgd, or about 61 parts per million total nitrogen. This will be reduced to 8 parts million through the water treatment process, comfortably below the Colorado River Basin

[33] Montgomery Watson Harza, January 2009, Hi-Desert Water District Water Reclamation Facility Preliminary Design Report, Volume 1, Report. Tables 2-2 and 2-4; attached to this application as "Att7_IG2_TechJust_3of8"

Plan limit of 10 parts per million.[34] A total nitrogen load of 15,900 pounds per year will be diverted from the drinking water aquifer.

Other alternatives that would serve the same function as the wastewater treatment plant include regular pumping of septic tanks, and export of the effluent out of the basin for treatment. Importing additional surface water through MWA's State Water Project contract would improve drinking water quality but would not meet the Regional Board's water quality objectives for the groundwater basin and is not an acceptable alternative. Wellhead treatment systems would improve drinking water quality but would not meet the Regional Board's water quality objectives for the groundwater basin and are not an acceptable alternative.[35]

8.1.4.2 Water Supply Benefits

Water imported from the State Water Project is percolated into the drinking water aquifer to supplement limited natural supplies. Currently, water not lost to evaporative consumptive uses re-enters the groundwater system as effluent from septic systems.

The Hi-Desert Water District 2010 Urban Water Management Plan estimates septic returns of approximately 32 percent of gross water demand. These septic returns are about 1,000 acre-feet per year under current (2013) demands, and would rise to about 1,200 acre-feet per year under 2035 demand conditions.[36]

The Hi-Desert Water District Wastewater Treatment and Water Reclamation Project will continue to recharge these same amounts of water in the future, and thus no net benefit is claimed. Alternatives to the project would export the water from the basin for treatment, and would require additional State Water Project (SWP) imports to keep the basin in balance – these avoided cost benefits are discussed below.

The project is thus neutral in impacts to the groundwater basin, and neutral in the amount of SWP water to be imported.

8.1.5 *Annual Cost of Avoided Projects*

Avoided costs are costs that occur in the without-project condition that, with the proposed project, are no longer expected. Table 16 should be used if the applicant wishes to present Benefits from Avoided Costs. To estimate a benefit from avoided costs of future projects,

If the Hi-Desert Water District Wastewater Treatment and Water Reclamation Project is not constructed, another project that meets the Colorado River RWQCB's mandate to eliminate septic discharges to the drinking water aquifer must be implemented. The option to pump all

[34] MWH, 2009, Op cit., p. 2-6

[35] Tom Vandenberg, attorney for the Colorado River RWQCB, personal communication March 19, 2013

[36] HDWD 2010 UWMP Table 2-7, from MWA 2010 demand model. Assumes SBX7-7 target reductions are being met. The HDWD 2010 UWMP is included in this grant application as Att7_IG2_TechJust_5of5.

septic tanks on a regular basis for export from the basin for treatment is an option that would meet the RWQCB's order. If this volume of wastewater was exported from the basin, additional amounts of State Water Project (SWP) water supplies would be required to maintain basin levels and avoid overdraft.

A survey of local septic tank pumping services showed prices as high as $199 per thousand gallons. A typical low price quote of $162.50 per thousand gallons was used for this analysis.[37] One-time costs for septic system location, excavation, and lid removal would be in addition to this charge. $162.50 is approximately $52,950 per acre-foot.

Water exported from the basin for treatment would be replaced through additional importation of SWP water using the MWA contract. The current MWA charge for deliveries to Improvement District Morongo (IDM), of which HDWD is a part of, is currently $450 per acre-foot. These costs have been rising at around 8 percent per year, and are likely to continue to rise to pay for Bay-Delta and other SWP improvements. It is assumed that these charges to IDM costs will continue to rise at 3 percent per year.

The detailed time series of these avoided costs are displayed in Table 8-2. The summary of these avoided costs is presented in DWR Table 16 format below.

[37] Quote from Ferris Septic of Southern California. Additional fees for septic system location, excavation and lid removal are not included.

Table 8-2 Time Series of Avoided Costs, HDWD

	Year	Aquifer Recharge\1	Septic Pumping\2 @$162.5/1000 gal	MWA Imported Water Charge for IDM Region (3%/yr escalation)	SWP Replacement Supply	Total Avoided Cost
Unit Cost:						
Unit:		(af/yr)		($af)		
	2015	0	$0	$477	$0	$0
	2016	519	$27,483,613	$492	$255,226	$27,738,839
	2017	1,040	$55,068,891	$506	$526,738	$55,595,630
	2018	1,042	$55,170,557	$522	$543,542	$55,714,099
	2019	1,044	$55,272,223	$537	$560,880	$55,833,103
	2020	1,059	$56,085,548	$553	$586,207	$56,671,755
	2021	1,063	$56,295,939	$570	$606,058	$56,901,998
	2022	1,067	$56,506,331	$587	$626,573	$57,132,904
	2023	1,071	$56,716,722	$605	$647,773	$57,364,495
	2024	1,075	$56,927,114	$623	$669,681	$57,596,795
	2025	1,107	$58,610,245	$642	$710,166	$59,320,411
	2026	1,111	$58,822,048	$661	$734,114	$59,556,162
	2027	1,115	$59,033,852	$681	$758,860	$59,792,712
	2028	1,119	$59,245,655	$701	$784,430	$60,030,085
	2029	1,123	$59,457,458	$722	$810,852	$60,268,310
	2030	1,155	$61,151,886	$744	$858,978	$62,010,864
	2031	1,159	$61,360,865	$766	$887,771	$62,248,636
	2032	1,163	$61,569,845	$789	$917,519	$62,487,363
	2033	1,167	$61,778,824	$813	$948,252	$62,727,076
	2034	1,171	$61,987,803	$837	$980,003	$62,967,807
	2035	1,202	$63,659,638	$862	$1,036,627	$64,696,266
	2036	1,202	$63,659,638	$888	$1,067,726	$64,727,365
	2037	1,202	$63,659,638	$915	$1,099,758	$64,759,396
	2038	1,202	$63,659,638	$942	$1,132,751	$64,792,389
	2039	1,202	$63,659,638	$970	$1,166,733	$64,826,372
	2040	1,202	$63,659,638	$1,000	$1,201,735	$64,861,374
	2041	1,202	$63,659,638	$1,030	$1,237,787	$64,897,426
	2042	1,202	$63,659,638	$1,060	$1,274,921	$64,934,559
	2043	1,202	$63,659,638	$1,092	$1,313,168	$64,972,807
	2044	1,202	$63,659,638	$1,125	$1,352,563	$65,012,202
	2045	1,202	$63,659,638	$1,159	$1,393,140	$65,052,779
	2046	1,202	$63,659,638	$1,194	$1,434,935	$65,094,573
	2047	1,202	$63,659,638	$1,229	$1,477,983	$65,137,621
	2048	1,202	$63,659,638	$1,266	$1,522,322	$65,181,961
	2049	1,202	$63,659,638	$1,304	$1,567,992	$65,227,630
	2050	1,202	$63,659,638	$1,343	$1,615,032	$65,274,670
	2051	1,202	$63,659,638	$1,384	$1,663,482	$65,323,121
	2052	1,202	$63,659,638	$1,425	$1,713,387	$65,373,025
	2053	1,202	$63,659,638	$1,468	$1,764,789	$65,424,427
	2054	1,202	$63,659,638	$1,512	$1,817,732	$65,477,371
	2055	1,202	$63,659,638	$1,557	$1,872,264	$65,531,903
	2056	1,202	$63,659,638	$1,604	$1,928,432	$65,588,071
	2057	1,202	$63,659,638	$1,652	$1,986,285	$65,645,924
	2058	1,202	$63,659,638	$1,702	$2,045,874	$65,705,512
	2059	1,202	$63,659,638	$1,753	$2,107,250	$65,766,888
	2060	1,202	$63,659,638	$1,805	$2,170,467	$65,830,106
	2061	1,202	$63,659,638	$1,860	$2,235,581	$65,895,220
	2062	1,202	$63,659,638	$1,915	$2,302,649	$65,962,287
	2063	1,202	$63,659,638	$1,973	$2,371,728	$66,031,367
	2064	1,202	$63,659,638	$2,032	$2,442,880	$66,102,519
	2065	1,202	$63,659,638	$2,093	$2,516,166	$66,175,805
	2066	1,202	$63,659,638	$2,156	$2,591,651	$66,251,290

Notes:

\1 HDWD 2010 UWMP Table 2-7, from MWA 2010 demand model. 2005 and 2010 demands are actual. Assumes SBX7-7 target reductions are being met.

\2 Quote from Ferris Septic of Southern California. Additonal fees for septic system location, excavation and lid removal are not included.

Table 16 – Annual Costs of Avoided Projects

(All avoided costs are in 2012 dollars)

Project: Hi-Desert Water District Wastewater Treatment and Reclamation Project

	Costs				Discounting Calculations	
(a)	(b)	(c)	(d)	(e)	(f)	(g)
Year	Alternative (Avoided Project Name): _____ Avoided Project Description:				Discount Factor	Discounted Costs (e) x (f)
	Avoided Capital Costs	Avoided Replacement Costs	Avoided Operations and Maintenance Costs	Total Cost Avoided for Individual Alternatives (b) + (c) + (d)		
2013					0.943	
2014					0.890	
2015	$0	$0	$0	$0	0.840	$0
2016	$0	$0	$27,738,839	$27,738,839	0.792	$21,971,759
2017	$0	$0	$55,595,630	$55,595,630	0.747	$41,544,289
2018	$0	$0	$55,714,099	$55,714,099	0.705	$39,276,241
2019	$0	$0	$55,833,103	$55,833,103	0.665	$37,132,202
2020	$0	$0	$56,671,755	$56,671,755	0.627	$35,556,560
2021	$0	$0	$56,901,998	$56,901,998	0.592	$33,680,205
2022	$0	$0	$57,132,904	$57,132,904	0.558	$31,902,715
2023	$0	$0	$57,364,495	$57,364,495	0.527	$30,218,900
2024	$0	$0	$57,596,795	$57,596,795	0.497	$28,623,842
2025	$0	$0	$59,320,411	$59,320,411	0.469	$27,811,723
2026	$0	$0	$59,556,162	$59,556,162	0.442	$26,341,748
2027	$0	$0	$59,792,712	$59,792,712	0.417	$24,949,410
2028	$0	$0	$60,030,085	$60,030,085	0.394	$23,630,620
2029	$0	$0	$60,268,310	$60,268,310	0.371	$22,381,506
2030	$0	$0	$62,010,864	$62,010,864	0.350	$21,725,121
2031	$0	$0	$62,248,636	$62,248,636	0.331	$20,573,984
2032	$0	$0	$62,487,363	$62,487,363	0.312	$19,483,855
2033	$0	$0	$62,727,076	$62,727,076	0.294	$18,451,508
2034	$0	$0	$62,967,807	$62,967,807	0.278	$17,473,887
2035	$0	$0	$64,696,266	$64,696,266	0.262	$16,937,305
2036	$0	$0	$64,727,365	$64,727,365	0.247	$15,986,271
2037	$0	$0	$64,759,396	$64,759,396	0.233	$15,088,851
2038	$0	$0	$64,792,389	$64,792,389	0.220	$14,242,017
2039	$0	$0	$64,826,372	$64,826,372	0.207	$13,442,912
2040	$0	$0	$64,861,374	$64,861,374	0.196	$12,688,840
2041	$0	$0	$64,897,426	$64,897,426	0.185	$11,977,257
2042	$0	$0	$64,934,559	$64,934,559	0.174	$11,305,765
2043	$0	$0	$64,972,807	$64,972,807	0.164	$10,672,098
2044	$0	$0	$65,012,202	$65,012,202	0.155	$10,074,122
2045	$0	$0	$65,052,779	$65,052,779	0.146	$9,509,820
2046	$0	$0	$65,094,573	$65,094,573	0.138	$8,977,292
2047	$0	$0	$65,137,621	$65,137,621	0.130	$8,474,744
2048	$0	$0	$65,181,961	$65,181,961	0.123	$8,000,484
2049	$0	$0	$65,227,630	$65,227,630	0.116	$7,552,915
2050	$0	$0	$65,274,670	$65,274,670	0.109	$7,130,530
2051	$0	$0	$65,323,121	$65,323,121	0.103	$6,731,908
2052	$0	$0	$65,373,025	$65,373,025	0.097	$6,355,709
2053	$0	$0	$65,424,427	$65,424,427	0.092	$6,000,666
2054	$0	$0	$65,477,371	$65,477,371	0.087	$5,665,587
2055	$0	$0	$65,531,903	$65,531,903	0.082	$5,349,345
2056	$0	$0	$65,588,071	$65,588,071	0.077	$5,050,877
2057	$0	$0	$65,645,924	$65,645,924	0.073	$4,769,181
2058	$0	$0	$65,705,512	$65,705,512	0.069	$4,503,312
2059	$0	$0	$65,766,888	$65,766,888	0.065	$4,252,376
2060	$0	$0	$65,830,106	$65,830,106	0.061	$4,015,531
2061	$0	$0	$65,895,220	$65,895,220	0.058	$3,791,984
2062	$0	$0	$65,962,287	$65,962,287	0.054	$3,580,985
2063	$0	$0	$66,031,367	$66,031,367	0.051	$3,381,825
2064	$0	$0	$66,102,519	$66,102,519	0.048	$3,193,839
2065	$0	$0	$66,175,805	$66,175,805	0.046	$3,016,396
2066	$0	$0	$66,251,290	$66,251,290	0.043	$2,848,903
Last Year of Project Life					...	
					Total Present Value of Discounted Costs (Sum of Column (g))	$777,299,721
					(%) Avoided Cost Claimed by Project	100%
					Total Present Value of Discounted Avoided Project Costs Claimed by Alternative Project (Total Present Value of Discounted Costs x % Avoided Cost Claimed by Project)	$777,299,721
Comments:						

8.1.6 *Flood Damage Reduction Benefits Analysis*

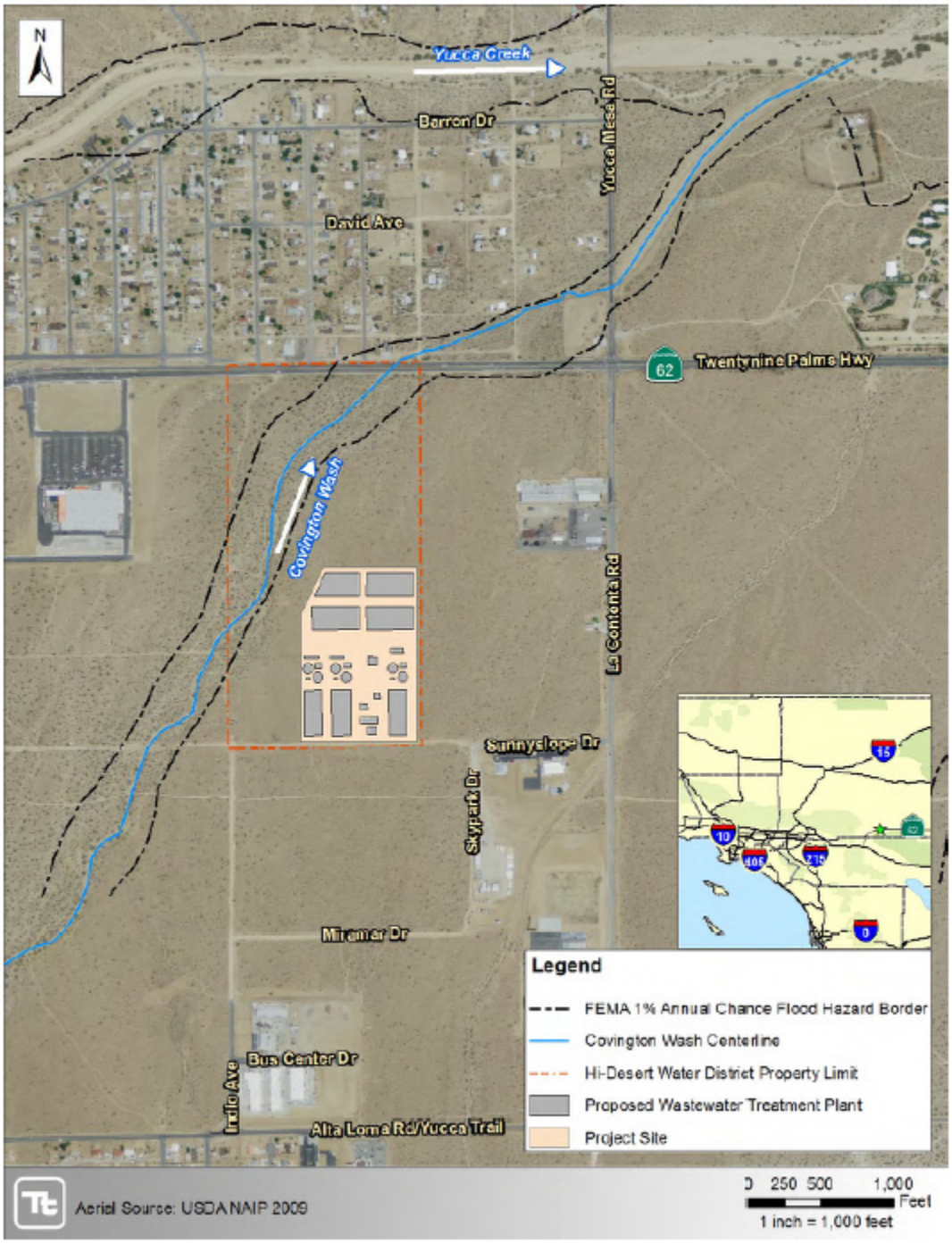
Describe all costs that will be incurred to implement and operate the project and to achieve benefits from the project. This includes costs funded by local, State, and federal agencies, non-profit organizations, and other entities. All costs, both initial investments and operational costs, associated with the project necessary to accomplish full implementation of the project and achievement of the stated benefits, must be included. All costs must be clearly documented to allow a reviewer to assess the accuracy and reasonableness of the analysis. If the reviewers find that some project costs are not included in the analysis, applicants risk losing points.

The Hi-Desert Water District (HDWD) is planning to construct a wastewater treatment plant adjacent to Covington Wash in the town of Yucca Valley. The location of the Wash relative to the treatment plant site is shown on Figure 8-1. HDWD commissioned a Floodplain Study and Alternatives Analysis that was completed in January 2012.[38] This document is attached as Att8_IG2_BenCost_2of5. The principal objective is to determine the flood impacts associated with the 100-year flood event and to develop alternatives for mitigating the impacts at the project site. A secondary objective is mitigating flood risk on adjacent properties and within the community, particularly the DAC community north of Highway 62.

Three alternatives have been identified, flood impacts identified, and cost estimates developed. At this time a decision has not been made on which alternative to implement, and consequently the level of benefit has not been defined. Consequently, no flood damage reduction benefit is claimed for this project.

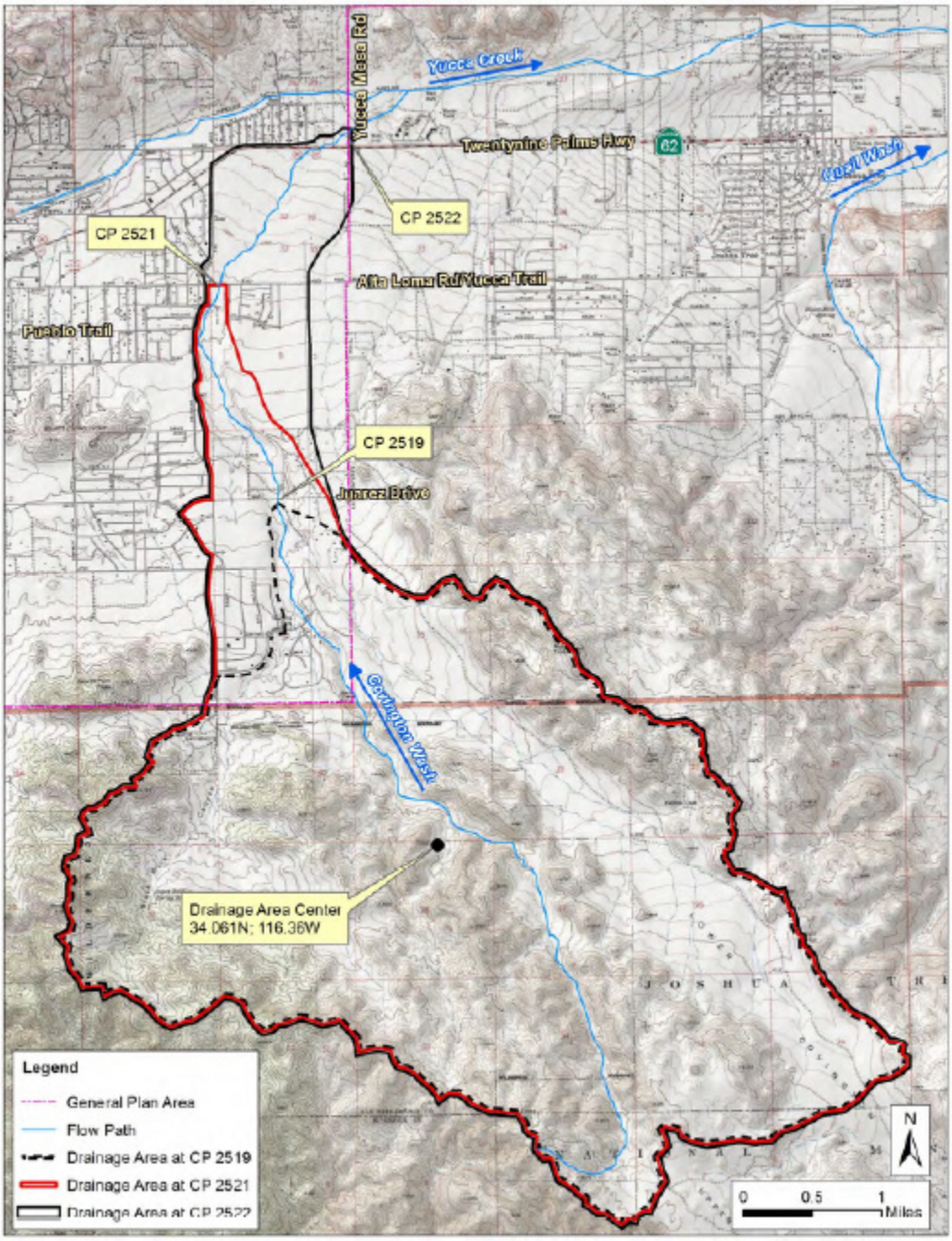
[38] TetraTech, January 2012, Hi-Desert Water District Wastewater Treatment and Water Reclamation Project, Covington Wash Floodplain Study and Alternatives Analysis, Draft Report. Included in grant application as Att8_IG2_BenCost_2of5

Figure 8-1 HDWD Wastewater Treatment Plant Site relative to Covington Wash



Source: TetraTech, January 2012

Figure 8-2 Covington Was Drainage Area



Source: TetraTech, January 2012

8.1.7 *Annual Benefits*

The time stream of annual benefits for the Hi-Desert Water District Wastewater Treatment and Water Reclamation Project are reported in DWR Table 15 format below.

Table 15 – Annual Benefit (All benefits are in 2012 dollars) Project: Hi-Desert Water District Wastewater Treatment and Reclamation 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 [1] (f) x (g)	Discount Factor [1]	Discounted Benefits [1] (h) x (i)
2015								0.840	
2015								0.840	
2015								0.840	
2015								0.840	
2016	Avoided septic tank pumping	acre-feet per year	519	0	-519	-$52,951	$27,483,613	0.792	$21,769,596
2016	Avoided SWP water import	acre-feet per year	519	0	-519	-$492	$255,226	0.792	$202,163
2016	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	519	519	$0	$0	0.792	$0
2016	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	519	519	$0	$0	0.792	$0
2017	Avoided septic tank pumping	acre-feet per year	1,040	0	-1,040	-$52,951	$55,068,891	0.747	$41,150,679
2017	Avoided SWP water import	acre-feet per year	1,040	0	-1,040	-$506	$526,738	0.747	$393,609
2017	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,040	1,040	$0	$0	0.747	$0
2017	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,040	1,040	$0	$0	0.747	$0
2018	Avoided septic tank pumping	acre-feet per year	1,042	0	-1,042	-$52,951	$55,170,557	0.705	$38,893,066
2018	Avoided SWP water import	acre-feet per year	1,042	0	-1,042	-$522	$543,542	0.705	$383,176
2018	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,042	1,042	$0	$0	0.705	$0
2018	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,042	1,042	$0	$0	0.705	$0
2019	Avoided septic tank pumping	acre-feet per year	1,044	0	-1,044	-$52,951	$55,272,223	0.665	$36,759,185
2019	Avoided SWP water import	acre-feet per year	1,044	0	-1,044	-$537	$560,880	0.665	$373,017
2019	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,044	1,044	$0	$0	0.665	$0
2019	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,044	1,044	$0	$0	0.665	$0
2020	Avoided septic tank pumping	acre-feet per year	1,059	0	-1,059	-$52,951	$56,085,548	0.627	$35,188,767
2020	Avoided SWP water import	acre-feet per year	1,059	0	-1,059	-$553	$586,207	0.627	$367,794
2020	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,059	1,059	$0	$0	0.627	$0
2020	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,059	1,059	$0	$0	0.627	$0
2021	Avoided septic tank pumping	acre-feet per year	1,063	0	-1,063	-$52,951	$56,295,939	0.592	$33,321,480
2021	Avoided SWP water import	acre-feet per year	1,063	0	-1,063	-$570	$606,058	0.592	$358,725
2021	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,063	1,063	$0	$0	0.592	$0
2021	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,063	1,063	$0	$0	0.592	$0
2022	Avoided septic tank pumping	acre-feet per year	1,067	0	-1,067	-$52,951	$56,506,331	0.558	$31,552,840
2022	Avoided SWP water import	acre-feet per year	1,067	0	-1,067	-$587	$626,573	0.558	$349,875
2022	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,067	1,067	$0	$0	0.558	$0
2022	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,067	1,067	$0	$0	0.558	$0
2023	Avoided septic tank pumping	acre-feet per year	1,071	0	-1,071	-$52,951	$56,716,722	0.527	$29,877,662
2023	Avoided SWP water import	acre-feet per year	1,071	0	-1,071	-$605	$647,773	0.527	$341,239
2023	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,071	1,071	$0	$0	0.527	$0
2023	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,071	1,071	$0	$0	0.527	$0

Table 15 – Annual Benefit (All benefits are in 2012 dollars) Project: Hi-Desert Water District Wastewater Treatment and Reclamation 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 [1] (f) x (g)	Discount Factor [1]	Discounted Benefits [1] (h) x (i)
2024	Avoided septic tank pumping	acre-feet per year	1,075	0	-1,075	-$52,951	$56,927,114	0.497	$28,291,031
2024	Avoided SWP water import	acre-feet per year	1,075	0	-1,075	-$623	$669,681	0.497	$332,811
2024	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,075	1,075	$0	$0	0.497	$0
2024	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,075	1,075	$0	$0	0.497	$0
2025	Avoided septic tank pumping	acre-feet per year	1,107	0	-1,107	-$52,951	$58,610,245	0.469	$27,478,770
2025	Avoided SWP water import	acre-feet per year	1,107	0	-1,107	-$642	$710,166	0.469	$332,953
2025	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,107	1,107	$0	$0	0.469	$0
2025	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,107	1,107	$0	$0	0.469	$0
2026	Avoided septic tank pumping	acre-feet per year	1,111	0	-1,111	-$52,951	$58,822,048	0.442	$26,017,049
2026	Avoided SWP water import	acre-feet per year	1,111	0	-1,111	-$661	$734,114	0.442	$324,699
2026	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,111	1,111	$0	$0	0.442	$0
2026	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,111	1,111	$0	$0	0.442	$0
2027	Avoided septic tank pumping	acre-feet per year	1,115	0	-1,115	-$52,951	$59,033,852	0.417	$24,632,764
2027	Avoided SWP water import	acre-feet per year	1,115	0	-1,115	-$681	$758,860	0.417	$316,646
2027	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,115	1,115	$0	$0	0.417	$0
2027	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,115	1,115	$0	$0	0.417	$0
2028	Avoided septic tank pumping	acre-feet per year	1,119	0	-1,119	-$52,951	$59,245,655	0.394	$23,321,832
2028	Avoided SWP water import	acre-feet per year	1,119	0	-1,119	-$701	$784,430	0.394	$308,788
2028	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,119	1,119	$0	$0	0.394	$0
2028	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,119	1,119	$0	$0	0.394	$0
2029	Avoided septic tank pumping	acre-feet per year	1,123	0	-1,123	-$52,951	$59,457,458	0.371	$22,080,384
2029	Avoided SWP water import	acre-feet per year	1,123	0	-1,123	-$722	$810,852	0.371	$301,121
2029	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,123	1,123	$0	$0	0.371	$0
2029	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,123	1,123	$0	$0	0.371	$0
2030	Avoided septic tank pumping	acre-feet per year	1,155	0	-1,155	-$52,951	$61,151,886	0.350	$21,424,184
2030	Avoided SWP water import	acre-feet per year	1,155	0	-1,155	-$744	$858,978	0.350	$300,938
2030	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,155	1,155	$0	$0	0.350	$0
2030	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,155	1,155	$0	$0	0.350	$0
2031	Avoided septic tank pumping	acre-feet per year	1,159	0	-1,159	-$52,951	$61,360,865	0.331	$20,280,564
2031	Avoided SWP water import	acre-feet per year	1,159	0	-1,159	-$766	$887,771	0.331	$293,420
2031	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,159	1,159	$0	$0	0.331	$0
2031	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,159	1,159	$0	$0	0.331	$0
2032	Avoided septic tank pumping	acre-feet per year	1,163	0	-1,163	-$52,951	$61,569,845	0.312	$19,197,769
2032	Avoided SWP water import	acre-feet per year	1,163	0	-1,163	-$789	$917,519	0.312	$286,087
2032	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,163	1,163	$0	$0	0.312	$0
2032	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,163	1,163	$0	$0	0.312	$0

Table 15 – Annual Benefit (All benefits are in 2012 dollars) Project: Hi-Desert Water District Wastewater Treatment and Reclamation 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 [1] (f) x (g)	Discount Factor [1]	Discounted Benefits [1] (h) x (i)
2033	Avoided septic tank pumping	acre-feet per year	1,167	0	-1,167	-$52,951	$61,778,824	0.294	$18,172,575
2033	Avoided SWP water import	acre-feet per year	1,167	0	-1,167	-$813	$948,252	0.294	$278,933
2033	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,167	1,167	$0	$0	0.294	$0
2033	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,167	1,167	$0	$0	0.294	$0
2034	Avoided septic tank pumping	acre-feet per year	1,171	0	-1,171	-$52,951	$61,987,803	0.278	$17,201,931
2034	Avoided SWP water import	acre-feet per year	1,171	0	-1,171	-$837	$980,003	0.278	$271,956
2034	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,171	1,171	$0	$0	0.278	$0
2034	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,171	1,171	$0	$0	0.278	$0
2035	Avoided septic tank pumping	acre-feet per year	1,202	0	-1,202	-$52,951	$63,659,638	0.262	$16,665,919
2035	Avoided SWP water import	acre-feet per year	1,202	0	-1,202	-$862	$1,036,627	0.262	$271,386
2035	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,202	1,202	$0	$0	0.262	$0
2035	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,202	1,202	$0	$0	0.262	$0
2036	Avoided septic tank pumping	acre-feet per year	1,202	0	-1,202	-$52,951	$63,659,638	0.247	$15,722,565
2036	Avoided SWP water import	acre-feet per year	1,202	0	-1,202	-$888	$1,067,726	0.247	$263,705
2036	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,202	1,202	$0	$0	0.247	$0
2036	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,202	1,202	$0	$0	0.247	$0
2037	Avoided septic tank pumping	acre-feet per year	1,202	0	-1,202	-$52,951	$63,659,638	0.233	$14,832,609
2037	Avoided SWP water import	acre-feet per year	1,202	0	-1,202	-$915	$1,099,758	0.233	$256,242
2037	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,202	1,202	$0	$0	0.233	$0
2037	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,202	1,202	$0	$0	0.233	$0
2038	Avoided septic tank pumping	acre-feet per year	1,202	0	-1,202	-$52,951	$63,659,638	0.220	$13,993,027
2038	Avoided SWP water import	acre-feet per year	1,202	0	-1,202	-$942	$1,132,751	0.220	$248,990
2038	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,202	1,202	$0	$0	0.220	$0
2038	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,202	1,202	$0	$0	0.220	$0
2039	Avoided septic tank pumping	acre-feet per year	1,202	0	-1,202	-$52,951	$63,659,638	0.207	$13,200,969
2039	Avoided SWP water import	acre-feet per year	1,202	0	-1,202	-$970	$1,166,733	0.207	$241,943
2039	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,202	1,202	$0	$0	0.207	$0
2039	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,202	1,202	$0	$0	0.207	$0
2040	Avoided septic tank pumping	acre-feet per year	1,202	0	-1,202	-$52,951	$63,659,638	0.196	$12,453,744
2040	Avoided SWP water import	acre-feet per year	1,202	0	-1,202	-$1,000	$1,201,735	0.196	$235,096
2040	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,202	1,202	$0	$0	0.196	$0
2040	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,202	1,202	$0	$0	0.196	$0
2041	Avoided septic tank pumping	acre-feet per year	1,202	0	-1,202	-$52,951	$63,659,638	0.185	$11,748,815
2041	Avoided SWP water import	acre-feet per year	1,202	0	-1,202	-$1,030	$1,237,787	0.185	$228,442
2041	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,202	1,202	$0	$0	0.185	$0
2041	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,202	1,202	$0	$0	0.185	$0

Table 15 – Annual Benefit (All benefits are in 2012 dollars) Project: Hi-Desert Water District Wastewater Treatment and Reclamation 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 [1] (f) x (g)	Discount Factor [1]	Discounted Benefits [1] (h) x (i)
2042	Avoided septic tank pumping	acre-feet per year	1,202	0	-1,202	-$52,951	$63,659,638	0.174	$11,083,788
2042	Avoided SWP water import	acre-feet per year	1,202	0	-1,202	-$1,060	$1,274,921	0.174	$221,977
2042	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,202	1,202	$0	$0	0.174	$0
2042	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,202	1,202	$0	$0	0.174	$0
2043	Avoided septic tank pumping	acre-feet per year	1,202	0	-1,202	-$52,951	$63,659,638	0.164	$10,456,404
2043	Avoided SWP water import	acre-feet per year	1,202	0	-1,202	-$1,092	$1,313,168	0.164	$215,694
2043	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,202	1,202	$0	$0	0.164	$0
2043	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,202	1,202	$0	$0	0.164	$0
2044	Avoided septic tank pumping	acre-feet per year	1,202	0	-1,202	-$52,951	$63,659,638	0.155	$9,864,532
2044	Avoided SWP water import	acre-feet per year	1,202	0	-1,202	-$1,125	$1,352,563	0.155	$209,590
2044	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,202	1,202	$0	$0	0.155	$0
2044	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,202	1,202	$0	$0	0.155	$0
2045	Avoided septic tank pumping	acre-feet per year	1,202	0	-1,202	-$52,951	$63,659,638	0.146	$9,306,162
2045	Avoided SWP water import	acre-feet per year	1,202	0	-1,202	-$1,159	$1,393,140	0.146	$203,658
2045	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,202	1,202	$0	$0	0.146	$0
2045	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,202	1,202	$0	$0	0.146	$0
2046	Avoided septic tank pumping	acre-feet per year	1,202	0	-1,202	-$52,951	$63,659,638	0.138	$8,779,398
2046	Avoided SWP water import	acre-feet per year	1,202	0	-1,202	-$1,194	$1,434,935	0.138	$197,894
2046	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,202	1,202	$0	$0	0.138	$0
2046	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,202	1,202	$0	$0	0.138	$0
2047	Avoided septic tank pumping	acre-feet per year	1,202	0	-1,202	-$52,951	$63,659,638	0.130	$8,282,451
2047	Avoided SWP water import	acre-feet per year	1,202	0	-1,202	-$1,229	$1,477,983	0.130	$192,293
2047	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,202	1,202	$0	$0	0.130	$0
2047	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,202	1,202	$0	$0	0.130	$0
2048	Avoided septic tank pumping	acre-feet per year	1,202	0	-1,202	-$52,951	$63,659,638	0.123	$7,813,633
2048	Avoided SWP water import	acre-feet per year	1,202	0	-1,202	-$1,266	$1,522,322	0.123	$186,851
2048	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,202	1,202	$0	$0	0.123	$0
2048	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,202	1,202	$0	$0	0.123	$0
2049	Avoided septic tank pumping	acre-feet per year	1,202	0	-1,202	-$52,951	$63,659,638	0.116	$7,371,352
2049	Avoided SWP water import	acre-feet per year	1,202	0	-1,202	-$1,304	$1,567,992	0.116	$181,563
2049	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,202	1,202	$0	$0	0.116	$0
2049	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,202	1,202	$0	$0	0.116	$0
2050	Avoided septic tank pumping	acre-feet per year	1,202	0	-1,202	-$52,951	$63,659,638	0.109	$6,954,106
2050	Avoided SWP water import	acre-feet per year	1,202	0	-1,202	-$1,343	$1,615,032	0.109	$176,424
2050	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,202	1,202	$0	$0	0.109	$0
2050	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,202	1,202	$0	$0	0.109	$0

Table 15 – Annual Benefit (All benefits are in 2012 dollars) Project: Hi-Desert Water District Wastewater Treatment and Reclamation 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 [1] (f) x (g)	Discount Factor [1]	Discounted Benefits [1] (h) x (i)
2051	Avoided septic tank pumping	acre-feet per year	1,202	0	-1,202	-$52,951	$63,659,638	0.103	$6,560,477
2051	Avoided SWP water import	acre-feet per year	1,202	0	-1,202	-$1,384	$1,663,482	0.103	$171,431
2051	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,202	1,202	$0	$0	0.103	$0
2051	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,202	1,202	$0	$0	0.103	$0
2052	Avoided septic tank pumping	acre-feet per year	1,202	0	-1,202	-$52,951	$63,659,638	0.097	$6,189,129
2052	Avoided SWP water import	acre-feet per year	1,202	0	-1,202	-$1,425	$1,713,387	0.097	$166,579
2052	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,202	1,202	$0	$0	0.097	$0
2052	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,202	1,202	$0	$0	0.097	$0
2053	Avoided septic tank pumping	acre-feet per year	1,202	0	-1,202	-$52,951	$63,659,638	0.092	$5,838,801
2053	Avoided SWP water import	acre-feet per year	1,202	0	-1,202	-$1,468	$1,764,789	0.092	$161,865
2053	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,202	1,202	$0	$0	0.092	$0
2053	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,202	1,202	$0	$0	0.092	$0
2054	Avoided septic tank pumping	acre-feet per year	1,202	0	-1,202	-$52,951	$63,659,638	0.087	$5,508,303
2054	Avoided SWP water import	acre-feet per year	1,202	0	-1,202	-$1,512	$1,817,732	0.087	$157,284
2054	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,202	1,202	$0	$0	0.087	$0
2054	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,202	1,202	$0	$0	0.087	$0
2055	Avoided septic tank pumping	acre-feet per year	1,202	0	-1,202	-$52,951	$63,659,638	0.082	$5,196,512
2055	Avoided SWP water import	acre-feet per year	1,202	0	-1,202	-$1,557	$1,872,264	0.082	$152,832
2055	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,202	1,202	$0	$0	0.082	$0
2055	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,202	1,202	$0	$0	0.082	$0
2056	Avoided septic tank pumping	acre-feet per year	1,202	0	-1,202	-$52,951	$63,659,638	0.077	$4,902,370
2056	Avoided SWP water import	acre-feet per year	1,202	0	-1,202	-$1,604	$1,928,432	0.077	$148,507
2056	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,202	1,202	$0	$0	0.077	$0
2056	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,202	1,202	$0	$0	0.077	$0
2057	Avoided septic tank pumping	acre-feet per year	1,202	0	-1,202	-$52,951	$63,659,638	0.073	$4,624,877
2057	Avoided SWP water import	acre-feet per year	1,202	0	-1,202	-$1,652	$1,986,285	0.073	$144,304
2057	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,202	1,202	$0	$0	0.073	$0
2057	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,202	1,202	$0	$0	0.073	$0
2058	Avoided septic tank pumping	acre-feet per year	1,202	0	-1,202	-$52,951	$63,659,638	0.069	$4,363,092
2058	Avoided SWP water import	acre-feet per year	1,202	0	-1,202	-$1,702	$2,045,874	0.069	$140,220
2058	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,202	1,202	$0	$0	0.069	$0
2058	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,202	1,202	$0	$0	0.069	$0
2059	Avoided septic tank pumping	acre-feet per year	1,202	0	-1,202	-$52,951	$63,659,638	0.065	$4,116,124
2059	Avoided SWP water import	acre-feet per year	1,202	0	-1,202	-$1,753	$2,107,250	0.065	$136,251
2059	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,202	1,202	$0	$0	0.065	$0
2059	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,202	1,202	$0	$0	0.065	$0

Table 15 – Annual Benefit (All benefits are in 2012 dollars) Project: Hi-Desert Water District Wastewater Treatment and Reclamation 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 (1) (f) x (g)	Discount Factor (1)	Discounted Benefits (1) (h) x (i)
2060	Avoided septic tank pumping	acre-feet per year	1,202	0	-1,202	-$52,951	$63,659,638	0.061	$3,883,136
2060	Avoided SWP water import	acre-feet per year	1,202	0	-1,202	-$1,805	$2,170,467	0.061	$132,395
2060	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,202	1,202	$0	$0	0.061	$0
2060	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,202	1,202	$0	$0	0.061	$0
2061	Avoided septic tank pumping	acre-feet per year	1,202	0	-1,202	-$52,951	$63,659,638	0.058	$3,663,336
2061	Avoided SWP water import	acre-feet per year	1,202	0	-1,202	-$1,860	$2,235,581	0.058	$128,648
2061	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,202	1,202	$0	$0	0.058	$0
2061	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,202	1,202	$0	$0	0.058	$0
2062	Avoided septic tank pumping	acre-feet per year	1,202	0	-1,202	-$52,951	$63,659,638	0.054	$3,455,977
2062	Avoided SWP water import	acre-feet per year	1,202	0	-1,202	-$1,915	$2,302,649	0.054	$125,007
2062	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,202	1,202	$0	$0	0.054	$0
2062	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,202	1,202	$0	$0	0.054	$0
2063	Avoided septic tank pumping	acre-feet per year	1,202	0	-1,202	-$52,951	$63,659,638	0.051	$3,260,356
2063	Avoided SWP water import	acre-feet per year	1,202	0	-1,202	-$1,973	$2,371,728	0.051	$121,469
2063	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,202	1,202	$0	$0	0.051	$0
2063	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,202	1,202	$0	$0	0.051	$0
2064	Avoided septic tank pumping	acre-feet per year	1,202	0	-1,202	-$52,951	$63,659,638	0.048	$3,075,808
2064	Avoided SWP water import	acre-feet per year	1,202	0	-1,202	-$2,032	$2,442,880	0.048	$118,031
2064	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,202	1,202	$0	$0	0.048	$0
2064	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,202	1,202	$0	$0	0.048	$0
2065	Avoided septic tank pumping	acre-feet per year	1,202	0	-1,202	-$52,951	$63,659,638	0.046	$2,901,705
2065	Avoided SWP water import	acre-feet per year	1,202	0	-1,202	-$2,093	$2,516,166	0.046	$114,691
2065	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,202	1,202	$0	$0	0.046	$0
2065	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,202	1,202	$0	$0	0.046	$0
2066	Avoided septic tank pumping	acre-feet per year	1,202	0	-1,202	-$52,951	$63,659,638	0.043	$2,737,458
2066	Avoided SWP water import	acre-feet per year	1,202	0	-1,202	-$2,156	$2,591,651	0.043	$111,445
2066	Water Quality Improvement (remove nitrate, TSS, other contaminants)	acre-feet per year	0	1,202	1,202	$0	$0	0.043	$0
2066	Recharge aquifer with tertiary-treated wastewater	acre-feet per year	0	1,202	1,202	$0	$0	0.043	$0
Last Year of Project Life								...	
Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)									$777,299,721
Comments:									

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

8.2 Victor Valley Wastewater Reclamation Authority Subregional Reclamation Project

8.2.1 *Introduction*

The Victor Valley Wastewater Reclamation Authority (VVWRA) will construct of two water reclamation plants (WRPs) to recycle water for percolation to groundwater and serving recycled water to customers in Hesperia and Apple Valley. This will expand VVWRA's regional recycled water system to new locations within its service area. The Apple Valley WRP and Hesperia WRP have been designed as scalping facilities, meaning that these facilities will take a relatively constant wastewater flow from the interceptor system. Wastewater flow in the interceptor in excess of the plant capacity will continue to flow through the collection system to the Westside Regional WRP for treatment. The WRPs have been designed with membrane bioreactors and ultraviolet disinfection to provide advanced treatment suitable for both Title 22 customers and groundwater percolation basins.

8.2.2 *Monetized Benefits Analysis*

Be sure to include a discussion that maintains consistency with previously presented data, with-project and without-project comparisons, the period of analysis, economic cost, sunk costs, opportunity costs, discount rate, and the dollar value base year.

8.2.2.1 Project Costs

Describe all costs that will be incurred to implement and operate the project and to achieve benefits from the project.

Capital costs for constructing the two Subregional Wastewater Treatment Plants are presented in Chapter 4, Budget. Operations and maintenance costs are taken from the engineer's estimates attached to this application as Att8_IG2_BenCost_2of5 and Att8_IG2_BenCost_3of5. Summary operations and maintenance costs for operations at 1.0 mgd are displayed in Figure 8-3 and Figure 8-4. For operations at 2.0 mgd, the power and chemical costs would double, but labor costs would remain the same.

Figure 8-3 Operations and Maintenance Costs -- VVWRA Hesperia Subregional Reclamation Plant, 1 mgd

carollo

OPERATION & MAINTENANCE COSTS
OVERALL PROJECT SUMMARY

Project:	Hesperia Water Reclamation Plant 1 mgd (Phase 1)	Updated: Estimator:	August 3, 2010 CL/AG
Job #:	8229A.10	Project Status:	Detailed Design
Location:	Hesperia, CA	ENR CCI at Time of Estimate:	8865

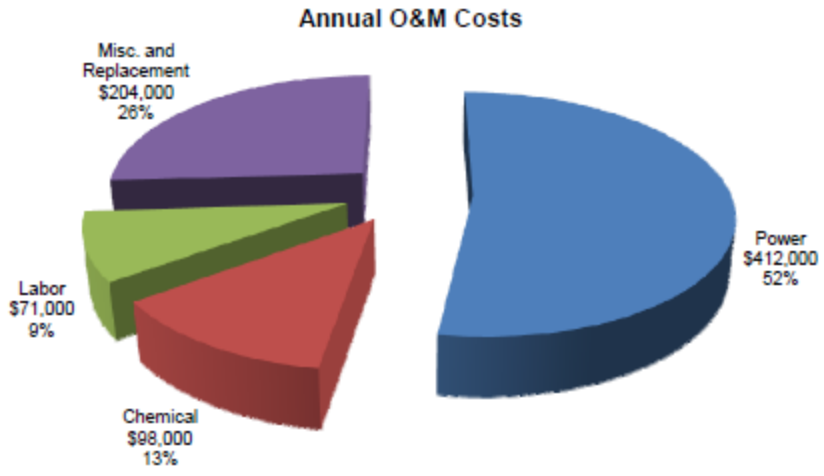
Item No.	DESCRIPTION	Total Cost
1	ANNUAL POWER COSTS [a, b]	$412,000
2	ANNUAL CHEMICAL COSTS	$98,000
3	ANNUAL LABOR COSTS	$71,000
4	ANNUAL MISCELLANEOUS AND REPLACEMENT COSTS	$204,000
	ESTIMATED ANNUAL O&M TOTAL	$785,000

Notes:

a) Costs include influent pumping from off-site lift station

b) Costs do not include reclaimed water pumping

NUMBER OF YEARS	10
ESTIMATED 10-YEAR O&M TOTAL	$7,850,000



Mojave Water Agency

Figure 8-4 Operations and Maintenance Costs -- VVWRA Apple Valley Subregional Reclamation Plant, 1 mgd

carollo

OPERATION & MAINTENANCE COSTS
OVERALL PROJECT SUMMARY

Project:	Apple Valley Water Reclamation Plant 1 mgd (Phase 1)	Updated:	August 3, 2010
		Estimator:	CL/AG
Job #:	8229A.10	Project Status:	Detailed Design
Location:	Apple Valley, CA	ENR CCI at Time of Estimate:	8865

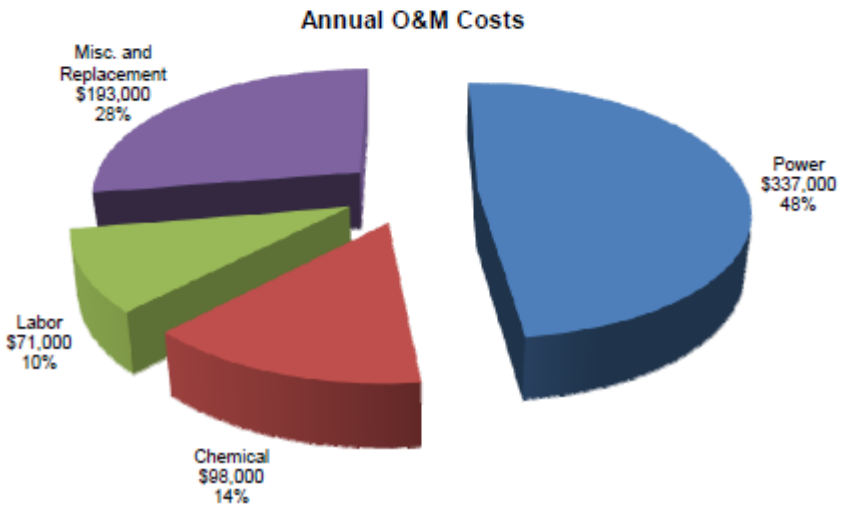
Item No.	DESCRIPTION	Total Cost
1	ANNUAL POWER COSTS [a, b]	$337,000
2	ANNUAL CHEMICAL COSTS	$98,000
3	ANNUAL LABOR COSTS	$71,000
4	ANNUAL MISCELLANEOUS AND REPLACEMENT COSTS	$193,000
	ESTIMATED ANNUAL O&M TOTAL	**$699,000**

Notes:

a) Costs do not include existing Otoe Rd lift station — **NUMBER OF YEARS** 10

b) Costs do not include reclaimed water pumping

ESTIMATED 10-YEAR O&M TOTAL **$6,990,000**



Mojave Water Agency

8.2.2.2 Project Benefits

Display and describe the economic benefits of the project. Provide monetary value to the physical benefits listed in Attachment 7: Technical Justification Physical Benefits Section

Benefits from the project include but are not limited to:

- Water Supply/Avoided replacement water purchase
- Energy and Greenhouse Gas emission reduction
- Avoided supplemental supply capital
- Avoided imported water recharge pond construction

8.2.2.3 Water Supply

The MWA service area lies in the California High Desert, which is part of the Mojave Desert. The High Desert Area is located on the northeastern flanks of the San Bernardino and San Gabriel Mountains, which separate the High Desert from the coastal basins and inland valleys of the greater Los Angeles area. Average rainfall within the lower lying areas of the Mojave Basin Area (which includes Hesperia and Apple Valley) is roughly five inches per year[39].

All water suppliers share a keen interest in their local and regional water supplies. The economic health of the region is tied to its ability to demonstrate that affordable high quality water will be available as the region develops. Overdraft in 2000 averaged approximately 34,300 acre-feet per year, and is projected to increase to 50,600 acre-feet by 2020.[40] Consumptive use in the MWA service area is currently approximately 108,000 acre-feet per year, and is expected to grow to approximately 124,000 acre-feet by 2020.[41] Less than half of 2020 demands would be met without RWMP implementation and full implementation of two adjudicated physical solutions.[42] To keep the basins in balance and prevent further overdraft, MWA imports water from the State Water Project (SWP).

The VVWRA is located in heart of the most populous potion of the MWA region, with approximately 80 percent of the total population. The majority of the imported SWP supplies are used within the VVWRA territory. The proposed Subregional Reclamation Project facilities will be used to provide highly treated reclaimed wastewater for irrigation uses on parks, golf courses and open space areas, and for commercial and industrial uses. Excess effluent not used for recycling will be disposed of in percolation ponds. Every acre-foot of reclaimed water used in this way will eliminate the need for the importation of an acre-foot of SWP water.

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[39] MWA 2004 Regional Water Management Plan (RWMP) p.3-23; attached as Att2_IG2_Adopt_2of2.pdf

[40] RWMP Tables 5-6 and 5-12 with current SWP imports level of 8,000 acre-feet per year

[41] RWMP Tables 5-9 and 5-10

[42] MWA 2004 Regional Water Management Plan PEIR p.6-15

The two Subregional Reclamation Project facilities will be operated at 1.0 mgd initially, starting in June 2015, and will transition to 2.0 mgd operations by 2020.

Each of the principal benefits can best be characterized in terms of avoided costs of the without-project alternative. This is presented in the section below.

8.2.3 *Annual Cost of Avoided Projects*

Avoided costs are costs that occur in the without-project condition that, with the proposed project, are no longer expected. Table 16 should be used if the applicant wishes to present Benefits from Avoided Costs. To estimate a benefit from avoided costs of future projects, shortages, or operations, complete Table 16 for each avoided project.

Starting in June 2015, the two plants together will begin producing 2.0 mgd. This production will increase to a total 4.0 mgd by 2020. The reclaimed water will offset existing uses currently provided by potable supplies. The reclaimed water will also be used in-basin, taking demand off of the regional aquifer, rather than being discharged to the Mojave River and out of the basin as it is currently.

Avoided Treatment Plant Expansion and Associated Collection System Improvements. The VVWRA 2011 Financial Plan Update[43] proposes construction of the Hesperia and Apple Valley Subregional Reclamation Plants as an alternative to expansion of the main wastewater treatment plant and associated improvements and capacity expansions to the wastewater collection system. These improvements are estimated to total approximately $52 million, and would not be needed with the addition of the subregional reclamation plants.

Avoided Wastewater Treatment Costs. Cost to treat wastewater at the main treatment plant is approximately $1,900 per million gallons[44] ($619 per acre-foot). These costs would be avoided for wastewater volumes treated at the subregional reclamation plants.

Avoided Replacement Water Purchase. Every acre-foot reclaimed will reduce the need to purchase State Water Project (SWP) replacement water from Mojave Water Agency in conformance with the physical solution proscribed in the Mojave River Area Judgment. The cost for this Replacement water is currently priced at $395 per acre-foot.[45] These costs go up every year, and are conservatively assumed to continue to increase by 3 percent per year over the life of the project. The time stream of these avoided water purchase costs is displayed in Table 8-3.

Avoided Supplemental Supply Capital. Mojave Water Agency's access to State Water Supply is limited by contract and by the reliability of deliveries of SWP water. Recognizing

[43] Bartle Wells Associates, Victor Valley Wastewater Reclamation Authority 2011 Financial Plan Update, August 26, 2011. Included in this application as Att8_IG2_BenCost_5of5

[44] Logan Olds, VVWRA GM, personal communication

[45] Eighteenth Annual Report of the Mojave Basin Area Watermaster, Water Years 2010-11, May 1, 2012, p.26

an imminent shortfall of available supply, in 2009 MWA purchased a 14,000 acre-foot SWP Table A water contract for $5,250 per acre-foot. A more recent purchase put the cost at $5,850/acre foot. As recently as 2005, the average reliability of Mojave's SWP supplies was estimated to be 77 percent. Recent court rulings to protect endangered fish species in the Sacramento-San Joaquin Delta have restricted SWP imports, and current long-term reliability of supply is estimated to be as low as 60 percent. Assuming a long-term SWP reliability of 60 percent, the effective cost of the Table A contract is ($5,850 / 0.6 =) $9,750 per acre-foot. Amortizing this cost at 6 percent interest over 30 years yields an annualized supplemental supply purchase cost of $708 per acre-foot per year[46]. Such a purchase would also compel payment of SWP fixed annual charges, currently $169 per acre-foot. Thus, for every acre-foot of water conserved, water purveyors will benefit by avoiding the (708+169=) $877 payment for purchase of new Table A amounts.[47] Escalating these 2010 costs to 2012 cost levels produces a repayment of ($877 x 1.02=) $895 per acre-foot of contract amount.[48] It is assumed that, absent construction of the Subregional Reclamation Facilities, the purchase of a supplemental supply would be made in 2015 and paid back over the life of the project. The equivalent volume of the 4.0 mgd reclamation facilities is 4,480 acre-feet per year. As shown in Table 8-3, at $895 per acre-foot, capital repayment for new water supplies rights or contracts is about $4 million per year.

Avoided Pumping Energy. As described in Attachment 7, providing water reclaimed water to irrigation uses on the highlands above the Mojave River floodplain wellfields will result in significant energy savings. Well drawdown lift and pressurization to distribution system pressure are also avoided. As displayed in Table 7-3, these savings amount to approximately $964,000 per year in energy offsets when the reclamation plants are operating at 4.0 mgd. The time series of these benefits is displayed in Table 8-3. As described in Attachment 7, there will be energy use associated with running the reclamation facilities and distributing the product water; these costs are included in the operations cost estimate.

Greenhouse Gas Emission Reduction. As noted in Attachment 7 (see Table 7-3), at a typical conversion of 1,400 kWh of energy producing one ton of CO2 equivalents, the project will eliminate 3,000 tons of carbon emissions per year. Since there is not yet a reliable market for these emissions, this benefit is not monetized in this application.

[46] Annual water purchase costs would be in addition to this purchase of Table A supply, so this cost is not duplicative of replacement water purchases from the State Water Project discussed above

[47] The capital cost of new supply might also have been considered a one-time up-front cost, since supplemental water supplies typically need to be purchased many years in advance

[48] This is the repayment rate for purchase of water rights or contracts, and does not include actual water purchase or delivery.

Avoided Imported Water Recharge Pond Construction. An unpublished study of future water supply options by Mojave Water Agency[49] showed that decreasing reliability of State Water Project supplies will require significantly more recharge pond capacity to achieve the same benefit. In other words, recharging 100 units of a supply that is 77 percent reliable would require (100 / 0.77=) 130 units of recharge capacity. If SWP reliability drops to 50 percent, (100 / 0.50=) 200 units of recharge capacity will be required to recharge the same 100 units of supply. An inventory of proposed recharge facilities within MWA showed an average cost of $1,000 per acre-foot of annual recharge capacity. Escalating this unit cost from 2008 to 2012 price levels yields a unit cost of ($1,000 x 1.04=) $1,040 per acre-foot, or about $4.66 million to construct a recharge pond to recharge 4,480 acre-feet per year. This is reported as an avoided capital cost in DWR Table 16 below.

Figure 3-5. Comparison of Moderate Growth Demand to 77% Effective Planned Recharge

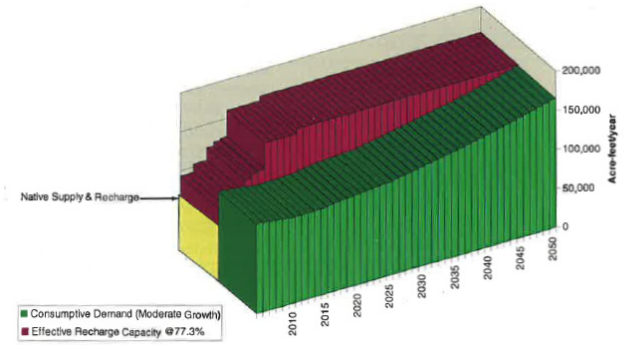
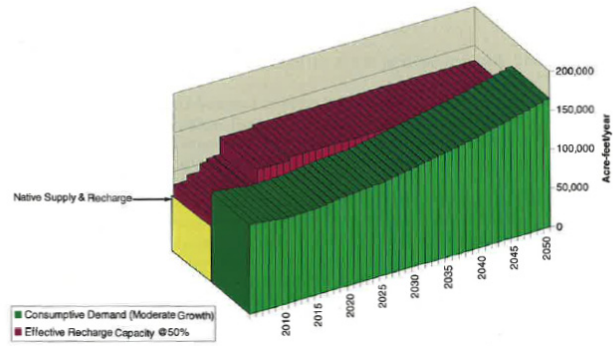


Figure 3-6. Comparison of Moderate Growth Demand to 50% Effective Planned Recharge



8.2.4 *Flood Damage Reduction Benefits Analysis*

No flood damage reduction benefits are claimed for this project.

8.2.5 *Annual Benefits*

Project Benefits for the VVWRA Subregional Reclamation Project are presented in DWR Table 15 format below.

[49] June 2008 study is protected by attorney-client privilege

Table 8-3 Avoided Cost Worksheet, VVWRA Subregional Reclamation Facilities

Year	Aquifer Recharge (af/yr)	Avoided Treatment Costs @$824/af	MWA Replacement and Make-up Water Unit Cost ($/af)	MWA Replacement and Make-up Water Cost	Groundwater Pumping	Supplemental Supply Capital	Total Avoided Cost
2015	1,120	$922,600	$445	$497,925	$541,575	$4,007,539	$5,969,639
2016	2,240	$1,845,200	$458	$1,025,726	$1,148,139	$4,007,539	$8,026,604
2017	2,240	$1,845,200	$472	$1,056,497	$1,217,028	$4,007,539	$8,126,264
2018	2,240	$1,845,200	$486	$1,088,192	$1,290,049	$4,007,539	$8,230,981
2019	2,240	$1,845,200	$500	$1,120,838	$1,367,452	$4,007,539	$8,341,030
2020	4,480	$3,690,400	$515	$2,308,927	$1,449,500	$4,007,539	$11,456,365
2021	4,480	$3,690,400	$531	$2,378,194	$1,536,470	$4,007,539	$11,612,603
2022	4,480	$3,690,400	$547	$2,449,540	$1,628,658	$4,007,539	$11,776,137
2023	4,480	$3,690,400	$563	$2,523,026	$1,726,377	$4,007,539	$11,947,343
2024	4,480	$3,690,400	$580	$2,598,717	$1,829,960	$4,007,539	$12,126,616
2025	4,480	$3,690,400	$597	$2,676,679	$1,939,757	$4,007,539	$12,314,375
2026	4,480	$3,690,400	$615	$2,756,979	$2,056,143	$4,007,539	$12,511,061
2027	4,480	$3,690,400	$634	$2,839,689	$2,179,511	$4,007,539	$12,717,139
2028	4,480	$3,690,400	$653	$2,924,879	$2,310,282	$4,007,539	$12,933,100
2029	4,480	$3,690,400	$672	$3,012,626	$2,448,899	$4,007,539	$13,159,464
2030	4,480	$3,690,400	$693	$3,103,004	$2,595,833	$4,007,539	$13,396,776
2031	4,480	$3,690,400	$713	$3,196,094	$2,751,583	$4,007,539	$13,645,617
2032	4,480	$3,690,400	$735	$3,291,977	$2,916,678	$4,007,539	$13,906,594
2033	4,480	$3,690,400	$757	$3,390,737	$3,091,679	$4,007,539	$14,180,354
2034	4,480	$3,690,400	$780	$3,492,459	$3,277,179	$4,007,539	$14,467,577
2035	4,480	$3,690,400	$803	$3,597,232	$3,473,810	$4,007,539	$14,768,982
2036	4,480	$3,690,400	$827	$3,705,149	$3,682,239	$4,007,539	$15,085,327
2037	4,480	$3,690,400	$852	$3,816,304	$3,903,173	$4,007,539	$15,417,416
2038	4,480	$3,690,400	$877	$3,930,793	$4,137,363	$4,007,539	$15,766,096
2039	4,480	$3,690,400	$904	$4,048,717	$4,385,605	$4,007,539	$16,132,261
2040	4,480	$3,690,400	$931	$4,170,178	$4,648,741	$4,007,539	$16,516,859
2041	4,480	$3,690,400	$959	$4,295,284	$4,927,666	$4,007,539	$16,920,889
2042	4,480	$3,690,400	$988	$4,424,142	$5,223,326	$4,007,539	$17,345,407
2043	4,480	$3,690,400	$1,017	$4,556,866	$5,536,725	$4,007,539	$17,791,531
2044	4,480	$3,690,400	$1,048	$4,693,572	$5,868,929	$4,007,539	$18,260,441
2045	4,480	$3,690,400	$1,079	$4,834,380	$6,221,065	$4,007,539	$18,753,384
2046	4,480	$3,690,400	$1,111	$4,979,411	$6,594,329	$4,007,539	$19,271,679
2047	4,480	$3,690,400	$1,145	$5,128,793	$6,989,988	$4,007,539	$19,816,721
2048	4,480	$3,690,400	$1,179	$5,282,657	$7,409,388	$4,007,539	$20,389,984
2049	4,480	$3,690,400	$1,215	$5,441,137	$7,853,951	$4,007,539	$20,993,027
2050	4,480	$3,690,400	$1,251	$5,604,371	$8,325,188	$4,007,539	$21,627,498
2051	4,480	$3,690,400	$1,289	$5,772,502	$8,824,699	$4,007,539	$22,295,141
2052	4,480	$3,690,400	$1,327	$5,945,677	$9,354,181	$4,007,539	$22,997,798
2053	4,480	$3,690,400	$1,367	$6,124,047	$9,915,432	$4,007,539	$23,737,419
2054	4,480	$3,690,400	$1,408	$6,307,769	$10,510,358	$4,007,539	$24,516,066
2055	4,480	$3,690,400	$1,450	$6,497,002	$11,140,979	$4,007,539	$25,335,921
2056	4,480	$3,690,400	$1,494	$6,691,912	$11,809,438	$4,007,539	$26,199,289
2057	4,480	$3,690,400	$1,539	$6,892,669	$12,518,005	$4,007,539	$27,108,613
2058	4,480	$3,690,400	$1,585	$7,099,449	$13,269,085	$4,007,539	$28,066,473
2059	4,480	$3,690,400	$1,632	$7,312,433	$14,065,230	$4,007,539	$29,075,602
2060	4,480	$3,690,400	$1,681	$7,531,806	$14,909,144	$4,007,539	$30,138,889
2061	4,480	$3,690,400	$1,732	$7,757,760	$15,803,692	$4,007,539	$31,259,392
2062	4,480	$3,690,400	$1,784	$7,990,493	$16,751,914	$4,007,539	$32,440,346
2063	4,480	$3,690,400	$1,837	$8,230,208	$17,757,029	$4,007,539	$33,685,176
2064	4,480	$3,690,400	$1,892	$8,477,114	$18,822,450	$4,007,539	$34,997,504
2065	2,240	$1,845,200	$1,949	$4,365,714	$9,975,899	$2,003,770	$18,190,582
2066	0	$0	$2,007	$0			$0

Table 16 – Annual Costs of Avoided Projects (All avoided costs are in 2012 dollars) Project: Victor Valley Wastewater Reclamation Authority Subregional Reclamation Project						
	Costs				Discounting Calculations	
(a)	(b)	(c)	(d)	(e)	(f)	(g)
Year	Alternative (Avoided Project Name): Imported SWP Water Avoided Project Description:				Discount Factor	Discounted Costs (e) x (f)
	Avoided Capital Costs	Avoided Replacement Costs	Avoided Operations and Maintenance Costs	Total Cost Avoided for Individual Alternatives (b) + (c) + (d)		
2015	$56,659,200	$0	$5,969,639	$62,628,839	0.840	$52,584,381
2016	$0	$0	$8,026,604	$8,026,604	0.792	$6,357,822
2017	$0	$0	$8,126,264	$8,126,264	0.747	$6,072,418
2018	$0	$0	$8,230,981	$8,230,981	0.705	$5,802,517
2019	$0	$0	$8,341,030	$8,341,030	0.665	$5,547,261
2020	$0	$0	$11,456,365	$11,456,365	0.627	$7,187,865
2021	$0	$0	$11,612,603	$11,612,603	0.592	$6,873,482
2022	$0	$0	$11,776,137	$11,776,137	0.558	$6,575,733
2023	$0	$0	$11,947,343	$11,947,343	0.527	$6,293,711
2024	$0	$0	$12,126,616	$12,126,616	0.497	$6,026,557
2025	$0	$0	$12,314,375	$12,314,375	0.469	$5,773,460
2026	$0	$0	$12,511,061	$12,511,061	0.442	$5,533,654
2027	$0	$0	$12,717,139	$12,717,139	0.417	$5,306,418
2028	$0	$0	$12,933,100	$12,933,100	0.394	$5,091,067
2029	$0	$0	$13,159,464	$13,159,464	0.371	$4,886,957
2030	$0	$0	$13,396,776	$13,396,776	0.350	$4,693,477
2031	$0	$0	$13,645,617	$13,645,617	0.331	$4,510,054
2032	$0	$0	$13,906,594	$13,906,594	0.312	$4,336,142
2033	$0	$0	$14,180,354	$14,180,354	0.294	$4,171,228
2034	$0	$0	$14,467,577	$14,467,577	0.278	$4,014,826
2035	$0	$0	$14,768,982	$14,768,982	0.262	$3,866,479
2036	$0	$0	$15,085,327	$15,085,327	0.247	$3,725,752
2037	$0	$0	$15,417,416	$15,417,416	0.233	$3,592,237
2038	$0	$0	$15,766,096	$15,766,096	0.220	$3,465,546
2039	$0	$0	$16,132,261	$16,132,261	0.207	$3,345,314
2040	$0	$0	$16,516,859	$16,516,859	0.196	$3,231,195
2041	$0	$0	$16,920,889	$16,920,889	0.185	$3,122,864
2042	$0	$0	$17,345,407	$17,345,407	0.174	$3,020,011
2043	$0	$0	$17,791,531	$17,791,531	0.164	$2,922,345
2044	$0	$0	$18,260,441	$18,260,441	0.155	$2,829,590
2045	$0	$0	$18,753,384	$18,753,384	0.146	$2,741,486
2046	$0	$0	$19,271,679	$19,271,679	0.138	$2,657,787
2047	$0	$0	$19,816,721	$19,816,721	0.130	$2,578,259
2048	$0	$0	$20,389,984	$20,389,984	0.123	$2,502,682
2049	$0	$0	$20,993,027	$20,993,027	0.116	$2,430,849
2050	$0	$0	$21,627,498	$21,627,498	0.109	$2,362,563
2051	$0	$0	$22,295,141	$22,295,141	0.103	$2,297,637
2052	$0	$0	$22,997,798	$22,997,798	0.097	$2,235,896
2053	$0	$0	$23,737,419	$23,737,419	0.092	$2,177,173
2054	$0	$0	$24,516,066	$24,516,066	0.087	$2,121,311
2055	$0	$0	$25,335,921	$25,335,921	0.082	$2,068,162
2056	$0	$0	$26,199,289	$26,199,289	0.077	$2,017,583
2057	$0	$0	$27,108,613	$27,108,613	0.073	$1,969,443
2058	$0	$0	$28,066,473	$28,066,473	0.069	$1,923,615
2059	$0	$0	$29,075,602	$29,075,602	0.065	$1,879,979
2060	$0	$0	$30,138,889	$30,138,889	0.061	$1,838,424
2061	$0	$0	$31,259,392	$31,259,392	0.058	$1,798,842
2062	$0	$0	$32,440,346	$32,440,346	0.054	$1,761,133
2063	$0	$0	$33,685,176	$33,685,176	0.051	$1,725,201
2064	$0	$0	$34,997,504	$34,997,504	0.048	$1,690,955
2065	$0	$0	$18,190,582	$18,190,582	0.046	$829,155
2066	$0	$0	$0	$0	0.043	$0
Last Year of Project Life					...	
Total Present Value of Discounted Costs (Sum of Column (g))						$234,368,502
(%) Avoided Cost Claimed by Project						100%
Total Present Value of Discounted Avoided Project Costs Claimed by Alternative Project (Total Present Value of Discounted Costs x % Avoided Cost Claimed by Project)						$234,368,502

Table 15 – Annual Benefit (All benefits are in 2012 dollars) Project: Victor Valley Wastewater Reclamation Authority Subregional Reclamation 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 [1] (f) x (g)	Discount Factor [1]	Discounted Benefits [1] (h) x (i)
2015	Avoided Replacement Water Purchase	acre-feet	2,240	0	-2,240	-$445	$995,850	0.840	$836,135
2015	Avoided Groundwater Pumping	acre-feet	2,240	0	-2,240	-$215	$482,000	0.840	$404,696
2015	Avoided Supplemental Supply Capital	acre-feet	2,240	0	-2,240	-$895	$4,007,539	0.840	$3,364,807
2015	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	2,240	2,240	$0	$0	0.840	$0
2015	Avoided Main Treatment Plant and Collection System Improvments	mgd of capacity	4	0	-4	-$13,000,000	$52,000,000	0.840	$43,660,203
2015	Avoided Recharge Pond Construction	acre-feet	2,240	0	-2,240	-$1,020	$2,284,800	0.840	$1,918,362
2015	Avoided Main Treatment Plant Operation	acre-feet	2,240	0	-2,240	-$824	$1,845,200	0.840	$1,549,266
2016	Avoided Replacement Water Purchase	acre-feet	2,240	0	-2,240	-$458	$1,025,726	0.792	$812,471
2016	Avoided Groundwater Pumping	acre-feet	2,240	0	-2,240	-$215	$482,000	0.792	$381,789
2016	Avoided Supplemental Supply Capital	acre-feet	2,240	0	-2,240	-$895	$4,007,539	0.792	$3,174,346
2016	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	2,240	2,240	$0	$0	0.792	$0
2016	Avoided Main Treatment Plant Operation	acre-feet	2,240	0	-2,240	-$824	$1,845,200	0.792	$1,461,571
2017	Avoided Replacement Water Purchase	acre-feet	2,240	0	-2,240	-$472	$1,056,497	0.747	$789,476
2017	Avoided Groundwater Pumping	acre-feet	2,240	0	-2,240	-$215	$482,000	0.747	$360,178
2017	Avoided Supplemental Supply Capital	acre-feet	2,240	0	-2,240	-$895	$4,007,539	0.747	$2,994,666
2017	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	2,240	2,240	$0	$0	0.747	$0
2017	Avoided Main Treatment Plant Operation	acre-feet	2,240	0	-2,240	-$824	$1,845,200	0.747	$1,378,841
2018	Avoided Replacement Water Purchase	acre-feet	2,240	0	-2,240	-$486	$1,088,192	0.705	$767,133
2018	Avoided Groundwater Pumping	acre-feet	2,240	0	-2,240	-$215	$482,000	0.705	$339,791
2018	Avoided Supplemental Supply Capital	acre-feet	2,240	0	-2,240	-$895	$4,007,539	0.705	$2,825,157
2018	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	2,240	2,240	$0	$0	0.705	$0
2018	Avoided Main Treatment Plant Operation	acre-feet	2,240	0	-2,240	-$824	$1,845,200	0.705	$1,300,793
2019	Avoided Replacement Water Purchase	acre-feet	2,240	0	-2,240	-$500	$1,120,838	0.665	$745,421
2019	Avoided Groundwater Pumping	acre-feet	2,240	0	-2,240	-$215	$482,000	0.665	$320,558
2019	Avoided Supplemental Supply Capital	acre-feet	2,240	0	-2,240	-$895	$4,007,539	0.665	$2,665,242
2019	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	2,240	2,240	$0	$0	0.665	$0
2019	Avoided Main Treatment Plant Operation	acre-feet	2,240	0	-2,240	-$824	$1,845,200	0.665	$1,227,163
2020	Avoided Replacement Water Purchase	acre-feet	4,480	0	-4,480	-$515	$2,308,927	0.627	$1,448,649
2020	Avoided Groundwater Pumping	acre-feet	4,480	0	-4,480	-$215	$964,000	0.627	$604,826
2020	Avoided Supplemental Supply Capital	acre-feet	4,480	0	-4,480	-$895	$4,007,539	0.627	$2,514,380
2020	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	4,480	4,480	$0	$0	0.627	$0
2020	Avoided Main Treatment Plant Operation	acre-feet	4,480	0	-4,480	-$824	$3,690,400	0.627	$2,315,403
2021	Avoided Replacement Water Purchase	acre-feet	4,480	0	-4,480	-$531	$2,378,194	0.592	$1,407,650
2021	Avoided Groundwater Pumping	acre-feet	4,480	0	-4,480	-$215	$964,000	0.592	$570,590
2021	Avoided Supplemental Supply Capital	acre-feet	4,480	0	-4,480	-$895	$4,007,539	0.592	$2,372,056
2021	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	4,480	4,480	$0	$0	0.592	$0
2021	Avoided Main Treatment Plant Operation	acre-feet	4,480	0	-4,480	-$824	$3,690,400	0.592	$2,184,342

Table 15 – Annual Benefit (All benefits are in 2012 dollars) Project: Victor Valley Wastewater Reclamation Authority Subregional Reclamation 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 [1] (f) x (g)	Discount Factor [1]	Discounted Benefits [1] (h) x (i)
2022	Avoided Replacement Water Purchase	acre-feet	4,480	0	-4,480	-$547	$2,449,540	0.558	$1,367,810
2022	Avoided Groundwater Pumping	acre-feet	4,480	0	-4,480	-$215	$964,000	0.558	$538,293
2022	Avoided Supplemental Supply Capital	acre-feet	4,480	0	-4,480	-$895	$4,007,539	0.558	$2,237,789
2022	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	4,480	4,480	$0	$0	0.558	$0
2022	Avoided Main Treatment Plant Operation	acre-feet	4,480	0	-4,480	-$824	$3,690,400	0.558	$2,060,700
2023	Avoided Replacement Water Purchase	acre-feet	4,480	0	-4,480	-$563	$2,523,026	0.527	$1,329,099
2023	Avoided Groundwater Pumping	acre-feet	4,480	0	-4,480	-$215	$964,000	0.527	$507,823
2023	Avoided Supplemental Supply Capital	acre-feet	4,480	0	-4,480	-$895	$4,007,539	0.527	$2,111,122
2023	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	4,480	4,480	$0	$0	0.527	$0
2023	Avoided Main Treatment Plant Operation	acre-feet	4,480	0	-4,480	-$824	$3,690,400	0.527	$1,944,057
2024	Avoided Replacement Water Purchase	acre-feet	4,480	0	-4,480	-$580	$2,598,717	0.497	$1,291,483
2024	Avoided Groundwater Pumping	acre-feet	4,480	0	-4,480	-$215	$964,000	0.497	$479,078
2024	Avoided Supplemental Supply Capital	acre-feet	4,480	0	-4,480	-$895	$4,007,539	0.497	$1,991,624
2024	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	4,480	4,480	$0	$0	0.497	$0
2024	Avoided Main Treatment Plant Operation	acre-feet	4,480	0	-4,480	-$824	$3,690,400	0.497	$1,834,016
2025	Avoided Replacement Water Purchase	acre-feet	4,480	0	-4,480	-$597	$2,676,679	0.469	$1,254,931
2025	Avoided Groundwater Pumping	acre-feet	4,480	0	-4,480	-$215	$964,000	0.469	$451,961
2025	Avoided Supplemental Supply Capital	acre-feet	4,480	0	-4,480	-$895	$4,007,539	0.469	$1,878,891
2025	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	4,480	4,480	$0	$0	0.469	$0
2025	Avoided Main Treatment Plant Operation	acre-feet	4,480	0	-4,480	-$824	$3,690,400	0.469	$1,730,204
2026	Avoided Replacement Water Purchase	acre-feet	4,480	0	-4,480	-$615	$2,756,979	0.442	$1,219,415
2026	Avoided Groundwater Pumping	acre-feet	4,480	0	-4,480	-$215	$964,000	0.442	$426,378
2026	Avoided Supplemental Supply Capital	acre-feet	4,480	0	-4,480	-$895	$4,007,539	0.442	$1,772,538
2026	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	4,480	4,480	$0	$0	0.442	$0
2026	Avoided Main Treatment Plant Operation	acre-feet	4,480	0	-4,480	-$824	$3,690,400	0.442	$1,632,267
2027	Avoided Replacement Water Purchase	acre-feet	4,480	0	-4,480	-$634	$2,839,689	0.417	$1,184,903
2027	Avoided Groundwater Pumping	acre-feet	4,480	0	-4,480	-$215	$964,000	0.417	$402,244
2027	Avoided Supplemental Supply Capital	acre-feet	4,480	0	-4,480	-$895	$4,007,539	0.417	$1,672,206
2027	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	4,480	4,480	$0	$0	0.417	$0
2027	Avoided Main Treatment Plant Operation	acre-feet	4,480	0	-4,480	-$824	$3,690,400	0.417	$1,539,875
2028	Avoided Replacement Water Purchase	acre-feet	4,480	0	-4,480	-$653	$2,924,879	0.394	$1,151,368
2028	Avoided Groundwater Pumping	acre-feet	4,480	0	-4,480	-$215	$964,000	0.394	$379,475
2028	Avoided Supplemental Supply Capital	acre-feet	4,480	0	-4,480	-$895	$4,007,539	0.394	$1,577,553
2028	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	4,480	4,480	$0	$0	0.394	$0
2028	Avoided Main Treatment Plant Operation	acre-feet	4,480	0	-4,480	-$824	$3,690,400	0.394	$1,452,712
2029	Avoided Replacement Water Purchase	acre-feet	4,480	0	-4,480	-$672	$3,012,626	0.371	$1,118,782
2029	Avoided Groundwater Pumping	acre-feet	4,480	0	-4,480	-$215	$964,000	0.371	$357,995

Table 15 – Annual Benefit (All benefits are in 2012 dollars) Project: Victor Valley Wastewater Reclamation Authority Subregional Reclamation 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 [1] (f) x (g)	Discount Factor [1]	Discounted Benefits [1] (h) x (i)
2029	Avoided Supplemental Supply Capital	acre-feet	4,480	0	-4,480	-$895	$4,007,539	0.371	$1,488,257
2029	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	4,480	4,480	$0	$0	0.371	$0
2029	Avoided Main Treatment Plant Operation	acre-feet	4,480	0	-4,480	-$824	$3,690,400	0.371	$1,370,483
2030	Avoided Replacement Water Purchase	acre-feet	4,480	0	-4,480	-$693	$3,103,004	0.350	$1,087,118
2030	Avoided Groundwater Pumping	acre-feet	4,480	0	-4,480	-$215	$964,000	0.350	$337,731
2030	Avoided Supplemental Supply Capital	acre-feet	4,480	0	-4,480	-$895	$4,007,539	0.350	$1,404,016
2030	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	4,480	4,480	$0	$0	0.350	$0
2030	Avoided Main Treatment Plant Operation	acre-feet	4,480	0	-4,480	-$824	$3,690,400	0.350	$1,292,909
2031	Avoided Replacement Water Purchase	acre-feet	4,480	0	-4,480	-$713	$3,196,094	0.331	$1,056,351
2031	Avoided Groundwater Pumping	acre-feet	4,480	0	-4,480	-$215	$964,000	0.331	$318,615
2031	Avoided Supplemental Supply Capital	acre-feet	4,480	0	-4,480	-$895	$4,007,539	0.331	$1,324,544
2031	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	4,480	4,480	$0	$0	0.331	$0
2031	Avoided Main Treatment Plant Operation	acre-feet	4,480	0	-4,480	-$824	$3,690,400	0.331	$1,219,725
2032	Avoided Replacement Water Purchase	acre-feet	4,480	0	-4,480	-$735	$3,291,977	0.312	$1,026,454
2032	Avoided Groundwater Pumping	acre-feet	4,480	0	-4,480	-$215	$964,000	0.312	$300,580
2032	Avoided Supplemental Supply Capital	acre-feet	4,480	0	-4,480	-$895	$4,007,539	0.312	$1,249,570
2032	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	4,480	4,480	$0	$0	0.312	$0
2032	Avoided Main Treatment Plant Operation	acre-feet	4,480	0	-4,480	-$824	$3,690,400	0.312	$1,150,684
2033	Avoided Replacement Water Purchase	acre-feet	4,480	0	-4,480	-$757	$3,390,737	0.294	$997,403
2033	Avoided Groundwater Pumping	acre-feet	4,480	0	-4,480	-$215	$964,000	0.294	$283,566
2033	Avoided Supplemental Supply Capital	acre-feet	4,480	0	-4,480	-$895	$4,007,539	0.294	$1,178,839
2033	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	4,480	4,480	$0	$0	0.294	$0
2033	Avoided Main Treatment Plant Operation	acre-feet	4,480	0	-4,480	-$824	$3,690,400	0.294	$1,085,551
2034	Avoided Replacement Water Purchase	acre-feet	4,480	0	-4,480	-$780	$3,492,459	0.278	$969,175
2034	Avoided Groundwater Pumping	acre-feet	4,480	0	-4,480	-$215	$964,000	0.278	$267,515
2034	Avoided Supplemental Supply Capital	acre-feet	4,480	0	-4,480	-$895	$4,007,539	0.278	$1,112,113
2034	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	4,480	4,480	$0	$0	0.278	$0
2034	Avoided Main Treatment Plant Operation	acre-feet	4,480	0	-4,480	-$824	$3,690,400	0.278	$1,024,105
2035	Avoided Replacement Water Purchase	acre-feet	4,480	0	-4,480	-$803	$3,597,232	0.262	$941,746
2035	Avoided Groundwater Pumping	acre-feet	4,480	0	-4,480	-$215	$964,000	0.262	$252,373
2035	Avoided Supplemental Supply Capital	acre-feet	4,480	0	-4,480	-$895	$4,007,539	0.262	$1,049,163
2035	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	4,480	4,480	$0	$0	0.262	$0
2035	Avoided Main Treatment Plant Operation	acre-feet	4,480	0	-4,480	-$824	$3,690,400	0.262	$966,137
2036	Avoided Replacement Water Purchase	acre-feet	4,480	0	-4,480	-$827	$3,705,149	0.247	$915,092
2036	Avoided Groundwater Pumping	acre-feet	4,480	0	-4,480	-$215	$964,000	0.247	$238,087
2036	Avoided Supplemental Supply Capital	acre-feet	4,480	0	-4,480	-$895	$4,007,539	0.247	$989,776
2036	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	4,480	4,480	$0	$0	0.247	$0

Table 15 – Annual Benefit (All benefits are in 2012 dollars) Project: Victor Valley Wastewater Reclamation Authority Subregional Reclamation 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 [1] (f) x (g)	Discount Factor [1]	Discounted Benefits [1] (h) x (i)
2036	Avoided Main Treatment Plant Operation	acre-feet	4,480	0	-4,480	-$824	$3,690,400	0.247	$911,450
2037	Avoided Replacement Water Purchase	acre-feet	4,480	0	-4,480	-$852	$3,816,304	0.233	$889,194
2037	Avoided Groundwater Pumping	acre-feet	4,480	0	-4,480	-$215	$964,000	0.233	$224,611
2037	Avoided Supplemental Supply Capital	acre-feet	4,480	0	-4,480	-$895	$4,007,539	0.233	$933,751
2037	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	4,480	4,480	$0	$0	0.233	$0
2037	Avoided Main Treatment Plant Operation	acre-feet	4,480	0	-4,480	-$824	$3,690,400	0.233	$859,858
2038	Avoided Replacement Water Purchase	acre-feet	4,480	0	-4,480	-$877	$3,930,793	0.220	$864,028
2038	Avoided Groundwater Pumping	acre-feet	4,480	0	-4,480	-$215	$964,000	0.220	$211,897
2038	Avoided Supplemental Supply Capital	acre-feet	4,480	0	-4,480	-$895	$4,007,539	0.220	$880,897
2038	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	4,480	4,480	$0	$0	0.220	$0
2038	Avoided Main Treatment Plant Operation	acre-feet	4,480	0	-4,480	-$824	$3,690,400	0.220	$811,187
2039	Avoided Replacement Water Purchase	acre-feet	4,480	0	-4,480	-$904	$4,048,717	0.207	$839,574
2039	Avoided Groundwater Pumping	acre-feet	4,480	0	-4,480	-$215	$964,000	0.207	$199,903
2039	Avoided Supplemental Supply Capital	acre-feet	4,480	0	-4,480	-$895	$4,007,539	0.207	$831,035
2039	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	4,480	4,480	$0	$0	0.207	$0
2039	Avoided Main Treatment Plant Operation	acre-feet	4,480	0	-4,480	-$824	$3,690,400	0.207	$765,271
2040	Avoided Replacement Water Purchase	acre-feet	4,480	0	-4,480	-$931	$4,170,178	0.196	$815,813
2040	Avoided Groundwater Pumping	acre-feet	4,480	0	-4,480	-$215	$964,000	0.196	$188,587
2040	Avoided Supplemental Supply Capital	acre-feet	4,480	0	-4,480	-$895	$4,007,539	0.196	$783,995
2040	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	4,480	4,480	$0	$0	0.196	$0
2040	Avoided Main Treatment Plant Operation	acre-feet	4,480	0	-4,480	-$824	$3,690,400	0.196	$721,953
2041	Avoided Replacement Water Purchase	acre-feet	4,480	0	-4,480	-$959	$4,295,284	0.185	$792,724
2041	Avoided Groundwater Pumping	acre-feet	4,480	0	-4,480	-$215	$964,000	0.185	$177,913
2041	Avoided Supplemental Supply Capital	acre-feet	4,480	0	-4,480	-$895	$4,007,539	0.185	$739,618
2041	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	4,480	4,480	$0	$0	0.185	$0
2041	Avoided Main Treatment Plant Operation	acre-feet	4,480	0	-4,480	-$824	$3,690,400	0.185	$681,088
2042	Avoided Replacement Water Purchase	acre-feet	4,480	0	-4,480	-$988	$4,424,142	0.174	$770,288
2042	Avoided Groundwater Pumping	acre-feet	4,480	0	-4,480	-$215	$964,000	0.174	$167,842
2042	Avoided Supplemental Supply Capital	acre-feet	4,480	0	-4,480	-$895	$4,007,539	0.174	$697,753
2042	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	4,480	4,480	$0	$0	0.174	$0
2042	Avoided Main Treatment Plant Operation	acre-feet	4,480	0	-4,480	-$824	$3,690,400	0.174	$642,536
2043	Avoided Replacement Water Purchase	acre-feet	4,480	0	-4,480	-$1,017	$4,556,866	0.164	$748,487
2043	Avoided Groundwater Pumping	acre-feet	4,480	0	-4,480	-$215	$964,000	0.164	$158,342
2043	Avoided Supplemental Supply Capital	acre-feet	4,480	0	-4,480	-$895	$4,007,539	0.164	$658,258
2043	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	4,480	4,480	$0	$0	0.164	$0
2043	Avoided Main Treatment Plant Operation	acre-feet	4,480	0	-4,480	-$824	$3,690,400	0.164	$606,166
2044	Avoided Replacement Water Purchase	acre-feet	2,240	0	-2,240	-$1,048	$2,346,786	0.155	$363,652

Table 15 – Annual Benefit (All benefits are in 2012 dollars) Project: Victor Valley Wastewater Reclamation Authority Subregional Reclamation 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 [1] (f) x (g)	Discount Factor [1]	Discounted Benefits [1] (h) x (i)
2044	Avoided Groundwater Pumping	acre-feet	2,240	0	-2,240	-$215	$482,000	0.155	$74,689
2044	Avoided Supplemental Supply Capital	acre-feet	2,240	0	-2,240	-$895	$2,003,770	0.155	$310,499
2044	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	2,240	2,240	$0	$0	0.155	$0
2044	Avoided Main Treatment Plant Operation	acre-feet	2,240	0	-2,240	-$824	$1,845,200	0.155	$285,927
2045	Avoided Replacement Water Purchase	acre-feet	2,240	0	-2,240	-$1,079	$2,417,190	0.146	$353,360
2045	Avoided Groundwater Pumping	acre-feet	2,240	0	-2,240	-$215	$482,000	0.146	$70,462
2045	Avoided Supplemental Supply Capital	acre-feet	2,240	0	-2,240	-$895	$2,003,770	0.146	$292,924
2045	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	2,240	2,240	$0	$0	0.146	$0
2045	Avoided Main Treatment Plant Operation	acre-feet	2,240	0	-2,240	-$824	$1,845,200	0.146	$269,743
2046	Avoided Replacement Water Purchase	acre-feet	2,240	0	-2,240	-$1,111	$2,489,705	0.138	$343,359
2046	Avoided Groundwater Pumping	acre-feet	2,240	0	-2,240	-$215	$482,000	0.138	$66,473
2046	Avoided Supplemental Supply Capital	acre-feet	2,240	0	-2,240	-$895	$2,003,770	0.138	$276,343
2046	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	2,240	2,240	$0	$0	0.138	$0
2046	Avoided Main Treatment Plant Operation	acre-feet	2,240	0	-2,240	-$824	$1,845,200	0.138	$254,474
2047	Avoided Replacement Water Purchase	acre-feet	2,240	0	-2,240	-$1,145	$2,564,397	0.130	$333,641
2047	Avoided Groundwater Pumping	acre-feet	2,240	0	-2,240	-$215	$482,000	0.130	$62,711
2047	Avoided Supplemental Supply Capital	acre-feet	2,240	0	-2,240	-$895	$2,003,770	0.130	$260,701
2047	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	2,240	2,240	$0	$0	0.130	$0
2047	Avoided Main Treatment Plant Operation	acre-feet	2,240	0	-2,240	-$824	$1,845,200	0.130	$240,070
2048	Avoided Replacement Water Purchase	acre-feet	2,240	0	-2,240	-$1,179	$2,641,329	0.123	$324,199
2048	Avoided Groundwater Pumping	acre-feet	2,240	0	-2,240	-$215	$482,000	0.123	$59,161
2048	Avoided Supplemental Supply Capital	acre-feet	2,240	0	-2,240	-$895	$2,003,770	0.123	$245,944
2048	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	2,240	2,240	$0	$0	0.123	$0
2048	Avoided Main Treatment Plant Operation	acre-feet	2,240	0	-2,240	-$824	$1,845,200	0.123	$226,481
2049	Avoided Replacement Water Purchase	acre-feet	2,240	0	-2,240	-$1,215	$2,720,568	0.116	$315,023
2049	Avoided Groundwater Pumping	acre-feet	2,240	0	-2,240	-$215	$482,000	0.116	$55,812
2049	Avoided Supplemental Supply Capital	acre-feet	2,240	0	-2,240	-$895	$2,003,770	0.116	$232,023
2049	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	2,240	2,240	$0	$0	0.116	$0
2049	Avoided Main Treatment Plant Operation	acre-feet	2,240	0	-2,240	-$824	$1,845,200	0.116	$213,662
2050	Avoided Replacement Water Purchase	acre-feet	4,480	0	-4,480	-$1,251	$5,604,371	0.109	$612,215
2050	Avoided Groundwater Pumping	acre-feet	4,480	0	-4,480	-$215	$964,000	0.109	$105,306
2050	Avoided Supplemental Supply Capital	acre-feet	4,480	0	-4,480	-$895	$4,007,539	0.109	$437,779
2050	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	4,480	4,480	$0	$0	0.109	$0
2050	Avoided Main Treatment Plant Operation	acre-feet	4,480	0	-4,480	-$824	$3,690,400	0.109	$403,135
2051	Avoided Replacement Water Purchase	acre-feet	4,480	0	-4,480	-$1,289	$5,772,502	0.103	$594,888
2051	Avoided Groundwater Pumping	acre-feet	4,480	0	-4,480	-$215	$964,000	0.103	$99,346
2051	Avoided Supplemental Supply Capital	acre-feet	4,480	0	-4,480	-$895	$4,007,539	0.103	$412,999

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(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 [1] (f) x (g)	Discount Factor [1]	Discounted Benefits [1] (h) x (i)
2051	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	4,480	4,480	$0	$0	0.103	$0
2051	Avoided Main Treatment Plant Operation	acre-feet	4,480	0	-4,480	-$824	$3,690,400	0.103	$380,316
2052	Avoided Replacement Water Purchase	acre-feet	4,480	0	-4,480	-$1,327	$5,945,677	0.097	$578,052
2052	Avoided Groundwater Pumping	acre-feet	4,480	0	-4,480	-$215	$964,000	0.097	$93,722
2052	Avoided Supplemental Supply Capital	acre-feet	4,480	0	-4,480	-$895	$4,007,539	0.097	$389,622
2052	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	4,480	4,480	$0	$0	0.097	$0
2052	Avoided Main Treatment Plant Operation	acre-feet	4,480	0	-4,480	-$824	$3,690,400	0.097	$358,789
2053	Avoided Replacement Water Purchase	acre-feet	4,480	0	-4,480	-$1,367	$6,124,047	0.092	$561,692
2053	Avoided Groundwater Pumping	acre-feet	4,480	0	-4,480	-$215	$964,000	0.092	$88,417
2053	Avoided Supplemental Supply Capital	acre-feet	4,480	0	-4,480	-$895	$4,007,539	0.092	$367,568
2053	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	4,480	4,480	$0	$0	0.092	$0
2053	Avoided Main Treatment Plant Operation	acre-feet	4,480	0	-4,480	-$824	$3,690,400	0.092	$338,480
2054	Avoided Replacement Water Purchase	acre-feet	4,480	0	-4,480	-$1,408	$6,307,769	0.087	$545,795
2054	Avoided Groundwater Pumping	acre-feet	4,480	0	-4,480	-$215	$964,000	0.087	$83,412
2054	Avoided Supplemental Supply Capital	acre-feet	4,480	0	-4,480	-$895	$4,007,539	0.087	$346,762
2054	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	4,480	4,480	$0	$0	0.087	$0
2054	Avoided Main Treatment Plant Operation	acre-feet	4,480	0	-4,480	-$824	$3,690,400	0.087	$319,321
2055	Avoided Replacement Water Purchase	acre-feet	4,480	0	-4,480	-$1,450	$6,497,002	0.082	$530,348
2055	Avoided Groundwater Pumping	acre-feet	4,480	0	-4,480	-$215	$964,000	0.082	$78,691
2055	Avoided Supplemental Supply Capital	acre-feet	4,480	0	-4,480	-$895	$4,007,539	0.082	$327,134
2055	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	4,480	4,480	$0	$0	0.082	$0
2055	Avoided Main Treatment Plant Operation	acre-feet	4,480	0	-4,480	-$824	$3,690,400	0.082	$301,246
2056	Avoided Replacement Water Purchase	acre-feet	4,480	0	-4,480	-$1,494	$6,691,912	0.077	$515,338
2056	Avoided Groundwater Pumping	acre-feet	4,480	0	-4,480	-$215	$964,000	0.077	$74,237
2056	Avoided Supplemental Supply Capital	acre-feet	4,480	0	-4,480	-$895	$4,007,539	0.077	$308,617
2056	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	4,480	4,480	$0	$0	0.077	$0
2056	Avoided Main Treatment Plant Operation	acre-feet	4,480	0	-4,480	-$824	$3,690,400	0.077	$284,194
2057	Avoided Replacement Water Purchase	acre-feet	4,480	0	-4,480	-$1,539	$6,892,669	0.073	$500,753
2057	Avoided Groundwater Pumping	acre-feet	4,480	0	-4,480	-$215	$964,000	0.073	$70,035
2057	Avoided Supplemental Supply Capital	acre-feet	4,480	0	-4,480	-$895	$4,007,539	0.073	$291,148
2057	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	4,480	4,480	$0	$0	0.073	$0
2057	Avoided Main Treatment Plant Operation	acre-feet	4,480	0	-4,480	-$824	$3,690,400	0.073	$268,108
2058	Avoided Replacement Water Purchase	acre-feet	4,480	0	-4,480	-$1,585	$7,099,449	0.069	$486,581
2058	Avoided Groundwater Pumping	acre-feet	4,480	0	-4,480	-$215	$964,000	0.069	$66,070
2058	Avoided Supplemental Supply Capital	acre-feet	4,480	0	-4,480	-$895	$4,007,539	0.069	$274,668
2058	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	4,480	4,480	$0	$0	0.069	$0
2058	Avoided Main Treatment Plant Operation	acre-feet	4,480	0	-4,480	-$824	$3,690,400	0.069	$252,932

Table 15 – Annual Benefit (All benefits are in 2012 dollars) Project: Victor Valley Wastewater Reclamation Authority Subregional Reclamation 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 (1) (f) x (g)	Discount Factor (1)	Discounted Benefits (1) (h) x (i)
2059	Avoided Replacement Water Purchase	acre-feet	4,480	0	-4,480	-$1,632	$7,312,433	0.065	$472,810
2059	Avoided Groundwater Pumping	acre-feet	4,480	0	-4,480	-$215	$964,000	0.065	$62,331
2059	Avoided Supplemental Supply Capital	acre-feet	4,480	0	-4,480	-$895	$4,007,539	0.065	$259,121
2059	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	4,480	4,480	$0	$0	0.065	$0
2059	Avoided Main Treatment Plant Operation	acre-feet	4,480	0	-4,480	-$824	$3,690,400	0.065	$238,615
2060	Avoided Replacement Water Purchase	acre-feet	4,480	0	-4,480	-$1,681	$7,531,806	0.061	$459,428
2060	Avoided Groundwater Pumping	acre-feet	4,480	0	-4,480	-$215	$964,000	0.061	$58,802
2060	Avoided Supplemental Supply Capital	acre-feet	4,480	0	-4,480	-$895	$4,007,539	0.061	$244,453
2060	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	4,480	4,480	$0	$0	0.061	$0
2060	Avoided Main Treatment Plant Operation	acre-feet	4,480	0	-4,480	-$824	$3,690,400	0.061	$225,109
2061	Avoided Replacement Water Purchase	acre-feet	4,480	0	-4,480	-$1,732	$7,757,760	0.058	$446,425
2061	Avoided Groundwater Pumping	acre-feet	4,480	0	-4,480	-$215	$964,000	0.058	$55,474
2061	Avoided Supplemental Supply Capital	acre-feet	4,480	0	-4,480	-$895	$4,007,539	0.058	$230,617
2061	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	4,480	4,480	$0	$0	0.058	$0
2061	Avoided Main Treatment Plant Operation	acre-feet	4,480	0	-4,480	-$824	$3,690,400	0.058	$212,367
2062	Avoided Replacement Water Purchase	acre-feet	4,480	0	-4,480	-$1,784	$7,990,493	0.054	$433,791
2062	Avoided Groundwater Pumping	acre-feet	4,480	0	-4,480	-$215	$964,000	0.054	$52,334
2062	Avoided Supplemental Supply Capital	acre-feet	4,480	0	-4,480	-$895	$4,007,539	0.054	$217,563
2062	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	4,480	4,480	$0	$0	0.054	$0
2062	Avoided Main Treatment Plant Operation	acre-feet	4,480	0	-4,480	-$824	$3,690,400	0.054	$200,346
2063	Avoided Replacement Water Purchase	acre-feet	4,480	0	-4,480	-$1,837	$8,230,208	0.051	$421,514
2063	Avoided Groundwater Pumping	acre-feet	4,480	0	-4,480	-$215	$964,000	0.051	$49,372
2063	Avoided Supplemental Supply Capital	acre-feet	4,480	0	-4,480	-$895	$4,007,539	0.051	$205,248
2063	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	4,480	4,480	$0	$0	0.051	$0
2063	Avoided Main Treatment Plant Operation	acre-feet	4,480	0	-4,480	-$824	$3,690,400	0.051	$189,005
2064	Avoided Replacement Water Purchase	acre-feet	4,480	0	-4,480	-$1,892	$8,477,114	0.048	$409,584
2064	Avoided Groundwater Pumping	acre-feet	4,480	0	-4,480	-$215	$964,000	0.048	$46,577
2064	Avoided Supplemental Supply Capital	acre-feet	4,480	0	-4,480	-$895	$4,007,539	0.048	$193,630
2064	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	4,480	4,480	$0	$0	0.048	$0
2064	Avoided Main Treatment Plant Operation	acre-feet	4,480	0	-4,480	-$824	$3,690,400	0.048	$178,307
2065	Avoided Replacement Water Purchase	acre-feet	2,240	0	-2,240	-$1,949	$4,365,714	0.046	$198,996
2065	Avoided Groundwater Pumping	acre-feet	2,240	0	-2,240	-$215	$482,000	0.046	$21,970
2065	Avoided Supplemental Supply Capital	acre-feet	2,240	0	-2,240	-$895	$2,003,770	0.046	$91,335
2065	Suppy reclaimed wastewater for irrigation uses	acre-feet	0	2,240	2,240	$0	$0	0.046	$0
2065	Avoided Main Treatment Plant Operation	acre-feet	2,240	0	-2,240	-$824	$1,845,200	0.046	$84,107
2066	Avoided Replacement Water Purchase	acre-feet	0	0	0	-$2,007	$0	0.043	$0
2066	Avoided Groundwater Pumping	acre-feet	0	0	0	-$215	$0	0.043	$0
Last Year of Project Life								...	
Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)									$194,302,528

8.3 Project Benefits and Cost Summary

Table 20 – Proposal Benefits and Costs Summary

Proposal: Mojave Water Agency 2013 Propositon 84 Round 2 IRWM Implementation Grant

Agency: Mojave Water Agency Regional Water Management Group

Project	Project Proponent	Total Present Value Project Costs (1)	Total Present Value Project Benefits			From Section D1 – Cost-Effectiveness Analysis, Cost Savings	From Section D2 – Briefly describe the main Non-monetized benefits
			From Section D3 – Monetized (2)	From Section D4 – Flood Damage Reduction (3)	Total		
(a)	(b)	(c)	(d)	(e)	(f) = (d) + (e)	(g)	(h)
Hi-Desert Water District Wastewater Treatment and Reclamation Project	Hi-Desert Water District	$135,448,546	$773,262,750	$0	$773,262,750	--	Water quality improvement (revove nitrate, TSS, other contaminants); Recharge aqufer with tertiary-treated wastewater; Flood damage reduction
Victor Valley Wastewater Reclamation Authority Subregional Reclamation Project	Victor Valley Wastewater Reclamation Authority	$98,912,609	$194,302,528	$0	$194,302,528	--	Supply reclaimed waste water got irrigation uses; Greenhouse gas reduction
All Projects		$234,361,155	$967,565,278	$0	$967,565,278	--	--

(1) From Table 19, or RWMG method

(2) From Table 15 or RWMG method

(3) From Table 18 or RWMG method