Attachment 8

Benefits and Cost Analysis

REVISED (March 28, 2013)

Santa Ana One Water One Watershed IRWM Prop 84,
Round 2 Implementation Proposals

Table 20 – Proposal Benefits and Costs Summary

Proposal: _Santa Ana One Water One Watershed IRWM Prop 84, Round 2 Implementation Proposal _

Agency: _Santa Ana Watershed Project Authority_

	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)	Perris Desalination Program - Brackish Water Wells 94, 95 and 96	Eastern Municipal Water District	$ 13,220,577	$ 82,670,144	$ -	$ 82,670,144		Basin reclamation, pollutant containment.
(B)	Quail Valley Subarea 9 Phase 1 Sewer System Project	Eastern Municipal Water District	$ 7,375,316	$ 8,582,882	$ -	$ 8,582,882		Public Health, DAC Assistance, pollutant containment, basin reclamation, recreation.
(C)	Forest First - Increase Stormwater Capture and Decrease Sediment Loading through Forest Ecological Restoration	USDA Forest Service - San Bernardino National Forest	$ 4,719,798	$ 8,944,512	$ -	$ 8,944,512		Safety from reduced wildfire risk, TES habitat, recreation, reduced GHG
(D)	Wineville Regional Recycled Water Pipeline and Groundwater Recharge System Upgrades	Inland Empire Utilities Agency	$ 19,264,001	$ 25,611,709	$ -	$ 25,611,709		reduced imported water, increased groundwater recharge, reduced GHG
(E)	Plunge Creek Water Recharge and Habitat Improvement	San Bernardino Valley Water Conservation District	$ 1,077,184	$ 8,916,334	$ -	$ 8,916,334		increased wildlife habitat, increased groundwater recharge, reduced GHG
(F)	Prado Basin Sediment Management Demonstration Project	Orange County Water District	$ 7,899,130	$ 14,208,774	$ -	$ 14,208,774		increased water supply, stormwater capture, increased groundwater recharge, improved water quality
(G)	San Sevaine Ground Water Recharge Basin	Inland Empire Utilities Agency	$ 2,301,277	$ 14,853,914	$ -	$ 14,853,914		increased groundwater recharge
(H)	Corona/Home Gardens Well Rehabilitation and Multi-Jurisdictional Water Transmission Line Project	City of Corona Department of Water & Power	$ 13,868,380	$ 18,176,788	$ -	$ 18,176,788		reduced imported water, reduced GHG
(I)	Enhanced Stormwater Capture and Recharge along the Santa Ana River	San Bernardino Valley Municipal Water District	$ 7,091,244	$ 30,233,125	$ -	$ 30,233,125		increased use of local stormwater, increased water supply, supply reliability, improved water quality, possible reduced imported water
(J)	Regional Residential Landscape Retrofit Program	Inland Empire Utilities Agency	$ 884,100	$ 6,758,856	$ -	$ 6,758,856		reduced imported water, reduced GHG
(K)	Canyon Lake Hybrid Treatment Process	Lake Elsinore and San Jacinto Watersheds Authority	$ 783,810	$ 2,985,311	$ -	$ 2,985,311		reduced water treatment
(L)	14th Street Groundwater Recharge and Storm Water Quality Treatment Integration Facility	City of Upland	$ 4,665,361	$ 258,200	$ 279,196	$ 537,396		reduced imported water, flood protection

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				From Section D3 – Monetized [2]	From Section D4 – Flood Damage Reduction [3]	Total		
(M)	Customer Handbook to Using Water Efficiently in the Landscape	Western Municipal Water District	$ 198,749	$ 46,676,656	$ -	$ 46,676,656		reduced imported water
(N)	Vulcan Pit Flood Control and Aquifer Recharge Project	City of Fontana	$ 21,382,259	$ 41,144,554	$ 18,827,799	$ 59,972,353		improved water quality, water supply reliability, improved groundwater management, reduced demand on delta, reduced GHG
(O)	Francis Street Storm Drain and Ely Basin Flood Control and Aquifer Recharge Project	City of Ontario	$ 15,135,964	$ 8,470,292	$ 55,440,036	$ 63,910,328		improved water quality, water supply reliability, improved groundwater management, reduced demand on delta, reduced GHG
(P)	Commercial/Industrial/Institutional Performance-Based Water Use Efficiency Program	Municipal Water District of Orange County	$ 2,083,291	$ 4,364,416	$ -	$ 4,364,416		improved water reliability
(Q)	Peters Canyon Channel Water Capture and Reuse Pipeline	City of Irvine	$ 14,964,137	$ 59,060,139	$ -	$ 59,060,139		improved water quality, increased water supply, reduced GHG
(R)	Soboba Band of Luiseño Indians Wastewater Project	Soboba Band of Luiseno Indians	$ 141,450	$ -	$ -	$ -		imprived water quality, public health benefits
(S)	Recycled Water Project Phase I (Arlington-Central Avenue Pipeline)	City of Riverside	$ 23,965,188	$ 31,637,007	$ -	$ 31,637,007		increased water supply reliability, increased groundwater recharge
(T)	Wilson III Basins Project and Wilson Basins/Spreading Grounds	City of Yucaipa	$ 12,573,266	$ 12,415,530	$ 3,470,485	$ 15,886,015		improved water quality, water supply reliability, improved groundwater management, reduced demand on delta, reduced GHG

Project A: Perris Desalination Program-Brackish Water Wells 94, 95 and 96 (Eastern Municipal Water District)

Table 11 – Statement of Cost-Effectiveness Project name: EMWD - Perris Desalination Program - Brackish Wells 94, 95 and 96 _____	
Question 1	Types of benefits provided: Water Supply, Water Quality, Ecosystem Improvement, Power Reduction, GHG Emissions Reduction
Question 2	Have alternative methods of providing the same types and amounts of physical benefits as the proposed project been identified? Yes
	If no, why?
	If yes, list the methods (including the proposed project) and estimated costs. Operational experience and planning studies have identified least-cost alternatives to achieve maximum return on investment.
Question 3.	If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods.
Comments: The extraction wells are a component of the Perris II Desalination Program.	

Table 12 – Non-monetized Benefits Checklist - EMWD - Perris Desalination Program - Brackish Wells 94, 95, and 96		
No.	**Question**	**Enter "Yes", "No" or "Neg"**
	Community/Social Benefits **Will the proposal**	
1	**Provide education or technology benefits?**	**Yes**
	The proposed Project contributes to the advancement of technology benefitting both desalination (reverse osmosis) and groundwater basin reclamation. EMWD engineers and managers participate in industry conferences and other activities to share experiences and promote education. EMWD also administers an extensive public education program including tours of District facilities and a free speakers bureau for local organizations.	
2	**Provide social recreation or access benefits?**	No
	Examples are not limited to, but may include: - Provide new or improved outdoor recreation opportunities? - Provide more access to open space? - Provide some other recreation or public access benefit?	
3	**Help avoid, reduce or resolve various public water resources conflicts?**	**Yes**
	The project will provide approximately 3,000 acre-feet annually of additional potable water from brackish ground water. This reliance on local groundwater will reduce the amount of SWP water imported from the Delta, and help meet the IRWM goal of reduced dependence on the San Joaquin Delta for water supply.	
4	**Promote social health and safety?**	Yes
	The project will provide 3,000 acre-feet per year of potable water by desalting brackish groundwater. This new source of potable water will reduce reliance on the State Water Project by increasing reliance on local groundwater and increasing water supply reliability.	
5	**Have other social benefits?**	Yes
	This project presents an opportunity to help resolve the contaminated basin problem while generating a reliable potable water supply and minimizing potential rate increases for the largely disadvantaged communities. The project will provide the opportunity for more recycled water to be used. This will increase the opportunity for the partnering agencies to use recycled water for parks and open space areas so that local residents may enjoy a more aesthetic, natural and scenic environment leading to a cleaner and more sustainable community.	
	Environmental Stewardship Benefits: **Will the proposal**	
6	**Benefit wildlife or habitat in ways that were not quantified in Attachment 7?**	Yes
	By reducing reliance on the State Water Project, less stress will be placed on terrestrial, aquatic, riparian, and wetland habitats in the Delta.	
7	**Improve water quality in ways that were not quantified in Attachment 7?**	Yes
	The project will use desalters to make effective, beneficial use of local degraded brackish groundwater supplies. This is a viable, long-term step in generating new local potable water sources.	
8	**Reduce net emissions in ways that were not quantified in Attachment 7?**	No
	The brackish groundwater provided by the proposed project for desalination will reduce water imported from the San Joaquin Delta. Desalination is more energy efficient than pumping water from the Delta, and will reduce greenhouse gasses accordingly.	
9	**Provide other environmental stewardship benefits, other than those claimed in Sections D1, D3, or D4?**	No
	Sustainability Benefits: **Will the proposal**	
10	**Improve the overall, long-term management of California groundwater resources?**	Yes
	The project will increase the use of brackish groundwater for desalination and production of potable water. As salts are continuously removed from the groundwater basin, the quality of the basin will improve, thus allowing it to be used for recharge purposes.	
11	**Reduce demand for net diversions for the regions from the Delta?**	Yes
	The project will provide approximately 3,000 acre-feet of potable water from brackish groundwater. This new local source of water will correspondingly reduce the need for water imported from the Delta.	
12	**Provide a long-term solution in place of a short-term one?**	No
13	**Promote energy savings or replace fossil fuel based energy sources with renewable energy and resources?**	Yes
	The project will replace 3,000 acre-feet annually of water currently imported from the Delta. Reduced importation will reduce SWP energy usage by 6,111 megawatt hours annually. This SWP energy reduction represents a 3,403 metric ton reduction in greenhouse gas emissions.	
14	**Improve water supply reliability in ways not quantified in Attachment 7?**	Yes
	The additional 3,000 acre-feet of potable water provided annually by the project will make EMWD less reliant on imported water, thus reducing the likelihood of catastrophic supply outages and supply uncertainty.	
15	**Other (If the above listed categories do not apply, provide non-monetized benefit description)?**	

Table 15 – Annual Benefit (All benefits should be in 2012 dollars) Project: EMWD - Perris Desalination Program - Brackish Wells 94, 95 and 96 _____									
(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)
2012	Water Supply	acre-feet	0	0	0	251	0	1.000	**0**
	SWP	acre-feet	2100	2100	0	396	0	1.000	**0**
	Water Quality	tons of salt	0	0	0	290	0	1.000	**0**
	Energy	MWh	6111	6111	0	118	0	1.000	**0**
	Emissions	tons of CO2	3403	3403	0	10	0	1.000	**0**
2013	Water Supply	acre-feet	0	0	0	256	0	0.943	**0**
	SWP	acre-feet	2100	2100	0	404	0	0.943	**0**
	Water Quality	tons of salt	0	0	0	296	0	0.943	**0**
	Energy	MWh	6111	6111	0	120	0	0.943	**0**
	Emissions	tons of CO2	3403	3403	0	11	0	0.943	**0**
2014	Water Supply	acre-feet	0	0	0	275	0	0.890	**0**
	SWP	acre-feet	2100	2100	0	420	0	0.890	**0**
	Water Quality	tons of salt	0	0	0	307	0	0.890	**0**
	Energy	MWh	6111	6111	0	125	0	0.890	**0**
	Emissions	tons of CO2	3403	3403	0	11	0	0.890	**0**
2015	Water Supply	acre-feet	0	1050	1050	295	310,038	0.840	**260,432**
	SWP	acre-feet	2100	1050	-1050	437	458,815	0.840	**385,404**
	Water Quality	tons of salt	0	3000	3000	320	958,838	0.840	**805,424**
	Energy	MWh	6111	4855.5	-1255.5	130	162,954	0.840	**136,881**
	Emissions	tons of CO2	3403	2216.5	-1186.5	12	14,549	0.840	**12,221**
2016	Water Supply	acre-feet	0	2100	2100	316	664,504	0.792	**526,287**
	SWP	acre-feet	2100	0	-2100	454	954,335	0.792	**755,833**
	Water Quality	tons of salt	0	6000	6000	332	1,994,384	0.792	**1,579,552**
	Energy	MWh	6111	3600	-2511	135	338,944	0.792	**268,444**
	Emissions	tons of CO2	3403	1030	-2373	13	31,134	0.792	**24,658**
2017	Water Supply	acre-feet	0	2100	2100	339	711,690	0.747	**531,632**
	SWP	acre-feet	2100	0	-2100	473	992,508	0.747	**741,403**
	Water Quality	tons of salt	0	6000	6000	346	2,074,159	0.747	**1,549,397**
	Energy	MWh	6111	3600	-2511	140	352,502	0.747	**263,319**
	Emissions	tons of CO2	3403	1030	-2373	14	33,314	0.747	**24,885**
2018	Water Supply	acre-feet	0	2100	2100	363	761,793	0.705	**537,064**
	SWP	acre-feet	2100	0	-2100	492	1,032,208	0.705	**727,707**
	Water Quality	tons of salt	0	6000	6000	360	2,157,126	0.705	**1,520,774**
	Energy	MWh	6111	3600	-2511	146	366,602	0.705	**258,454**
	Emissions	tons of CO2	3403	1030	-2373	15	35,646	0.705	**25,130**
2019	Water Supply	acre-feet	0	2100	2100	388	814,983	0.665	**541,964**
	SWP	acre-feet	2100	0	-2100	511	1,073,497	0.665	**713,875**
	Water Quality	tons of salt	0	6000	6000	374	2,243,411	0.665	**1,491,868**
	Energy	MWh	6111	3600	-2511	152	381,266	0.665	**253,542**
	Emissions	tons of CO2	3403	1030	-2373	16	38,141	0.665	**25,364**
2020	Water Supply	acre-feet	0	2100	2100	415	871,436	0.627	**546,390**
	SWP	acre-feet	2100	0	-2100	532	1,116,437	0.627	**700,006**
	Water Quality	tons of salt	0	6000	6000	389	2,333,147	0.627	**1,462,883**
	Energy	MWh	6111	3600	-2511	158	396,517	0.627	**248,616**
	Emissions	tons of CO2	3403	1030	-2373	17	40,811	0.627	**25,588**
2021	Water Supply	acre-feet	0	2100	2100	443	931,340	0.592	**551,353**
	SWP	acre-feet	2100	0	-2100	553	1,161,094	0.592	**687,368**
	Water Quality	tons of salt	0	6000	6000	404	2,426,473	0.592	**1,436,472**
	Energy	MWh	6111	3600	-2511	164	412,377	0.592	**244,127**
	Emissions	tons of CO2	3403	1030	-2373	18	43,667	0.592	**25,851**
2022	Water Supply	acre-feet	0	2100	2100	474	994,892	0.558	**555,150**
	SWP	acre-feet	2100	0	-2100	575	1,207,538	0.558	**673,806**
	Water Quality	tons of salt	0	6000	6000	421	2,523,532	0.558	**1,408,131**
	Energy	MWh	6111	3600	-2511	171	428,872	0.558	**239,311**
	Emissions	tons of CO2	3403	1030	-2373	20	46,724	0.558	**26,072**
2023	Water Supply	acre-feet	0	2100	2100	506	1,062,301	0.527	**559,833**

	SWP	acre-feet	2100	0	-2100	598	1,255,839	0.527	**661,827**
	Water Quality	tons of salt	0	6000	6000	437	2,624,473	0.527	**1,383,097**
	Energy	MWh	6111	3600	-2511	178	446,027	0.527	**235,056**
	Emissions	tons of CO2	3403	1030	-2373	21	49,995	0.527	**26,347**
2024	Water Supply	acre-feet	0	2100	2100	540	1,133,788	0.497	**563,492**
	SWP	acre-feet	2100	0	-2100	622	1,306,073	0.497	**649,118**
	Water Quality	tons of salt	0	6000	6000	455	2,729,452	0.497	**1,356,538**
	Energy	MWh	6111	3600	-2511	185	463,868	0.497	**230,543**
	Emissions	tons of CO2	3403	1030	-2373	23	53,494	0.497	**26,587**
2025	Water Supply	acre-feet	0	2100	2100	576	1,209,583	0.469	**567,100**
	SWP	acre-feet	2100	0	-2100	647	1,358,316	0.469	**636,831**
	Water Quality	tons of salt	0	6000	6000	473	2,838,630	0.469	**1,330,861**
	Energy	MWh	6111	3600	-2511	192	482,423	0.469	**226,179**
	Emissions	tons of CO2	3403	1030	-2373	24	57,239	0.469	**26,836**
2026	Water Supply	acre-feet	0	2100	2100	614	1,289,933	0.442	**570,538**
	SWP	acre-feet	2100	0	-2100	673	1,412,648	0.442	**624,816**
	Water Quality	tons of salt	0	6000	6000	492	2,952,175	0.442	**1,305,750**
	Energy	MWh	6111	3600	-2511	200	501,720	0.442	**221,911**
	Emissions	tons of CO2	3403	1030	-2373	26	61,246	0.442	**27,089**
2027	Water Supply	acre-feet	0	2100	2100	655	1,375,095	0.417	**573,779**
	SWP	acre-feet	2100	0	-2100	700	1,469,154	0.417	**613,027**
	Water Quality	tons of salt	0	6000	6000	512	3,070,262	0.417	**1,281,113**
	Energy	MWh	6111	3600	-2511	208	521,789	0.417	**217,724**
	Emissions	tons of CO2	3403	1030	-2373	28	65,533	0.417	**27,345**
2028	Water Supply	acre-feet	0	2100	2100	698	1,465,341	0.394	**576,826**
	SWP	acre-feet	2100	0	-2100	728	1,527,920	0.394	**601,460**
	Water Quality	tons of salt	0	6000	6000	532	3,193,073	0.394	**1,256,941**
	Energy	MWh	6111	3600	-2511	216	542,660	0.394	**213,616**
	Emissions	tons of CO2	3403	1030	-2373	30	70,120	0.394	**27,603**
2029	Water Supply	acre-feet	0	2100	2100	743	1,560,960	0.371	**579,685**
	SWP	acre-feet	2100	0	-2100	757	1,589,037	0.371	**590,112**
	Water Quality	tons of salt	0	6000	6000	553	3,320,796	0.371	**1,233,225**
	Energy	MWh	6111	3600	-2511	225	564,367	0.371	**209,586**
	Emissions	tons of CO2	3403	1030	-2373	32	75,029	0.371	**27,863**
2030	Water Supply	acre-feet	0	2100	2100	792	1,662,253	0.350	**582,360**
	SWP	acre-feet	2100	0	-2100	787	1,652,599	0.350	**578,978**
	Water Quality	tons of salt	0	6000	6000	576	3,453,628	0.350	**1,209,957**
	Energy	MWh	6111	3600	-2511	234	586,941	0.350	**205,631**
	Emissions	tons of CO2	3403	1030	-2373	34	80,281	0.350	**28,126**
2031	Water Supply	acre-feet	0	2100	2100	843	1,769,541	0.331	**584,856**
	SWP	acre-feet	2100	0	-2100	818	1,718,703	0.331	**568,054**
	Water Quality	tons of salt	0	6000	6000	599	3,591,773	0.331	**1,187,128**
	Energy	MWh	6111	3600	-2511	243	610,419	0.331	**201,751**
	Emissions	tons of CO2	3403	1030	-2373	36	85,900	0.331	**28,391**
2032	Water Supply	acre-feet	0	2100	2100	897	1,883,161	0.312	**587,178**
	SWP	acre-feet	2100	0	-2100	851	1,787,451	0.312	**557,336**
	Water Quality	tons of salt	0	6000	6000	623	3,735,444	0.312	**1,164,729**
	Energy	MWh	6111	3600	-2511	253	634,836	0.312	**197,945**
	Emissions	tons of CO2	3403	1030	-2373	39	91,913	0.312	**28,659**
2033	Water Supply	acre-feet	0	2100	2100	954	2,003,467	0.294	**589,331**
	SWP	acre-feet	2100	0	-2100	885	1,858,949	0.294	**546,820**
	Water Quality	tons of salt	0	6000	6000	647	3,884,861	0.294	**1,142,753**
	Energy	MWh	6111	3600	-2511	263	660,229	0.294	**194,210**
	Emissions	tons of CO2	3403	1030	-2373	41	98,347	0.294	**28,929**
2034	Water Supply	acre-feet	0	2100	2100	1,015	2,130,834	0.278	**591,317**
	SWP	acre-feet	2100	0	-2100	921	1,933,307	0.278	**536,502**
	Water Quality	tons of salt	0	6000	6000	673	4,040,256	0.278	**1,121,192**
	Energy	MWh	6111	3600	-2511	273	686,638	0.278	**190,546**
	Emissions	tons of CO2	3403	1030	-2373	44	105,232	0.278	**29,202**
2035	Water Supply	acre-feet	0	2100	2100	1,079	2,265,658	0.262	**593,143**
	SWP	acre-feet	2100	0	-2100	957	2,010,639	0.262	**526,380**
	Water Quality	tons of salt	0	6000	6000	700	4,201,866	0.262	**1,100,037**
	Energy	MWh	6111	3600	-2511	284	714,104	0.262	**186,950**

	Emissions	tons of CO2	3403	1030	-2373	47	112,598	0.262	**29,478**
2036	Water Supply	acre-feet	0	2100	2100	1,147	2,408,354	0.247	**594,812**
	SWP	acre-feet	2100	0	-2100	996	2,091,065	0.247	**516,448**
	Water Quality	tons of salt	0	6000	6000	728	4,369,941	0.247	**1,079,282**
	Energy	MWh	6111	3600	-2511	296	742,668	0.247	**183,423**
	Emissions	tons of CO2	3403	1030	-2373	51	120,480	0.247	**29,756**
2037	Water Supply	acre-feet	0	2100	2100	1,219	2,559,361	0.233	**596,328**
	SWP	acre-feet	2100	0	-2100	1,036	2,174,707	0.233	**506,704**
	Water Quality	tons of salt	0	6000	6000	757	4,544,738	0.233	**1,058,918**
	Energy	MWh	6111	3600	-2511	308	772,375	0.233	**179,962**
	Emissions	tons of CO2	3403	1030	-2373	54	128,913	0.233	**30,037**
2038	Water Supply	acre-feet	0	2100	2100	1,295	2,719,142	0.220	**597,695**
	SWP	acre-feet	2100	0	-2100	1,077	2,261,696	0.220	**497,143**
	Water Quality	tons of salt	0	6000	6000	788	4,726,528	0.220	**1,038,938**
	Energy	MWh	6111	3600	-2511	320	803,270	0.220	**176,567**
	Emissions	tons of CO2	3403	1030	-2373	58	137,937	0.220	**30,320**
2039	Water Supply	acre-feet	0	2100	2100	1,375	2,888,185	0.207	**598,917**
	SWP	acre-feet	2100	0	-2100	1,120	2,352,163	0.207	**487,763**
	Water Quality	tons of salt	0	6000	6000	819	4,915,589	0.207	**1,019,336**
	Energy	MWh	6111	3600	-2511	333	835,401	0.207	**173,235**
	Emissions	tons of CO2	3403	1030	-2373	62	147,593	0.207	**30,606**
2040	Water Supply	acre-feet	0	2100	2100	1,460	3,067,004	0.196	**599,998**
	SWP	acre-feet	2100	0	-2100	1,165	2,446,250	0.196	**478,560**
	Water Quality	tons of salt	0	6000	6000	852	5,112,212	0.196	**1,000,103**
	Energy	MWh	6111	3600	-2511	346	868,817	0.196	**169,967**
	Emissions	tons of CO2	3403	1030	-2373	67	157,924	0.196	**30,895**
2041	Water Supply	acre-feet	0	2100	2100	1,551	3,256,139	0.185	**600,942**
	SWP	acre-feet	2100	0	-2100	1,211	2,544,100	0.185	**469,531**
	Water Quality	tons of salt	0	6000	6000	886	5,316,701	0.185	**981,233**
	Energy	MWh	6111	3600	-2511	360	903,569	0.185	**166,760**
	Emissions	tons of CO2	3403	1030	-2373	71	168,979	0.185	**31,186**
2042	Water Supply	acre-feet	0	2100	2100	1,646	3,456,163	0.174	**601,753**
	SWP	acre-feet	2100	0	-2100	1,260	2,645,864	0.174	**460,672**
	Water Quality	tons of salt	0	6000	6000	922	5,529,369	0.174	**962,719**
	Energy	MWh	6111	3600	-2511	374	939,712	0.174	**163,613**
	Emissions	tons of CO2	3403	1030	-2373	76	180,808	0.174	**31,480**
2043	Water Supply	acre-feet	0	2100	2100	1,747	3,667,677	0.164	**602,434**
	SWP	acre-feet	2100	0	-2100	1,310	2,751,698	0.164	**451,980**
	Water Quality	tons of salt	0	6000	6000	958	5,750,544	0.164	**944,555**
	Energy	MWh	6111	3600	-2511	389	977,301	0.164	**160,526**
	Emissions	tons of CO2	3403	1030	-2373	82	193,464	0.164	**31,777**
2044	Water Supply	acre-feet	0	2100	2100	1,853	3,891,314	0.155	**602,988**
	SWP	acre-feet	2100	0	-2100	1,363	2,861,766	0.155	**443,452**
	Water Quality	tons of salt	0	6000	6000	997	5,980,566	0.155	**926,733**
	Energy	MWh	6111	3600	-2511	405	1,016,393	0.155	**157,498**
	Emissions	tons of CO2	3403	1030	-2373	87	207,007	0.155	**32,077**
2045	Water Supply	acre-feet	0	2100	2100	1,966	4,127,744	0.146	**603,419**
	SWP	acre-feet	2100	0	-2100	1,417	2,976,237	0.146	**435,085**
	Water Quality	tons of salt	0	6000	6000	1,037	6,219,788	0.146	**909,247**
	Energy	MWh	6111	3600	-2511	421	1,057,048	0.146	**154,526**
	Emissions	tons of CO2	3403	1030	-2373	93	221,497	0.146	**32,380**
								Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)	**$ 79,835,041**

Comments: Water Supply benefit is estimated as cost difference between MWD Tier 1 ($847) and desalting cost ($591). MWD rates are escalated at 5% while desalting costs are escalated at 4%. Benefit to the State Water Project is assumed as the purchase cost not including energy. MWD costs are escalated at 4% per year. Benefit to Water Quality assumes EMWD desalting cost (alternative). Desalting costs are escalated at 4% per year. Benefit to Energy Conservation assumes MWD energy rate ($.12 per kWh) escalated at 4% per year. Benefit to Greenhouse Gas emissions assumes reserve price of GHG credit under Cap-and-Trade Program. Escalation is 5% plus inflation (assumed at 2%).

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

Table 16 – Annual Costs of Avoided Projects (All avoided costs should be in 2012 dollars) Project: EMWD - Perris Desalination Program - Brackish Wells 94, 95, and 96 _____						
	Costs				Discounting Calculations	
(a)	(b)	(c)	(d)	(e)	(f)	(g)
Year	Alternative (Avoided Project Name): _Recharge Desalter _____ Avoided Project Description: 3-MGD Recycled Water Desalter for Indirect Recharge				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)		
2012				-	1.000	-
2013				-	0.943	-
2014				-	0.890	-
2015				-	0.840	-
2016	5,191,561		665	5,192,226	0.792	**4,112,243**
2017	5,191,561		691	5,192,252	0.747	**3,878,613**
2018	5,191,561		719	5,192,280	0.705	**3,660,557**
2019	5,191,561		748	5,192,309	0.665	**3,452,885**
2020	5,191,561		778	5,192,339	0.627	**3,255,596**
2021	5,191,561		809	5,192,370	0.592	**3,073,883**
2022	5,191,561		841	5,192,402	0.558	**2,897,360**
2023	5,191,561		875	5,192,436	0.527	**2,736,414**
2024	5,191,561		910	5,192,471	0.497	**2,580,658**
2025	5,191,561		946	5,192,507	0.469	**2,434,450**
2026	5,191,561		984	5,192,545	0.442	**2,296,668**
2027	5,191,561		1,023	5,192,584	0.417	**2,166,684**
2028	5,191,561		1,064	5,192,625	0.394	**2,044,058**
2029	5,191,561		1,107	5,192,668	0.371	**1,928,372**
2030	5,191,561		1,151	5,192,712	0.350	**1,819,234**
2031	5,191,561		1,197	5,192,758	0.331	**1,716,274**
2032	5,191,561		1,245	5,192,806	0.312	**1,619,141**
2033	5,191,561		1,295	5,192,856	0.294	**1,527,507**
2034	5,191,561		1,347	5,192,908	0.278	**1,441,058**
2035	5,191,561		1,401	5,192,962	0.262	**1,359,503**
2036	5,191,561		1,457	5,193,018	0.247	**1,282,564**
2037	5,191,561		1,515	5,193,076	0.233	**1,209,980**
2038	5,191,561		1,576	5,193,136	0.220	**1,141,503**
2039	5,191,561		1,639	5,193,199	0.207	**1,076,903**
2040	5,191,561		1,704	5,193,265	0.196	**1,015,959**
2041	5,191,561		1,772	5,193,333	0.185	**958,465**
2042	5,191,561		1,843	5,193,404	0.174	**904,224**
2043	5,191,561		1,917	5,193,478	0.164	**853,054**
2044	5,191,561		1,994	5,193,554	0.155	**804,780**
2045	5,191,561		2,073	5,193,634	0.146	**759,238**
Last Year of Project Life					...	
					Total Present Value of Discounted Costs (Sum of Column (g))	**$ 60,007,828**
					(%) Avoided Cost Claimed by Project	**62%**
					Total Present Value of Discounted Avoided Project Costs Claimed by Alternative Project (Total Present Value of Discounted Costs x % Avoided Cost Claimed by Project)	**$ 37,248,884**
Comments: Avoided project is assumed to be new RO capability for 3,000 acre-feet annually at $20k per AF and 6% with 30-year repayment. Actual facility would need to be of greater flow capacity to meet 6,000 ton per year target processing better quality water. This alternative would not provide basin reclamation or plume containment benefits.						

Table 19 – Annual Costs of Project (All costs should be in 2012 Dollars) Project: EMWD - Perris Desalination Program - Brackish Wells 94, 95, and 96 _____										
	Initial Costs Grand Total Cost from Table 7 (row (i), column	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)
2012								-	1.000	-
2013	555,000							555,000	0.943	**523,365**
2014	6,485,000							6,485,000	0.890	**5,771,650**
2015	3,192,000							3,192,000	0.840	**2,681,280**
2016			15,038	188,229	28,985			232,252	0.792	**183,943**
2017			15,639	195,758	30,144			241,542	0.747	**180,432**
2018			16,265	203,589	31,350			251,203	0.705	**177,098**
2019			16,915	211,732	32,604			261,252	0.665	**173,732**
2020			17,592	220,201	33,908			271,702	0.627	**170,357**
2021			18,296	229,010	35,265			282,570	0.592	**167,281**
2022			19,027	238,170	36,675			293,873	0.558	**163,981**
2023			19,789	247,697	38,142			305,627	0.527	**161,066**
2024			20,580	257,605	39,668			317,853	0.497	**157,973**
2025			21,403	267,909	41,255			330,567	0.469	**154,983**
2026			22,259	278,625	42,905			343,789	0.442	**152,058**
2027			23,150	289,770	44,621			357,541	0.417	**149,189**
2028			24,076	301,361	46,406			371,843	0.394	**146,374**
2029			25,039	313,415	48,262			386,716	0.371	**143,613**
2030			26,040	325,952	50,193			402,185	0.350	**140,903**
2031			27,082	338,990	52,200			418,272	0.331	**138,244**
2032			28,165	352,550	54,288			435,003	0.312	**135,636**
2033			29,292	366,652	56,460			452,403	0.294	**133,077**
2034			30,464	381,318	58,718			470,499	0.278	**130,566**
2035			31,682	396,570	61,067			489,319	0.262	**128,102**
2036			32,949	412,433	63,510			508,892	0.247	**125,685**
2037			34,267	428,931	66,050			529,248	0.233	**123,314**
2038			35,638	446,088	68,692			550,418	0.220	**120,987**
2039			37,064	463,931	71,440			572,435	0.207	**118,705**
2040			38,546	482,488	74,297			595,332	0.196	**116,465**
2041			40,088	501,788	77,269			619,145	0.185	**114,267**
2042			41,692	521,860	80,360			643,911	0.174	**112,111**
2043			43,359	542,734	83,574			669,667	0.164	**109,996**
2044			45,094	564,443	86,917			696,454	0.155	**107,921**
2045			46,897	587,021	90,394			724,312	0.146	**105,884**
Total Present Value of Discounted Costs (Sum of column (j)) Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries										**$ 13,220,241**

Comments: OM&R costs based on EMWD actual escalated at 4%.

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

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

Table 20 – Proposal Benefits and Costs Summary - Perris Desalination Program - Brackish Wells 94, 95, and 96 Proposal: _____ Agency: _____							
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)
Perris Desalter Wells	EMWD	13,220,241	79,835,041	-	79,835,041	-	Basin reclamation, pollutant containment.

(1) From Table 19, or RWMG method

(2) From Table 15 or RWMG method

(3) From Table 18 or RWMG method

Project B: Quail Valley Subarea 9 Phase 1 Sewer System Project (Eastern Municipal Water District)

Table 11 – Statement of Cost-Effectiveness Project name: EMWD - Quail Valley Subarea 9 Phase I Sewer System Project __	
Question 1	Types of benefits provided: Public Health, Disadvantaged Community, Water Supply, Water Quality, Ecosystem Improvement, Power Reduction, GHG Emissions Reduction, Recreation
Question 2	Have alternative methods of providing the same types and amounts of physical benefits as the proposed project been identified? Yes
	If no, why?
	If yes, list the methods (including the proposed project) and estimated costs. Operational experience and planning studies have identified least-cost alternatives to achieve maximum return on investment in consideration of Environmental Justice objective.
Question 3.	If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods. Environmental Justice.
Comments: Quail Valley is a Severely Disadvantaged Community with a Median Household Income of $31,650. On October 3, 2006, the SCRWQCB, Santa Ana Region, adopted Resolution No. R8-2206-0024 which prohibits new septic systems.	

Table 12 – Non-monetized Benefits Checklist - EMWD - Quail Valley Subarea 9 Phase I Sewer System Project		
No.	**Question**	**Enter "Yes", "No" or "Neg"**
	Community/Social Benefits **Will the proposal**	
1	**Provide education or technology benefits?**	**Yes**
	The Quail Valley Environmental Coalition (QVEC), in cooperation with SAWPA, will continue to conduct an extensive public outreach campaign to inform local residents of the Project status and other efforts aimed at improving the residents' quality of life. The QVEC will also solicit comments and coordinate with resource agencies to communicate problems and facilitate solutions.	
2	**Provide social recreation or access benefits?**	Yes
	Canyon Lake Reservoir is a popular recreational facility used for fishing, swimming, wading, jet skiing, and water skiing. The Reservoir has received considerable media attention for closures due to high bacteria levels. The Project will reduce the amount of surface and subsurface septic effluent reaching the Reservoir.	
3	**Help avoid, reduce or resolve various public water resources conflicts?**	**Yes**
	On August 29, 2006 the County of Riverside adopted Ordinance No. 856, which established a septic tank prohibition for specified areas of Quail Valley. On October 3, 2006, the SCRWQCB, Santa Ana Region, adopted Resolution No. R8-2206-0024 which prohibited new septic systems. This project will allow these prohibitions to be lifted, and allow property owners to improve existing residences or build on or sell unimproved lots.	
4	**Promote social health and safety?**	Yes
	The failing septic systems result in septic effluent running through the community and into Canyon Lake. In wet weather conditions, children walk through surface effluent on their way to school. Additionally, in some areas the soil between the surface and underlying bedrock has become saturated with septic effluent and gray water, thus allowing for surface and subsurface migration of pollutants to Canyon Lake. Due to the age of the existing water lines in Quail Valley (constructed approximately 40 years ago), the potential exists for septic effluent to enter the potable water system. The contaminated groundwater is also a supply source for privately owned wells.	
5	**Have other social benefits?**	Yes
	Quail Valley is a Severely Disadvantaged Community, with a yearly Median Household Income (MHI) of $31,650. A Severely Disadvantaged Community is defined as having an MHI of less than 60% of the Statewide MHI. Eliminating the environmental health hazards prevalent in Quail Valley is necessary to allow property owners to improve existing residences or to build on or sell unimproved lots. Without improvements the community will continue to decline into disrepair.	
	Environmental Stewardship Benefits: **Will the proposal**	
6	**Benefit wildlife or habitat in ways that were not quantified in Attachment 7?**	Yes
	Canyon Lake Reservoir is listed as an impaired water body by the federal government due to elevated levels of nitrates, phosphorus, and pathogens. Reducing these items will enhance the quality of the water in the reservoir, and improve the habitats of fish and waterfowl.	
7	**Improve water quality in ways that were not quantified in Attachment 7?**	Yes
	Canyon Lake Reservoir is listed as an impaired water body by the federal government due to elevated levels of nitrates, phosphorus, and pathogens. The reservoir is a potable water supply source for Elsinore Valley Municipal Water District and a popular recreational facility. Diseases and public health risks associated with septic system bacteria are well documented.	
8	**Reduce net emissions in ways that were not quantified in Attachment 7?**	No
	Eliminating failing septic systems will reduce the amount of nitrates, phosphorus, and pathogens in Canyon Lake. Treating the effluent will provide recycled water, which reduces the amount of water imported by EMWD from the SWP, thereby saving energy and reducing greenhouse gases.	
9	**Provide other environmental stewardship benefits, other than those claimed in Sections D1, D3, or D4?**	No
	Sustainability Benefits: **Will the proposal**	
10	**Improve the overall, long-term management of California groundwater resources?**	Yes
	Elimination of failing septic systems reduces the amount of nitrates, phosphorus, and pathogens entering the local groundwater basin.	
11	**Reduce demand for net diversions for the regions from the Delta?**	Yes
	Treating the septic effluent will provide recycled water, which reduces the need for imported water from the Delta.	
12	**Provide a long-term solution in place of a short-term one?**	Yes
	The current prohibition of new septic systems helps keep the existing health problems from worsening, but does not eliminate the problem. Construction of a sewer collection system will provide a long-term solution to the current unhealthy conditions in Quail Valley.	
13	**Promote energy savings or replace fossil fuel based energy sources with renewable energy and resources?**	No
14	**Improve water supply reliability in ways not quantified in Attachment 7?**	Yes
	Existing failing septic systems allow surface and subsurface pollutants to reach Canyon Lake, a source of potable water for Elsinore Valley Municipal Water District, and local privately-owned wells. This project will reduce the levels of nitrates, phosphorus, and pathogens reaching these critical drinking supply sources.	
15	**Other (If the above listed categories do not apply, provide non-monetized benefit description)?**	

Table 15 – Annual Benefit (All benefits should be in 2012 dollars) Project: EMWD - Quail Valley Subarea 9 Phase I Sewer System									
(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)
2012	Water Quality	acre-foot	0	0	0	4,831	0	1.000	**0**
	Water Supply	acre-foot	0	0	0	830	0	1.000	**0**
	SWP	acre-foot	36	36	0	396	0	1.000	**0**
2013	Water Quality	acre-foot	0	0	0	4,930	0	0.943	**0**
	Water Supply	acre-foot	0	0	0	847	0	0.943	**0**
	SWP	acre-foot	36	36	0	404	0	0.943	**0**
2014	Water Quality	acre-foot	0	0	0	6,163	0	0.890	**0**
	Water Supply	acre-foot	0	0	0	890	0	0.890	**0**
	SWP	acre-foot	36	36	0	420	0	0.890	**0**
2015	Water Quality	acre-foot	0	0	0	6,533	0	0.840	**0**
	Water Supply	acre-foot	0	0	0	935	0	0.840	**0**
	SWP	acre-foot	36	36	0	437	0	0.840	**0**
2016	Water Quality	acre-foot	0	22	22	6,925	152,348	0.792	**120,660**
	Water Supply	acre-foot	0	22	22	981	21,587	0.792	**17,097**
	SWP	acre-foot	36	18	-18	454	8,180	0.792	**6,479**
2017	Water Quality	acre-foot	0	44	44	7,340	322,978	0.747	**241,265**
	Water Supply	acre-foot	0	44	44	1,030	45,333	0.747	**33,863**
	SWP	acre-foot	36	0	-36	473	17,014	0.747	**12,710**
2018	Water Quality	acre-foot	0	44	44	7,781	342,357	0.705	**241,362**
	Water Supply	acre-foot	0	44	44	1,082	47,599	0.705	**33,557**
	SWP	acre-foot	36	0	-36	492	17,695	0.705	**12,475**
2019	Water Quality	acre-foot	0	44	44	8,248	362,898	0.665	**241,327**
	Water Supply	acre-foot	0	44	44	1,136	49,979	0.665	**33,236**
	SWP	acre-foot	36	0	-36	511	18,403	0.665	**12,238**
2020	Water Quality	acre-foot	0	44	44	8,743	384,672	0.627	**241,189**
	Water Supply	acre-foot	0	44	44	1,193	52,478	0.627	**32,904**
	SWP	acre-foot	36	0	-36	532	19,139	0.627	**12,000**
2021	Water Quality	acre-foot	0	44	44	9,267	407,752	0.592	**241,389**
	Water Supply	acre-foot	0	44	44	1,252	55,102	0.592	**32,620**
	SWP	acre-foot	36	0	-36	553	19,904	0.592	**11,783**
2022	Water Quality	acre-foot	0	44	44	9,823	432,218	0.558	**241,177**
	Water Supply	acre-foot	0	44	44	1,315	57,857	0.558	**32,284**
	SWP	acre-foot	36	0	-36	575	20,701	0.558	**11,551**
2023	Water Quality	acre-foot	0	44	44	10,413	458,151	0.527	**241,445**
	Water Supply	acre-foot	0	44	44	1,381	60,750	0.527	**32,015**
	SWP	acre-foot	36	0	-36	598	21,529	0.527	**11,346**
2024	Water Quality	acre-foot	0	44	44	11,037	485,640	0.497	**241,363**
	Water Supply	acre-foot	0	44	44	1,450	63,788	0.497	**31,702**
	SWP	acre-foot	36	0	-36	622	22,390	0.497	**11,128**
2025	Water Quality	acre-foot	0	44	44	11,700	514,778	0.469	**241,348**
	Water Supply	acre-foot	0	44	44	1,522	66,977	0.469	**31,401**
	SWP	acre-foot	36	0	-36	647	23,285	0.469	**10,917**
2026	Water Quality	acre-foot	0	44	44	12,401	545,665	0.442	**241,348**
	Water Supply	acre-foot	0	44	44	1,598	70,326	0.442	**31,105**
	SWP	acre-foot	36	0	-36	673	24,217	0.442	**10,711**
2027	Water Quality	acre-foot	0	44	44	13,146	578,405	0.417	**241,348**
	Water Supply	acre-foot	0	44	44	1,678	73,842	0.417	**30,812**
	SWP	acre-foot	36	0	-36	700	25,186	0.417	**10,509**
2028	Water Quality	acre-foot	0	44	44	13,934	613,109	0.394	**241,348**
	Water Supply	acre-foot	0	44	44	1,762	77,534	0.394	**30,521**
	SWP	acre-foot	36	0	-36	728	26,193	0.394	**10,311**
2029	Water Quality	acre-foot	0	44	44	14,770	649,895	0.371	**241,348**
	Water Supply	acre-foot	0	44	44	1,850	81,411	0.371	**30,233**
	SWP	acre-foot	36	0	-36	757	27,241	0.371	**10,116**
2030	Water Quality	acre-foot	0	44	44	15,657	688,889	0.350	**241,348**

	Water Supply	acre-foot	0	44	44	1,943	85,481	0.350	**29,948**
	SWP	acre-foot	36	0	-36	787	28,330	0.350	**9,925**
2031	Water Quality	acre-foot	0	44	44	16,596	730,223	0.331	**241,348**
	Water Supply	acre-foot	0	44	44	2,040	89,755	0.331	**29,665**
	SWP	acre-foot	36	0	-36	818	29,463	0.331	**9,738**
2032	Water Quality	acre-foot	0	44	44	17,592	774,036	0.312	**241,348**
	Water Supply	acre-foot	0	44	44	2,142	94,243	0.312	**29,385**
	SWP	acre-foot	36	0	-36	851	30,642	0.312	**9,554**
2033	Water Quality	acre-foot	0	44	44	18,647	820,478	0.294	**241,348**
	Water Supply	acre-foot	0	44	44	2,249	98,955	0.294	**29,108**
	SWP	acre-foot	36	0	-36	885	31,868	0.294	**9,374**
2034	Water Quality	acre-foot	0	44	44	19,766	869,707	0.278	**241,348**
	Water Supply	acre-foot	0	44	44	2,361	103,903	0.278	**28,834**
	SWP	acre-foot	36	0	-36	921	33,142	0.278	**9,197**
2035	Water Quality	acre-foot	0	44	44	20,952	921,889	0.262	**241,348**
	Water Supply	acre-foot	0	44	44	2,480	109,098	0.262	**28,562**
	SWP	acre-foot	36	0	-36	957	34,468	0.262	**9,024**
2036	Water Quality	acre-foot	0	44	44	22,209	977,202	0.247	**241,348**
	Water Supply	acre-foot	0	44	44	2,603	114,553	0.247	**28,292**
	SWP	acre-foot	36	0	-36	996	35,847	0.247	**8,853**
2037	Water Quality	acre-foot	0	44	44	23,542	1,035,835	0.233	**241,348**
	Water Supply	acre-foot	0	44	44	2,734	120,281	0.233	**28,025**
	SWP	acre-foot	36	0	-36	1,036	37,281	0.233	**8,686**
2038	Water Quality	acre-foot	0	44	44	24,954	1,097,985	0.220	**241,348**
	Water Supply	acre-foot	0	44	44	2,870	126,295	0.220	**27,761**
	SWP	acre-foot	36	0	-36	1,077	38,772	0.220	**8,522**
2039	Water Quality	acre-foot	0	44	44	26,451	1,163,864	0.207	**241,348**
	Water Supply	acre-foot	0	44	44	3,014	132,610	0.207	**27,499**
	SWP	acre-foot	36	0	-36	1,120	40,323	0.207	**8,362**
2040	Water Quality	acre-foot	0	44	44	28,039	1,233,696	0.196	**241,348**
	Water Supply	acre-foot	0	44	44	3,165	139,240	0.196	**27,240**
	SWP	acre-foot	36	0	-36	1,165	41,936	0.196	**8,204**
2041	Water Quality	acre-foot	0	44	44	29,721	1,307,717	0.185	**241,348**
	Water Supply	acre-foot	0	44	44	3,323	146,202	0.185	**26,983**
	SWP	acre-foot	36	0	-36	1,211	43,613	0.185	**8,049**
2042	Water Quality	acre-foot	0	44	44	31,504	1,386,180	0.174	**241,348**
	Water Supply	acre-foot	0	44	44	3,489	153,512	0.174	**26,728**
	SWP	acre-foot	36	0	-36	1,260	45,358	0.174	**7,897**
2043	Water Quality	acre-foot	0	44	44	33,394	1,469,351	0.164	**241,348**
	Water Supply	acre-foot	0	44	44	3,663	161,188	0.164	**26,476**
	SWP	acre-foot	36	0	-36	1,310	47,172	0.164	**7,748**
2044	Water Quality	acre-foot	0	44	44	35,398	1,557,512	0.155	**241,348**
	Water Supply	acre-foot	0	44	44	3,847	169,247	0.155	**26,226**
	SWP	acre-foot	36	0	-36	1,363	49,059	0.155	**7,602**
2045	Water Quality	acre-foot	0	44	44	37,522	1,650,963	0.146	**241,348**
	Water Supply	acre-foot	0	44	44	4,039	177,710	0.146	**25,979**
	SWP	acre-foot	36	0	-36	1,417	51,021	0.146	**7,459**
2046	Water Quality	acre-foot	0	44	44	39,773	1,750,021	0.138	**255,829**
	Water Supply	acre-foot	0	44	44	4,241	186,595	0.138	**27,278**
	SWP	acre-foot	36	0	-36	1,474	53,062	0.138	**7,757**
								Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)	**$ 8,582,882**

Comments: Water Quality benefits are estimated as benefits to public health valued at Project cost (see Table 19). Water Supply benefits are based on effluent production estimates valued at alternative supply source. Benefits to the State Water Project are estimated at 80% of the reclaimed water produced. Multiple program costs could reduce all identified Project benefits by 37% (see Attach 7 Narrative, Section D., Benefit Allocation).

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

Table 19 – Annual Costs of Project (All costs should be in 2012 Dollars) Project: EMWD - Quail Valley Subarea 9 Phase I Sewer System Project ____										
	Initial Costs Grand Total Cost from Table 7 (row (i), column	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)
2012								-	1.000	-
2013	100,000							100,000	0.943	**94,300**
2014	800,000							800,000	0.890	**712,000**
2015	2,875,000							2,875,000	0.840	**2,415,000**
2016	1,825,000	1,929,699						3,754,699	0.792	**2,973,722**
2017			7,866	39,059	6,015	15,508		68,448	0.747	**51,131**
2018			8,181	40,622	6,255	16,128		71,186	0.705	**50,186**
2019			8,508	42,247	6,505	16,773		74,033	0.665	**49,232**
2020			8,848	43,936	6,766	17,444		76,995	0.627	**48,276**
2021			9,202	45,694	7,036	18,142		80,074	0.592	**47,404**
2022			9,570	47,522	7,318	18,867		83,277	0.558	**46,469**
2023			9,953	49,423	7,610	19,622		86,608	0.527	**45,643**
2024			10,351	51,399	7,915	20,407		90,073	0.497	**44,766**
2025			10,765	53,455	8,231	21,223		93,676	0.469	**43,919**
2026			11,196	55,594	8,561	22,072		97,423	0.442	**43,090**
2027			11,644	57,817	8,903	22,955		101,320	0.417	**42,277**
2028			12,110	60,130	9,259	23,873		105,372	0.394	**41,479**
2029			12,594	62,535	9,630	24,828		109,587	0.371	**40,697**
2030			13,098	65,037	10,015	25,821		113,971	0.350	**39,929**
2031			13,622	67,638	10,415	26,854		118,530	0.331	**39,176**
2032			14,167	70,344	10,832	27,928		123,271	0.312	**38,436**
2033			14,733	73,157	11,265	29,046		128,202	0.294	**37,711**
2034			15,323	76,084	11,716	30,207		133,330	0.278	**37,000**
2035			15,935	79,127	12,185	31,416		138,663	0.262	**36,302**
2036			16,573	82,292	12,672	32,672		144,209	0.247	**35,617**
2037			17,236	85,584	13,179	33,979		149,978	0.233	**34,945**
2038			17,925	89,007	13,706	35,338		155,977	0.220	**34,285**
2039			18,642	92,568	14,254	36,752		162,216	0.207	**33,638**
2040			19,388	96,270	14,824	38,222		168,705	0.196	**33,004**
2041			20,163	100,121	15,417	39,751		175,453	0.185	**32,381**
2042			20,970	104,126	16,034	41,341		182,471	0.174	**31,770**
2043			21,809	108,291	16,675	42,995		189,770	0.164	**31,171**
2044			22,681	112,623	17,342	44,714		197,360	0.155	**30,582**
2045			23,588	117,127	18,036	46,503		205,255	0.146	**30,005**
2046			24,532	121,813	18,758	48,363		213,465	0.138	**29,458**
Total Present Value of Discounted Costs (Sum of column (j)) Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries										**$7,374,999**

Comments: Column (b) includes costs for abandonment, residential connection, and financial participation charges. OM&R costs based on EMWD actual for 2012/13 budget escalated at 4%.

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

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

Table 20 – Proposal Benefits and Costs Summary - Quail Valley Subarea 9 Phase 1

Proposal: _____

Agency: _____

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)
Quail Valley Phase I Sewer System	EMWD	7,374,999	8,582,882	-	8,582,882	-	Public Health, DAC Assistance, pollutant containment, basin reclamation, recreation.

(1) From Table 19, or RWMG method

(2) From Table 15 or RWMG method

(3) From Table 18 or RWMG method

Project C: Forest First – Increase Stormwater Capture and Decrease Sediment Loading through Forest Ecological Restoration (US Forest Service)

General Principles

Consistency – Tables 12, 15, 16, and 19 are consistent with the Workplan, Schedule, and Budget presented in other sections. The Technical Justification submittal includes background for the physical benefits, which have been monetized, in the cases of water quantity (Table 15) and water quality (Table 16), and have been non-monetized (Table 12), in the cases of reduced greenhouse gas emissions and improved habitat and recreation. An additional non-monetized benefit that is described here concerns the public safety aspects of reduced fire risk. In general, though a lower intensity ground-based fire costs less to suppress than a higher intensity fire, the specifics of each fire cannot be predetermined, so no monetization of potential fire savings is attempted.

Completeness – There are four primary actions that are being conducted under this proposal: 1) reduce vegetative fuel loading in the Bluff Mesa area, 2) reduce vegetative fuel loading in the Santa Ana Unit 3 area, 3) improve the road system in the Bluff Mesa area by upgrading some roads and decommissioning others, and 4) improving road crossings in the Santa Ana Unit 3 area to hydrologically disconnect Forest Service Road 1N09 from perennial streams. Costs for these actions have been summarized in Table 7 and have been estimated annually in Table 19. Maintenance of the areas has been estimated in Table 19 based on other similar projects over the estimated 15 year life cycle of the project.

Without-Project and With-Project Comparison –

- Water quantity
    - Without-Project: the additional water quantity generated by reduced evapotranspiration is set at zero, though it is possible that continued stocking of fuels would actually reduce the available water.
    - With-Project: In the Technical Justification section, the CardnoENTRIX analysis indicates that a basal area reduction of 50% would generate 15% additional water from the acres completed. As the specific acres completed in each of the implemented years is not specifically known, the total acreage is divided by four and Table 15 tracks the additional benefits with this assumption.
- Water quality
    - Without-Project: the sediment generated from the system is set based on the amount of sediment generated from a high intensity fire burning through the project area acres. The annual risk of a debris flow generating fire is included. In addition, the average sediment generated from the roads in the areas is added to the total.
    - With-Project: Table 16 is used because reducing the generated sediment from the upper watershed reduces the amount of maintenance of sediment basins that San Bernardino County Flood Control is required to do. In this manner, it is an avoided cost. As the implementation of the project is phased over the life of the grant, the acres and road miles implemented effects the level of sediment available for generation. Avoided costs are based on San Bernardino County Flood Control estimates of $10/cu.yd. to remove and dispose of sediment from debris basins.
- Habitat enhancement and recreational use
    - Without-Project: As the situation will not change for the better without the project, these benefits are set at zero.
    - With-Project: As with other benefits, the assumption is made that one quarter of the acres will be completed for the first 4 years of the grant. Complete benefits to recreation are achieved followed enhanced road work.
- Greenhouse Gas Emissions (detailed in Attachment 7)
    - Without-Project: Previous studies on other fires were used in the Bluff Mesa NEPA to estimate the GHG that would be emitted in the case of a high intensity wildfire. The calculations combine these previous studied fires with the density of trees per acre. For the Angora Fire in the Lake Tahoe Basin, the GHG emissions related to the fire were estimated at 46.2 tons per acre for a tree density of 273 trees per acre. The Bluff Mesa density ranges from 77-238 trees per acre. From these numbers, the without-project estimate is 22 tons per acre.
    - With-Project: For the Angora Fire, modeling estimates concluded that the GHG levels could have been reduced to 12 tons per acre had the density of trees been reduced to 60 trees per acre. The Bluff Mesa action reduces the tree density to a range of 37-121 trees per acre. Based on these averages the GHG

levels with the project were set at 12 tons per acre. As the acres of the project are implemented, the amount of reduction is realized.

- Public Safety
    - Without-Project: These project areas are pieces of an overall strategy to protect communities from wildfire. The Bluff Mesa area ties into South Big Bear and North Big Bear projects to protect communities of in the Big Bear area. The Santa Ana Unit 3 work supports protection of communities such as Smiley Park, Running Springs, and Arrowbear. These communities and their evacuation routes would be more vulnerable without the project.
    - With-Project: In contrast, risk to public safety would be reduced with the implementation of the project. Also, when fires do start, the project areas will allow for safer areas for fire fighters to stand against the wildfires. There are a number of studies of fires where containment of the fires was achieved when the fire entered a fuels treated area.

Period of Analysis – The construction period for the project is within the life of the grant, as specified in the Schedule. Given annual Federally appropriated funding, the fuels reduction work will be phased with one contract with options for the Bluff Mesa area, two contracts for the Santa Ana Unit 3 area, a maintenance contract for the roads work in the Bluff Mesa area and a separate contract for the road crossings along Forest Service Road 1N09. The expectation within the schedule is for all construction activities to be completed by December 31, 2017. The life cycle of the fuels treatments is 15 years with maintenance associated with keeping the reduced levels of fuels through localized mastication and broadcast burning. Road base increases in the Bluff Mesa area will reduce maintenance costs by reducing the need for annual work. It is anticipated that the road crossings will not need maintenance over the period of analysis. Though it is expected that maintenance will not be needed on an annual basis, identifying specific time frames for maintenance cannot be justified. Therefore, annual maintenance costs are included with the knowledge that in some years the costs will be less or non-existent and in other years, the costs will be higher.

Section D2. Non-Monetized Benefit Analysis

Community/Social Benefits

Provide social recreation or access benefits? Yes

As described in Attachment 7, Wu et al (2011) summarized literature findings of other studies, including "Forests such as ponderosa pine provide numerous benefits, including aesthetic and recreational opportunities, erosion prevention, and microclimatic regulation (Frederici 2003). Restored forests enhance the value of surrounding real estate while making the region more attractive to high-quality labor (Kim & Wells 2005). A resilient forest ecosystem also provides the benefit of "insurance" from disturbances such as wildfire (Stephens et al. 2010). The combined economic
Value of this natural insurance along with a partial calculation of other services has been estimated at $3,500 per hectare [~$1420/acre] (Mason et al. 2006)." The Mason et al. (2006) analysis focused on the Fremont and Okanogan National Forests in Oregon and Washington. As the project location has different uses and benefits related to social recreation use, the specific local costs have not been quantified.

Bluff Mesa project EA (pp. 86-87): If there were no action, the short-term effects would be negligible. Over the longer term, however, forested areas would continue to lose contrast in texture and diversity of stands. The forest would continue to change from green to a brown disease state as trees continue to die from drought, insects, and disease. This would increase the visual contrast that currently exists. However, because of the relatively flat topography on top of Bluff Mesa, the visual absorption capability of the area is high and there are limited locations where distant views of the project area can be seen.
The Forest would have less of a park-like setting as stands became denser within the project's recreation areas. There would be a decrease in the diversity of discernible line and texture contrasts. Large stand-replacing fires could occur, drastically altering the forest from its current condition. If this should occur, the ROS experience, and Forest recreation and scenery goals would not be met.

Implementing the design features would reduce potential adverse effects, ensuring the project would comply with forest plan standards and guidelines. The proposed action would have the potential to increase unauthorized access due to the reduction in vegetation and the temporary opening of existing closed routes. However, the project would result in 1.0 mile of road being decommissioned and 2.6 miles of road being restricted to administrative use only and gated. Thus, after project implementation, the project would be made more consistent with the primary ROS

designation of semi-primitive, non-motorized. In addition, design features incorporated into the proposed action would minimize the potential unauthorized access.
Park-like settings would be created within the project area, even within many fuel breaks. Further, the preservation of big-tree conifer forests would be made more likely, as large-diameter conifers would not be affected by the treatments and the proposed action would reduce the risk of stand-replacing wildfire.

Promote social health and safety? Yes

As was summarized in Attachment 7, Loomis and Gonzales-Caban (2010) conducted a willingness to pay (WTP) analysis related to prescribed burning and mechanized fuels reduction. With the many assumptions they used across multiple states and racial groups, they concluded "we obtain WTP per household as a function of acres burned for white households in California, Florida, and Montana for the prescribed burning program: WTP per household = $174.06 + 0.002578 (acre reduction)." The proposed project is focused on mechanized fuels reduction over the majority of the treated acres with the idea that once the fuels environment is back to historical levels, then prescribed fire could be used to help maintain the area. Therefore, though the public has shown a quantifiable WTP for some aspects of fuels management, the specifics of the current project have not been quantified.

Bluff Mesa project area (Decision Notice and FONSI, pp. 7-8):
1. Firefighter Safety: Currently, over 75 percent of the project area is predicted to exhibit crown fires (active/passive) under hot, dry weather conditions. Fire line intensities would be such that fire suppression will be limited, difficult, and dangerous. There is a need to reduce fuels to a condition where there will primarily be surface fires under most weather conditions (other than extreme) so that effective suppression efforts can be conducted safely to protect communities and natural resources. The proposed action will substantially contribute towards firefighter safety by reducing the potential for crown fires under hot, dry conditions from over 75 percent to less than 50 percent over the project area.

2. Protect Communities in the Vicinity of Big Bear Lake: There is a large permanent population and even larger seasonal populations in the Big Bear Lake Valley, and an inholding of private property around Bluff Lake is completely surrounded by National Forest System lands in the project area. Because of the risk of crown fire in the project area and the difficulty associated with suppression, there is a need to reduce fuels to a condition that the risk of loss of human life, structures, and improvements is substantially reduced. The proposed action will substantially contribute towards protecting communities by reducing the potential for crown fires under hot, dry conditions from over 75 percent to less than 50 percent over the project area. In addition, it will create shaded fuel breaks that will greatly improve tactical firefighter operations and their potential for success. Further, these fuel breaks will provide improved escape routes and residents of the private inholding around Bluff Lake and for recreationists in the project area.

Environmental Stewardship Benefits

Benefit wildlife or habitat in ways that were not quantified in Attachment 7? Yes

As with the social recreation benefits described in Attachment 7 and by such authors as Mason et al. (2006), there have been economic analyses in other locations showing that there is a willingness to pay (WTP) related to endangered species.

http://www.fws.gov/nativeamerican/graphics/FWS_Pub/WhySaveEndangeredSpecies.pdf states that "Texas Parks and Wildlife Department calls birding 'the nation's fastest growing outdoor recreation.' It estimates that birders pump an estimated $400 million each year into the state's economy." In a recent study (Birding in the United States: A Demographic and Economic Analysis), the U.S. Fish and Wildlife Service estimated that wildlife watching—not just bird watching— generated $85 billion in economic benefits to the nation in 2001.
http://www.nwf.org/~/media/PDFs/Wildlife/esabythenumbers.pdf?dmc=1&ts=20130214T1413355172 summarizes other economic benefits of wildlife species, including:

- $108 billion in annual revenues would rank hunting, fishing and wildlife watching as the seventh largest corporation in America.
- Hunting, fishing and wildlife watching employ nearly as many people -- 2.6 million -- as the United States computer industry.

As these estimates from the US Fish and Wildlife Service are national values, the economic benefits of protecting the wildlife species in the project areas have not been quantified. According to the current NEPA analyses for the project area, the following wildlife species and habitat concerns are involved in this project.

Bluff Mesa project area (Decision Notice and FONSI, pp. 3-4): “Several threatened, endangered, and sensitive plants occur within or adjacent to the project area; they are mostly associated with the montane meadow and riparian habitats. Suitable habitat is present for the California spotted owl, although no spotted owl protected activity centers (PACs) currently occur within the protected area. The project area also contains suitable habitat for the southwestern willow flycatcher, mountain yellow-legged frog, several sensitive or watch list snakes, and bats. Bald eagle roosting sites occur in the northern portion of the project area. Limited treatments within these habitats may be beneficial for long-term habitat maintenance. Three treatment level variations were developed for Treatment Level 4 and are: 4a – areas identified as spotted owl nest and roost habitat and bald eagle habitat; 4b – primarily consists of suitable spotted owl habitat (outside of PACs); and 4c – montane meadows that occur both upstream and downstream of Bluff Lake.”

Bluff Mesa project area (EA, p.55): “The effects of no action would be similar for all species listed, and therefore is summarized here. If the area is left untreated, the wildlife species in the project area would experience lower levels of disturbance, both to individuals and to habitats important for foraging, movement, shelter, migration, wintering, and breeding than they would under the proposed action.
Forest stands would continue to be at higher risk of mortality due to fire, insects, diseases, and drought. In the absence of fire or other disturbance, moderately dense stands would convert to high-density stands and recruitment of large trees would slow due to the density-related decline in tree reproduction, growth, and vigor. This would negatively affect the species for which large trees are an important habitat component (e.g., California spotted owl and San Bernardino flying squirrels).
If left untreated, the project area would be at a higher risk of larger fires with more intense fire behavior. Moderate- to high-severity fires would be expected to remove much of the over story and understory (depending on weather and wind conditions). Patch sizes of burned areas may be large, but would be dependent on conditions at the time of the fire.”

Bluff Mesa project area (Decision Notice and FONSI, p.11): The action is not expected to adversely affect any endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973. A biological assessment for threatened and endangered species was completed and a "may affect, not likely to adversely affect" determination was made for two wildlife species and a "may affect, not likely to adversely affect" determination was made for three plants and their critical habitat for all activities except prescribed burning of the Bluff Mesa meadows (EA, pages 55 and 69-70; Biological Assessment, project record).

Section D3. Monetized Benefit Analysis

Table 15 – Water Quantity (acre-feet per year (AFY))

(d) As stated above, the assumption is that without the project no additional water will be generated, nor can the potential for reduced water be quantified. The NEPA analysis for the Bluff Mesa area and the Santa Ana Unit 3 area indicates that without the project, fuel stocking will increase, which will potentially extract additional water from the system.

(e) The project will begin implementation in Federal Fiscal Year (FFY) 2014. As the fuels projects will have phased implementation between FFY14 and FFY17, it is assumed that ¼ of the fuels acres will be reduced resulting in ¼ of the water benefits being realized. The action results in basal area reductions of 30% to 70%. Using an average of 50%, and the most likely increase of 0.6% increase in flow for every 1% basal reduction above 25% (CardnoEXTRIX, 2012), results in an increase flow of 15%.

Using the USGS Regression Equations through the Stream Stats online program (http://water.usgs.gov/osw/streamstats/california.html) allowed for the determination of peak flows from each of the project areas. For the Bluff Mesa area, the 2-year peak flow was modeled as 49 cubic feet per second (cfs).

The hypothesis being tested is that increasing the flow by 15% from a basin that generates 2-year peak flows of 49 cfs would result in at least a 1 cfs increase (725 AFY).

The project affects are analyzed to last for 15 years from the time of implementation. This results in full benefits being achieved from 2017-2028, with partial benefits in the beginning and ending years of the period of analysis. Maintenance will be conducted to limit regrowth and maintain reduced vegetative cover.

(g) The CardnoENTRIX report states, "Increased stream flows in the Santa Ana River Watershed are expected to decrease water costs by allowing water districts to use local water supplies in place of costly, imported water from outside the Basin. Currently, water districts purchase water as needed from the State Water Project and from Metropolitan Water District (MWD). These water purchases vary in cost from $125 (lowest State Water Project rate) to $450 per AF (MWD untreated replenishment water rate), with a most likely value of $250 cost savings per acre-foot."

No analysis of increased costs of water delivery was made for the future.

(j) Using the above assumptions, the Present Value of Discounted Benefits for water quantity related to the Forest First project, is $1,524,812.

Table 16 – Avoided Project Costs – Sediment Reduction (cu.yd)

San Bernardino County Flood Control is a partner on the project. One of their tasks is do cleanout sediment debris basins. Below the project area are Plunge Creek basins and the Seven Oaks dam. Currently total costs for sediment removal are $10/cu.yd. (Kevin Blakeslee, personal communication). Modeling was conducted to determine the sediment that would be generated if a high severity wildfire burned the project area. Additional modeling was conducted on the sediment generated from natural surface Forest Service roads on a per mile basis. Through the implementation of the project, the risk of having a wildfire that would generate debris flows is reduced. Conducting the roads projects will reduce the sediment generated and delivered to the drainages. Reducing downstream sediment generation avoids the sediment removal costs.

Modeling of Fire Frequency Reduction

According to the CardnoEXTRIX report, "**Table 8** presents data from the USGS study on existing fire frequency and magnitude in the San Gabriel Mountains, based on fires in the San Gabriel Mountains over approximately the last 80 years. To estimate the change in the frequency of fires of each magnitude, we use a range of 30 to 60 percent forest fire reduction after a thinning event, with a most likely reduction of 50 percent. This range is our best estimate of the effect of thinning on fire frequency based on interviews with forest fire experts at the Forest Service Fire Laboratory in Missoula, Montana."

Table 8 Effect of Thinning on Fire Frequency

Fire Magnitude	Annual Probability of Occurrence Before Thinning	Annual Probability of Occurrence After Thinning		
		Low	**Most Likely**	**High**
I	3.8%	1.2%	1.9%	2.3%
II	3.6%	1.1%	1.8%	2.1%
III	6.3%	1.9%	3.2%	3.8%
All Fires	13.7%	1.2%	1.9%	2.3%

The Bluff Mesa fuels project Fire and Fuels Resource Report (Table 12) shows the Existing Condition (Without-Project) and the Post Treatment Condition (With Project) of how vegetation would burn for a wildfire.

Table 12. Existing Condition and Post Treatment Fire Type

	Existing Condition		Post Treatment	
Fire Type	Acres	Percent of Area	Acres	Percent of Area
Surface Fire	371	23%	870	54%
Passive Crown Fire	637	40%	467	29%
Active Crown Fire	591	37%	263	17%
Total	1,600	100%	1,600	100%

Sediment generated following a fire is dependent of how intense fires burn and how the burns affect the soils resource. Based on experience from over two dozen post-wildfire assessments, surface fire does not add to erosion, passive crown fire results in low to moderate soil burn severity and active crown fire results in moderate to high soil burn severity.

Modeling of Sediment generated from 100% burn of project areas

The Los Angeles District of the U.S. Army Corps of Engineers has developed empirical relationships for the estimation of debris production from recently burned, coastal-draining, mountainous, Southern California drainage basins (Gatwood et al., 2000).
ftp://frap.cdf.ca.gov/pub/incoming/IMMP/Prop%201-E%20BCP%20Justification/US%20ACE%20LA%20DebrisMethod.pdf

The extent, recency, and frequency of forest and brush fires (wildfire) directly affect the amount of runoff and debris yield from a watershed. Since the occurrence of flood and wildfire events are independent processes, coincident-frequency analysis depicting the relationship between fire frequency and the frequency of flood events is a viable approach to determine the probabilities of occurrence of debris yield events of various magnitudes.

Since all of the drainage subareas were less than 10 acres and the peak data was known - Equation #2 was used for the calculation

LOG Dy = 0.85(LOG Q) + 0.53 (LOG RR) + 0.04 (LOG A) + 0.22 (FF)

Where:
Dy = Unit Debris Yield (yd3/mi2)
P = Maximum 1-Hour Precipitation (inches, taken to two places after the decimal point, times 100)
RR = Relief Ratio (ft/mi)
A = Drainage Area (ac)
FF = Non - Dimensional Fire Factor
Q = unit Peak Runoff (ft3/s/mi2) Adjustment-Transposition Factor (AT) = 1.0 (area similar to the San Gabriel Mountains)

The model generates cubic yards of sediment for a high severity burn from various design storms (return intervals of 2-year, 5-year, 10-year, 25-year, 50-year, and 100-year). The chances of these design storms occurring in any given year are 50% (Q2), 20% (Q5), 10% (Q10), 4% (Q25), 2% (Q50), and 1% (Q100).

Modeling of Sediment Reduction from Road Improvements

Also, road improvement reduces sediment loading (less tonnage but much higher probability)

The Forest Service conducted a roads analysis and modeling effort using of the Big Bear Watershed using GeoWEPP (Elliot et al., 2007). A portion of the modeling was done in the watershed adjacent to the Bluff Mesa area.

The roads in the Big Bear Lake basin were analyzed by determining the total length of roads in each region using a truncate feature in Arc Map. FSWEPP ROAD simulated one road section for each climate region. Each segment was simulated for fifty years with 16-ft wide low traffic road conditions using the region's climate file. Culvert spacing was assumed to be 400 feet. During the site visit, we observed that the roads could best be described as in sloped with bare ditches and low traffic. The rock component was set at the default of 20 percent and the soil texture was sandy loam. Values of 4, 50 and 25 percent were used for the road, fill and buffer slopes, respectively. Road segment lengths were assumed to be 400 ft long with 1 ft, long buffer and fill slope lengths (the minimum value) since no cross drains other than culverts at channel crossings were observed during the visit.

For the watershed adjacent to the Bluff Mesa project area, road sediment generated was 12.5 tons/mile.

Following this work, The Forest Service conducted a quantification of sediment production from roads. QUANTIFIYING FOREST NATURAL BACKGROUND AND ROAD SEDIMENT YEILD IN BIG BEAR LAKE, CALIFORNIA; THESIS; Mikaila Rimbenieks, 2011

Sedimentation of water bodies on the National Forest has become an issue of increasing concern, which is largely caused by exposed surface area created by forest roads (Walter and King, 2004). This study assesses sediment deposition on forest land by measuring the volume of sediment runoff from rocked and traditional forest roads. Samples were taken in the Big Bear Lake watershed due to the impaired status of the lake in addition to the extensive road system managed by the USDA Forest Service. The study, consisted of ten sample plots, utilizes silt fences as sediment deposition capture devices. Each plot has a silt fence which serves as a control paired with a sample silt fence located on both traditional and rocked roads. Sediment deposition volume was measured after each significant storm event and was compared to control values. The amount of sediment deposition was determined by comparing the rocked versus traditional forest road sediment volumes in addition to comparing these values with the determined control. Results indicate that sediment production is 2.3 times greater on traditional forest roads versus rocked roads. Excluding the burned area, the natural sediment background on the forest is zero, indicating that sediment from USDA Forest Service land is primarily attributed to dirt roads.

SEDIMENT PRODUCTION AND DELIVERY FROM FOREST ROADS IN THE SIERRA NEVADA, CALIFORNIA; THESIS; Drew Coe, 2006
Sediment production rates varied greatly between years and between road segments. Sediment production rates from native surface roads were 12-25 times greater than from rocked roads. On average, recently-graded roads produced twice as much sediment per unit of storm erosivity as roads that had not been recently-graded. Unit area erosion rates were 3-4 times higher in the first wet season than in either of the following two wet seasons, as the first wet season had near normal precipitation and a higher proportion of rainfall. Road sediment production is best mitigated by rocking native surface roads, decreasing sediment transport capacity by improving and maintaining drainage, and avoiding sites where unusual soil characteristics increase road surface or ditch runoff.

Given the variability in reduction of sediment production following the rocking of roads (45% reduction on average for Big Bear watershed, 92-96% reduction on average for Sierran forests), the Forest assumes that the project will reduce sediment production by 70%.

Generating Estimates of Avoided Maintenance Costs through Project Period of Analysis

For the Without-Project and With-Project conditions, the assumptions used for generating the sediment avoided are as follows:

- The CardnoENTRIX analysis of percent chance of a Magnitude III fire (6.3% without project, 3.2% with project)
- In estimating sediment generation following wildfire, the Forest Service conservatively assumes that moderate and high soil burn severity will generate the high soil burn severity erosion rates (77% without project, 46% with project).
- A weighted average of storm occurrence and sediment modeled is used: 50% (Q2), 20% (Q5), 10% (Q10), 4% (Q25), 2% (Q50), 1% (Q100), and the remaining 13% is assumed to be a condition where no significant storm moves sediment.
- If a fire occurs, then the sediment generated following the fire reduces on average as time progresses and new vegetative growth again provides cover and soil stability. The assumption within most sediment generating models is that normal background sediment is reached 10 years after a fire.

The following is an example of the calculations to generate column (d) for 2014-2017.

Without-Project condition for comparison (2013 and beyond)

- If the project is not conducted, the increased stocking of trees through time would likely increase the percentage subject to passive and active crown fire, but no estimate of this change is made.
- 6.3% chance of fire
- Each sediment value generated by the USGS model is multiplied by 77% based on fire modeling of vegetation and stocking available for passive and active crown fire.
- The weighted storm average incorporates the multiple storm events.
- The 6 miles of roads continue to generate 12 tons/mile per year.
- Using these assumptions, the expected sediment in any given year from the project area is 126,604 cubic yards.

With-Project condition (2014-2031)

- The project is scheduled to be implemented in phases, with the assumption that ¼ of the acres will be implemented in 2014-2017.
- For acres with implementation, there is a 3.2% chance of fire
- For acres with implementation, the sediment generated by the USGS model is multiplied by 46% based on post-implementation fire modeling
- The weighted storm average incorporates the multiple storm events.
- In 2016, 2 miles of roads work will be conducted reducing sediment by 17.5 cu.yds. per year
- In 2017, the total of 6 miles of road work will have been implemented, reducing sediment yield by 52.5 cu.yds.
- Using these assumptions, the expected sediment reduces as the fuels and roads projects are implemented

2014	2015	2016	2017+
104,570	82,536	60,485	38,415

Comparison using O&M cleanout cost of $10/cu.yd.

San Bernardino County Flood Control tracks spending on overhead, labor, equipment, and disposal of sediment dredged from the various basins at the base of the mountains. Keith Blakeslee has set the cost, in 2012 dollars, at $10/cu.yd. of sediment.

The difference in expected value from the Without-Project and the With-Project analyses are transferred to Column (d) of Table 16.

Section D5. Project Benefits and Cost Summary

Table 19 – Annual Costs of Project

Table 19 distributes the costs shown in Table 7 – Project Budget to the appropriate years as defined in the Schedule. The value shown in 2012 is the federally appropriated dollars that have been spent on the NEPA analysis for the Bluff Mesa project area and the Santa Ana Unit 3 project area.

For Federal fiscal year (FFY) 2013, only the NEPA decision for the Santa Ana Unit 3 project area is anticipated.

For FFY14, the schedule indicates the following tasks will be conducted. Listed here are the planned distributions of funds for these tasks.

- Contract preparation for Bluff Mesa fuels area at $300/ac ($470,000 of Forest funds)
- Begin NEPA analysis on road crossing work ($30,000 of grant funds)
- Develop monitoring plan and collect Forest BMP data ($3,000 Forest funds)
- Partner monitoring of water supply and sediment removal ($50,000 in-lieu)
- Bluff Mesa fuels implementation phase 1: $900,000 ($200,000 grant, $700,000 Forest)
- Fuels implementation contract administration ($200,000 Forest funds)
- Administration and reporting on the grant ($2,500 of grant funds)

For FFY15, the schedule indicates the following tasks will be conducted. Listed here are the planned distributions of funds for these tasks.

- Contract preparation for Santa Ana fuels area at $300/ac ($60,000 of Forest funds)
- Finish NEPA analysis on road crossing work ($10,000 of grant funds)
- Acquire permits for road crossing work ($3,500 of grant funds)
- Collect Forest BMP data ($3,000 Forest funds)
- Partner monitoring of water supply and sediment removal ($50,000 in-lieu)
- Fuels implementation phase 2: $900,000 ($200,000 grant, $700,000 Forest)
- Fuels implementation contract administration ($200,000 Forest funds)
- Administration and reporting on the grant ($2,500 of Forest funds)

For FFY16, the schedule indicates the following tasks will be conducted. Listed here are the planned distributions of funds for these tasks.

- Contract preparation for road crossings ($25,000 of grant funds)
- Contract on road crossing work ($250,000 of grant funds)
- Administration of roads contract ($5,000 of grant funds)
- Collect Forest BMP data ($5,000; $3,000 grant, $2,000 Forest funds)
- Partner monitoring of water supply and sediment removal ($50,000 in-lieu)
- Fuels implementation phase 3: ($750,000 Forest funds)
- Fuels implementation contract administration ($200,000 Forest funds)
- Administration and reporting on the grant ($2,500 of Forest funds)

For FFY17, the schedule indicates the following tasks will be conducted. Listed here are the planned distributions of funds for these tasks.

- Contract for road base improvement ($180,000 of grant funds)
- Contract administration for roads projects ($35,000 of grant funds)
- Contingency for roads projects ($40,000 of grant funds)
- Partner monitoring of water supply and sediment removal ($50,000 in-lieu)
- Collect Forest BMP data ($5,000 Forest funds)
- Administration and reporting on the grant ($2,500 of grant funds)

For FFY18, the schedule indicates the following tasks will be conducted. Listed here are the planned distributions of funds for these tasks.

- Collect final Forest BMP data ($7,000 of grant funds)
- Partner monitoring of water supply and sediment removal ($50,000 in-lieu)
- Administration and reporting on the grant ($6,500 of grant funds)

In addition, once the implementation has been started, there is a need to maintain the reduced vegetative condition and to maintain the roads after storms that exceed the design criteria. This maintenance will likely not occur every year, but specific future planning cannot be estimated given the variables of the forest environment. Therefore, a cost of $20,000 per annum is included in Table 19. Road maintenance costs the Forest on average $800/mile. With the road improvements, maintenance will likely be needed every third or fourth year, and the costs could be lower as the new condition should erode less. Mastication and prescribed burning will be used in a targeted fashion across the project areas, but will be dependent on burn windows and other Forest needs. When the work is done, it may cost more than $20,000 in any one year, but it is likely that work will not be needed every year.

Table 20 – Proposal Benefits and Costs

The Total Present Value of Project cost is $4,719,798.
The Total Present Value from Section D3 is $8,944,512.
The non-monetized benefits include public and firefighter safety, improved wildlife and habitat, improved recreation, and reduced GHG.

Table 11 – Statement of Cost-Effectiveness Project name: _____	
Question 1	Types of benefits provided
Question 2	Have alternative methods of providing the same types and amounts of physical benefits as the proposed project been identified?
	If no, why?
	If yes, list the methods (including the proposed project) and estimated costs.
Question 3.	If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods.
Comments:	

Table 12 – Non-monetized Benefits Checklist		
No.	**Question**	**Enter "Yes", "No" or "Neg"**
	Community/Social Benefits **Will the proposal**	
1	**Provide education or technology benefits?**	**No**
	Examples are not limited to, but may include: - Include educational features that should result in water supply, water quality, or flood damage reduction benefits? - Develop, test, or document a new technology for water supply, water quality, or flood damage reduction management? - Provide some other education or technological benefit?	
2	**Provide social recreation or access benefits?**	Yes
	Examples are not limited to, but may include: - Provide new or improved outdoor recreation opportunities? - Provide more access to open space? - Provide some other recreation or public access benefit?	
3	**Help avoid, reduce or resolve various public water resources conflicts?**	**No**
	Examples are not limited to, but may include: - Provide more opportunities for public involvement in water management? - Help avoid or resolve an existing conflict as evidenced by recurring fines or litigation? - Help meet an existing state mandate (e.g., water quality, water conservation, flood control)?	
4	**Promote social health and safety?**	Yes
	Examples are not limited to, but may include: - Increase urban water supply reliability for fire-fighting and critical services following seismic events? - Reduce risk to life from dam failure or flooding? - Reduce exposure to water-related hazards?	
5	**Have other social benefits?**	No
	Examples are not limited to, but may include: - Redress or increase inequitable distribution of environmental burdens? - Have disproportionate beneficial or adverse effects on disadvantaged communities, Native Americans, or other distinct cultural groups?	
	Environmental Stewardship Benefits: **Will the proposal**	
6	**Benefit wildlife or habitat in ways that were not quantified in Attachment 7?**	Yes
	Examples are not limited to, but may include: - Cause an increase in the amount or quality of terrestrial, aquatic, riparian or wetland habitat? - Contribute to an existing biological opinion or recovery plan for a listed special status species? - Preserve or restore designated critical habitat of a listed species? - Enhance wildlife protection or habitat?	
7	**Improve water quality in ways that were not quantified in Attachment 7?**	No
	Examples are not limited to, but may include: - Cause an improvement in water quality in an impaired water body or sensitive habitat? - Prevent water quality degradation? - Cause some other improvement in water quality?	
8	**Reduce net emissions in ways that were not quantified in Attachment 7?**	No
	Examples are not limited to, but may include: - Reduce net production of greenhouse gasses? - Reduce net emissions of other harmful chemicals into the air or water?	
9	**Provide other environmental stewardship benefits, other than those claimed in Sections D1, D3, or D4?**	No
	Sustainability Benefits: **Will the proposal**	
10	**Improve the overall, long-term management of California groundwater resources?**	No
	Examples are not limited to, but may include: - Reduce extraction of non-renewable groundwater? - Promote aquifer storage or recharge?	
11	**Reduce demand for net diversions for the regions from the Delta?**	No
12	**Provide a long-term solution in place of a short-term one?**	No
13	**Promote energy savings or replace fossil fuel based energy sources with renewable energy and resources?**	No
	Examples are not limited to, but may include: - Reduce net energy use on a permanent basis?	

Table 15 – Annual Benefit (All benefits should be in 2012 dollars) Project: __Forest First_____									
(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)
2012	Water quantity	AFY	0	0	0	$250	$0	1.000	**$0**
2013	Water quantity	AFY	0	0	0	$250	$0	0.943	**$0**
2014	Water quantity	AFY	0	181	181	$250	$45,313	0.890	**$40,328**
2015	Water quantity	AFY	0	363	363	$250	$90,625	0.840	**$76,125**
2016	Water quantity	AFY	0	544	544	$250	$135,938	0.792	**$107,663**
2017	Water quantity	AFY	0	725	725	$250	$181,250	0.747	**$135,394**
2018	Water quantity	AFY	0	725	725	$250	$181,250	0.705	**$127,781**
2019	Water quantity	AFY	0	725	725	$250	$181,250	0.665	**$120,531**
2020	Water quantity	AFY	0	725	725	$250	$181,250	0.627	**$113,644**
2021	Water quantity	AFY	0	725	725	$250	$181,250	0.592	**$107,300**
2022	Water quantity	AFY	0	725	725	$250	$181,250	0.558	**$101,138**
2023	Water quantity	AFY	0	725	725	$250	$181,250	0.527	**$95,519**
2024	Water quantity	AFY	0	725	725	$250	$181,250	0.497	**$90,081**
2025	Water quantity	AFY	0	725	725	$250	$181,250	0.469	**$85,006**
2026	Water quantity	AFY	0	725	725	$250	$181,250	0.442	**$80,113**
2027	Water quantity	AFY	0	725	725	$250	$181,250	0.417	**$75,581**
2028	Water quantity	AFY	0	725	725	$250	$181,250	0.394	**$71,413**
2029	Water quantity	AFY	0	544	544	$250	$136,000	0.371	**$50,456**
2030	Water quantity	AFY	0	363	363	$250	$90,750	0.350	**$31,763**
Last Year of Project Life 2031	Water quantity	AFY	0	181	181	$250	$45,250	0.331	**$14,978**
								Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)	**$1,524,812**
Comments: See narrative									

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

Table 16 – Annual Costs of Avoided Projects (All avoided costs should be in 2012 dollars) Project: _Forest First - _____						
	Costs				Discounting Calculations	
(a)	(b)	(c)	(d)	(e)	(f)	(g)
Year	Alternative (Avoided Project Name): _Sediment cleanout of flood control basins__ Avoided Project Description: Seven Oaks dam and Plunge Creek basins sediment removal; based on recent Flood Control data, $10/cu.yd. Project reduces risk of high severity fire. Also, when fire occurs, project reduces burn severity and erosion levels				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)		
2012			$0	$0	1.000	**$0**
2013			$0	$0	0.943	**$0**
2014			$220,340	$220,340	0.899	**$198,086**
2015			$440,680	$440,680	0.839	**$369,731**
2016			$661,190	$661,190	0.792	**$523,662**
2017			$881,890	$881,890	0.747	**$658,772**
2018			$881,890	$881,890	0.705	**$621,732**
2019			$881,890	$881,890	0.665	**$586,457**
2020			$881,890	$881,890	0.627	**$552,945**
2021			$881,890	$881,890	0.592	**$522,079**
2022			$881,890	$881,890	0.558	**$492,095**
2023			$881,890	$881,890	0.527	**$464,756**
2024			$881,890	$881,890	0.497	**$438,299**
2025			$881,890	$881,890	0.469	**$413,606**
2026			$881,890	$881,890	0.442	**$389,795**
2027			$881,890	$881,890	0.417	**$367,748**
2028			$881,890	$881,890	0.394	**$347,465**
2029			$661,190	$661,190	0.371	**$245,301**
2030			$440,680	$440,680	0.350	**$154,238**
Last Year of Project Life 2031			$220,340	$220,340	0.331	**$72,933**
Total Present Value of Discounted Costs (Sum of Column (g))						**$7,419,700**
(%) 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)						**$7,419,700**
Comments: See narrative						

Table 17 – Example Calculation of Expected Annual Damage											
Hydrologic Event	Event Exceedance Probability	Event Damage if Flood Structures Fail	Probability Structural Failure		Expected Event Damage		Interval Probability	Average Damage in Interval		Average Damage in Interval times Interval Probability	
			Without	With Project	Without Project	With Project		Without Project	With Project	Without	With Project
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(i)	(j)	(k)	(l)	(m)
					(c) x (d)	(c) x (e)	from (b)	from (f)	from (g)	(i) x (j)	(i) x (k)
5-year	0.2	$100	0	0	$0	$0					
10-Year	0.1	$200	0.5	0	$100	$0	0.1	$50	$0	$5	$0
15-Year	0.067	$400	0.75	0	$300	$0	0.033	$200	$0	$7	$0
20-Year	0.05	$600	1	0	$600	$0	0.017	$450	$0	$8	$0
25-Year	0.04	$800	1	1	$800	$800	0.01	$700	$400	$7	$4
Expected Annual Damages, Without and With Project										$26.25	$4.00

Not applicable for Forest First project

Table 18 – Present Value of Expected Annual Damage Reduction Benefits Project: _____			
(a)	Expected Annual Damage Without Project [1]		
(b)	Expected Annual Damage With Project [1]		
(c)	Expected Annual Benefit	(a) – (b)	
(d)	Present Value Coefficient [2]		
(e)	**Present Value of Future Benefits** **Transfer to Table 20, column (e).**	**(c) x (d)**	

(1) This program assumes no land use changes in the floodplain. So, EAD will be constant over analysis period.

(2) 6% discount rate; 50-year analysis period (could vary depending upon lifecycle of project).

Not applicable for Forest First project

Table 19 – Annual Costs of Project

(All costs should be in 2012 Dollars)

Project: _Forest First_____

	Initial Costs Grand Total Cost from Table 7 (row (i), column	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)
2012	750,000							750,000	1.000	**$750,000**
2013	13,000							13,000	0.943	**$12,259**
2014	1,655,500				20,000			1,675,500	0.899	**$1,506,275**
2015	1,229,000				20,000			1,249,000	0.839	**$1,047,911**
2016	1,187,500				20,000			1,207,500	0.792	**$956,340**
2017	332,500				20,000			352,500	0.747	**$263,318**
2018	63,540				20,000			83,540	0.705	**$58,896**
2019	0				20,000			20,000	0.665	**$13,300**
2020	0				20,000			20,000	0.627	**$12,540**
2021	0				20,000			20,000	0.592	**$11,840**
2022	0				20,000			20,000	0.558	**$11,160**
2023	0				20,000			20,000	0.527	**$10,540**
2024	0				20,000			20,000	0.497	**$9,940**
2025	0				20,000			20,000	0.469	**$9,380**
2026	0				20,000			20,000	0.442	**$8,840**
2027	0				20,000			20,000	0.417	**$8,340**
2028	0				20,000			20,000	0.394	**$7,880**
2029	0				20,000			20,000	0.371	**$7,420**
2030	0				20,000			20,000	0.350	**$7,000**
Last Year of Project Life 2031	0				20,000			20,000	0.331	**$6,620**
	5231040								…	
								Total Present Value of Discounted Costs (Sum of column (j)) Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries		**$4,719,798**

Comments: See narrative

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

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

Table 20 – Proposal Benefits and Costs Summary

Proposal: _____

Agency: _____

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)
Forest First	Forest Service	$4,719,798	$8,944,512	$0	$8,944,512		Safety from reduced wildfire risk, TES habitat, recreation, reduced GHG

(1) From Table 19, or RWMG method

(2) From Table 15 or RWMG method

(3) From Table 18 or RWMG method

Project D: Wineville Regional Recycled Water Pipeline and Groundwater Recharge System Upgrades (Inland Empire Utilities Agency)

Tables 9(a), 9(b), 12, 15(a), 15(b), 15(c), 19, and 20 are included in this document to quantify water supply costs and benefits, as well as other benefits, for the Wineville Extension Recycled Water Pipeline and Associated Improvements (the "Project"). Narrative supporting the tables is provided below:

I. Narrative Description of the Project's Economic Costs

The Project's economic costs consist of costs contained in the Project budget (Attachment 4), as well as annual administration, maintenance, and replacement costs associated with the Project.

Although there are pumping costs associated with moving the recycled water from the Project to end users, these costs would also be incurred using water purchased from the State Water Project ("SWP"). Since these costs offset each other, they were not included in the analysis.

II. Cost Details

Budget categories (a) through (h) are included in the cost details as described in Table 7.

III. Estimates of Without-Project conditions; e.g. Current and Future Water Supplies and Demand.

The Project is needed to meet current and future water demands by providing 4,500 acre feet per year ("AFY") of recycled water for reuse in the Cities of Fontana and Ontario and in regional groundwater recharge basins. The City of Fontana is geographically located at the eastern end of the Inland Empire Utilities Agency ("IEUA") service area boundary and has not been serviced with recycled water, and has not had the benefit of this alternative water source. This Project enables the community to reuse the recycled water instead of solely relying on potable water for all of its needs. Many of the industries located within the Project vicinity are interested in the reuse of the recycled water in order to achieve their green project objectives, which will be made possible by this Project.

IEUA's service area generally overlies the Chino Groundwater Basin, which is located in the northern part of the Santa Ana River watershed. The Chino Basin consists of a relatively flat alluvial valley from east to west and slopes from north to south at a one to two percent grade. Historically, the majority of the water supply for the IEUA service area comes from Chino Basin groundwater sources at approximately 75 percent of the total demand. Approximately 25 percent of the demand comes from imported water purchased from Metropolitan Water District of Southern California ("MWD"). Imported water supplied by MWD is from Northern California (SWP water).

Due to population increase, the potable water demand is projected to increase from 203,000 AFY in Fiscal Year 2010/2011 to 237,000 AFY by 2020. Recycled wastewater is a largely untapped source of water supply that can be used to offset the additional demand.

IV. Estimates of With-Project Conditions; e.g. Improvements in New Water Supplies Made Available to Meet Demand

This Project enables the region to meet its goal of maximizing the beneficial reuse of the recycled water. The Project provides reliable water supply to the Chino Basin in general with the addition of 3,000 AFY of groundwater recharge into several specific basins. The source of supply for this Project is from the wastewater flows from the service area and therefore will be consistently available to the region through all hydrologic conditions. For every molecule of water that is not imported from the SWP, there is an environmental benefit to the Bay-Delta and it relieves stress on the SWP. There is also a direct benefit on the reduction of greenhouse gases. With a Project total benefit of 4,500 AFY, the greenhouse gas emissions would be reduced by an estimated 4,766 metric tons (as

CO2eq). This pollution reduction will occur by reductions in the amount of energy that would have been used to pump this same amount of imported water over the Tehachapi Mountains and into Southern California.

The Project is part of the Regional Recycled Water Implementation Plan ("RWIP") adopted by IEUA in November of 2005. The RWIP promoted a strategy to utilize recycled water to the maximum extent practicable in order to:

- Reduce dependency of the Chino Basin water users on imported SWP water;
- Offset groundwater pumping that exceeds the Basin's safe yield;
- Improve groundwater quality in the Basin by integrating the desalter program, the recycled water program, and the recharge program into one Optimum Basin Management Plan.
- Increase the number of times that a drop of water in the Santa Ana Watershed is used before it reaches the ocean.
- Promote resource-efficient, multiple-purpose use of flood control basins.

V. Description of Methods used to Estimate Without- and With-Project Conditions.

With and without Project conditions are based on discussions with the Project engineer, IEUA, the cities of Ontario and Fontana, and various Project proponents, as well as information contained in the attached Exhibits described below.

VI. Description of the Distribution of Local, Regional, and Statewide Benefits

Benefits are regional in nature, since any reduction in demand on SWP water will benefit water agencies throughout the state whose need for additional water exceeds that of IEUA and its cities.

VII. Identification of Beneficiaries

IEUA, the cities of Fontana and Ontario, the entire Inland Empire region, all local water users and rate payers, Metropolitan Water District, and all urban water suppliers intending to purchase SWP water in the future.

The recycled water pipeline extension is a collaborative effort between IEUA and the Cities of Ontario, Fontana, and Fontana Water Company. Another demonstration of collaborative effort is the groundwater recharge system upgrades which will seamlessly integrate the 19 recharge basins in one operational control platform and maintain communication with Chino Basin Watermaster and the San Bernardino County Flood Control.

VIII. When the Benefits will be Received

The benefits will be realized as of the completion date of the Project, when the Wineville Extention Recycled Water Pipeline ("RPW"), the Recycled Water Customer Retrofits, and the SCADA Improvements all come online.

Importantly, the RPW *alone* will serve recycled water customers within the Cities of Ontario and Fontana. The estimated connected demand is approximately 1,500 acre-feet per year (AFY) for direct usage and 3,000 AFY for groundwater recharge.

IX. Uncertainty of the Benefits

The benefits were calculated based on monitoring of dry weather flows. There will be variation in these flows, but it is expected that the demand for non-potable water will not exceed the amount extracted from the various basins.

X. Description of any Adverse Effects

N/A

XI. Narrative Discussion that Describes, Qualifies, and Supports the Values Entered in the Tables

Water valuation is based on the Tier 2 full service treated volumetric cost for 2014, which is the actual amount paid by DWP, the District, and other local entities to purchase SWP water for designated uses and purposes.

The estimated valuation of groundwater was provided by San Bernardino Valley Water Conservation District, and is based on average purchase price for groundwater that is not included as part of a cooperative recharge program.

Greenhouse gas ("GHG") valuation is based on 2013 Reserve Price Notices published by the California Environmental Protection Agency Air Resources Board ("ARB") as part of the State's Cap-and-Trade Program. The program is a central element of California's Global Warming Solutions Act (AB 32) and covers major sources of GHG emissions in the State such as refineries, power plants, industrial facilities, and transportation fuels. The regulation includes an enforceable GHG cap that will decline over time. ARB will distribute allowances, which are tradable permits, equal to the emission allowed under the cap. Not only do ARB auctions generally curtail the production of GHGs, but they also raise substantial funds for the State. *See* "California's First Carbon-Credit Auction Raises $290 Million," Los Angeles Times, November 20, 2012.

Estimated administration, operations, maintenance, and replacement costs for the Project are based on discussions with DWP, the District, and maintenance data collected by David Taussig & Associates, Inc. for comparable projects.

XII. Documentation to Support Information Presented

See the following attached:

Exhibit A *- Metropolitan Water District Rates and Charges*

Exhibit B *– 2013 Annual Auction Reserve Price Notice; California Cap-and-Trade Program Greenhouse Gas Allowance Auctions, Updated on January 15, 2013*

Additionally, IEUA completed the Recycled Water System Feasibility Study ("Feasibility Study") in 2002. The Feasibility Study is the Facilities Planning Report for IEUA's Recycled Water System, based on which Capital Improvement Projects for the Recycled Water Distribution System would be developed. Since then, IEUA updated the Feasibility Study with the Regional RWIP in 2005. The RWIP provides an updated overview of the recycled water supplies, existing, and estimated recycled water demands, and a recommended regional backbone system to distribute recycled water throughout its service area. IEUA initiated the Three Year Business Plan ("Business Plan") in 2007 to accelerate the implementation of the RWIP. The Central Project Area project was identified in the Business Plan as a priority project for IEUA's recycled water system.

IEUA and its member agencies updated the Chino Basin Recharge Master Plan in 2010, and adopted the SCADA System Master Plan in June 2012 to optimize and increase the groundwater recharge within the Chino Basin to make the region more self-reliant on its water sources.

Table 9 (a) – Annual Project Physical Benefits			
Project Name: Wineville Recycled Water Pipeline and Groundwater Recharge Upgrades Project			
Type of Benefit Claimed: New Recycled Water Supply			
Measure of Benefit Claimed (Name of Units): Acre-Feet			
Additional Information About this Measure: Acre-Feet of New Recycled Water Supplied/Recharged.			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Increase in Water Supply Resulting from Project (c) – (b)
2012	0	0	0
2013	0	0	0
2014	0	0	0
2015	0	0	0
2016	0	0	0
2017	0	4,500	4,500
2018	0	4,500	4,500
2019	0	4,500	4,500
2020	0	4,500	4,500
2021	0	4,500	4,500
2022	0	4,500	4,500
2023	0	4,500	4,500
2024	0	4,500	4,500
2025	0	4,500	4,500
2026	0	4,500	4,500
2027	0	4,500	4,500
2028	0	4,500	4,500
2029	0	4,500	4,500
2030	0	4,500	4,500
2031	0	4,500	4,500
2032	0	4,500	4,500
2033	0	4,500	4,500
2034	0	4,500	4,500
2035	0	4,500	4,500
2036	0	4,500	4,500
2037	0	4,500	4,500
2038	0	4,500	4,500
2039	0	4,500	4,500
2040	0	4,500	4,500
2041	0	4,500	4,500
2042	0	4,500	4,500
2043	0	4,500	4,500
2044	0	4,500	4,500
2045	0	4,500	4,500
2046	0	4,500	4,500
Comments:			

Table 9 (b) – Annual Project Physical Benefits			
Project Name: Wineville Recycled Water Pipeline and Groundwater Recharge Upgrades Project			
Type of Benefit Claimed: Reduced Greenhouse Gas Emissions			
Measure of Benefit Claimed (Name of Units): Metric Tons			
Additional Information About this Measure: Metric Tons of Greenhouse Gases Emission			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Decrease in GHGs Resulting from Project (c) – (b)
2012	0	0	0
2013	0	0	0
2014	0	0	0
2015	0	0	0
2016	0	0	0
2017	0	4,766	4,766
2018	0	4,766	4,766
2019	0	4,766	4,766
2020	0	4,766	4,766
2021	0	4,766	4,766
2022	0	4,766	4,766
2023	0	4,766	4,766
2024	0	4,766	4,766
2025	0	4,766	4,766
2026	0	4,766	4,766
2027	0	4,766	4,766
2028	0	4,766	4,766
2029	0	4,766	4,766
2030	0	4,766	4,766
2031	0	4,766	4,766
2032	0	4,766	4,766
2033	0	4,766	4,766
2034	0	4,766	4,766
2035	0	4,766	4,766
2036	0	4,766	4,766
2037	0	4,766	4,766
2038	0	4,766	4,766
2039	0	4,766	4,766
2040	0	4,766	4,766
2041	0	4,766	4,766
2042	0	4,766	4,766
2043	0	4,766	4,766
2044	0	4,766	4,766
2045	0	4,766	4,766
2046	0	4,766	4,766
Comments:			

Table 12 – Non-monetized Benefits Checklist		
No.	**Question**	**Enter "Yes", "No" or "Neg"**
	Community/Social Benefits **Will the proposal**	
1	**Provide education or technology benefits?**	No
	Examples are not limited to, but may include: - Include educational features that should result in water supply, water quality, or flood damage reduction benefits? - Develop, test, or document a new technology for water supply, water quality, or flood damage reduction management? - Provide some other education or technological benefit?	
2	**Provide social recreation or access benefits?**	No
	Examples are not limited to, but may include: - Provide new or improved outdoor recreation opportunities? - Provide more access to open space? - Provide some other recreation or public access benefit?	
3	**Help avoid, reduce or resolve various public water resources conflicts?**	**Yes**
	Examples are not limited to, but may include: - Provide more opportunities for public involvement in water management? - Help avoid or resolve an existing conflict as evidenced by recurring fines or litigation? - Help meet an existing state mandate (e.g., water quality, water conservation, flood control)?	Yes, please see attachment 3 and attachment 8.
4	**Promote social health and safety?**	Yes
	Examples are not limited to, but may include: - Increase urban water supply reliability for fire-fighting and critical services following seismic events? - Reduce risk to life from dam failure or flooding? - Reduce exposure to water-related hazards?	Yes, please see attachment 3 and attachment 8.
5	**Have other social benefits?**	No
	Examples are not limited to, but may include: - Redress or increase inequitable distribution of environmental burdens? - Have disproportionate beneficial or adverse effects on disadvantaged communities, Native Americans, or other distinct cultural groups?	
	Environmental Stewardship Benefits: **Will the proposal**	
6	**Benefit wildlife or habitat in ways that were not quantified in Attachment 7?**	No
	Examples are not limited to, but may include: - Cause an increase in the amount or quality of terrestrial, aquatic, riparian or wetland habitat? - Contribute to an existing biological opinion or recovery plan for a listed special status species? - Preserve or restore designated critical habitat of a listed species? - Enhance wildlife protection or habitat?	
7	**Improve water quality in ways that were not quantified in Attachment 7?**	Yes
	Examples are not limited to, but may include: - Cause an improvement in water quality in an impaired water body or sensitive habitat? - Prevent water quality degradation? - Cause some other improvement in water quality?	Yes, please see attachment 3 and attachment 8.
8	**Reduce net emissions in ways that were not quantified in Attachment 7?**	Yes
	Examples are not limited to, but may include: - Reduce net production of greenhouse gasses? - Reduce net emissions of other harmful chemicals into the air or water?	Yes, please see attachment 3 and attachment 8.
9	**Provide other environmental stewardship benefits, other than those claimed in Sections D1, D3, or D4?**	Yes
	Sustainability Benefits: **Will the proposal**	Yes, please see attachment 3 and attachment 8.
10	**Improve the overall, long-term management of California groundwater resources?**	Yes
	Examples are not limited to, but may include: - Reduce extraction of non-renewable groundwater? - Promote aquifer storage or recharge?	Yes, please see attachment 3 and attachment 8.
11	**Reduce demand for net diversions for the regions from the Delta?**	Yes
12	**Provide a long-term solution in place of a short-term one?**	Yes
13	**Promote energy savings or replace fossil fuel based energy sources with renewable energy and resources?**	Yes
	Examples are not limited to, but may include: - Reduce net energy use on a permanent basis? - Increase renewable energy production? - Include new buildings or modify buildings to include certified LEED features? - Provide a net increase in recycling or reuse of materials? - Replace unsustainable land or water management practices with recognized sustainable practices?	Yes, please see attachment 3 and attachment 8.
14	**Improve water supply reliability in ways not quantified in Attachment 7?**	Yes
	Examples are not limited to, but may include: - Provide a more flexible mix of water sources? - Reduce likelihood of catastrophic supply outages? - Reduce supply uncertainty? - Reduce supply variability?	
15	**Other (If the above listed categories do not apply, provide non-monetized benefit description)?**	N/A

Table 15 (a) – Annual Benefit (All benefits should be in 2012 dollars) Project: Wineville Recycled Water Pipeline and Groundwater Recharge Upgrades Project									
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
Year	Type of Benefit	Measure of Benefit (Units)	Without Project	With Project (1)	Change Resulting from Project (e) – (d)	Unit $ Value (2)	Annual $ Value (f) x (g)	Discount Factor (6%)	Discounted Benefits (h) x (i)
2012							$0	1.000	**$0**
2013							$0	0.943	**$0**
2014							$0	0.890	**$0**
2015							$0	0.840	**$0**
2016							$0	0.792	**$0**
2017	Reduced Importation of Potable Water	Acre-Feet	0	1,500	1,500	$1,032	$1,548,000	0.747	**$1,156,756**
2018	Reduced Importation of Potable Water	Acre-Feet	0	1,500	1,500	$1,032	$1,548,000	0.705	**$1,091,279**
2019	Reduced Importation of Potable Water	Acre-Feet	0	1,500	1,500	$1,032	$1,548,000	0.665	**$1,029,508**
2020	Reduced Importation of Potable Water	Acre-Feet	0	1,500	1,500	$1,032	$1,548,000	0.627	**$971,234**
2021	Reduced Importation of Potable Water	Acre-Feet	0	1,500	1,500	$1,032	$1,548,000	0.592	**$916,259**
2022	Reduced Importation of Potable Water	Acre-Feet	0	1,500	1,500	$1,032	$1,548,000	0.558	**$864,395**
2023	Reduced Importation of Potable Water	Acre-Feet	0	1,500	1,500	$1,032	$1,548,000	0.527	**$815,467**
2024	Reduced Importation of Potable Water	Acre-Feet	0	1,500	1,500	$1,032	$1,548,000	0.497	**$769,309**
2025	Reduced Importation of Potable Water	Acre-Feet	0	1,500	1,500	$1,032	$1,548,000	0.469	**$725,763**
2026	Reduced Importation of Potable Water	Acre-Feet	0	1,500	1,500	$1,032	$1,548,000	0.442	**$684,682**
2027	Reduced Importation of Potable Water	Acre-Feet	0	1,500	1,500	$1,032	$1,548,000	0.417	**$645,926**
2028	Reduced Importation of Potable Water	Acre-Feet	0	1,500	1,500	$1,032	$1,548,000	0.394	**$609,364**
2029	Reduced Importation of Potable Water	Acre-Feet	0	1,500	1,500	$1,032	$1,548,000	0.371	**$574,872**
2030	Reduced Importation of Potable Water	Acre-Feet	0	1,500	1,500	$1,032	$1,548,000	0.350	**$542,332**
2031	Reduced Importation of Potable Water	Acre-Feet	0	1,500	1,500	$1,032	$1,548,000	0.331	**$511,634**
2032	Reduced Importation of Potable Water	Acre-Feet	0	1,500	1,500	$1,032	$1,548,000	0.312	**$482,674**
2033	Reduced Importation of Potable Water	Acre-Feet	0	1,500	1,500	$1,032	$1,548,000	0.294	**$455,353**
2034	Reduced Importation of Potable Water	Acre-Feet	0	1,500	1,500	$1,032	$1,548,000	0.278	**$429,578**
2035	Reduced Importation of Potable Water	Acre-Feet	0	1,500	1,500	$1,032	$1,548,000	0.262	**$405,262**
2036	Reduced Importation of Potable Water	Acre-Feet	0	1,500	1,500	$1,032	$1,548,000	0.247	**$382,323**
2037	Reduced Importation of Potable Water	Acre-Feet	0	1,500	1,500	$1,032	$1,548,000	0.233	**$360,682**
2038	Reduced Importation of Potable Water	Acre-Feet	0	1,500	1,500	$1,032	$1,548,000	0.220	**$340,266**
2039	Reduced Importation of Potable Water	Acre-Feet	0	1,500	1,500	$1,032	$1,548,000	0.207	**$321,006**
2040	Reduced Importation of Potable Water	Acre-Feet	0	1,500	1,500	$1,032	$1,548,000	0.196	**$302,835**
2041	Reduced Importation of Potable Water	Acre-Feet	0	1,500	1,500	$1,032	$1,548,000	0.185	**$285,694**
2042	Reduced Importation of Potable Water	Acre-Feet	0	1,500	1,500	$1,032	$1,548,000	0.174	**$269,522**
2043	Reduced Importation of Potable Water	Acre-Feet	0	1,500	1,500	$1,032	$1,548,000	0.164	**$254,266**
2044	Reduced Importation of Potable Water	Acre-Feet	0	1,500	1,500	$1,032	$1,548,000	0.155	**$239,874**
2045	Reduced Importation of Potable Water	Acre-Feet	0	1,500	1,500	$1,032	$1,548,000	0.146	**$226,296**
2046	Reduced Importation of Potable Water	Acre-Feet	0	1,500	1,500	$1,032	$1,548,000	0.138	**$213,487**
								Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)	**$16,877,899**

Comments:

(1) Current estimated connected demand of approximately 1,500 acre-feet per year (AFY) for direct usage.

(2) Water valuation is based on the Tier 2 full service treated volumetric cost for 2014, which is the actual amount paid by the Agency and other local entities to purchase State Water Project ("SWP") water for designated uses and purposes.

Table 15 (b) – Annual Benefit (All benefits should be in 2012 dollars) Project: Wineville Recycled Water Pipeline and Groundwater Recharge Upgrades Project									
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
Year	Type of Benefit	Measure of Benefit (Units)	Without Project	With Project (1)	Change Resulting from Project (e) – (d)	Unit $ Value (2)	Annual $ Value (f) x (g)	Discount Factor (6%)	Discounted Benefits (h) x (i)
2012							$0	1.000	**$0**
2013							$0	0.943	**$0**
2014							$0	0.890	**$0**
2015							$0	0.840	**$0**
2016							$0	0.792	**$0**
2017	Groundwater Recharge	Acre-Feet	0	3,000	3,000	$250	$750,000	0.747	**$560,444**
2018	Groundwater Recharge	Acre-Feet	0	3,000	3,000	$250	$750,000	0.705	**$528,720**
2019	Groundwater Recharge	Acre-Feet	0	3,000	3,000	$250	$750,000	0.665	**$498,793**
2020	Groundwater Recharge	Acre-Feet	0	3,000	3,000	$250	$750,000	0.627	**$470,559**
2021	Groundwater Recharge	Acre-Feet	0	3,000	3,000	$250	$750,000	0.592	**$443,924**
2022	Groundwater Recharge	Acre-Feet	0	3,000	3,000	$250	$750,000	0.558	**$418,796**
2023	Groundwater Recharge	Acre-Feet	0	3,000	3,000	$250	$750,000	0.527	**$395,091**
2024	Groundwater Recharge	Acre-Feet	0	3,000	3,000	$250	$750,000	0.497	**$372,727**
2025	Groundwater Recharge	Acre-Feet	0	3,000	3,000	$250	$750,000	0.469	**$351,629**
2026	Groundwater Recharge	Acre-Feet	0	3,000	3,000	$250	$750,000	0.442	**$331,726**
2027	Groundwater Recharge	Acre-Feet	0	3,000	3,000	$250	$750,000	0.417	**$312,949**
2028	Groundwater Recharge	Acre-Feet	0	3,000	3,000	$250	$750,000	0.394	**$295,235**
2029	Groundwater Recharge	Acre-Feet	0	3,000	3,000	$250	$750,000	0.371	**$278,523**
2030	Groundwater Recharge	Acre-Feet	0	3,000	3,000	$250	$750,000	0.350	**$262,758**
2031	Groundwater Recharge	Acre-Feet	0	3,000	3,000	$250	$750,000	0.331	**$247,885**
2032	Groundwater Recharge	Acre-Feet	0	3,000	3,000	$250	$750,000	0.312	**$233,854**
2033	Groundwater Recharge	Acre-Feet	0	3,000	3,000	$250	$750,000	0.294	**$220,617**
2034	Groundwater Recharge	Acre-Feet	0	3,000	3,000	$250	$750,000	0.278	**$208,129**
2035	Groundwater Recharge	Acre-Feet	0	3,000	3,000	$250	$750,000	0.262	**$196,348**
2036	Groundwater Recharge	Acre-Feet	0	3,000	3,000	$250	$750,000	0.247	**$185,234**
2037	Groundwater Recharge	Acre-Feet	0	3,000	3,000	$250	$750,000	0.233	**$174,749**
2038	Groundwater Recharge	Acre-Feet	0	3,000	3,000	$250	$750,000	0.220	**$164,858**
2039	Groundwater Recharge	Acre-Feet	0	3,000	3,000	$250	$750,000	0.207	**$155,526**
2040	Groundwater Recharge	Acre-Feet	0	3,000	3,000	$250	$750,000	0.196	**$146,723**
2041	Groundwater Recharge	Acre-Feet	0	3,000	3,000	$250	$750,000	0.185	**$138,418**
2042	Groundwater Recharge	Acre-Feet	0	3,000	3,000	$250	$750,000	0.174	**$130,583**
2043	Groundwater Recharge	Acre-Feet	0	3,000	3,000	$250	$750,000	0.164	**$123,191**
2044	Groundwater Recharge	Acre-Feet	0	3,000	3,000	$250	$750,000	0.155	**$116,218**
2045	Groundwater Recharge	Acre-Feet	0	3,000	3,000	$250	$750,000	0.146	**$109,640**
2046	Groundwater Recharge	Acre-Feet	0	3,000	3,000	$250	$750,000	0.138	**$103,434**
							Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)		**$8,177,277**
Comments:									

(1) Future additional groundwater recharge with recycled water estimated to be the projected total groundwater recharge of 3,000 acre-feet per year.

(2) Valuation based on estimate of cost of purchasing groundwater that is not part of a cooperative recharge program.

Table 15 (c) – Annual Benefit (All benefits should be in 2012 dollars) Project: Wineville Recycled Water Pipeline and Groundwater Recharge Upgrades Project									
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
Year	Type of Benefit	Measure of Benefit (Units)	Without Project	With Project	Change Resulting from Project (e) – (d)	Unit $ Value [1]	Annual $ Value (f) x (g)	Discount Factor (6%)	Discounted Benefits (h) x (i)
2012							$0	1.000	**$0**
2013							$0	0.943	**$0**
2014							$0	0.890	**$0**
2015							$0	0.840	**$0**
2016							$0	0.792	**$0**
2017	Reduced Greenhouse Gas	Metric Tons	0	4,766	4,766	$11	$51,044	0.747	**$38,143**
2018	Reduced Greenhouse Gas	Metric Tons	0	4,766	4,766	$11	$51,044	0.705	**$35,984**
2019	Reduced Greenhouse Gas	Metric Tons	0	4,766	4,766	$11	$51,044	0.665	**$33,947**
2020	Reduced Greenhouse Gas	Metric Tons	0	4,766	4,766	$11	$51,044	0.627	**$32,026**
2021	Reduced Greenhouse Gas	Metric Tons	0	4,766	4,766	$11	$51,044	0.592	**$30,213**
2022	Reduced Greenhouse Gas	Metric Tons	0	4,766	4,766	$11	$51,044	0.558	**$28,503**
2023	Reduced Greenhouse Gas	Metric Tons	0	4,766	4,766	$11	$51,044	0.527	**$26,889**
2024	Reduced Greenhouse Gas	Metric Tons	0	4,766	4,766	$11	$51,044	0.497	**$25,367**
2025	Reduced Greenhouse Gas	Metric Tons	0	4,766	4,766	$11	$51,044	0.469	**$23,931**
2026	Reduced Greenhouse Gas	Metric Tons	0	4,766	4,766	$11	$51,044	0.442	**$22,577**
2027	Reduced Greenhouse Gas	Metric Tons	0	4,766	4,766	$11	$51,044	0.417	**$21,299**
2028	Reduced Greenhouse Gas	Metric Tons	0	4,766	4,766	$11	$51,044	0.394	**$20,093**
2029	Reduced Greenhouse Gas	Metric Tons	0	4,766	4,766	$11	$51,044	0.371	**$18,956**
2030	Reduced Greenhouse Gas	Metric Tons	0	4,766	4,766	$11	$51,044	0.350	**$17,883**
2031	Reduced Greenhouse Gas	Metric Tons	0	4,766	4,766	$11	$51,044	0.331	**$16,871**
2032	Reduced Greenhouse Gas	Metric Tons	0	4,766	4,766	$11	$51,044	0.312	**$15,916**
2033	Reduced Greenhouse Gas	Metric Tons	0	4,766	4,766	$11	$51,044	0.294	**$15,015**
2034	Reduced Greenhouse Gas	Metric Tons	0	4,766	4,766	$11	$51,044	0.278	**$14,165**
2035	Reduced Greenhouse Gas	Metric Tons	0	4,766	4,766	$11	$51,044	0.262	**$13,363**
2036	Reduced Greenhouse Gas	Metric Tons	0	4,766	4,766	$11	$51,044	0.247	**$12,607**
2037	Reduced Greenhouse Gas	Metric Tons	0	4,766	4,766	$11	$51,044	0.233	**$11,893**
2038	Reduced Greenhouse Gas	Metric Tons	0	4,766	4,766	$11	$51,044	0.220	**$11,220**
2039	Reduced Greenhouse Gas	Metric Tons	0	4,766	4,766	$11	$51,044	0.207	**$10,585**
2040	Reduced Greenhouse Gas	Metric Tons	0	4,766	4,766	$11	$51,044	0.196	**$9,986**
2041	Reduced Greenhouse Gas	Metric Tons	0	4,766	4,766	$11	$51,044	0.185	**$9,420**
2042	Reduced Greenhouse Gas	Metric Tons	0	4,766	4,766	$11	$51,044	0.174	**$8,887**
2043	Reduced Greenhouse Gas	Metric Tons	0	4,766	4,766	$11	$51,044	0.164	**$8,384**
2044	Reduced Greenhouse Gas	Metric Tons	0	4,766	4,766	$11	$51,044	0.155	**$7,910**
2045	Reduced Greenhouse Gas	Metric Tons	0	4,766	4,766	$11	$51,044	0.146	**$7,462**
2046	Reduced Greenhouse Gas	Metric Tons	0	4,766	4,766	$11	$51,044	0.138	**$7,040**
							Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)		**$556,533**
Comments:									

(1) Greenhouse gas ("GHG") valuation is based on 2013 Reserve Price Notices published by the California Environmental Protection Agency Air Resources Board ("ARB") as part of the State's Cap-and-Trade Program.

Table 19 – Annual Costs of Project

(All costs should be in 2012 Dollars)

Project: Wineville Recycled Water Pipeline and Groundwater Recharge Upgrades Project

	Initial Costs Grand Total Cost from Table 7 (row (i), column	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)
2012	$0	$0						$0	1.000	**$0**
2013	$5,384,615	$256,410						$5,641,026	0.943	**$5,321,722**
2014	$6,461,538	$307,692						$6,769,231	0.890	**$6,024,591**
2015	$6,461,538	$307,692						$6,769,231	0.840	**$5,683,577**
2016	$2,692,308	$128,205						$2,820,513	0.792	**$2,234,110**
2017	$0	$0						$0	0.747	**$0**
2018	$0	$0						$0	0.705	**$0**
2019	$0	$0						$0	0.665	**$0**
2020	$0	$0						$0	0.627	**$0**
2021	$0	$0						$0	0.592	**$0**
2022	$0	$0						$0	0.558	**$0**
2023	$0	$0						$0	0.527	**$0**
2024	$0	$0						$0	0.497	**$0**
2025	$0	$0						$0	0.469	**$0**
2026	$0	$0						$0	0.442	**$0**
2027	$0	$0						$0	0.417	**$0**
2028	$0	$0						$0	0.394	**$0**
2029	$0	$0						$0	0.371	**$0**
2030	$0	$0						$0	0.350	**$0**
2031	$0	$0						$0	0.331	**$0**
2032	$0	$0						$0	0.312	**$0**
2033	$0	$0						$0	0.294	**$0**
2034	$0	$0						$0	0.278	**$0**
2035	$0	$0						$0	0.262	**$0**
2036	$0	$0						$0	0.247	**$0**
2037	$0	$0						$0	0.233	**$0**
2038	$0	$0						$0	0.220	**$0**
2039	$0	$0						$0	0.207	**$0**
2040	$0	$0						$0	0.196	**$0**
2041	$0	$0						$0	0.185	**$0**
2042	$0	$0						$0	0.174	**$0**
2043	$0	$0						$0	0.164	**$0**
2044	$0	$0						$0	0.155	**$0**
2045	$0	$0						$0	0.146	**$0**
2046	$0	$0						$0	0.138	**$0**
								Total Present Value of Discounted Costs (Sum of column (j)) Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries		**$19,264,001**

Comments:

(1) Based on opportunity costs, sunk costs, and associated costs.

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

COSTS AND BENEFITS SUMMARY

Table 20 summarizes the costs and benefits for the Project.

Table 20 – Proposal Benefits and Costs Summary Proposal: Wineville Recycled Water Pipeline and Groundwater Recharge Upgrades Project Agency: IEUA							
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	Total		
(a)	(b)	(c)	(d)	(e)	(f) = (d) + (e)	(g)	(h)
		$19,264,001	$25,611,709	$0	$25,611,709		
(1) From Table 19, or RWMG method							
(2) From Table 15 or RWMG method							

Adopted Water Rates & Charges

Historical Water Rates

Effective January 1st	2012	2013	2014
Tier 1 Supply Rate ($/AF)	$106	$140	$148
Delta Supply Surcharge ($/AF)	$58	*	*
Tier 2 Supply Rate ($/AF)	$290	$290	$290
System Access Rate ($/AF)	$217	$223	$243
Water Stewardship Rate ($/AF)	$43	$41	$41
System Power Rate ($/AF)	$136	$189	$161
Full Service Untreated Volumetric Cost ($/AF)			
Tier 1	$560	$593	$593
Tier 2	$686	$743	$735
Replenishment Water Rate: untreated ($/AF)	$442	**	**
Interim Agricultural Water Program: untreated ($/AF)	$537	***	***
Treatment Surcharge ($/AF)	$234	$254	$297
Full Service Treated Volumetric Cost ($/AF)			
Tier 1	$794	$847	$890
Tier 2	$920	$997	$1,032
Treated Replenishment Water Rate ($/AF)	$651	**	**
Treated Interim Agricultural Water Program ($/AF)	$765	***	***
Readiness-to-Serve Charge (millions of dollars)	$146	$142	$166
Capacity Charge ($/cfs)	$7,400	$6,400	$8,600

* The Delta Supply Surcharge will be suspended after 2012
** Discussions on the replenishment program are continuing with the Member Agencies
*** The Interim Agricultural Water Program will be discontinued after 2012

Definitions

Tier 1 Supply Rate - recovers the of cost of maintaining a reliable amount of supply.

Delta Supply Surcharge - reflects the additional supply costs that Metropolitan faces along with other costs due to the pumping restrictions on the State Water Project.

Tier 2 Supply Rate - set at Metropolitan's cost of developing additional supply to encourage efficient use of local resources.

System Access Rate – recovers a portion of the costs associated with the delivery of supplies.

System Power Rate – recovers Metropolitan's power costs for pumping supplies to Southern California.

Water Stewardship Rate – recovers the cost of Metropolitan's financial commitment to conservation, water recycling, groundwater clean-up and other local resource management programs.

Replenishment Water Rate – a discounted rate for surplus system supplies available for the purpose of replenishing local storage.

Treated Replenishment Water Rate – a discounted rate for surplus system supplies available for the purpose of replenishing local storage.

Interim Agricultural Water Rate – discounted rate for surplus system supplies available for the purpose of growing agricultural, horticultural, or floricultural products.

Treated Interim Agricultural Water Program Rate – discounted rate for surplus system supplies available for the purpose of growing agricultural, horticultural, or floricultural products.

Treatment Surcharge – recovers the costs of treating imported water.

Readiness-to-Serve Charge - a fixed charge that recovers the cost of the portion of system capacity that is on standby to provide emergency service and operational flexibility.

Capacity Charge – the capacity charge recovers the cost of providing peak capacity within the distribution system.

Page updated: April 19, 2012

Air Resources Board

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Matthew Rodriquez
Secretary for Environmental Protection

Edmund G. Brown Jr.
Governor

2013 Annual Auction Reserve Price Notice

California Cap-and-Trade Program Greenhouse Gas Allowance Auctions

Issued on December 3, 2012

Updated on January 15, 2013

Auction Summary

This document, *2013 Annual Auction Reserve Price Notice,* specifies the 2013 Auction Reserve Price and the number of allowances to be auctioned in 2013 for the quarterly auctions as part of the Current Auction and Advance Auction. The 2013 quarterly GHG allowance auctions will offer 2013 vintage allowances and 2016 vintage allowances for sale.

The 2013 Auction Reserve Price and the annual budget of 2013 and 2016 vintage allowances for sale in 2013, is shown in Table 1 below.

Table 1: 2013 Auction Data

Auction Data Description	Auction Data
Auction Reserve Price	$10.71
Number of allowances to be auctioned in 2013 (2013 Vintage)	~~56,848,885*~~ 57,628,254
Number of advance allowances to be auctioned in 2013 (2016 Vintage)	38,240,000

~~* Amount could increase based on additional consignment from POUs as described in this notice.~~

The Auction Reserve Price

The Auction Reserve Price is a predetermined minimum price at which allowances will be sold to auction participants. The 2012 Auction Reserve Price was $10. Section 95911 of the Cap-and-Trade Regulation stipulates that the "Auction Reserve Price in U.S. dollars shall be the U.S. dollar Auction Reserve Price for the previous calendar year increased annually by 5 percent plus the rate of inflation as measured by the most recently available twelve months of the Consumer Price Index for All Urban Consumers." The rate of inflation used to calculate the 2013 Auction Reserve Price is 2.16 percent.

Current Auction Budget

The current auction budget describes the minimum number of current year vintage allowances to be sold in 2013. This number includes the State-owned allowances (approximately

10,600,000) and the remaining allowances to be consigned by the electricity distribution utilities. Some public owned utilities (POUs) were provided the flexibility to defer providing direction until January 1, 2013, on how to distribute their allowances between their Compliance and Limited Use Holding Accounts. ~~These deferred allowances total approximately 6,700,000. These are not included in the minimum 2013 annual auction budget. Once ARB receives direction from all of the remaining POUs, this notice will be updated to reflect the final 2013 annual auction budget presented in Table 1~~. ARB has now received direction from all POUs on how to distribute their allowances and Table 1 has been updated to reflect the final annual auction budget for 2013 vintage allowances. **This annual budget update does not change the amount of 2013 vintage allowances for sale in the February 19 auction.** Twenty-five percent of the State-owned allowances will be available at each auction. Utilities are required to notify ARB 75 days before each auction of the number of allowances they intend to consign. The total number of allowances to be auctioned in each auction will be published in the auction notice 60 days in advance. Utility allowances not consigned in the first three auctions will be included in the November 19, 2013 auction.

Advance Auction Budget

The advance auction budget represents ten percent of the allowances from the budget year three years subsequent to the current calendar year. Since the annual allowance budget of 2016 is 382,400,000, the advance auction budget for 2013 is 38,240,000. These allowances will be equally divided for sale across the four auctions in 2013.

2013 Quarterly Auction Dates

An *Auction Notice* with instructions on how to participate will be published 60 days prior to each auction. The *Auction Notice* provides information about eligibility, auction format, and GHG allowances to be auctioned for the applicable quarterly auction.

Table 2 provides additional information specific to the scheduled quarterly auctions.

Table 2: 2013 Quarterly Auction Critical Dates

Auction Consignment Due Date for EDUs	Auction Notice Posting Date	Auction Application Due Date	Auction Dates
12/6/2012	12/21/2012	1/22/2013	2/19/2013
3/4/2013	3/18/2013	4/16/2013	5/16/2013
6/3/2013	6/17/2013	7/17/2013	8/16/2013
9/5/2013	9/20/2013	10/21/2013	11/19/2013

Contact Information

For further information about participation in the 2013 auctions, please contact:
Mr. Chuck Seidler at (916) 324-0931 or cseidler@arb.ca.gov.

Updated on January 15, 2013

Project E: Plunge Creek Water Recharge and Habitat Improvement (San Bernardino Valley Water Conservation District)

Tables 9, 9(b), 9(c), 12, 15, 15(b), 15(c), 19, and 20 are included in this document to quantify the groundwater recharge and habit conservation benefits, as well as other benefits, of the Plunge Creek Water Recharge and Habitat Conservation Project (the "Project") proposed by the San Bernardino Valley Water Conservation District (the "District"). Narrative supporting the tables is provided below:

I. Narrative Description of the Project's Economic Costs

The Project's economic costs consist of costs contained in the Project budget (Attachment 4), as well as annual administration, maintenance, and replacement costs associated with the Project.

This document shows the conceptual design element and the surrounding area.

II. Cost Details

Budget categories (a) through (h) are included in the cost details as described in Table 5.

III. Estimates of Without-Project conditions; e.g. Current and Future Water Supplies and Demand.

The San Bernardino Valley Municipal Water District ("SBVMWD"), a partner agency, recently assessed all watershed streams to expand recharge. The results of this effort were documented in a January 2012 report. Plunge Creek was one of the creeks for which they documented the potential for added recharge. The report indicates that the annual average flow is 6,122 acre feet per year based on historic flows from 1934-2008. Notably, SBVMWD proposed recharge facilities downstream from the District. Recharge estimated for these basins assuming stormwater capture like the historic period from 1934-2008, was 3,729 acre feet per year.

IV. Estimates of With-Project Conditions; e.g. Improvements in New Water Supplies Made Available to Meet Demand

The primary purpose and design concept behind this Project is to achieve multiple benefits to habitat and water conservation. This is achieved through hydraulic scour and modification which results in restoration of the enlarged stream bed for higher quality habitat and increased permeability for recharge. This Project will monitor progress and results to provide a working template for restoration that may be implemented in other areas and provided to others working in alluvial areas across California. Additionally, one of the Project partners is the San Bernardino County Flood and Water Conservation District, who is likely to be able to use concepts from this Project in other regions of the basin and increase the benefit.

The Project entails the phased improvement of approximately 110 acres within Plunge Creek located along the east-west reach that is easterly of Boulder Avenue and southerly of Greenspot Road near the easterly terminus of Abbey Way. The 110 acre Project area consists of five (5) habitat and water conservation treatment areas. Treatment consists of modifying the existing hydrologic pattern to intentionally create stream flow conditions that will produce a scouring effect that will simulate natural ecological processes. The scouring effect is specifically intended to clear non-native grasses. Additional treatments (i.e. thinning and pruning by hand) will be completed to modify existing native vegetation leaving small elevated pockets of shrub composition and density that is consistent with **high quality San Bernardino Kangaroo Rat ("SBKR") habitat**.

Diverted flows shall recharge within the proposed habitat and water conservation areas with excess flow, ultimately rejoining the primary Plunge Creek wash. The flows will scour existing silt and remove invasive grasses exposing the native sand and gravel substrate improving habitat for the SBKR and recharge of groundwater.

Additionally, the use of local groundwater in lieu of non-local water will reduce the volume of greenhouse gas emissions. By utilizing local groundwater, there will be a reduction of 1,250 tons of carbon dioxide released into the

atmosphere annually. This pollution reduction will occur, inter alia, by reductions in the amount of energy that would have been used to pump this same amount of imported water over the Tehachapi Mountains and into Southern California.

V. Description of Methods used to Estimate Without- and With-Project Conditions.

With and without Project conditions are based on discussions with the Project engineer, the District, SBVMWD, and various Project proponents, as well as information contained in the attached Exhibits described below.

VI. Description of the Distribution of Local, Regional, and Statewide Benefits

Benefits are primarily local in nature. However, any increase in groundwater recharge will benefit water agencies throughout the state whose need for additional water exceeds that of SBVMWD.

VII. Identification of Beneficiaries

The District, all local water users and rate payers, and all SBKR and habitat conservation proponents.

VIII. When the Benefits will be Received

The benefits will be realized as of the completion date of the Project.

IX. Uncertainty of the Benefits

N/A

X. Description of any Adverse Effects

N/A

XI. Narrative Discussion that Describes, Qualifies, and Supports the Values Entered in the Tables

The San Bernardino Valley Municipal Water District ("SBVMWD") recently assessed all watershed streams to expand recharge. SBVMWD proposed recharge facilities downstream from the District. Recharge estimated for these basins assuming stormwater capture like the historic period from 1934-2008, was 3,729 acre feet per year. This was based on the flows that occur, the high hydraulic conductivity of the site at 6.7 feet per day as measured in 2011, and the size of recharge ponds proposed.

The area of the proposed recharge basins located on District land or existing easements with the Bureau of Land Management ("BLM") are 35% smaller than the studied 160 acres. Additionally, not all stream flows, such as that of Elder Creek, would be captured by the Project area. Finally because the method of recharge is done in close connection with the restoration of SBKR habitat, 100% of the 110 acres designed for restoration and recharge will not ultimately be percolation areas. Considering these factors, the Conceptual Design conservatively estimates that as much as 1250 acre feet per year ("AFY") of average recharge will be developed.

Additionally, the Project will develop additional habitat for the SBKR and related threatened and endangered species in the Santa Ana River Wash area. Plunge Creek flows will be diverted to Area 1 (48.2 acres) via construction of an approximately 1,600 ft. native material soft diversion structure/canal. Plunge Creek flows will then be diverted to Area 2 (52.0 acres), Area 3 (2.8 acres), Area 4 (4.0 acres), and Area 5 (3.1 acres) via developed native material sugar dikes beginning in the existing Plunge Creek wash and terminating outside the wash to the south (Areas 2 & 3) and north (Areas 4 & 5). Totaling 110 acres, the Plunge Creek site is an excellent opportunity to provide enhancement to habitat. However, to conservatively model the projected benefits it was assumed that 50% of the total acres would directly enhance the habitat.

Estimated valuation for groundwater recharge of $70 per acre-foot was based on the SBVWCD locally subsidized rate for replenished or recharged water.

San Bernardino costs for habitat acreage were estimated using public data related to San Bernardino Associated Governments ("SANBAG") land purchases for habitat protection and conservation. *See* SANBAG Board Action approving:

- ✓ Agreement No. C12231 and the Bill of Sale for the purchase of 76 credit acres of mitigation credits from Vulcan Materials Company at a net unit cost of **$175,000 per acre** for a total cost of $13,300,000 to satisfy U.S. Fish & Wildlife Service ("USFWS") and California Department of Fish & Game ("CDFG") mitigation requirements for the I-15/I-215 Devore Junction Goods Movement Project.

- ✓ *See also:* City of Highland purchase of Boulder Avenue Bridge, 8.5 acres for **$176,471 per acre**.

    - http://www.pe.com/local-news/san-bernardino-county/san-bernardino-county-headlines-index/20111001-highland-boulder-avenue-bridge-work-green-lighted.ece

    - http://www.ci.highland.ca.us/Downloads/Files/Initial%20Study%20Boulder%20Avenue%20 12-11-08.pdf

Finally, greenhouse gas ("GHG") valuation is based on 2013 Reserve Price Notices published by the California Environmental Protection Agency Air Resources Board ("ARB") as part of the State's Cap-and-Trade Program. The program is a central element of California's Global Warming Solutions Act (AB 32) and covers major sources of GHG emissions in the State such as refineries, power plants, industrial facilities, and transportation fuels. The regulation includes an enforceable GHG cap that will decline over time. ARB will distribute allowances, which are tradable permits, equal to the emission allowed under the cap. Not only do ARB auctions generally curtail the production of GHGs, but they also raise substantial funds for the State. *See* "California's First Carbon-Credit Auction Raises $290 Million," Los Angeles Times, November 20, 2012.

Estimated administration, operations, maintenance, and replacement costs for the Project are based on discussions with the District, SBVMWD, and maintenance data collected by David Taussig & Associates, Inc. for comparable projects.

XII. Documentation to Support Information Presented

See the following attached:

***Exhibit A** – 2013 Annual Auction Reserve Price Notice; California Cap-and-Trade Program Greenhouse Gas Allowance Auctions, Updated on January 15, 2013*

Table 9(a) – Annual Project Physical Benefits

Project Name: **Plunge Creek Water Recharge & Habitat Conversation Project**

Type of Benefit Claimed: **Groundwater Recharge and Groundwater Management**

Measure of Benefit Claimed (Name of Units): **Acre-Feet**

Additional Information About this Measure: **Acre-Feet of Recharge into the Groundwater Basin.**

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Increase in Water Supply Resulting from Project (c) – (b)
2012	0	0	0
2013	0	0	0
2014	0	500	500
2015	0	750	750
2016	0	1,000	1,000
2017	0	1,250	1,250
2018	0	1,250	1,250
2019	0	1,250	1,250
2020	0	1,250	1,250
2021	0	1,250	1,250
2022	0	1,250	1,250
2023	0	1,250	1,250
2024	0	1,250	1,250
2025	0	1,250	1,250
2026	0	1,250	1,250
2027	0	1,250	1,250
2028	0	1,250	1,250
2029	0	1,250	1,250
2030	0	1,250	1,250
2031	0	1,250	1,250
2032	0	1,250	1,250
2033	0	1,250	1,250
2034	0	1,250	1,250
2035	0	1,250	1,250
2036	0	1,250	1,250
2037	0	1,250	1,250
2038	0	1,250	1,250
2039	0	1,250	1,250
2040	0	1,250	1,250
2041	0	1,250	1,250

Comments:

Table 9(b) – Annual Project Physical Benefits

Project Name: **Plunge Creek Water Recharge & Habitat Conversation Project**

Type of Benefit Claimed: **SBKR Habitat**

Measure of Benefit Claimed (Name of Units): **Acres of Enhanced Habitat**

Additional Information About this Measure: **110 Total Acres to be Enhanced. 50% of which projected to directly benefit SBKR.**

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	**Without Project**	**With Project**	**Increase in Habitat Acreage Resulting from Project (c) – (b)**
2012	0	0	0
2013	0	0	0
2014	0	15	15
2015	0	25	25
2016	0	35	35
2017	0	45	45
2018	0	55	55
2019	0	55	55
2020	0	55	55
2021	0	55	55
2022	0	55	55
2023	0	55	55
2024	0	55	55
2025	0	55	55
2026	0	55	55
2027	0	55	55
2028	0	55	55
2029	0	55	55
2030	0	55	55
2031	0	55	55
2032	0	55	55
2033	0	55	55
2034	0	55	55
2035	0	55	55
2036	0	55	55
2037	0	55	55
2038	0	55	55
2039	0	55	55
2040	0	55	55
2041	0	55	55

Comments:

Table 9(c) – Annual Project Physical Benefits

Project Name: Plunge Creek Water Recharge & Habitat Conversation Project

Type of Benefit Claimed: Reduced Greenhouse Gas Emissions

Measure of Benefit Claimed (Name of Units): Metric Tons

Additional Information About this Measure: Metric Tons of Greenhouse Gases Emission

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	**Without Project**	**With Project**	**Decrease in GHGs Resulting from Project (c) – (b)**
2012	0	0	0
2013	0	0	0
2014	0	500	500
2015	0	750	750
2016	0	1,000	1,000
2017	0	1,250	1,250
2018	0	1,250	1,250
2019	0	1,250	1,250
2020	0	1,250	1,250
2021	0	1,250	1,250
2022	0	1,250	1,250
2023	0	1,250	1,250
2024	0	1,250	1,250
2025	0	1,250	1,250
2026	0	1,250	1,250
2027	0	1,250	1,250
2028	0	1,250	1,250
2029	0	1,250	1,250
2030	0	1,250	1,250
2031	0	1,250	1,250
2032	0	1,250	1,250
2033	0	1,250	1,250
2034	0	1,250	1,250
2035	0	1,250	1,250
2036	0	1,250	1,250
2037	0	1,250	1,250
2038	0	1,250	1,250
2039	0	1,250	1,250
2040	0	1,250	1,250
2041	0	1,250	1,250
2042	0	1,250	1,250
2043	0	1,250	1,250
2044	0	1,250	1,250

Table 12 – Non-monetized Benefits Checklist		
No.	**Question**	**Enter "Yes", "No" or "Neg"**
	Community/Social Benefits	
	Will the proposal	
1	**Provide education or technology benefits?**	No
	Examples are not limited to, but may include:	
	- Include educational features that should result in water supply, water quality, or flood damage reduction benefits?	
	- Develop, test, or document a new technology for water supply, water quality, or flood damage reduction management?	
	- Provide some other education or technological benefit?	
2	**Provide social recreation or access benefits?**	No
	Examples are not limited to, but may include:	
	- Provide new or improved outdoor recreation opportunities?	
	- Provide more access to open space?	
	- Provide some other recreation or public access benefit?	
3	**Help avoid, reduce or resolve various public water resources conflicts?**	Yes
	Examples are not limited to, but may include:	Yes, please see attachment 3 and attachment 8.
	- Provide more opportunities for public involvement in water management?	
	- Help avoid or resolve an existing conflict as evidenced by recurring fines or litigation?	
	- Help meet an existing state mandate (e.g., water quality, water conservation, flood control)?	
4	**Promote social health and safety?**	Yes
	Examples are not limited to, but may include:	Yes, please see attachment 3 and attachment 8.
	- Increase urban water supply reliability for fire-fighting and critical services following seismic events?	
	- Reduce risk to life from dam failure or flooding?	
	- Reduce exposure to water-related hazards?	
5	**Have other social benefits?**	No
	Examples are not limited to, but may include:	
	- Redress or increase inequitable distribution of environmental burdens?	
	- Have disproportionate beneficial or adverse effects on disadvantaged communities, Native Americans, or other distinct cultural groups?	
	Environmental Stewardship Benefits:	
	Will the proposal	
6	**Benefit wildlife or habitat in ways that were not quantified in Attachment 7?**	Yes
	Examples are not limited to, but may include:	Yes, please see attachment 3 and attachment 8.
	- Cause an increase in the amount or quality of terrestrial, aquatic, riparian or wetland habitat?	
	- Contribute to an existing biological opinion or recovery plan for a listed special status species?	
	- Preserve or restore designated critical habitat of a listed species?	
	- Enhance wildlife protection or habitat?	
7	**Improve water quality in ways that were not quantified in Attachment 7?**	Yes
	Examples are not limited to, but may include:	Yes, please see attachment 3 and attachment 8.
	- Cause an improvement in water quality in an impaired water body or sensitive habitat?	
	- Prevent water quality degradation?	
	- Cause some other improvement in water quality?	
8	**Reduce net emissions in ways that were not quantified in Attachment 7?**	Yes
	Examples are not limited to, but may include:	Yes, please see attachment 3 and attachment 8.
	- Reduce net production of greenhouse gasses?	
	- Reduce net emissions of other harmful chemicals into the air or water?	
9	**Provide other environmental stewardship benefits, other than those claimed in Sections D1, D3, or D4?**	Yes
	Sustainability Benefits:	Yes, please see attachment 3 and attachment 8.
	Will the proposal	
10	**Improve the overall, long-term management of California groundwater resources?**	Yes
	Examples are not limited to, but may include:	Yes, please see attachment 3 and attachment 8.
	- Reduce extraction of non-renewable groundwater?	
	- Promote aquifer storage or recharge?	
11	**Reduce demand for net diversions for the regions from the Delta?**	Yes
12	**Provide a long-term solution in place of a short-term one?**	Yes
13	**Promote energy savings or replace fossil fuel based energy sources with renewable energy and resources?**	Yes
	Examples are not limited to, but may include:	Yes, please see attachment 3 and attachment 8.
	- Reduce net energy use on a permanent basis?	
	- Increase renewable energy production?	
	- Include new buildings or modify buildings to include certified LEED features?	
	- Provide a net increase in recycling or reuse of materials?	
	- Replace unsustainable land or water management practices with recognized sustainable practices?	
14	**Improve water supply reliability in ways not quantified in Attachment 7?**	Yes
	Examples are not limited to, but may include:	
	- Provide a more flexible mix of water sources?	
	- Reduce likelihood of catastrophic supply outages?	
	- Reduce supply uncertainty?	
	- Reduce supply variability?	
15	**Other (If the above listed categories do not apply, provide non-monetized benefit description)?**	N/A

Table 15(a) – Annual Benefit (All benefits should be in 2012 dollars) Project: Plunge Creek Water Recharge and Habitat Conservation									
(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)
2012							$0	1.000	**$0**
2013							$0	0.943	**$0**
2014							$0	0.890	**$0**
2014	Groundwater Recharge	Acre-Feet	0	500	500	$70	$35,000	0.890	**$31,150**
2015	Groundwater Recharge	Acre-Feet	0	750	750	$70	$52,500	0.840	**$44,080**
2016	Groundwater Recharge	Acre-Feet	0	1,000	1,000	$70	$70,000	0.792	**$55,447**
2017	Groundwater Recharge	Acre-Feet	0	1,250	1,250	$70	$87,500	0.747	**$65,385**
2018	Groundwater Recharge	Acre-Feet	0	1,250	1,250	$70	$87,500	0.705	**$61,684**
2019	Groundwater Recharge	Acre-Feet	0	1,250	1,250	$70	$87,500	0.665	**$58,192**
2020	Groundwater Recharge	Acre-Feet	0	1,250	1,250	$70	$87,500	0.627	**$54,899**
2021	Groundwater Recharge	Acre-Feet	0	1,250	1,250	$70	$87,500	0.592	**$51,791**
2022	Groundwater Recharge	Acre-Feet	0	1,250	1,250	$70	$87,500	0.558	**$48,860**
2023	Groundwater Recharge	Acre-Feet	0	1,250	1,250	$70	$87,500	0.527	**$46,094**
2024	Groundwater Recharge	Acre-Feet	0	1,250	1,250	$70	$87,500	0.497	**$43,485**
2025	Groundwater Recharge	Acre-Feet	0	1,250	1,250	$70	$87,500	0.469	**$41,023**
2026	Groundwater Recharge	Acre-Feet	0	1,250	1,250	$70	$87,500	0.442	**$38,701**
2027	Groundwater Recharge	Acre-Feet	0	1,250	1,250	$70	$87,500	0.417	**$36,511**
2028	Groundwater Recharge	Acre-Feet	0	1,250	1,250	$70	$87,500	0.394	**$34,444**
2029	Groundwater Recharge	Acre-Feet	0	1,250	1,250	$70	$87,500	0.371	**$32,494**
2030	Groundwater Recharge	Acre-Feet	0	1,250	1,250	$70	$87,500	0.350	**$30,655**
2031	Groundwater Recharge	Acre-Feet	0	1,250	1,250	$70	$87,500	0.331	**$28,920**
2032	Groundwater Recharge	Acre-Feet	0	1,250	1,250	$70	$87,500	0.312	**$27,283**
2033	Groundwater Recharge	Acre-Feet	0	1,250	1,250	$70	$87,500	0.294	**$25,739**
2034	Groundwater Recharge	Acre-Feet	0	1,250	1,250	$70	$87,500	0.278	**$24,282**
2035	Groundwater Recharge	Acre-Feet	0	1,250	1,250	$70	$87,500	0.262	**$22,907**
2036	Groundwater Recharge	Acre-Feet	0	1,250	1,250	$70	$87,500	0.247	**$21,611**
2037	Groundwater Recharge	Acre-Feet	0	1,250	1,250	$70	$87,500	0.233	**$20,387**
2038	Groundwater Recharge	Acre-Feet	0	1,250	1,250	$70	$87,500	0.220	**$19,233**
2039	Groundwater Recharge	Acre-Feet	0	1,250	1,250	$70	$87,500	0.207	**$18,145**
2040	Groundwater Recharge	Acre-Feet	0	1,250	1,250	$70	$87,500	0.196	**$17,118**
2041	Groundwater Recharge	Acre-Feet	0	1,250	1,250	$70	$87,500	0.185	**$16,149**
							Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)		**$1,016,668**

Comments:
Conservatively assumed that economic benefits would commence once the project construction and implementation phases are near completion.

(1) Estimated valuation for groundwater recharge of $70 per acre-foot based on the SBVWCD locally subsidized rate for replenished or recharged water.

Table 15(b) – Annual Benefit (All benefits should be in 2012 dollars) Project: Plunge Creek Water Recharge and Habitat Conservation									
(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)
2012							$0	1.000	**$0**
2013							$0	0.943	**$0**
2014							$0	0.890	**$0**
2014	Creation of Additional Habitat	Acres	0	15	15	$175,000	$2,625,000	0.890	**$2,336,241**
2015	Creation of Additional Habitat	Acres	0	10	10	$175,000	$1,750,000	0.840	**$1,469,334**
2016	Creation of Additional Habitat	Acres	0	10	10	$175,000	$1,750,000	0.792	**$1,386,164**
2017	Creation of Additional Habitat	Acres	0	10	10	$175,000	$1,750,000	0.747	**$1,307,702**
2018	Creation of Additional Habitat	Acres	0	10	10	$175,000	$1,750,000	0.705	**$1,233,681**
2019	Creation of Additional Habitat	Acres	0	0	0	$175,000	$0	0.665	**$0**
2020	Creation of Additional Habitat	Acres	0	0	0	$175,000	$0	0.627	**$0**
2021	Creation of Additional Habitat	Acres	0	0	0	$175,000	$0	0.592	**$0**
2022	Creation of Additional Habitat	Acres	0	0	0	$175,000	$0	0.558	**$0**
2023	Creation of Additional Habitat	Acres	0	0	0	$175,000	$0	0.527	**$0**
2024	Creation of Additional Habitat	Acres	0	0	0	$175,000	$0	0.497	**$0**
2025	Creation of Additional Habitat	Acres	0	0	0	$175,000	$0	0.469	**$0**
2026	Creation of Additional Habitat	Acres	0	0	0	$175,000	$0	0.442	**$0**
2027	Creation of Additional Habitat	Acres	0	0	0	$175,000	$0	0.417	**$0**
2028	Creation of Additional Habitat	Acres	0	0	0	$175,000	$0	0.394	**$0**
2029	Creation of Additional Habitat	Acres	0	0	0	$175,000	$0	0.371	**$0**
2030	Creation of Additional Habitat	Acres	0	0	0	$175,000	$0	0.350	**$0**
2031	Creation of Additional Habitat	Acres	0	0	0	$175,000	$0	0.331	**$0**
2032	Creation of Additional Habitat	Acres	0	0	0	$175,000	$0	0.312	**$0**
2033	Creation of Additional Habitat	Acres	0	0	0	$175,000	$0	0.294	**$0**
2034	Creation of Additional Habitat	Acres	0	0	0	$175,000	$0	0.278	**$0**
2035	Creation of Additional Habitat	Acres	0	0	0	$175,000	$0	0.262	**$0**
2036	Creation of Additional Habitat	Acres	0	0	0	$175,000	$0	0.247	**$0**
2037	Creation of Additional Habitat	Acres	0	0	0	$175,000	$0	0.233	**$0**
2038	Creation of Additional Habitat	Acres	0	0	0	$175,000	$0	0.220	**$0**
2039	Creation of Additional Habitat	Acres	0	0	0	$175,000	$0	0.207	**$0**
2040	Creation of Additional Habitat	Acres	0	0	0	$175,000	$0	0.196	**$0**
2041	Creation of Additional Habitat	Acres	0	0	0	$175,000	$0	0.185	**$0**
							Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)		**$7,733,121**

Comments:
Conservatively assumed that economic benefits would commence once the project construction and implementation phases are near completion.

(1) Valuation of habitat based on recent habitat purchases made in San Bernardino County. See Section XI above. It is expected that approximately 50% of the total land (50% of 110 acres - 55 acres) will be utilized as habitat for the Kangaroo Rat and other species.

Table 15(c) – Annual Benefit (All benefits should be in 2012 dollars) Project: Plunge Creek Water Recharge and Habitat Conservation									
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
Year	Type of Benefit	Measure of Benefit (Units)	Without Project	With Project	Change Resulting from Project (e) – (d)	Unit $ Value (1)	Annual $ Value (f) x (g)	Discount Factor (6%)	Discounted Benefits (h) x (i)
2012							$0	1.000	**$0**
2013							$0	0.943	**$0**
2014	Reduced Greenhouse Gas Emissions	Metric Tons	0	500	500	$11	$5,500	0.890	**$4,895**
2015	Reduced Greenhouse Gas Emissions	Metric Tons	0	750	750	$11	$8,250	0.840	**$6,927**
2016	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,000	1,000	$11	$11,000	0.792	**$8,713**
2017	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,250	1,250	$11	$13,750	0.747	**$10,275**
2018	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,250	1,250	$11	$13,750	0.705	**$9,693**
2019	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,250	1,250	$11	$13,750	0.665	**$9,145**
2020	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,250	1,250	$11	$13,750	0.627	**$8,627**
2021	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,250	1,250	$11	$13,750	0.592	**$8,139**
2022	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,250	1,250	$11	$13,750	0.558	**$7,678**
2023	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,250	1,250	$11	$13,750	0.527	**$7,243**
2024	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,250	1,250	$11	$13,750	0.497	**$6,833**
2025	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,250	1,250	$11	$13,750	0.469	**$6,447**
2026	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,250	1,250	$11	$13,750	0.442	**$6,082**
2027	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,250	1,250	$11	$13,750	0.417	**$5,737**
2028	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,250	1,250	$11	$13,750	0.394	**$5,413**
2029	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,250	1,250	$11	$13,750	0.371	**$5,106**
2030	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,250	1,250	$11	$13,750	0.350	**$4,817**
2031	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,250	1,250	$11	$13,750	0.331	**$4,545**
2032	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,250	1,250	$11	$13,750	0.312	**$4,287**
2033	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,250	1,250	$11	$13,750	0.294	**$4,045**
2034	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,250	1,250	$11	$13,750	0.278	**$3,816**
2035	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,250	1,250	$11	$13,750	0.262	**$3,600**
2036	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,250	1,250	$11	$13,750	0.247	**$3,396**
2037	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,250	1,250	$11	$13,750	0.233	**$3,204**
2038	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,250	1,250	$11	$13,750	0.220	**$3,022**
2039	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,250	1,250	$11	$13,750	0.207	**$2,851**
2040	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,250	1,250	$11	$13,750	0.196	**$2,690**
2041	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,250	1,250	$11	$13,750	0.185	**$2,538**
2042	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,250	1,250	$11	$13,750	0.174	**$2,394**
2043	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,250	1,250	$11	$13,750	0.164	**$2,259**
2044	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,250	1,250	$11	$13,750	0.155	**$2,131**
							Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)		**$166,545**
Comments:									

(1) Greenhouse gas ("GHG") valuation is based on 2013 Reserve Price Notices published by the California Environmental Protection Agency Air Resources Board ("ARB") as part of the State's Cap-and-Trade Program.

Table 19 – Annual Costs of Project

(All costs should be in 2012 Dollars)

Project: Plunge Creek Water Recharge and Habitat Conservation

	Initial Costs Grand Total Cost from Table 7 (row (i), column	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)
2012	$0	$0	$0	$0	$0	$0	$0	$0	1.000	**$0**
2013	$105,505	$35,505	$0	$0	$0	$0	$0	$141,010	0.943	**$133,028**
2014	$105,505	$35,505	$500	$3,958	$13,500	$0	$0	$158,968	0.890	**$141,481**
2015	$166,497	$46,497	$515	$4,076	$13,905	$0	$0	$231,490	0.840	**$194,363**
2016	$166,497	$46,497	$530	$4,199	$14,322	$0	$0	$232,045	0.792	**$183,801**
2017	$166,497	$46,497	$546	$4,325	$14,752	$0	$0	$232,616	0.747	**$173,824**
2018	$0	$0	$563	$4,454	$15,194	$0	$0	$20,212	0.705	**$14,248**
2019	$0	$0	$580	$4,588	$15,650	$0	$0	$20,818	0.665	**$13,845**
2020	$0	$0	$597	$4,726	$16,120	$0	$0	$21,442	0.627	**$13,453**
2021	$0	$0	$615	$4,868	$16,603	$0	$0	$22,086	0.592	**$13,073**
2022	$0	$0	$633	$5,014	$17,101	$0	$0	$22,748	0.558	**$12,703**
2023	$0	$0	$652	$5,164	$17,614	$0	$0	$23,431	0.527	**$12,343**
2024	$0	$0	$672	$5,319	$18,143	$0	$0	$24,134	0.497	**$11,994**
2025	$0	$0	$692	$5,478	$18,687	$0	$0	$24,858	0.469	**$11,654**
2026	$0	$0	$713	$5,643	$19,248	$0	$0	$25,603	0.442	**$11,324**
2027	$0	$0	$734	$5,812	$19,825	$0	$0	$26,372	0.417	**$11,004**
2028	$0	$0	$756	$5,986	$20,420	$0	$0	$27,163	0.394	**$10,692**
2029	$0	$0	$779	$6,166	$21,033	$0	$0	$27,978	0.371	**$10,390**
2030	$0	$0	$802	$6,351	$21,664	$0	$0	$28,817	0.350	**$10,096**
2031	$0	$0	$826	$6,542	$22,313	$0	$0	$29,681	0.331	**$9,810**
2032	$0	$0	$851	$6,738	$22,983	$0	$0	$30,572	0.312	**$9,532**
2033	$0	$0	$877	$6,940	$23,672	$0	$0	$31,489	0.294	**$9,263**
2034	$0	$0	$903	$7,148	$24,383	$0	$0	$32,434	0.278	**$9,001**
2035	$0	$0	$930	$7,363	$25,114	$0	$0	$33,407	0.262	**$8,746**
2036	$0	$0	$958	$7,583	$25,867	$0	$0	$34,409	0.247	**$8,498**
2037	$0	$0	$987	$7,811	$26,643	$0	$0	$35,441	0.233	**$8,258**
2038	$0	$0	$1,016	$8,045	$27,443	$0	$0	$36,504	0.220	**$8,024**
2039	$0	$0	$1,047	$8,287	$28,266	$0	$0	$37,600	0.207	**$7,797**
2040	$0	$0	$1,078	$8,535	$29,114	$0	$0	$38,727	0.196	**$7,576**
2041	$0	$0	$1,111	$8,791	$29,987	$0	$0	$39,889	0.185	**$7,362**
Total Present Value of Discounted Costs (Sum of column (j)) Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries										**$1,077,184**

Comments:
Administration is minimum because the efforts become part of other programs of the SBVWCD. Costs are escalated at 3% CPI-U long term average.

(1) Based on opportunity costs, sunk costs, and associated costs.
(2) The incremental change in O&M costs attributable to the Project.

COSTS AND BENEFITS SUMMARY

Table 20 summarizes the costs and benefits for the Project.

Table 20 – Proposal Benefits and Costs Summary Proposal: Plunge Creek Water Recharge and Habitat Conservation Agency: San Bernardino Valley Water Conversation District							
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)
	N/A	$1,077,184	$8,916,334	$0	$8,916,334		

Adopted Water Rates & Charges

Historical Water Rates

Effective January 1st	2012	2013	2014
Tier 1 Supply Rate ($/AF)	$106	$140	$148
Delta Supply Surcharge ($/AF)	$58	*	*
Tier 2 Supply Rate ($/AF)	$290	$290	$290
System Access Rate ($/AF)	$217	$223	$243
Water Stewardship Rate ($/AF)	$43	$41	$41
System Power Rate ($/AF)	$136	$189	$161
Full Service Untreated Volumetric Cost ($/AF)			
Tier 1	$560	$593	$593
Tier 2	$686	$743	$735
Replenishment Water Rate: untreated ($/AF)	$442	**	**
Interim Agricultural Water Program: untreated ($/AF)	$537	***	***
Treatment Surcharge ($/AF)	$234	$254	$297
Full Service Treated Volumetric Cost ($/AF)			
Tier 1	$794	$847	$890
Tier 2	$920	$997	$1,032
Treated Replenishment Water Rate ($/AF)	$651	**	**
Treated Interim Agricultural Water Program ($/AF)	$765	***	***
Readiness-to-Serve Charge (millions of dollars)	$146	$142	$166
Capacity Charge ($/cfs)	$7,400	$6,400	$8,600

* The Delta Supply Surcharge will be suspended after 2012
** Discussions on the replenishment program are continuing with the Member Agencies
*** The Interim Agricultural Water Program will be discontinued after 2012

Definitions

Tier 1 Supply Rate - recovers the of cost of maintaining a reliable amount of supply.

Delta Supply Surcharge - reflects the additional supply costs that Metropolitan faces along with other costs due to the pumping restrictions on the State Water Project.

Tier 2 Supply Rate - set at Metropolitan's cost of developing additional supply to encourage efficient use of local resources.

System Access Rate – recovers a portion of the costs associated with the delivery of supplies.

System Power Rate – recovers Metropolitan's power costs for pumping supplies to Southern California.

Water Stewardship Rate – recovers the cost of Metropolitan's financial commitment to conservation, water recycling, groundwater clean-up and other local resource management programs.

Replenishment Water Rate – a discounted rate for surplus system supplies available for the purpose of replenishing local storage.

Treated Replenishment Water Rate – a discounted rate for surplus system supplies available for the purpose of replenishing local storage.

Interim Agricultural Water Rate – discounted rate for surplus system supplies available for the purpose of growing agricultural, horticultural, or floricultural products.

Treated Interim Agricultural Water Program Rate – discounted rate for surplus system supplies available for the purpose of growing agricultural, horticultural, or floricultural products.

Treatment Surcharge – recovers the costs of treating imported water.

Readiness-to-Serve Charge - a fixed charge that recovers the cost of the portion of system capacity that is on standby to provide emergency service and operational flexibility.

Capacity Charge – the capacity charge recovers the cost of providing peak capacity within the distribution system.

Page updated: April 19, 2012

Air Resources Board

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Matthew Rodriquez
Secretary for Environmental Protection

Edmund G. Brown Jr.
Governor

2013 Annual Auction Reserve Price Notice

California Cap-and-Trade Program Greenhouse Gas Allowance Auctions

Issued on December 3, 2012

Updated on January 15, 2013

Auction Summary

This document, *2013 Annual Auction Reserve Price Notice,* specifies the 2013 Auction Reserve Price and the number of allowances to be auctioned in 2013 for the quarterly auctions as part of the Current Auction and Advance Auction. The 2013 quarterly GHG allowance auctions will offer 2013 vintage allowances and 2016 vintage allowances for sale.

The 2013 Auction Reserve Price and the annual budget of 2013 and 2016 vintage allowances for sale in 2013, is shown in Table 1 below.

Table 1: 2013 Auction Data

Auction Data Description	Auction Data
Auction Reserve Price	$10.71
Number of allowances to be auctioned in 2013 (2013 Vintage)	~~56,848,885*~~ 57,628,254
Number of advance allowances to be auctioned in 2013 (2016 Vintage)	38,240,000

~~* Amount could increase based on additional consignment from POUs as described in this notice.~~

The Auction Reserve Price

The Auction Reserve Price is a predetermined minimum price at which allowances will be sold to auction participants. The 2012 Auction Reserve Price was $10. Section 95911 of the Cap-and-Trade Regulation stipulates that the "Auction Reserve Price in U.S. dollars shall be the U.S. dollar Auction Reserve Price for the previous calendar year increased annually by 5 percent plus the rate of inflation as measured by the most recently available twelve months of the Consumer Price Index for All Urban Consumers." The rate of inflation used to calculate the 2013 Auction Reserve Price is 2.16 percent.

Current Auction Budget

The current auction budget describes the minimum number of current year vintage allowances to be sold in 2013. This number includes the State-owned allowances (approximately

10,600,000) and the remaining allowances to be consigned by the electricity distribution utilities. Some public owned utilities (POUs) were provided the flexibility to defer providing direction until January 1, 2013, on how to distribute their allowances between their Compliance and Limited Use Holding Accounts. ~~These deferred allowances total approximately 6,700,000. These are not included in the minimum 2013 annual auction budget. Once ARB receives direction from all of the remaining POUs, this notice will be updated to reflect the final 2013 annual auction budget presented in Table 1~~. ARB has now received direction from all POUs on how to distribute their allowances and Table 1 has been updated to reflect the final annual auction budget for 2013 vintage allowances. **This annual budget update does not change the amount of 2013 vintage allowances for sale in the February 19 auction.** Twenty-five percent of the State-owned allowances will be available at each auction. Utilities are required to notify ARB 75 days before each auction of the number of allowances they intend to consign. The total number of allowances to be auctioned in each auction will be published in the auction notice 60 days in advance. Utility allowances not consigned in the first three auctions will be included in the November 19, 2013 auction.

Advance Auction Budget

The advance auction budget represents ten percent of the allowances from the budget year three years subsequent to the current calendar year. Since the annual allowance budget of 2016 is 382,400,000, the advance auction budget for 2013 is 38,240,000. These allowances will be equally divided for sale across the four auctions in 2013.

2013 Quarterly Auction Dates

An *Auction Notice* with instructions on how to participate will be published 60 days prior to each auction. The *Auction Notice* provides information about eligibility, auction format, and GHG allowances to be auctioned for the applicable quarterly auction.

Table 2 provides additional information specific to the scheduled quarterly auctions.

Table 2: 2013 Quarterly Auction Critical Dates

Auction Consignment Due Date for EDUs	Auction Notice Posting Date	Auction Application Due Date	Auction Dates
12/6/2012	12/21/2012	1/22/2013	2/19/2013
3/4/2013	3/18/2013	4/16/2013	5/16/2013
6/3/2013	6/17/2013	7/17/2013	8/16/2013
9/5/2013	9/20/2013	10/21/2013	11/19/2013

Contact Information

For further information about participation in the 2013 auctions, please contact:
Mr. Chuck Seidler at (916) 324-0931 or cseidler@arb.ca.gov.

Updated on January 15, 2013

Project F: Prado Basin Sediment Management Demonstration Project (Orange County Water District)

Table 11 – Statement of Cost-Effectiveness Project name: _____	
Question 1	Types of benefits provided
Question 2	Have alternative methods of providing the same types and amounts of physical benefits as the proposed project been identified?
	If no, why?
	If yes, list the methods (including the proposed project) and estimated costs.
Question 3.	If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods.
Comments:	

Table 12 – Non-monetized Benefits Checklist		
No.	**Question**	**Enter "Yes", "No" or "Neg"**
	Community/Social Benefits	
	Will the proposal	
1	**Provide education or technology benefits?**	No
	Examples are not limited to, but may include:	
	- Include educational features that should result in water supply, water quality, or flood damage reduction benefits?	
	- Develop, test, or document a new technology for water supply, water quality, or flood damage reduction management?	
	- Provide some other education or technological benefit?	
2	**Provide social recreation or access benefits?**	No
	Examples are not limited to, but may include:	
	- Provide new or improved outdoor recreation opportunities?	
	- Provide more access to open space?	
	- Provide some other recreation or public access benefit?	
3	**Help avoid, reduce or resolve various public water resources conflicts?**	No
	Examples are not limited to, but may include:	
	- Provide more opportunities for public involvement in water management?	
	- Help avoid or resolve an existing conflict as evidenced by recurring fines or litigation?	
	- Help meet an existing state mandate (e.g., water quality, water conservation, flood control)?	
4	**Promote social health and safety?**	Yes
	Examples are not limited to, but may include:	This project reduces sedimentation trends that threaten
	- Increase urban water supply reliability for fire-fighting and critical services following seismic events?	
	- Reduce risk to life from dam failure or flooding?	
	- Reduce exposure to water-related hazards?	
5	**Have other social benefits?**	No
	Examples are not limited to, but may include:	
	- Redress or increase inequitable distribution of environmental burdens?	
	- Have disproportionate beneficial or adverse effects on disadvantaged communities, Native Americans, or other distinct cultural groups?	
	Environmental Stewardship Benefits:	
	Will the proposal	
6	**Benefit wildlife or habitat in ways that were not quantified in Attachment 7?**	Yes
	Examples are not limited to, but may include:	This project preserves and enhances the environment by protecting and enhancing
	- Cause an increase in the amount or quality of terrestrial, aquatic, riparian or wetland habitat?	
	- Contribute to an existing biological opinion or recovery plan for a listed special status species?	
	- Preserve or restore designated critical habitat of a listed species?	
	- Enhance wildlife protection or habitat?	
7	**Improve water quality in ways that were not quantified in Attachment 7?**	Yes
	Examples are not limited to, but may include:	The project will remove invasive, non-native vegetation
	- Cause an improvement in water quality in an impaired water body or sensitive habitat?	
	- Prevent water quality degradation?	
	- Cause some other improvement in water quality?	
8	**Reduce net emissions in ways that were not quantified in Attachment 7?**	No
	Examples are not limited to, but may include:	
	- Reduce net production of greenhouse gasses?	
	- Reduce net emissions of other harmful chemicals into the air or water?	
9	**Provide other environmental stewardship benefits, other than those claimed in Sections D1, D3, or D4?**	Yes
	Sustainability Benefits:	
	Will the proposal	
10	**Improve the overall, long-term management of California groundwater resources?**	Yes
	Examples are not limited to, but may include:	OCWD has extensive experience on groundwater
	- Reduce extraction of non-renewable groundwater?	
	- Promote aquifer storage or recharge?	
11	**Reduce demand for net diversions for the regions from the Delta?**	Yes
12	**Provide a long-term solution in place of a short-term one?**	Yes
13	**Promote energy savings or replace fossil fuel based energy sources with renewable energy and resources?**	No
	Examples are not limited to, but may include:	
	- Reduce net energy use on a permanent basis?	
	- Increase renewable energy production?	
	- Include new buildings or modify buildings to include certified LEED features?	
	- Provide a net increase in recycling or reuse of materials?	
	- Replace unsustainable land or water management practices with recognized sustainable practices?	
14	**Improve water supply reliability in ways not quantified in Attachment 7?**	No
	Examples are not limited to, but may include:	
	- Provide a more flexible mix of water sources?	
	- Reduce likelihood of catastrophic supply outages?	
	- Reduce supply uncertainty?	
	- Reduce supply variability?	
15	**Other (If the above listed categories do not apply, provide non-monetized benefit description)?**	No

Table 15 – Annual Benefit (All benefits should be in 2012 dollars) Project: Prado Basin Sediment Management Demonstration									
(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)
2012	Water Supply	acre feet per year (afy)			0	$794	$0	1.000	**$0**
	Stormwater Capture, Storage & Management	afy			0	$794	$0	1.000	**$0**
	Groundwater Recharge	afy			0	$794	$0	1.000	**$0**
	Water Quality Improvement	Salts Removed (mg/L)			0	$0.54	$0	1.000	**$0**
2013	Water Supply	acre feet per year (afy)			0	$847	$0	0.943	**$0**
	Stormwater Capture, Storage & Management	afy			0	$847	$0	0.943	**$0**
	Groundwater Recharge	afy			0	$847	$0	0.943	**$0**
	Water Quality Improvement	Salts Removed (mg/L)			0	$0.54	$0	0.943	**$0**
2014	Water Supply	acre feet per year (afy)			0	$851	$0	0.890	**$0**
	Stormwater Capture, Storage & Management	afy			0	$851	$0	0.890	**$0**
	Groundwater Recharge	afy			0	$851	$0	0.890	**$0**
	Water Quality Improvement	Salts Removed (mg/L)			0	$0.54	$0	0.890	**$0**
2015	Water Supply	acre feet per year (afy)			0	$892	$0	0.840	**$0**
	Stormwater Capture, Storage & Management	afy			0	$892	$0	0.840	**$0**
	Groundwater Recharge	afy			0	$892	$0	0.840	**$0**
	Water Quality Improvement	Salts Removed (mg/L)			0	$0.54	$0	0.840	**$0**
2016	Water Supply	acre feet per year (afy)	0	150	150	$941	$141,150	0.792	**$111,791**
	Stormwater Capture, Storage & Management	afy	0	150	150	$941	$141,150	0.792	**$111,791**
	Groundwater Recharge	afy	0	150	150	$941	$141,150	0.792	**$111,791**
	Water Quality Improvement	Salts Removed (mg/L)	0	372	372	$0.54	$30,132	0.792	**$23,865**
2017	Water Supply	acre feet per year (afy)	0	300	300	$992	$297,600	0.747	**$222,307**
	Stormwater Capture, Storage & Management	afy	0	300	300	$992	$297,600	0.747	**$222,307**
	Groundwater Recharge	afy	0	300	300	$992	$297,600	0.747	**$222,307**
	Water Quality Improvement	Salts Removed (mg/L)	0	372	372	$0.54	$60,264	0.747	**$45,017**

2018	Water Supply	acre feet per year (afy)	0	300	300	$1,047	$314,100	0.705	**$221,441**
	Stormwater Capture, Storage & Management	afy	0	300	300	$1,047	$314,100	0.705	**$221,441**
	Groundwater Recharge	afy	0	300	300	$1,047	$314,100	0.705	**$221,441**
	Water Quality Improvement	Salts Removed (mg/L)	0	372	372	$0.54	$60,264	0.705	**$42,486**
2019	Water Supply	acre feet per year (afy)	0	300	300	$1,112	$333,600	0.665	**$221,844**
	Stormwater Capture, Storage & Management	afy	0	300	300	$1,112	$333,600	0.665	**$221,844**
	Groundwater Recharge	afy	0	300	300	$1,112	$333,600	0.665	**$221,844**
	Water Quality Improvement	Salts Removed (mg/L)	0	372	372	$0.54	$60,264	0.665	**$40,076**
2020	Water Supply	acre feet per year (afy)	0	300	300	$1,178	$353,400	0.627	**$221,582**
	Stormwater Capture, Storage & Management	afy	0	300	300	$1,178	$353,400	0.627	**$221,582**
	Groundwater Recharge	afy	0	300	300	$1,178	$353,400	0.627	**$221,582**
	Water Quality Improvement	Salts Removed (mg/L)		372	372	$0.54	$60,264	0.627	**$37,786**
2021	Water Supply	acre feet per year (afy)	0	300	300	$1,248	$374,400	0.592	**$221,645**
	Stormwater Capture, Storage & Management	afy	0	300	300	$1,248	$374,400	0.592	**$221,645**
	Groundwater Recharge	afy	0	300	300	$1,248	$374,400	0.592	**$221,645**
	Water Quality Improvement	Salts Removed (mg/L)		372	372	$0.54	$60,264	0.592	**$35,676**
2022	Water Supply	acre feet per year (afy)	0	300	300	$1,323	$396,900	0.558	**$221,470**
	Stormwater Capture, Storage & Management	afy	0	300	300	$1,323	$396,900	0.558	**$221,470**
	Groundwater Recharge	afy	0	300	300	$1,323	$396,900	0.558	**$221,470**
	Water Quality Improvement	Salts Removed (mg/L)		372	372	$0.54	$60,264	0.558	**$33,627**
2023	Water Supply	acre feet per year (afy)	0	300	300	$1,403	$420,900	0.527	**$221,814**
	Stormwater Capture, Storage & Management	afy	0	300	300	$1,403	$420,900	0.527	**$221,814**
	Groundwater Recharge	afy	0	300	300	$1,403	$420,900	0.527	**$221,814**
	Water Quality Improvement	Salts Removed (mg/L)		372	372	$0.54	$60,264	0.527	**$31,759**
2024	Water Supply	acre feet per year (afy)	0	300	300	$1,487	$446,100	0.497	**$221,712**
	Stormwater Capture, Storage & Management	afy	0	300	300	$1,487	$446,100	0.497	**$221,712**
	Groundwater Recharge	afy	0	300	300	$1,487	$446,100	0.497	**$221,712**

	Water Quality Improvement	Salts Removed (mg/L)		372	372	$0.54	$60,264	0.497	**$29,951**
2025	Water Supply	acre feet per year (afy)	0	300	300	$1,576	$472,800	0.469	**$221,743**
	Stormwater Capture, Storage & Management	afy	0	300	300	$1,576	$472,800	0.469	**$221,743**
	Groundwater Recharge	afy	0	300	300	$1,576	$472,800	0.469	**$221,743**
	Water Quality Improvement	Salts Removed (mg/L)		372	372	$0.54	$60,264	0.469	**$28,264**
2026	Water Supply	acre feet per year (afy)	0	300	300	$1,670	$501,000	0.442	**$221,442**
	Stormwater Capture, Storage & Management	afy	0	300	300	$1,670	$501,000	0.442	**$221,442**
	Groundwater Recharge	afy	0	300	300	$1,670	$501,000	0.442	**$221,442**
	Water Quality Improvement	Salts Removed (mg/L)		372	372	$0.54	$60,264	0.442	**$26,637**
2027	Water Supply	acre feet per year (afy)	0	300	300	$1,771	$531,300	0.417	**$221,552**
	Stormwater Capture, Storage & Management	afy	0	300	300	$1,771	$531,300	0.417	**$221,552**
	Groundwater Recharge	afy	0	300	300	$1,771	$531,300	0.417	**$221,552**
	Water Quality Improvement	Salts Removed (mg/L)		372	372	$0.54	$60,264	0.417	**$25,130**
2028	Water Supply	acre feet per year (afy)	0	300	300	$1,877	$563,100	0.394	**$221,861**
	Stormwater Capture, Storage & Management	afy	0	300	300	$1,877	$563,100	0.394	**$221,861**
	Groundwater Recharge	afy	0	300	300	$1,877	$563,100	0.394	**$221,861**
	Water Quality Improvement	Salts Removed (mg/L)		372	372	$0.54	$60,264	0.394	**$23,744**
2029	Water Supply	acre feet per year (afy)	0	300	300	$1,989	$596,700	0.371	**$221,376**
	Stormwater Capture, Storage & Management	afy	0	300	300	$1,989	$596,700	0.371	**$221,376**
	Groundwater Recharge	afy	0	300	300	$1,989	$596,700	0.371	**$221,376**
	Water Quality Improvement	Salts Removed (mg/L)		372	372	$0.54	$60,264	0.371	**$22,358**
2030	Water Supply	acre feet per year (afy)	0	300	300	$2,109	$632,700	0.350	**$221,445**
	Stormwater Capture, Storage & Management	afy	0	300	300	$2,109	$632,700	0.350	**$221,445**
	Groundwater Recharge	afy	0	300	300	$2,109	$632,700	0.350	**$221,445**
	Water Quality Improvement	Salts Removed (mg/L)		372	372	$0.54	$60,264	0.350	**$21,092**
2031	Water Supply	acre feet per year (afy)	0	300	300	$2,235	$670,500	0.331	**$221,936**
	Stormwater Capture, Storage & Management	afy	0	300	300	$2,235	$670,500	0.331	**$221,936**

	Groundwater Recharge	afy	0	300	300	$2,235	$670,500	0.331	**$221,936**
	Water Quality Improvement	Salts Removed (mg/L)		372	372	$0.54	$60,264	0.331	**$19,947**
2032	Water Supply	acre feet per year (afy)	0	300	300	$2,370	$711,000	0.312	**$221,832**
	Stormwater Capture, Storage & Management	afy	0	300	300	$2,370	$711,000	0.312	**$221,832**
	Groundwater Recharge	afy	0	300	300	$2,370	$711,000	0.312	**$221,832**
	Water Quality Improvement	Salts Removed (mg/L)		372	372	$0.54	$60,264	0.312	**$18,802**
2033	Water Supply	acre feet per year (afy)	0	300	300	$2,512	$753,600	0.294	**$221,558**
	Stormwater Capture, Storage & Management	afy	0	300	300	$2,512	$753,600	0.294	**$221,558**
	Groundwater Recharge	afy	0	300	300	$2,512	$753,600	0.294	**$221,558**
	Water Quality Improvement	Salts Removed (mg/L)		372	372	$0.54	$60,264	0.294	**$17,718**
2034	Water Supply	acre feet per year (afy)	0	300	300	$2,662	$798,600	0.278	**$222,011**
	Stormwater Capture, Storage & Management	afy	0	300	300	$2,662	$798,600	0.278	**$222,011**
	Groundwater Recharge	afy	0	300	300	$2,662	$798,600	0.278	**$222,011**
	Water Quality Improvement	Salts Removed (mg/L)		372	372	$0.54	$60,264	0.278	**$16,753**
2035	Water Supply	acre feet per year (afy)	0	300	300	$2,822	$846,600	0.262	**$221,809**
	Stormwater Capture, Storage & Management	afy	0	300	300	$2,822	$846,600	0.262	**$221,809**
	Groundwater Recharge	afy	0	300	300	$2,822	$846,600	0.262	**$221,809**
	Water Quality Improvement	Salts Removed (mg/L)		372	372	$0.54	$60,264	0.262	**$15,789**
2036	Water Supply	acre feet per year (afy)	0	300	300	$2,991	$897,300	0.247	**$221,633**
	Stormwater Capture, Storage & Management	afy	0	300	300	$2,991	$897,300	0.247	**$221,633**
	Groundwater Recharge	afy	0	300	300	$2,991	$897,300	0.247	**$221,633**
	Water Quality Improvement	Salts Removed (mg/L)		372	372	$0.54	$60,264	0.247	**$14,885**
								Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)	**$14,208,774**

Comments: No water supply, stormwater, groundwater recharge and water quality benefits will occurr during design and construction of this project (from 2012 to mid 2016). Benefits will occurr starting with the first year of project operation after mid-2016. The unit value in column (g) represents the Metropolitan Water District of Southern California (MWD) Tier 1 uninterruptible full-service treated water rate. MWD rates for 2012 and 2013 represent the actual unit values based on OCWD's water purchase invoices. Water rates for 2014 to 2020 were provided by MWD's Chief Financial Officer at the Long Range Finance Plan working group meeting on October 4, 2010. MWD water rates for 2021 and beyond are calculated values based on MWD's rate projections (from 2014 to 2020) and include a nominal rate increase, but exclude an inflation rate of 3% per year. With respect to water quality benefit, the unit value of $0.41 per mg/L per acre-foot of water comes from the Final Report of "Salinity Management Study" conducted jointly by MWD and the United States Bureau of Reclamation (June 1999). This benefit value was developed for MWD's service area. Using the update factor of 1.30 provided by F. Farnam of DWR, the unit value of $0.41 per mg/L per acre foot has been converted to $0.54 per mg/L per acre foot to reflect 2012 dollars. The water quality improvement benefit is calculated as the difference of TDS concentrations of imported MWD water (572 mg/L) in the project area and the stormwater in the Santa Ana River in the Prado Basin (200 mg/L). The construction of this project will be fully completed before the end of 2016. OCWD anticipates that the operation of this project will commence immediately after the completion of the construction work and that all benefits claimed for this project will be achieved thereafter.

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

Table 16 – Annual Costs of Avoided Projects (All avoided costs should be in 2012 dollars) 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)		
2012					1.000	
2013					0.943	
2014					0.899	
2015					0.839	
...					...	
Last Year of Project Life					...	
Total Present Value of Discounted Costs (Sum of Column (g))						
(%) Avoided Cost Claimed by Project						
Total Present Value of Discounted Avoided Project Costs Claimed by Alternative Project (Total Present Value of Discounted Costs x % Avoided Cost Claimed by Project)						
Comments:						

Table 17 – Example Calculation of Expected Annual Damage											
Hydrologic Event	Event Exceedance Probability	Event Damage if Flood Structures Fail	Probability Structural Failure		Expected Event Damage		Interval Probability	Average Damage in Interval		Average Damage in Interval times Interval Probability	
			Without	With Project	Without Project	With Project		Without Project	With Project	Without	With Project
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(i)	(j)	(k)	(l)	(m)
					(c) x (d)	(c) x (e)	from (b)	from (f)	from (g)	(i) x (j)	(i) x (k)
5-year	0.2	$100	0	0	$0	$0					
10-Year	0.1	$200	0.5	0	$100	$0	0.1	$50	$0	$5	$0
15-Year	0.067	$400	0.75	0	$300	$0	0.033	$200	$0	$7	$0
20-Year	0.05	$600	1	0	$600	$0	0.017	$450	$0	$8	$0
25-Year	0.04	$800	1	1	$800	$800	0.01	$700	$400	$7	$4
Expected Annual Damages, Without and With Project										$26.25	$4.00

Table 18 – Present Value of Expected Annual Damage Reduction Benefits Project: _____			
(a)	Expected Annual Damage Without Project [1]		**$26.25**
(b)	Expected Annual Damage With Project [1]		**$4.00**
(c)	Expected Annual Benefit	(a) – (b)	**$22.25**
(d)	Present Value Coefficient [2]		**15.76**
(e)	**Present Value of Future Benefits** **Transfer to Table 20, column (e).**	**(c) x (d)**	**$350.66**
(1)	*This program assumes no land use changes in the floodplain. So, EAD will be constant over analysis period.*		
(2)	*6% discount rate; 50-year analysis period (could vary depending upon lifecycle of project).*		

Table 19 – Annual Costs of Project (All costs should be in 2012 Dollars) Project: Prado Basin Sediment Management Demonstration										
	Initial Costs Grand Total Cost from Table 7 (row (i), column	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)
2012	$940,000	$0	$0	$0	$0	$0	$0	$940,000	1.000	**$940,000**
2013	$280,000	$0	$0	$0	$0	$0	$0	$280,000	0.943	**$264,040**
2014	$4,275,000	$0	$0	$0	$0	$0	$0	$4,275,000	0.890	**$3,804,750**
2015	$1,850,000	$0	$0	$0	$0	$0	$0	$1,850,000	0.840	**$1,554,000**
2016	$520,000	$0	$5,000	$20,000	$25,000	$0	$0	$570,000	0.792	**$451,440**
2017	$0	$0	$10,000	$40,000	$50,000	$0	$0	$100,000	0.747	**$74,700**
2018	$0	$0	$10,000	$40,000	$50,000	$0	$0	$100,000	0.705	**$70,500**
2019	$0	$0	$10,000	$40,000	$50,000	$0	$0	$100,000	0.665	**$66,500**
2020	$0	$0	$10,000	$40,000	$50,000	$0	$0	$100,000	0.627	**$62,700**
2021	$0	$0	$10,000	$40,000	$50,000	$0	$0	$100,000	0.592	**$59,200**
2022	$0	$0	$10,000	$40,000	$50,000	$0	$0	$100,000	0.558	**$55,800**
2023	$0	$0	$10,000	$40,000	$50,000	$0	$0	$100,000	0.527	**$52,700**
2024	$0	$0	$10,000	$40,000	$50,000	$0	$0	$100,000	0.497	**$49,700**
2025	$0	$0	$10,000	$40,000	$50,000	$0	$0	$100,000	0.442	**$44,200**
2026	$0	$0	$10,000	$40,000	$50,000	$0	$0	$100,000	0.417	**$41,700**
2027	$0	$0	$10,000	$40,000	$50,000	$0	$0	$100,000	0.394	**$39,400**
2028	$0	$0	$10,000	$40,000	$50,000	$0	$0	$100,000	0.371	**$37,100**
2029	$0	$0	$10,000	$40,000	$50,000	$0	$0	$100,000	0.350	**$35,000**
2030	$0	$0	$10,000	$40,000	$50,000	$0	$0	$100,000	0.331	**$33,100**
2031	$0	$0	$10,000	$40,000	$50,000	$0	$0	$100,000	0.312	**$31,200**
2032	$0	$0	$10,000	$40,000	$50,000	$0	$0	$100,000	0.294	**$29,400**
2033	$0	$0	$10,000	$40,000	$50,000	$0	$0	$100,000	0.278	**$27,800**
2034	$0	$0	$10,000	$40,000	$50,000	$0	$0	$100,000	0.262	**$26,200**
2035	$0	$0	$10,000	$40,000	$50,000	$0	$0	$100,000	0.247	**$24,700**
2036	$0	$0	$10,000	$40,000	$50,000	$0	$0	$100,000	0.233	**$23,300**
									Total Present Value of Discounted Costs (Sum of column (j)) Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries	**$7,899,130**

Comments: OCWD pays for the operation and maintenance (O&M) costs of any capital improvement project such as the Prado Basin Sediment Management Demonstration Project through the revenue generated by the replenishment assessment (RA) payments from OCWD's groundwater producers and users. Semiannually, OCWD collects RA payments from the groundwater producers/users that pump groundwater from OCWD's groundwater basin. Every fiscal year, OCWD budgets the O&M costs of each capital improvement project under the general fund (i.e., operating funds). OCWD's fiscal year starts on July 1 and ends on June 30 of the following year. The O&M costs were developed by OCWD staff based on a technical study entitled "Prado Basin Sediment Management Demonstration Project Engineering Analysis." Please note that the construction of this project will be fully completed before the end of 2016. OCWD anticipates project operation immediately thereafter. O&M costs were pro-rated for 2016. Starting in 2017 and beyond, this project will inccur 100% of the annual O&M costs as presented in this table.

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

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

Project G: San Sevaine Groundwater Recharge Basin (Inland Empire Utilities Agency)

Tables 9, 12, 15, 19, and 20 are included in this document to quantify water supply costs and benefits for the San Sevaine Groundwater Recharge Project (the "Project") proposed by the Inland Empire Utilities Agency ("IEUA"). Narrative supporting the tables is provided below:

I. Narrative Description of the Project's Economic Costs

The Project's economic costs consist of costs contained in the Project budget (Attachment 4), as well as annual administration, maintenance, and replacement costs associated with the Project.

II. Cost Details

Budget categories (a) through (h) are included in the cost details as described in Table 5.

III. Estimates of Without-Project conditions; e.g. Current and Future Water Supplies and Demand.

The San Sevaine Basins were originally constructed for flood control but are now operated for multiple purposes including, but not limited to, groundwater recharge (under a **Four Party** Agreement between San Bernardino County Flood Control, Chino Basin Watermaster, IEUA, and Chino Basin Water Conservation District). Millions of dollars have been spent on improvements to the basins by these Four Parties. The basins are used to recharge imported water, stormwater, and recycled water in a conjunctive use program. IEUA performs the actual operation and maintenance of the basins for recharge purposes in cooperation with the San Bernardino Flood Control District. <u>However, there are five (5), soft-bottomed basins located in series along San Sevaine Channel, comprising approximately 93 acres, all with the un-utilized potential to recharge up to 8,500 total AFY of recycled water</u>. However, as the facility currently operates, recycled water is delivered to the lower basin, Basin 5, which has a lower infiltration rate compared to the upper basins, enabling a current recharge of only approximately 500 AFY.

IV. Estimates of With-Project Conditions; e.g. Improvements in New Water Supplies Made Available to Meet Demand

In order to fully realize the valuable potential of the basin, it is proposed to build approximately 5,000 feet of pipeline to deliver water (recycled and stormwater) to the upper basins, which have higher infiltration rates. The Project includes: (1) a small pump station that could pump either recycled water or stormwater to the upper basins; (2) a 2,000-foot pipeline from basin 5 to basin 3; (3) a geophysical investigation to determine if poor inflitration rates in basin 5 can be improved; (4) flow control and internal berms to route water between basin 1 and basin 2 and keep a minimum amount of water depth throughout the summer to help with vector control; and (5) internal berms in basin 5 to deepen water and alternate wet and drying cycles to control insect issues.

<u>The expected benefits include 4,500 AFY of recycled water recharge and 350 AFY of stormwater recharge. The recharge program allows water banking in the groundwater basin to meet multiple demands and different hydrological conditions on a consistent basis</u>. The basins are used for recharge of imported water as well as stormwater and recycled water in a synergistic conjunctive use program. The goal is to make cost-effective improvements in basin design and infiltration characteristics that will increase the conjunctive use of all three types of water. Improved vector and insect control is another benefit.

These Project improvements are needed in order to fully realize the benefit of the $50 million of capital already expended by the Four Parties on the Chino Basin Recharge Facilities Improvement Projects. Any additional groundwater recharge that is accomplished is a significant benefit to the entire watershed. During periods of drought, this additional water that is stored in the ground for future needs is imperative in meeting current and future water demands. All of the water that is recharged has a positive effect on the salt balance of the watershed because the recharge is occurring at the upper end of the watershed in the alluvial fan, where stormwater quality and recycled water quality are the best. This offsets the pumping of highly saline water from the bottom end of Chino Basin, thus it

improves water quality, removes salt from the basin, and achieves hydraulic control for Orange County. The vector control aspect of the Project is also needed to prevent the spread of West Nile Virus.

The Project is part of the Regional Recycled Water Implementation Plan ("RWIP") adopted in November of 2005. The RWIP promoted a strategy to utilize recycled water to the maximum extent practicable in order to:

- Reduce dependency of the Chino Basin water users on imported State Water Project ("SWP") water;
- Offset groundwater pumping that exceeds the Basin's safe yield;
- Improve groundwater quality in the Basin by integrating the desalter program, the recycled water program, and the recharge program into one Optimum Basin Management Plan.
- Increase the number of times that a drop of water in the Santa Ana Watershed is used before it reaches the ocean.
- Promote resource-efficient, multiple-purpose use of flood control basins.

The San Sevaine Project helps meet all of the above goals. The Project also provides a reliable water supply by reducing dependence on imported water; banking water underground to meet demand in all hydrologic conditions; and increasing use of recycled water. It enhances the environment by providing open-water and shoreline habitat for birds. Regional integration is achieved through stakeholder collaboration on the Chino Basin Recharge Master Plan Update and the Four Party Agreement. It promotes sustainable water solutions by linking land and water use and by reducing energy consumption and greenhouse gas production. It manages rainfall as a resource by integrating flood control and other benefits. It restores some of the rainfall percolation capacity that has been lost due to urbanization and hard-paving channels. It protects the quality of rainfall that runs off the mountains by percolating it underground before it has a chance to pick up contaminants from agricultural areas, and it also provides soil-aquifer treatment for urban nuisance runoff.

The Project is also expected to solve the vector control problems caused by the continuous inflow of dry weather nuisance runoff in the summer. The dry weather runoff causes vegetation growth and provides mosquito habitat. The Project will construct berms to provide a conservation pool of water that is deep enough to stock with mosquito fish. This will prevent the need for "emergency maintenance" in the summer which could be destructive to wildlife. The Project will also provide more water to the basins year-round which has the incidental benefit of increasing open water and shoreline habitat for waterfowl.

V. Description of Methods used to Estimate Without- and With-Project Conditions.

With and without Project conditions are based on discussions with the Project engineer, IEUA the cities of Ontario and Fontana, other cities within IEUA's service area, and various Project proponents, as well as information contained in the attached Exhibits described below.

VI. Description of the Distribution of Local, Regional, and Statewide Benefits

Benefits are regional in nature, since any increase in groundwater recharge will benefit water agencies throughout the state whose need for additional water exceeds that of IEUA and its cities.

VII. Identification of Beneficiaries

IEUA, the cities of Fontana and Ontario, the entire Inland Empire region, all local water users and rate payers, Metropolitan Water District, and all urban water suppliers intending to purchase SWP water in the future.

The Regional Recycled Water Program is the result of collaborative efforts of IEUA's member agencies (Chino, Chino Hills, Fontana, Montclair, Ontario, Upland, and Cucamonga Valley Water District). A Three Year Business Plan was developed cooperatively in 2007 to strategically develop an implementation plan to increase the reuse of recycled water cost effectively and efficiently. The San Sevaine Improvement Project is needed to realize the full potential of the

basin. The Chino Basin groundwater recharge program results from the collaboration and execution of the Four Party agreement between IEUA, Chino Basin Water Master, San Bernardino County Flood Control, and the Chino Basin Water Conservation District. The main goals of the program are to (i) increase stormwater, recycled, and imported water recharge to improve water supply reliability; (ii) decrease imported water demand, (iii) and improve groundwater quality. The goals of the recharge plan could not be met reliably without this Project.

VIII. When the Benefits will be Received

The benefits will be realized as of the completion of the San Sevaine Improvements in the Fall of 2014. The San Sevaine Improvements Project consists of the design and construction of approximately 5,000 feet of pipeline and a pump station with the ability to either pump stormwater and/or recycled water to the upper basins, which have higher infiltration rates. The Project will also include geophysical investigations to determine if infiltration rates can be improved and flow control and internal berms to aid with vector control and maximizing basin operation by alternating wet and dry cycles.

IX. Uncertainty of the Benefits

The benefits were calculated based on monitoring of dry weather flows. There will be variation in these flows, but it is expected that the demand for non-potable water will not exceed the amount extracted from various detention/retention basins.

X. Description of any Adverse Effects

N/A

XI. Narrative Discussion that Describes, Qualifies, and Supports the Values Entered in the Tables

The estimated valuation of groundwater was provided by San Bernardino Valley Water Conservation District, and is based on average purchase price for groundwater that is not included as part of a cooperative recharge program.

Estimated administration, operations, maintenance, and replacement costs for the Project are based on discussions with IEUA, various cities, and maintenance data collected by David Taussig & Associates, Inc. for comparable projects.

XII. Documentation to Support Information Presented

IEUA completed the Recycled Water System Feasibility Study ("Feasibility Study") in 2002. The Feasibility Study is the Facilities Planning Report for IEUA's Recycled Water System, based on which Capital Improvement Projects for the Recycled Water Distribution System was developed. Since then, IEUA updated the Feasibility Study with the Regional RWIP in 2005. The RWIP provides an updated overview of the recycled water supplies, existing, and estimated recycled water demands, and a recommended regional backbone system to distribute recycled water throughout its service area. IEUA initiated the Three Year Business Plan ("Business Plan") in 2007 to accelerate the implementation of the RWIP.

Previous studies performed justifying the Project site location, feasibility, and technical methods are as follows:

- 2001 Chino Basin Optimum Basin Management Plan
- 2002 Regional Recycled Water Feasibility Study
- 2002 Ground Water Recharge MOA Four-Party Agreement
- 2005 Regional RW Implementation Plan
- 2007 Three Year Business Plan
- 2010 GWR Master Plan Update

Table 9 – Annual Project Physical Benefits			
Project Name: San Sevaine Ground Water Recharge Basin Improvements Project			
Type of Benefit Claimed: Increased Captured Stormwater, Recycled Water Recharge, and Imported Water Recharge			
Measure of Benefit Claimed (Name of Units): Acre-Feet			
Additional Information About this Measure: Acre-Feet of Recharge by Project			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Increase in Water Supply Resulting from Project (c) – (b)
2012	0	0	0
2013	0	0	0
2014	0	0	0
2015	0	4,850	4,850
2016	0	4,850	4,850
2017	0	4,850	4,850
2018	0	4,850	4,850
2019	0	4,850	4,850
2020	0	4,850	4,850
2021	0	4,850	4,850
2022	0	4,850	4,850
2023	0	4,850	4,850
2024	0	4,850	4,850
2025	0	4,850	4,850
2026	0	4,850	4,850
2027	0	4,850	4,850
2028	0	4,850	4,850
2029	0	4,850	4,850
2030	0	4,850	4,850
2031	0	4,850	4,850
2032	0	4,850	4,850
2033	0	4,850	4,850
2034	0	4,850	4,850
2035	0	4,850	4,850
2036	0	4,850	4,850
2037	0	4,850	4,850
2038	0	4,850	4,850
2039	0	4,850	4,850
2040	0	4,850	4,850
2041	0	4,850	4,850
2042	0	4,850	4,850
Comments:			

Table 12 – Non-monetized Benefits Checklist		
No.	**Question**	**Enter "Yes", "No" or "Neg"**
	Community/Social Benefits **Will the proposal**	
1	**Provide education or technology benefits?**	No
	Examples are not limited to, but may include: - Include educational features that should result in water supply, water quality, or flood damage reduction benefits? - Develop, test, or document a new technology for water supply, water quality, or flood damage reduction management? - Provide some other education or technological benefit?	
2	**Provide social recreation or access benefits?**	No
	Examples are not limited to, but may include: - Provide new or improved outdoor recreation opportunities? - Provide more access to open space? - Provide some other recreation or public access benefit?	
3	**Help avoid, reduce or resolve various public water resources conflicts?**	Yes
	Examples are not limited to, but may include: - Provide more opportunities for public involvement in water management? - Help avoid or resolve an existing conflict as evidenced by recurring fines or litigation? - Help meet an existing state mandate (e.g., water quality, water conservation, flood control)?	Yes, please see attachment 3 and attachment 8.
4	**Promote social health and safety?**	Yes
	Examples are not limited to, but may include: - Increase urban water supply reliability for fire-fighting and critical services following seismic events? - Reduce risk to life from dam failure or flooding? - Reduce exposure to water-related hazards?	Yes, please see attachment 3 and attachment 8.
5	**Have other social benefits?**	No
	Examples are not limited to, but may include: - Redress or increase inequitable distribution of environmental burdens? - Have disproportionate beneficial or adverse effects on disadvantaged communities, Native Americans, or other distinct cultural groups?	
	Environmental Stewardship Benefits: **Will the proposal**	
6	**Benefit wildlife or habitat in ways that were not quantified in Attachment 7?**	Yes
	Examples are not limited to, but may include: - Cause an increase in the amount or quality of terrestrial, aquatic, riparian or wetland habitat? - Contribute to an existing biological opinion or recovery plan for a listed special status species? - Preserve or restore designated critical habitat of a listed species? - Enhance wildlife protection or habitat?	Yes, please see attachment 3 and attachment 8.
7	**Improve water quality in ways that were not quantified in Attachment 7?**	Yes
	Examples are not limited to, but may include: - Cause an improvement in water quality in an impaired water body or sensitive habitat? - Prevent water quality degradation? - Cause some other improvement in water quality?	Yes, please see attachment 3 and attachment 8.
8	**Reduce net emissions in ways that were not quantified in Attachment 7?**	Yes
	Examples are not limited to, but may include: - Reduce net production of greenhouse gasses? - Reduce net emissions of other harmful chemicals into the air or water?	Yes, please see attachment 3 and attachment 8.
9	**Provide other environmental stewardship benefits, other than those claimed in Sections D1, D3, or D4?**	Yes
	Sustainability Benefits: **Will the proposal**	Yes, please see attachment 3 and attachment 8.
10	**Improve the overall, long-term management of California groundwater resources?**	Yes
	Examples are not limited to, but may include: - Reduce extraction of non-renewable groundwater? - Promote aquifer storage or recharge?	Yes, please see attachment 3 and attachment 8.
11	**Reduce demand for net diversions for the regions from the Delta?**	Yes
12	**Provide a long-term solution in place of a short-term one?**	Yes
13	**Promote energy savings or replace fossil fuel based energy sources with renewable energy and resources?**	Yes
	Examples are not limited to, but may include: - Reduce net energy use on a permanent basis? - Increase renewable energy production? - Include new buildings or modify buildings to include certified LEED features? - Provide a net increase in recycling or reuse of materials? - Replace unsustainable land or water management practices with recognized sustainable practices?	Yes, please see attachment 3 and attachment 8.
14	**Improve water supply reliability in ways not quantified in Attachment 7?**	Yes
	Examples are not limited to, but may include: - Provide a more flexible mix of water sources? - Reduce likelihood of catastrophic supply outages? - Reduce supply uncertainty? - Reduce supply variability?	
15	**Other (If the above listed categories do not apply, provide non-monetized benefit description)?**	N/A

Table 15 – Annual Benefit (All benefits should be in 2012 dollars) Project: San Sevaine Ground Water Recharge Basin Improvements Project									
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
Year	Type of Benefit	Measure of Benefit (Units)	Without Project	With Project (1)	Change Resulting from Project (e) – (d)	Unit $ Value (2)	Annual $ Value (f) x (g)	Discount Factor	Discounted Benefits (h) x (i)
2012							$0	1.000	**$0**
2013							$0	0.943	**$0**
2014							$0	0.890	**$0**
2015	Increased Groundwater Recharge	Acre-Feet	0	4,850	4,850	$250	$1,212,500	0.840	**$1,018,038**
2016	Increased Groundwater Recharge	Acre-Feet	0	4,850	4,850	$250	$1,212,500	0.792	**$960,414**
2017	Increased Groundwater Recharge	Acre-Feet	0	4,850	4,850	$250	$1,212,500	0.747	**$906,051**
2018	Increased Groundwater Recharge	Acre-Feet	0	4,850	4,850	$250	$1,212,500	0.705	**$854,765**
2019	Increased Groundwater Recharge	Acre-Feet	0	4,850	4,850	$250	$1,212,500	0.665	**$806,382**
2020	Increased Groundwater Recharge	Acre-Feet	0	4,850	4,850	$250	$1,212,500	0.627	**$760,738**
2021	Increased Groundwater Recharge	Acre-Feet	0	4,850	4,850	$250	$1,212,500	0.592	**$717,677**
2022	Increased Groundwater Recharge	Acre-Feet	0	4,850	4,850	$250	$1,212,500	0.558	**$677,054**
2023	Increased Groundwater Recharge	Acre-Feet	0	4,850	4,850	$250	$1,212,500	0.527	**$638,730**
2024	Increased Groundwater Recharge	Acre-Feet	0	4,850	4,850	$250	$1,212,500	0.497	**$602,575**
2025	Increased Groundwater Recharge	Acre-Feet	0	4,850	4,850	$250	$1,212,500	0.469	**$568,467**
2026	Increased Groundwater Recharge	Acre-Feet	0	4,850	4,850	$250	$1,212,500	0.442	**$536,290**
2027	Increased Groundwater Recharge	Acre-Feet	0	4,850	4,850	$250	$1,212,500	0.417	**$505,934**
2028	Increased Groundwater Recharge	Acre-Feet	0	4,850	4,850	$250	$1,212,500	0.394	**$477,296**
2029	Increased Groundwater Recharge	Acre-Feet	0	4,850	4,850	$250	$1,212,500	0.371	**$450,279**
2030	Increased Groundwater Recharge	Acre-Feet	0	4,850	4,850	$250	$1,212,500	0.350	**$424,792**
2031	Increased Groundwater Recharge	Acre-Feet	0	4,850	4,850	$250	$1,212,500	0.331	**$400,747**
2032	Increased Groundwater Recharge	Acre-Feet	0	4,850	4,850	$250	$1,212,500	0.312	**$378,063**
2033	Increased Groundwater Recharge	Acre-Feet	0	4,850	4,850	$250	$1,212,500	0.294	**$356,663**
2034	Increased Groundwater Recharge	Acre-Feet	0	4,850	4,850	$250	$1,212,500	0.278	**$336,475**
2035	Increased Groundwater Recharge	Acre-Feet	0	4,850	4,850	$250	$1,212,500	0.262	**$317,429**
2036	Increased Groundwater Recharge	Acre-Feet	0	4,850	4,850	$250	$1,212,500	0.247	**$299,461**
2037	Increased Groundwater Recharge	Acre-Feet	0	4,850	4,850	$250	$1,212,500	0.233	**$282,511**
2038	Increased Groundwater Recharge	Acre-Feet	0	4,850	4,850	$250	$1,212,500	0.220	**$266,520**
2039	Increased Groundwater Recharge	Acre-Feet	0	4,850	4,850	$250	$1,212,500	0.207	**$251,434**
2040	Increased Groundwater Recharge	Acre-Feet	0	4,850	4,850	$250	$1,212,500	0.196	**$237,202**
2041	Increased Groundwater Recharge	Acre-Feet	0	4,850	4,850	$250	$1,212,500	0.185	**$223,775**
2042	Increased Groundwater Recharge	Acre-Feet	0	4,850	4,850	$250	$1,212,500	0.174	**$211,109**
2043	Increased Groundwater Recharge	Acre-Feet	0	4,850	4,850	$250	$1,212,500	0.164	**$199,159**
2044	Increased Groundwater Recharge	Acre-Feet	0	4,850	4,850	$250	$1,212,500	0.155	**$187,886**
								Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)	**$14,853,914**

Comments:

(1) The project is expected to increase recharge by approximately 4,500 AFY of recycled water and 350 AFY of stormwater.

(2) Valuation based on estimated cost of purchasing groundwater that is not part of a cooperative recharge program.

Table 19 – Annual Costs of Project

(All costs should be in 2012 Dollars)

Project: San Sevaine Ground Water Recharge Basin Improvements Project

	Initial Costs Grand Total Cost from Table 7 (row (i), column	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)
2012	$0	$0						$0	1.000	**$0**
2013	$1,000,000	$428,571						$1,428,571	0.943	**$1,347,709**
2014	$750,000	$321,429						$1,071,429	0.890	**$953,568**
2015	$0	$0						$0	0.840	**$0**
2016	$0	$0						$0	0.792	**$0**
2017	$0	$0						$0	0.747	**$0**
2018	$0	$0						$0	0.705	**$0**
2019	$0	$0						$0	0.665	**$0**
2020	$0	$0						$0	0.627	**$0**
2021	$0	$0						$0	0.592	**$0**
2022	$0	$0						$0	0.558	**$0**
2023	$0	$0						$0	0.527	**$0**
2024	$0	$0						$0	0.497	**$0**
2025	$0	$0						$0	0.469	**$0**
2026	$0	$0						$0	0.442	**$0**
2027	$0	$0						$0	0.417	**$0**
2028	$0	$0						$0	0.394	**$0**
2029	$0	$0						$0	0.371	**$0**
2030	$0	$0						$0	0.350	**$0**
2031	$0	$0						$0	0.331	**$0**
2032	$0	$0						$0	0.312	**$0**
2033	$0	$0						$0	0.294	**$0**
2034	$0	$0						$0	0.278	**$0**
2035	$0	$0						$0	0.262	**$0**
2036	$0	$0						$0	0.247	**$0**
2037	$0	$0						$0	0.233	**$0**
2038	$0	$0						$0	0.220	**$0**
2039	$0	$0						$0	0.207	**$0**
2040	$0	$0						$0	0.196	**$0**
2041	$0	$0						$0	0.185	**$0**
2042	$0	$0						$0	0.174	**$0**
2043	$0	$0						$0	0.164	**$0**
2044	$0	$0						$0	0.155	**$0**
								Total Present Value of Discounted Costs (Sum of column (j)) Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries		**$2,301,277**

Comments:

(1) Based on opportunity costs, sunk costs, and associated costs

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

COSTS AND BENEFITS SUMMARY

Table 20 summarizes the costs and benefits for the Project.

Table 20 – Proposal Benefits and Costs Summary Proposal: San Sevaine Ground Water Recharge Basin Improvements Project Agency: IEUA							
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	Total		
(a)	(b)	(c)	(d)	(e)	(f) = (d) + (e)	(g)	(h)
		$2,301,277	$14,853,914	$0	$14,853,914		
(1) From Table 19, or RWMG method							
(2) From Table 15 or RWMG method							

Adopted Water Rates & Charges

Historical Water Rates

Effective January 1st	2012	2013	2014
Tier 1 Supply Rate ($/AF)	$106	$140	$148
Delta Supply Surcharge ($/AF)	$58	*	*
Tier 2 Supply Rate ($/AF)	$290	$290	$290
System Access Rate ($/AF)	$217	$223	$243
Water Stewardship Rate ($/AF)	$43	$41	$41
System Power Rate ($/AF)	$136	$189	$161
Full Service Untreated Volumetric Cost ($/AF)			
Tier 1	$560	$593	$593
Tier 2	$686	$743	$735
Replenishment Water Rate: untreated ($/AF)	$442	**	**
Interim Agricultural Water Program: untreated ($/AF)	$537	***	***
Treatment Surcharge ($/AF)	$234	$254	$297
Full Service Treated Volumetric Cost ($/AF)			
Tier 1	$794	$847	$890
Tier 2	$920	$997	$1,032
Treated Replenishment Water Rate ($/AF)	$651	**	**
Treated Interim Agricultural Water Program ($/AF)	$765	***	***
Readiness-to-Serve Charge (millions of dollars)	$146	$142	$166
Capacity Charge ($/cfs)	$7,400	$6,400	$8,600

* The Delta Supply Surcharge will be suspended after 2012
** Discussions on the replenishment program are continuing with the Member Agencies
*** The Interim Agricultural Water Program will be discontinued after 2012

Definitions

Tier 1 Supply Rate - recovers the of cost of maintaining a reliable amount of supply.

Delta Supply Surcharge - reflects the additional supply costs that Metropolitan faces along with other costs due to the pumping restrictions on the State Water Project.

Tier 2 Supply Rate - set at Metropolitan's cost of developing additional supply to encourage efficient use of local resources.

System Access Rate – recovers a portion of the costs associated with the delivery of supplies.

System Power Rate – recovers Metropolitan's power costs for pumping supplies to Southern California.

Water Stewardship Rate – recovers the cost of Metropolitan's financial commitment to conservation, water recycling, groundwater clean-up and other local resource management programs.

Replenishment Water Rate – a discounted rate for surplus system supplies available for the purpose of replenishing local storage.

Treated Replenishment Water Rate – a discounted rate for surplus system supplies available for the purpose of replenishing local storage.

Interim Agricultural Water Rate – discounted rate for surplus system supplies available for the purpose of growing agricultural, horticultural, or floricultural products.

Treated Interim Agricultural Water Program Rate – discounted rate for surplus system supplies available for the purpose of growing agricultural, horticultural, or floricultural products.

Treatment Surcharge – recovers the costs of treating imported water.

Readiness-to-Serve Charge - a fixed charge that recovers the cost of the portion of system capacity that is on standby to provide emergency service and operational flexibility.

Capacity Charge – the capacity charge recovers the cost of providing peak capacity within the distribution system.

Page updated: April 19, 2012

Air Resources Board

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Matthew Rodriquez
Secretary for Environmental Protection

Edmund G. Brown Jr.
Governor

2013 Annual Auction Reserve Price Notice

California Cap-and-Trade Program Greenhouse Gas Allowance Auctions

Issued on December 3, 2012

Updated on January 15, 2013

Auction Summary

This document, *2013 Annual Auction Reserve Price Notice,* specifies the 2013 Auction Reserve Price and the number of allowances to be auctioned in 2013 for the quarterly auctions as part of the Current Auction and Advance Auction. The 2013 quarterly GHG allowance auctions will offer 2013 vintage allowances and 2016 vintage allowances for sale.

The 2013 Auction Reserve Price and the annual budget of 2013 and 2016 vintage allowances for sale in 2013, is shown in Table 1 below.

Table 1: 2013 Auction Data

Auction Data Description	Auction Data
Auction Reserve Price	$10.71
Number of allowances to be auctioned in 2013 (2013 Vintage)	~~56,848,885*~~ 57,628,254
Number of advance allowances to be auctioned in 2013 (2016 Vintage)	38,240,000

~~* Amount could increase based on additional consignment from POUs as described in this notice.~~

The Auction Reserve Price

The Auction Reserve Price is a predetermined minimum price at which allowances will be sold to auction participants. The 2012 Auction Reserve Price was $10. Section 95911 of the Cap-and-Trade Regulation stipulates that the "Auction Reserve Price in U.S. dollars shall be the U.S. dollar Auction Reserve Price for the previous calendar year increased annually by 5 percent plus the rate of inflation as measured by the most recently available twelve months of the Consumer Price Index for All Urban Consumers." The rate of inflation used to calculate the 2013 Auction Reserve Price is 2.16 percent.

Current Auction Budget

The current auction budget describes the minimum number of current year vintage allowances to be sold in 2013. This number includes the State-owned allowances (approximately

10,600,000) and the remaining allowances to be consigned by the electricity distribution utilities. Some public owned utilities (POUs) were provided the flexibility to defer providing direction until January 1, 2013, on how to distribute their allowances between their Compliance and Limited Use Holding Accounts. ~~These deferred allowances total approximately 6,700,000. These are not included in the minimum 2013 annual auction budget. Once ARB receives direction from all of the remaining POUs, this notice will be updated to reflect the final 2013 annual auction budget presented in Table 1~~. ARB has now received direction from all POUs on how to distribute their allowances and Table 1 has been updated to reflect the final annual auction budget for 2013 vintage allowances. **This annual budget update does not change the amount of 2013 vintage allowances for sale in the February 19 auction.** Twenty-five percent of the State-owned allowances will be available at each auction. Utilities are required to notify ARB 75 days before each auction of the number of allowances they intend to consign. The total number of allowances to be auctioned in each auction will be published in the auction notice 60 days in advance. Utility allowances not consigned in the first three auctions will be included in the November 19, 2013 auction.

Advance Auction Budget

The advance auction budget represents ten percent of the allowances from the budget year three years subsequent to the current calendar year. Since the annual allowance budget of 2016 is 382,400,000, the advance auction budget for 2013 is 38,240,000. These allowances will be equally divided for sale across the four auctions in 2013.

2013 Quarterly Auction Dates

An *Auction Notice* with instructions on how to participate will be published 60 days prior to each auction. The *Auction Notice* provides information about eligibility, auction format, and GHG allowances to be auctioned for the applicable quarterly auction.

Table 2 provides additional information specific to the scheduled quarterly auctions.

Table 2: 2013 Quarterly Auction Critical Dates

Auction Consignment Due Date for EDUs	Auction Notice Posting Date	Auction Application Due Date	Auction Dates
12/6/2012	12/21/2012	1/22/2013	2/19/2013
3/4/2013	3/18/2013	4/16/2013	5/16/2013
6/3/2013	6/17/2013	7/17/2013	8/16/2013
9/5/2013	9/20/2013	10/21/2013	11/19/2013

Contact Information

For further information about participation in the 2013 auctions, please contact:
Mr. Chuck Seidler at (916) 324-0931 or cseidler@arb.ca.gov.

Updated on January 15, 2013

Project H: Corona/Home Gardens Well Rehabilitation and Multi-Jurisdictional Water Transmission Line Project (City of Corona)

Tables 9(a), 9(b), 12, 15(a), 15(b), 19, and 20 are included in this document to quantify water supply costs and benefits, as well as other benefits, for the Corona Home Gardens Well Rehabilitation and Multi-Jurisdictional Water Transmission Line (the "Project"). Narrative supporting the tables is provided below:

I. Narrative Description of the Project's Economic Costs

The Project's economic costs consist of costs contained in the Project budget (Attachment 4), as well as annual administration, maintenance, and replacement costs associated with the Project.

Although there are pumping costs associated with moving the water from the Project to end users, these costs would also be incurred using water purchased from the State Water Project ("SWP"). Since these costs offset each other, they were not included in the analysis.

II. Cost Details

Budget categories (a) through (h) are included in the cost details as described in Table 7.

III. Estimates of Without-Project conditions; e.g. Current and Future Water Supplies and Demand.

In the current condition, water shortages in the City of Corona (the "City") are creating the need to purchase water from the SWP. As a result, the City of Corona Department of Water and Power ("DWP") is partnering with the Home Gardens County Water District ("District") to replace one inactive, non-potable ground water well with two new wells.

IV. Estimates of With-Project Conditions; e.g. Improvements in New Water Supplies Made Available to Meet Demand

As a result of their combined efforts, this Project will produce 1,600 acre feet per year ("AFY") of water that was previously untapped and unavailable. For reference, the District has roughly 800 metered connections for a population of close to 3,000 people. It is estimated that 1,600 AFY equates to the annual water consumption for 10,000 people. This water supply is estimated to provide enough water for 100% of the District's metered population through 2030 plus additional water for 7,000 people in Corona. <u>Without this Project, this water source will remain unavailable for use by DWP and/or the District</u>.

Additionally, the use of local groundwater in lieu of SWP water will reduce the volume of greenhouse gas emissions by a factor of 3.39. By utilizing local groundwater in lieu of SWP water, there will be a reduction of 1,029 tons of carbon dioxide, 85.92 pounds of methane, and 22.96 pounds of nitrous oxide released into the atmosphere annually. These pollution reductions will occur by reductions in the amount of energy that would have been used to pump this same amount of imported water over the Tehachapi Mountains and into Southern California.

V. Description of Methods used to Estimate Without- and With-Project Conditions.

With and without Project conditions are based on discussions with the Project engineer, the City, DWP, the District, and various Project proponents, as well as information contained in the attached Exhibits described below.

VI. Description of the Distribution of Local, Regional, and Statewide Benefits

Benefits are primarily local in nature. However, any reduction in demand on SWP water will benefit water agencies throughout the state whose need for additional water exceeds that of DWP and the District.

VII. Identification of Beneficiaries

DWP, the District, all local water users and rate payers, Metropolitan Water District, and all urban water suppliers intending to purchase SWP water in the future.

VIII. When the Benefits will be Received

The benefits will be realized as of the completion date of the Project, when the wells and pipelines are capable of treating the high-nitrate, non-potable groundwater which is currently produced at the site (a nitrate-removal system will be installed and the well water from the District site will be blended with DWP's existing well-water collection system). The blended water will meet the regulatory standards of the Environmental Protection Agency and the California Department of Health Services. The District will also benefit from the pipeline through a water-purchase agreement that is currently being negotiated between DWP and the District.

IX. Uncertainty of the Benefits

The benefits were calculated based on monitoring of dry weather flows. There will be variation in these flows, but it is expected that the demand for non-potable water will not exceed the amount extracted from the groundwater wells.

X. Description of any Adverse Effects

N/A

XI. Narrative Discussion that Describes, Qualifies, and Supports the Values Entered in the Tables

Water valuation is based on the Tier 1 full service treated volumetric cost for 2014, which is the actual amount paid by DWP, the District, and other local entities to purchase SWP water for designated uses and purposes.

Greenhouse gas ("GHG") valuation is based on 2013 Reserve Price Notices published by the California Environmental Protection Agency Air Resources Board ("ARB") as part of the State's Cap-and-Trade Program. The program is a central element of California's Global Warming Solutions Act (AB 32) and covers major sources of GHG emissions in the State such as refineries, power plants, industrial facilities, and transportation fuels. The regulation includes an enforceable GHG cap that will decline over time. ARB will distribute allowances, which are tradable permits, equal to the emission allowed under the cap. Not only do ARB auctions generally curtail the production of GHGs, but they also raise substantial funds for the State. *See* "California's First Carbon-Credit Auction Raises $290 Million," Los Angeles Times, November 20, 2012.

Estimated administration, operations, maintenance, and replacement costs for the Project are based on discussions with DWP, the District, and maintenance data collected by David Taussig & Associates, Inc. for comparable projects.

XII. Documentation to Support Information Presented

See the following attached:

Exhibit A *- Metropolitan Water District Rates and Charges*

Exhibit B *– 2013 Annual Auction Reserve Price Notice; California Cap-and-Trade Program Greenhouse Gas Allowance Auctions, Updated on January 15, 2013*

Table 12 – Non-monetized Benefits Checklist		
No.	**Question**	**Enter "Yes", "No" or "Neg"**
	Community/Social Benefits **Will the proposal**	
1	**Provide education or technology benefits?**	No
	Examples are not limited to, but may include: - Include educational features that should result in water supply, water quality, or flood damage reduction benefits? - Develop, test, or document a new technology for water supply, water quality, or flood damage reduction management? - Provide some other education or technological benefit?	
2	**Provide social recreation or access benefits?**	No
	Examples are not limited to, but may include: - Provide new or improved outdoor recreation opportunities? - Provide more access to open space? - Provide some other recreation or public access benefit?	
3	**Help avoid, reduce or resolve various public water resources conflicts?**	Yes
	Examples are not limited to, but may include: - Provide more opportunities for public involvement in water management? - Help avoid or resolve an existing conflict as evidenced by recurring fines or litigation? - Help meet an existing state mandate (e.g., water quality, water conservation, flood control)?	Yes, please see attachment 3 and attachment 8.
4	**Promote social health and safety?**	Yes
	Examples are not limited to, but may include: - Increase urban water supply reliability for fire-fighting and critical services following seismic events? - Reduce risk to life from dam failure or flooding? - Reduce exposure to water-related hazards?	Yes, please see attachment 3 and attachment 8.
5	**Have other social benefits?**	Yes
	Examples are not limited to, but may include: - Redress or increase inequitable distribution of environmental burdens? - Have disproportionate beneficial or adverse effects on disadvantaged communities, Native Americans, or other distinct cultural groups?	Yes, please see attachment 3 and attachment 8.
	Environmental Stewardship Benefits: **Will the proposal**	
6	**Benefit wildlife or habitat in ways that were not quantified in Attachment 7?**	No
	Examples are not limited to, but may include: - Cause an increase in the amount or quality of terrestrial, aquatic, riparian or wetland habitat? - Contribute to an existing biological opinion or recovery plan for a listed special status species? - Preserve or restore designated critical habitat of a listed species? - Enhance wildlife protection or habitat?	
7	**Improve water quality in ways that were not quantified in Attachment 7?**	Yes
	Examples are not limited to, but may include: - Cause an improvement in water quality in an impaired water body or sensitive habitat? - Prevent water quality degradation? - Cause some other improvement in water quality?	Yes, please see attachment 3 and attachment 8.
8	**Reduce net emissions in ways that were not quantified in Attachment 7?**	Yes
	Examples are not limited to, but may include: - Reduce net production of greenhouse gasses? - Reduce net emissions of other harmful chemicals into the air or water?	Yes, please see attachment 3 and attachment 8.
9	**Provide other environmental stewardship benefits, other than those claimed in Sections D1, D3, or D4?**	Yes
	Sustainability Benefits: **Will the proposal**	Yes, please see attachment 3 and attachment 8.
10	**Improve the overall, long-term management of California groundwater resources?**	Yes
	Examples are not limited to, but may include: - Reduce extraction of non-renewable groundwater? - Promote aquifer storage or recharge?	Yes, please see attachment 3 and attachment 8.
11	**Reduce demand for net diversions for the regions from the Delta?**	Yes
12	**Provide a long-term solution in place of a short-term one?**	Yes
13	**Promote energy savings or replace fossil fuel based energy sources with renewable energy and resources?**	Yes
	Examples are not limited to, but may include: - Reduce net energy use on a permanent basis? - Increase renewable energy production? - Include new buildings or modify buildings to include certified LEED features? - Provide a net increase in recycling or reuse of materials? - Replace unsustainable land or water management practices with recognized sustainable practices?	Yes, please see attachment 3 and attachment 8.
14	**Improve water supply reliability in ways not quantified in Attachment 7?**	Yes
	Examples are not limited to, but may include: - Provide a more flexible mix of water sources? - Reduce likelihood of catastrophic supply outages? - Reduce supply uncertainty? - Reduce supply variability?	
15	**Other (If the above listed categories do not apply, provide non-monetized benefit description)?**	N/A

Table 9 (a) – Annual Project Physical Benefits			
Project Name: Corona Home Gardens Well Rehabilitation and Multi-Jurisdictional Water Transmission Line			
Type of Benefit Claimed: New Water Supply			
Measure of Benefit Claimed (Name of Units): Acre-Feet			
Additional Information About this Measure: Acre-Feet of New Water Supplied to the System			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Increase in Water Supply Resulting from Project (c) – (b)
2012	0	0	0
2013	0	0	0
2014	0	0	0
2015	0	1,600	1,600
2016	0	1,600	1,600
2017	0	1,600	1,600
2018	0	1,600	1,600
2019	0	1,600	1,600
2020	0	1,600	1,600
2021	0	1,600	1,600
2022	0	1,600	1,600
2023	0	1,600	1,600
2024	0	1,600	1,600
2025	0	1,600	1,600
2026	0	1,600	1,600
2027	0	1,600	1,600
2028	0	1,600	1,600
2029	0	1,600	1,600
2030	0	1,600	1,600
2031	0	1,600	1,600
2032	0	1,600	1,600
2033	0	1,600	1,600
2034	0	1,600	1,600
2035	0	1,600	1,600
2036	0	1,600	1,600
2037	0	1,600	1,600
2038	0	1,600	1,600
2039	0	1,600	1,600
2040	0	1,600	1,600
2041	0	1,600	1,600
2042	0	1,600	1,600
2043	0	1,600	1,600
2044	0	1,600	1,600
Comments:			

Table 9 (b) – Annual Project Physical Benefits			
Project Name: Corona Home Gardens Well Rehabilitation and Multi-Jurisdictional Water Transmission Line			
Type of Benefit Claimed: Reduced Greenhouse Gas Emissions			
Measure of Benefit Claimed (Name of Units): Metric Tons			
Additional Information About this Measure: Metric Tons of Greenhouse Gases Emission			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Increase in Water Supply Resulting from Project (c) – (b)
2012	0	0	0
2013	0	0	0
2014	0	0	0
2015	0	1,029	1,029
2016	0	1,029	1,029
2017	0	1,029	1,029
2018	0	1,029	1,029
2019	0	1,029	1,029
2020	0	1,029	1,029
2021	0	1,029	1,029
2022	0	1,029	1,029
2023	0	1,029	1,029
2024	0	1,029	1,029
2025	0	1,029	1,029
2026	0	1,029	1,029
2027	0	1,029	1,029
2028	0	1,029	1,029
2029	0	1,029	1,029
2030	0	1,029	1,029
2031	0	1,029	1,029
2032	0	1,029	1,029
2033	0	1,029	1,029
2034	0	1,029	1,029
2035	0	1,029	1,029
2036	0	1,029	1,029
2037	0	1,029	1,029
2038	0	1,029	1,029
2039	0	1,029	1,029
2040	0	1,029	1,029
2041	0	1,029	1,029
2042	0	1,029	1,029
2043	0	1,029	1,029
2044	0	1,029	1,029
Comments:			

Table 15 (a) – Annual Benefit

(All benefits should be in 2012 dollars)

Project: Corona Home Gardens Well Rehabilitation and Multi-Jurisdictional Water Transmission Line

(a) Year	(b) Type of Benefit	(c) Measure of Benefit (Units)	(d) Without Project	(e) With Project	(f) Change Resulting from Project (e) – (d)	(g) Unit $ Value [1]	(h) Annual $ Value (f) x (g)	(i) Discount Factor (6%)	(j) Discounted Benefits (h) x (i)
2012			0	0	0	$920	$0	1.000	**$0**
2013			0	0	0	$920	$0	0.943	**$0**
2014			0	0	0	$920	$0	0.890	**$0**
2015	Reduced Importation	Acre-Feet	0	1,600	1,600	$920	$1,472,720	0.840	**$1,236,524**
2016	Reduced Importation	Acre-Feet	0	1,600	1,600	$920	$1,472,720	0.792	**$1,166,532**
2017	Reduced Importation	Acre-Feet	0	1,600	1,600	$920	$1,472,720	0.747	**$1,100,502**
2018	Reduced Importation	Acre-Feet	0	1,600	1,600	$920	$1,472,720	0.705	**$1,038,209**
2019	Reduced Importation	Acre-Feet	0	1,600	1,600	$920	$1,472,720	0.665	**$979,443**
2020	Reduced Importation	Acre-Feet	0	1,600	1,600	$920	$1,472,720	0.627	**$924,003**
2021	Reduced Importation	Acre-Feet	0	1,600	1,600	$920	$1,472,720	0.592	**$871,701**
2022	Reduced Importation	Acre-Feet	0	1,600	1,600	$920	$1,472,720	0.558	**$822,359**
2023	Reduced Importation	Acre-Feet	0	1,600	1,600	$920	$1,472,720	0.527	**$775,811**
2024	Reduced Importation	Acre-Feet	0	1,600	1,600	$920	$1,472,720	0.497	**$731,897**
2025	Reduced Importation	Acre-Feet	0	1,600	1,600	$920	$1,472,720	0.469	**$690,469**
2026	Reduced Importation	Acre-Feet	0	1,600	1,600	$920	$1,472,720	0.442	**$651,385**
2027	Reduced Importation	Acre-Feet	0	1,600	1,600	$920	$1,472,720	0.417	**$614,515**
2028	Reduced Importation	Acre-Feet	0	1,600	1,600	$920	$1,472,720	0.394	**$579,731**
2029	Reduced Importation	Acre-Feet	0	1,600	1,600	$920	$1,472,720	0.371	**$546,916**
2030	Reduced Importation	Acre-Feet	0	1,600	1,600	$920	$1,472,720	0.350	**$515,958**
2031	Reduced Importation	Acre-Feet	0	1,600	1,600	$920	$1,472,720	0.331	**$486,753**
2032	Reduced Importation	Acre-Feet	0	1,600	1,600	$920	$1,472,720	0.312	**$459,201**
2033	Reduced Importation	Acre-Feet	0	1,600	1,600	$920	$1,472,720	0.294	**$433,209**
2034	Reduced Importation	Acre-Feet	0	1,600	1,600	$920	$1,472,720	0.278	**$408,687**
2035	Reduced Importation	Acre-Feet	0	1,600	1,600	$920	$1,472,720	0.262	**$385,554**
2036	Reduced Importation	Acre-Feet	0	1,600	1,600	$920	$1,472,720	0.247	**$363,730**
2037	Reduced Importation	Acre-Feet	0	1,600	1,600	$920	$1,472,720	0.233	**$343,142**
2038	Reduced Importation	Acre-Feet	0	1,600	1,600	$920	$1,472,720	0.220	**$323,719**
2039	Reduced Importation	Acre-Feet	0	1,600	1,600	$920	$1,472,720	0.207	**$305,395**
2040	Reduced Importation	Acre-Feet	0	1,600	1,600	$920	$1,472,720	0.196	**$288,108**
2041	Reduced Importation	Acre-Feet	0	1,600	1,600	$920	$1,472,720	0.185	**$271,800**
2042	Reduced Importation	Acre-Feet	0	1,600	1,600	$920	$1,472,720	0.174	**$256,415**
2043	Reduced Importation	Acre-Feet	0	1,600	1,600	$920	$1,472,720	0.164	**$241,901**
2044	Reduced Importation	Acre-Feet	0	1,600	1,600	$920	$1,472,720	0.155	**$228,209**
								Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)	**$18,041,778**

Comments:

(1) Water valuation is based on the Tier 1 full service treated volumetric cost for 2014, which is the actual amount paid by the City of Corona and other local entities to purchase State Water Project ("SWP") water for designated uses and purposes.

Table 15 (b) – Annual Benefit

(All benefits should be in 2012 dollars)

Project: Corona Home Gardens Well Rehabilitation and Multi-Jurisdictional Water Transmission Line

(a) Year	(b) Type of Benefit	(c) Measure of Benefit (Units)	(d) Without Project	(e) With Project	(f) Change Resulting from Project (e) – (d)	(g) Unit $ Value (1)	(h) Annual $ Value (f) x (g)	(i) Discount Factor (6%)	(j) Discounted Benefits (h) x (i)
2012							$0	1.000	$0
2013							$0	0.943	$0
2014							$0	0.890	$0
2015	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,029	1,029	$11	$11,021	0.840	$9,253
2016	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,029	1,029	$11	$11,021	0.792	$8,729
2017	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,029	1,029	$11	$11,021	0.747	$8,235
2018	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,029	1,029	$11	$11,021	0.705	$7,769
2019	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,029	1,029	$11	$11,021	0.665	$7,329
2020	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,029	1,029	$11	$11,021	0.627	$6,914
2021	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,029	1,029	$11	$11,021	0.592	$6,523
2022	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,029	1,029	$11	$11,021	0.558	$6,154
2023	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,029	1,029	$11	$11,021	0.527	$5,806
2024	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,029	1,029	$11	$11,021	0.497	$5,477
2025	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,029	1,029	$11	$11,021	0.469	$5,167
2026	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,029	1,029	$11	$11,021	0.442	$4,874
2027	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,029	1,029	$11	$11,021	0.417	$4,599
2028	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,029	1,029	$11	$11,021	0.394	$4,338
2029	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,029	1,029	$11	$11,021	0.371	$4,093
2030	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,029	1,029	$11	$11,021	0.350	$3,861
2031	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,029	1,029	$11	$11,021	0.331	$3,642
2032	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,029	1,029	$11	$11,021	0.312	$3,436
2033	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,029	1,029	$11	$11,021	0.294	$3,242
2034	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,029	1,029	$11	$11,021	0.278	$3,058
2035	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,029	1,029	$11	$11,021	0.262	$2,885
2036	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,029	1,029	$11	$11,021	0.247	$2,722
2037	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,029	1,029	$11	$11,021	0.233	$2,568
2038	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,029	1,029	$11	$11,021	0.220	$2,422
2039	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,029	1,029	$11	$11,021	0.207	$2,285
2040	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,029	1,029	$11	$11,021	0.196	$2,156
2041	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,029	1,029	$11	$11,021	0.185	$2,034
2042	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,029	1,029	$11	$11,021	0.174	$1,919
2043	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,029	1,029	$11	$11,021	0.164	$1,810
2044	Reduced Greenhouse Gas Emissions	Metric Tons	0	1,029	1,029	$11	$11,021	0.155	$1,708
							Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)		$135,009

Comments:

(1) Greenhouse gas ("GHG") valuation is based on 2013 Reserve Price Notices published by the California Environmental Protection Agency Air Resources Board ("ARB") as part of the State's Cap-and-Trade Program.

Table 19 – Annual Costs of Project

(All costs should be in 2012 Dollars)

Project: Corona Home Gardens Well Rehabilitation and Multi-Jurisdictional Water Transmission Line

	Initial Costs Grand Total Cost from Table 7 (row (i), column	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)
2012	$0	$0						$0	1.000	**$0**
2013	$716,200	$302,800						$1,019,000	0.943	**$961,321**
2014	$5,304,200	$3,617,400						$8,921,600	0.890	**$7,940,192**
2015	$0	$0	$6,672	$166,800	$50,000	$192,812	$0	$416,284	0.840	**$349,520**
2016	$0	$0	$6,672	$166,800	$50,000	$192,812	$0	$416,284	0.792	**$329,736**
2017	$0	$0	$6,672	$166,800	$50,000	$192,812	$0	$416,284	0.747	**$311,072**
2018	$0	$0	$6,672	$166,800	$50,000	$192,812	$0	$416,284	0.705	**$293,464**
2019	$0	$0	$6,672	$166,800	$50,000	$192,812	$0	$416,284	0.665	**$276,853**
2020	$0	$0	$6,672	$166,800	$50,000	$192,812	$0	$416,284	0.627	**$261,182**
2021	$0	$0	$6,672	$166,800	$50,000	$192,812	$0	$416,284	0.592	**$246,398**
2022	$0	$0	$6,672	$166,800	$50,000	$192,812	$0	$416,284	0.558	**$232,451**
2023	$0	$0	$6,672	$166,800	$50,000	$192,812	$0	$416,284	0.527	**$219,293**
2024	$0	$0	$6,672	$166,800	$50,000	$192,812	$0	$416,284	0.497	**$206,880**
2025	$0	$0	$6,672	$166,800	$50,000	$192,812	$0	$416,284	0.469	**$195,170**
2026	$0	$0	$6,672	$166,800	$50,000	$192,812	$0	$416,284	0.442	**$184,123**
2027	$0	$0	$6,672	$166,800	$50,000	$192,812	$0	$416,284	0.417	**$173,701**
2028	$0	$0	$6,672	$166,800	$50,000	$192,812	$0	$416,284	0.394	**$163,869**
2029	$0	$0	$6,672	$166,800	$50,000	$192,812	$0	$416,284	0.371	**$154,593**
2030	$0	$0	$6,672	$166,800	$50,000	$192,812	$0	$416,284	0.350	**$145,843**
2031	$0	$0	$6,672	$166,800	$50,000	$192,812	$0	$416,284	0.331	**$137,587**
2032	$0	$0	$6,672	$166,800	$50,000	$192,812	$0	$416,284	0.312	**$129,799**
2033	$0	$0	$6,672	$166,800	$50,000	$192,812	$0	$416,284	0.294	**$122,452**
2034	$0	$0	$6,672	$166,800	$50,000	$192,812	$0	$416,284	0.278	**$115,521**
2035	$0	$0	$6,672	$166,800	$50,000	$192,812	$0	$416,284	0.262	**$108,982**
2036	$0	$0	$6,672	$166,800	$50,000	$192,812	$0	$416,284	0.247	**$102,813**
2037	$0	$0	$6,672	$166,800	$50,000	$192,812	$0	$416,284	0.233	**$96,994**
2038	$0	$0	$6,672	$166,800	$50,000	$192,812	$0	$416,284	0.220	**$91,503**
2039	$0	$0	$6,672	$166,800	$50,000	$192,812	$0	$416,284	0.207	**$86,324**
2040	$0	$0	$6,672	$166,800	$50,000	$192,812	$0	$416,284	0.196	**$81,438**
2041	$0	$0	$6,672	$166,800	$50,000	$192,812	$0	$416,284	0.185	**$76,828**
2042	$0	$0	$6,672	$166,800	$50,000	$192,812	$0	$416,284	0.174	**$72,479**
									Total Present Value of Discounted Costs (Sum of column (j))	**$13,868,380**
									Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries	

Comments:

(1) Based on opportunity costs, sunk costs, and associated costs. Cost of drilling two (2) wells at Home Gardens Site, and installing Resin Treatment processing at pipeline connection to well collection system to treat water.

(2) The incremental change in O&M costs attributable to the project. Replacement is based on straight line depreciation of total project costs (column a & b) for 50 year

COSTS AND BENEFITS SUMMARY

Table 20 summarizes the costs and benefits for the Project.

Table 20 – Proposal Benefits and Costs Summary

Proposal: Corona Home Gardens Well Rehabilitation and Multi-Jurisdictional Water Transmission Line

Agency: _____

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)
		$13,868,380	$18,176,788	$0	$18,176,788		

(1) From Table 19, or RWMG method

(2) From Table 15 or RWMG method

(3) From Table 18 or RWMG method

Adopted Water Rates & Charges

Historical Water Rates

Effective January 1st	2012	2013	2014
Tier 1 Supply Rate ($/AF)	$106	$140	$148
Delta Supply Surcharge ($/AF)	$58	*	*
Tier 2 Supply Rate ($/AF)	$290	$290	$290
System Access Rate ($/AF)	$217	$223	$243
Water Stewardship Rate ($/AF)	$43	$41	$41
System Power Rate ($/AF)	$136	$189	$161
Full Service Untreated Volumetric Cost ($/AF)			
Tier 1	$560	$593	$593
Tier 2	$686	$743	$735
Replenishment Water Rate: untreated ($/AF)	$442	**	**
Interim Agricultural Water Program: untreated ($/AF)	$537	***	***
Treatment Surcharge ($/AF)	$234	$254	$297
Full Service Treated Volumetric Cost ($/AF)			
Tier 1	$794	$847	$890
Tier 2	$920	$997	$1,032
Treated Replenishment Water Rate ($/AF)	$651	**	**
Treated Interim Agricultural Water Program ($/AF)	$765	***	***
Readiness-to-Serve Charge (millions of dollars)	$146	$142	$166
Capacity Charge ($/cfs)	$7,400	$6,400	$8,600

* The Delta Supply Surcharge will be suspended after 2012
** Discussions on the replenishment program are continuing with the Member Agencies
*** The Interim Agricultural Water Program will be discontinued after 2012

Definitions

Tier 1 Supply Rate - recovers the of cost of maintaining a reliable amount of supply.

Delta Supply Surcharge - reflects the additional supply costs that Metropolitan faces along with other costs due to the pumping restrictions on the State Water Project.

Tier 2 Supply Rate - set at Metropolitan's cost of developing additional supply to encourage efficient use of local resources.

System Access Rate – recovers a portion of the costs associated with the delivery of supplies.

System Power Rate – recovers Metropolitan's power costs for pumping supplies to Southern California.

Water Stewardship Rate – recovers the cost of Metropolitan's financial commitment to conservation, water recycling, groundwater clean-up and other local resource management programs.

Replenishment Water Rate – a discounted rate for surplus system supplies available for the purpose of replenishing local storage.

Treated Replenishment Water Rate – a discounted rate for surplus system supplies available for the purpose of replenishing local storage.

Interim Agricultural Water Rate – discounted rate for surplus system supplies available for the purpose of growing agricultural, horticultural, or floricultural products.

Treated Interim Agricultural Water Program Rate – discounted rate for surplus system supplies available for the purpose of growing agricultural, horticultural, or floricultural products.

Treatment Surcharge – recovers the costs of treating imported water.

Readiness-to-Serve Charge - a fixed charge that recovers the cost of the portion of system capacity that is on standby to provide emergency service and operational flexibility.

Capacity Charge – the capacity charge recovers the cost of providing peak capacity within the distribution system.

Page updated: April 19, 2012

Air Resources Board

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Matthew Rodriquez
Secretary for Environmental Protection

Edmund G. Brown Jr.
Governor

2013 Annual Auction Reserve Price Notice

California Cap-and-Trade Program Greenhouse Gas Allowance Auctions

Issued on December 3, 2012

Updated on January 15, 2013

Auction Summary

This document, *2013 Annual Auction Reserve Price Notice,* specifies the 2013 Auction Reserve Price and the number of allowances to be auctioned in 2013 for the quarterly auctions as part of the Current Auction and Advance Auction. The 2013 quarterly GHG allowance auctions will offer 2013 vintage allowances and 2016 vintage allowances for sale.

The 2013 Auction Reserve Price and the annual budget of 2013 and 2016 vintage allowances for sale in 2013, is shown in Table 1 below.

Table 1: 2013 Auction Data

Auction Data Description	Auction Data
Auction Reserve Price	$10.71
Number of allowances to be auctioned in 2013 (2013 Vintage)	~~56,848,885*~~ 57,628,254
Number of advance allowances to be auctioned in 2013 (2016 Vintage)	38,240,000

~~* Amount could increase based on additional consignment from POUs as described in this notice.~~

The Auction Reserve Price

The Auction Reserve Price is a predetermined minimum price at which allowances will be sold to auction participants. The 2012 Auction Reserve Price was $10. Section 95911 of the Cap-and-Trade Regulation stipulates that the "Auction Reserve Price in U.S. dollars shall be the U.S. dollar Auction Reserve Price for the previous calendar year increased annually by 5 percent plus the rate of inflation as measured by the most recently available twelve months of the Consumer Price Index for All Urban Consumers." The rate of inflation used to calculate the 2013 Auction Reserve Price is 2.16 percent.

Current Auction Budget

The current auction budget describes the minimum number of current year vintage allowances to be sold in 2013. This number includes the State-owned allowances (approximately

10,600,000) and the remaining allowances to be consigned by the electricity distribution utilities. Some public owned utilities (POUs) were provided the flexibility to defer providing direction until January 1, 2013, on how to distribute their allowances between their Compliance and Limited Use Holding Accounts. ~~These deferred allowances total approximately 6,700,000. These are not included in the minimum 2013 annual auction budget. Once ARB receives direction from all of the remaining POUs, this notice will be updated to reflect the final 2013 annual auction budget presented in Table 1~~. ARB has now received direction from all POUs on how to distribute their allowances and Table 1 has been updated to reflect the final annual auction budget for 2013 vintage allowances. **This annual budget update does not change the amount of 2013 vintage allowances for sale in the February 19 auction.** Twenty-five percent of the State-owned allowances will be available at each auction. Utilities are required to notify ARB 75 days before each auction of the number of allowances they intend to consign. The total number of allowances to be auctioned in each auction will be published in the auction notice 60 days in advance. Utility allowances not consigned in the first three auctions will be included in the November 19, 2013 auction.

Advance Auction Budget

The advance auction budget represents ten percent of the allowances from the budget year three years subsequent to the current calendar year. Since the annual allowance budget of 2016 is 382,400,000, the advance auction budget for 2013 is 38,240,000. These allowances will be equally divided for sale across the four auctions in 2013.

2013 Quarterly Auction Dates

An *Auction Notice* with instructions on how to participate will be published 60 days prior to each auction. The *Auction Notice* provides information about eligibility, auction format, and GHG allowances to be auctioned for the applicable quarterly auction.

Table 2 provides additional information specific to the scheduled quarterly auctions.

Table 2: 2013 Quarterly Auction Critical Dates

Auction Consignment Due Date for EDUs	Auction Notice Posting Date	Auction Application Due Date	Auction Dates
12/6/2012	12/21/2012	1/22/2013	2/19/2013
3/4/2013	3/18/2013	4/16/2013	5/16/2013
6/3/2013	6/17/2013	7/17/2013	8/16/2013
9/5/2013	9/20/2013	10/21/2013	11/19/2013

Contact Information

For further information about participation in the 2013 auctions, please contact:
Mr. Chuck Seidler at (916) 324-0931 or cseidler@arb.ca.gov.

Updated on January 15, 2013

Project I: Enhanced Stormwater Capture and Recharge along the Santa Ana River (San Bernardino Valley Municipal Water District)

Table 11 – Statement of Cost-Effectiveness Project name: _____	
Question 1	Types of benefits provided: Increased use of local stormwater, increase water supply reliability, improve water quality, possible reduction in imported water
Question 2	Have alternative methods of providing the same types and amounts of physical benefits as the proposed project been identified? Not that we are aware
	If no, why? This project takes local stormwater that arrives by gravity and stores it in the ground by gravity. All other alternatives would require energy to move the water making them more costly.
	If yes, list the methods (including the proposed project) and estimated costs.
Question 3.	If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods.
Comments:	

Table 12 – Non-monetized Benefits Checklist		
No.	**Question**	**Enter "Yes", "No" or "Neg"**
	Community/Social Benefits	
	Will the proposal	
1	**Provide education or technology benefits?**	**No**
	Examples are not limited to, but may include:	
	- Include educational features that should result in water supply, water quality, or flood damage reduction benefits?	
	- Develop, test, or document a new technology for water supply, water quality, or flood damage reduction management?	
	- Provide some other education or technological benefit?	
2	**Provide social recreation or access benefits?**	No
	Examples are not limited to, but may include:	
	- Provide new or improved outdoor recreation opportunities?	
	- Provide more access to open space?	
	- Provide some other recreation or public access benefit?	
3	**Help avoid, reduce or resolve various public water resources conflicts?**	**No**
	Examples are not limited to, but may include:	
	- Provide more opportunities for public involvement in water management?	
	- Help avoid or resolve an existing conflict as evidenced by recurring fines or litigation?	
	- Help meet an existing state mandate (e.g., water quality, water conservation, flood control)?	
4	**Promote social health and safety?**	No
	Examples are not limited to, but may include:	
	- Increase urban water supply reliability for fire-fighting and critical services following seismic events?	
	- Reduce risk to life from dam failure or flooding?	
	- Reduce exposure to water-related hazards?	
5	**Have other social benefits?**	No
	Examples are not limited to, but may include:	
	- Redress or increase inequitable distribution of environmental burdens?	
	- Have disproportionate beneficial or adverse effects on disadvantaged communities, Native Americans, or other distinct cultural groups?	
	Environmental Stewardship Benefits:	
	Will the proposal	
6	**Benefit wildlife or habitat in ways that were not quantified in Attachment 7?**	No
	Examples are not limited to, but may include:	
	- Cause an increase in the amount or quality of terrestrial, aquatic, riparian or wetland habitat?	
	- Contribute to an existing biological opinion or recovery plan for a listed special status species?	
	- Preserve or restore designated critical habitat of a listed species?	
	- Enhance wildlife protection or habitat?	
7	**Improve water quality in ways that were not quantified in Attachment 7?**	No
	Examples are not limited to, but may include:	
	- Cause an improvement in water quality in an impaired water body or sensitive habitat?	
	- Prevent water quality degradation?	
	- Cause some other improvement in water quality?	
8	**Reduce net emissions in ways that were not quantified in Attachment 7?**	No
	Examples are not limited to, but may include:	
	- Reduce net production of greenhouse gasses?	
	- Reduce net emissions of other harmful chemicals into the air or water?	
9	**Provide other environmental stewardship benefits, other than those claimed in Sections D1, D3, or D4?**	No
	Sustainability Benefits:	
	Will the proposal	
10	**Improve the overall, long-term management of California groundwater resources?**	Yes
	Examples are not limited to, but may include:	
	- Reduce extraction of non-renewable groundwater?	
	- Promote aquifer storage or recharge?	
11	**Reduce demand for net diversions for the regions from the Delta?**	possibly
12	**Provide a long-term solution in place of a short-term one?**	Yes
13	**Promote energy savings or replace fossil fuel based energy sources with renewable energy and resources?**	Yes
	Examples are not limited to, but may include:	To the extent that this water replaces the need for SWP water, it could result in an energy savings.
	- Reduce net energy use on a permanent basis?	
	- Increase renewable energy production?	
	- Include new buildings or modify buildings to include certified LEED features?	
	- Provide a net increase in recycling or reuse of materials?	
	- Replace unsustainable land or water management practices with recognized sustainable practices?	
14	**Improve water supply reliability in ways not quantified in Attachment 7?**	Yes
	Examples are not limited to, but may include:	Stores water in wet years for use during dry years
	- Provide a more flexible mix of water sources?	
	- Reduce likelihood of catastrophic supply outages?	
	- Reduce supply uncertainty?	
	- Reduce supply variability?	
15	**Other (If the above listed categories do not apply, provide non-monetized benefit description)?**	

Table 15 – Annual Benefit (All benefits should be in 2012 dollars) Project: Enhnaced Stormwater Capture and Recharge along the Santa Ana River									
(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	Water Supply	acre-ft	0	1,600	1,600	$194	$310,400	0.840	**$260,736**
	Greenhouse	metric ton	3,520	-	(3,520)				
2016	Water Supply	acre-ft	0	500	500	$194	$97,000	0.792	**$76,824**
	Greenhouse	metric ton	1,100	-	(1,100)				
2017	Water Supply	acre-ft	0	200	200	$194	$38,800	0.747	**$28,984**
	Greenhouse	metric ton	440	-	(440)				
2018	Water Supply	acre-ft	0	1,000	1,000	$194	$194,000	0.705	**$136,770**
	Greenhouse	metric ton	2,200	-	(2,200)				
2019	Water Supply	acre-ft	0	12,000	12,000	$194	$2,328,000	0.665	**$1,548,120**
	Greenhouse	metric ton	26,400	-	(26,400)				
2020	Water Supply	acre-ft	0	28,500	28,500	$194	$5,529,000	0.627	**$3,466,683**
	Greenhouse	metric ton	62,700	-	(62,700)				
2021	Water Supply	acre-ft	0	1,700	1,700	$194	$329,800	0.592	**$195,242**
	Greenhouse	metric ton	3,740	-	(3,740)				
2022	Water Supply	acre-ft	0	72,000	72,000	$194	$13,968,000	0.558	**$7,794,144**
	Greenhouse	metric ton	158,400	-	(158,400)				
2023	Water Supply	acre-ft	0	11,000	11,000	$194	$2,134,000	0.527	**$1,124,618**
	Greenhouse	metric ton	24,200	-	(24,200)				
2024	Water Supply	acre-ft	0	4,600	4,600	$194	$892,400	0.497	**$443,523**
	Greenhouse	metric ton	10,120	-	(10,120)				
2025	Water Supply	acre-ft	0	3,700	3,700	$194	$717,800	0.469	**$336,648**
	Greenhouse	metric ton	8,140	-	(8,140)				
2026	Water Supply	acre-ft	0	13,300	13,300	$194	$2,580,200	0.442	**$1,140,448**
	Greenhouse	metric ton	29,260	-	(29,260)				
2027	Water Supply	acre-ft	0	1,700	1,700	$194	$329,800	0.417	**$137,527**
	Greenhouse	metric ton	3,740	-	(3,740)				
2028	Water Supply	acre-ft	0	2,000	2,000	$194	$388,000	0.394	**$152,872**
	Greenhouse	metric ton	4,400	-	(4,400)				
2029	Water Supply	acre-ft	0	3,300	3,300	$194	$640,200	0.371	**$237,514**
	Greenhouse	metric ton	7,260	-	(7,260)				
2030	Water Supply	acre-ft	0	1,300	1,300	$194	$252,200	0.350	**$88,270**
	Greenhouse	metric ton	2,860	-	(2,860)				
2031	Water Supply	acre-ft	0	34,000	34,000	$194	$6,596,000	0.331	**$2,183,276**
	Greenhouse	metric ton	74,800	-	(74,800)				

2032	Water Supply	acre-ft	0	28,000	28,000	$194	$5,432,000	0.312	**$1,694,784**
	Greenhouse	metric ton	61,600	-	(61,600)				
2033	Water Supply	acre-ft	0	47,300	47,300	$194	$9,176,200	0.294	**$2,697,803**
	Greenhouse	metric ton	104,060	-	(104,060)				
2034	Water Supply	acre-ft	0	2,400	2,400	$194	$465,600	0.278	**$129,437**
	Greenhouse	metric ton	5,280	-	(5,280)				
2035	Water Supply	acre-ft	0	4,000	4,000	$194	$776,000	0.262	**$203,312**
	Greenhouse	metric ton	8,800	-	(8,800)				
2036	Water Supply	acre-ft	0	45,900	45,900	$194	$8,904,600	0.247	**$2,199,436**
	Greenhouse	metric ton	100,980	-	(100,980)				
2037	Water Supply	acre-ft	0	6,000	6,000	$194	$1,164,000	0.233	**$271,212**
	Greenhouse	metric ton	13,200	-	(13,200)				
2038	Water Supply	acre-ft	0	1,700	1,700	$194	$329,800	0.220	**$72,556**
	Greenhouse	metric ton	3,740	-	(3,740)				
2039	Water Supply	acre-ft	0	2,300	2,300	$194	$446,200	0.207	**$92,363**
	Greenhouse	metric ton	5,060	-	(5,060)				
2040	Water Supply	acre-ft	0	800	800	$194	$155,200	0.196	**$30,419**
	Greenhouse	metric ton	1,760	-	(1,760)				
2041	Water Supply	acre-ft	0	750	750	$194	$145,500	0.185	**$26,918**
	Greenhouse	metric ton	1,650		(1,650)				
2042	Water Supply	acre-ft	0	1,600	1,600	$194	$310,400	0.174	**$54,010**
	Greenhouse	metric ton	3,520		(3,520)				
2043	Water Supply	acre-ft	0	200	200	$194	$38,800	0.164	**$6,363**
	Greenhouse	metric ton	440		(440)				
2044	Water Supply	acre-ft	0	1,600	1,600	$194	$310,400	0.155	**$48,112**
	Greenhouse	metric ton	3,520		(3,520)				
2045	Water Supply	acre-ft	0	1,800	1,800	$194	$349,200	0.146	**$50,983**
	Greenhouse	metric ton	3,960		(3,960)				
2046	Water Supply	acre-ft	0	56,000	56,000	$194	$10,864,000	0.138	**$1,499,232**
	Greenhouse	metric ton	123,200		(123,200)				
2047	Water Supply	acre-ft	0	2,100	2,100	$194	$407,400	0.130	**$52,962**
	Greenhouse	metric ton	4,620		(4,620)				
2048	Water Supply	acre-ft	0	40,100	40,100	$194	$7,779,400	0.123	**$956,866**
	Greenhouse	metric ton	88,220		(88,220)				
2049	Water Supply	acre-ft	0	1,700	1,700	$194	$329,800	0.116	**$38,257**
	Greenhouse	metric ton	3,740		(3,740)				
2050	Water Supply	acre-ft	0	1,700	1,700	$194	$329,800	0.109	**$35,948**
	Greenhouse	metric ton	3,740		(3,740)				
2051	Water Supply	acre-ft	0	33,000	33,000	$194	$6,402,000	0.103	**$659,406**

	Greenhouse	metric ton	72,600		(72,600)				
2052	Water Supply	acre-ft	0	1,700	1,700	$194	$329,800	0.097	**$31,991**
	Greenhouse	metric ton	3,740		(3,740)				
2053	Water Supply	acre-ft	0	1,600	1,600	$194	$310,400	0.092	**$28,557**
	Greenhouse	metric ton	3,520		(3,520)				
Last Year of Project Life	Unknown, the current facilities have been operating since 1930								
								Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)	**$30,233,125**
Comments: The benefits of this project are for a "snapshot in time" and will vary with hydrology. Actual amounts could be higher or lower. Greenhouse gas savings assumes that the captured stormwater is offsetting the need for a like amount of imported water which may, or may not, be true. Variable cost to SWP delivery for Valley District is $260/af. Enh Rech, not including water right									

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

Table 19 – Annual Costs of Project

(All costs should be in 2012 Dollars)

Project: ENHANCED STORMWATER CAPTURE AND RECHARGE ALONG THE SANTA ANA RIVER

	Initial Costs Grand Total Cost from Table 7 (row (i), column	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)
2015	$31,300,000		$ 25,000	$ 75,000	$ 100,000	$ 50,000	$ 100,000	$ 350,000	0.840	$ 294,000
2016			$ 25,750	$ 77,250	$ 103,000	$ 51,500	$ 100,000	$ 360,500	0.792	$ 285,516
2017			$ 26,523	$ 79,568	$ 106,090	$ 53,045	$ 100,000	$ 371,315	0.747	$ 277,372
2018			$ 27,318	$ 81,955	$ 109,273	$ 54,636	$ 100,000	$ 382,454	0.705	$ 269,630
2019			$ 28,138	$ 84,413	$ 112,551	$ 56,275	$ 100,000	$ 393,928	0.665	$ 261,962
2020			$ 28,982	$ 86,946	$ 115,927	$ 57,964	$ 100,000	$ 405,746	0.627	$ 254,403
2021			$ 29,851	$ 89,554	$ 119,405	$ 59,703	$ 100,000	$ 417,918	0.592	$ 247,408
2022			$ 30,747	$ 92,241	$ 122,987	$ 61,494	$ 100,000	$ 430,456	0.558	$ 240,194
2023			$ 31,669	$ 95,008	$ 126,677	$ 63,339	$ 100,000	$ 443,370	0.527	$ 233,656
2024			$ 32,619	$ 97,858	$ 130,477	$ 65,239	$ 100,000	$ 456,671	0.497	$ 226,965
2025			$ 33,598	$ 100,794	$ 134,392	$ 67,196	$ 100,000	$ 470,371	0.469	$ 220,604
2026			$ 34,606	$ 103,818	$ 138,423	$ 69,212	$ 100,000	$ 484,482	0.442	$ 214,141
2027			$ 35,644	$ 106,932	$ 142,576	$ 71,288	$ 100,000	$ 499,016	0.417	$ 208,090
2028			$ 36,713	$ 110,140	$ 146,853	$ 73,427	$ 100,000	$ 513,987	0.394	$ 202,511
2029			$ 37,815	$ 113,444	$ 151,259	$ 75,629	$ 100,000	$ 529,406	0.371	$ 196,410
2030			$ 38,949	$ 116,848	$ 155,797	$ 77,898	$ 100,000	$ 545,289	0.350	$ 190,851
2031			$ 40,118	$ 120,353	$ 160,471	$ 80,235	$ 100,000	$ 561,647	0.331	$ 185,905
2032			$ 41,321	$ 123,964	$ 165,285	$ 82,642	$ 100,000	$ 578,497	0.312	$ 180,491
2033			$ 42,561	$ 127,682	$ 170,243	$ 85,122	$ 100,000	$ 595,852	0.294	$ 175,180
2034			$ 43,838	$ 131,513	$ 175,351	$ 87,675	$ 100,000	$ 613,727	0.278	$ 170,616
2035			$ 45,153	$ 135,458	$ 180,611	$ 90,306	$ 100,000	$ 632,139	0.262	$ 165,620
2036			$ 46,507	$ 139,522	$ 186,029	$ 93,015	$ 100,000	$ 651,103	0.247	$ 160,822
2037			$ 47,903	$ 143,708	$ 191,610	$ 95,805	$ 100,000	$ 670,636	0.233	$ 156,258
2038			$ 49,340	$ 148,019	$ 197,359	$ 98,679	$ 100,000	$ 690,755	0.220	$ 151,966
2039			$ 50,820	$ 152,460	$ 203,279	$ 101,640	$ 100,000	$ 711,478	0.207	$ 147,276
2040			$ 52,344	$ 157,033	$ 209,378	$ 104,689	$ 100,000	$ 732,822	0.196	$ 143,633
2041			$ 53,915	$ 161,744	$ 215,659	$ 107,830	$ 100,000	$ 754,807	0.185	$ 139,639
2042			$ 55,532	$ 166,597	$ 222,129	$ 111,064	$ 100,000	$ 777,451	0.174	$ 135,277
2043			$ 57,198	$ 171,595	$ 228,793	$ 114,396	$ 100,000	$ 800,775	0.164	$ 131,327
2044			$ 58,914	$ 176,742	$ 235,657	$ 117,828	$ 100,000	$ 824,798	0.155	$ 127,844
2045			$ 60,682	$ 182,045	$ 242,726	$ 121,363	$ 100,000	$ 849,542	0.146	$ 124,033
2046			$ 62,502	$ 187,506	$ 250,008	$ 125,004	$ 100,000	$ 875,028	0.138	$ 120,754
2047			$ 64,377	$ 193,131	$ 257,508	$ 128,754	$ 100,000	$ 901,279	0.130	$ 117,166
2048			$ 66,308	$ 198,925	$ 265,234	$ 132,617	$ 100,000	$ 928,317	0.123	$ 114,183
2049			$ 68,298	$ 204,893	$ 273,191	$ 136,595	$ 100,000	$ 956,167	0.116	$ 110,915
2050			$ 70,347	$ 211,040	$ 281,386	$ 140,693	$ 100,000	$ 984,852	0.109	$ 107,349
2051			$ 72,457	$ 217,371	$ 289,828	$ 144,914	$ 100,000	$ 1,014,397	0.103	$ 104,483
2052			$ 74,631	$ 223,892	$ 298,523	$ 149,261	$ 100,000	$ 1,044,829	0.097	$ 101,348
2053			$ 76,870	$ 230,609	$ 307,478	$ 153,739	$ 100,000	$ 1,076,174	0.092	$ 99,008
Last Year of Project Life			$ 79,176	$ 237,527	$ 316,703	$ 158,351	$ 100,000	$ 1,108,459	0.087	$ 96,436
									Total Present Value of Discounted Costs (Sum of column (j))	**$ 7,091,244**
									Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries	

Comments: (g) is a lease payment

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

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

All cost excallated 3% presumed CPI-U per Agreements

FROM PSP

2012	1.000	**2022**	0.558	**2032**	0.312	**2042**	0.174	**2052**	0.097
2013	0.943	**2023**	0.527	**2033**	0.294	**2043**	0.164	**2053**	0.092
2014	0.890	**2024**	0.497	**2034**	0.278	**2044**	0.155	**2054**	0.087
2015	0.840	**2025**	0.469	**2035**	0.262	**2045**	0.146	**2055**	0.082
2016	0.792	**2026**	0.442	**2036**	0.247	**2046**	0.138	**2056**	0.077
2017	0.747	**2027**	0.417	**2037**	0.233	**2047**	0.130	**2057**	0.073
2018	0.705	**2028**	0.394	**2038**	0.220	**2048**	0.123	**2058**	0.069
2019	0.665	**2029**	0.371	**2039**	0.207	**2049**	0.116	**2059**	0.065
2020	0.627	**2030**	0.350	**2040**	0.196	**2050**	0.109	**2060**	0.061
2021	0.592	**2031**	0.331	**2041**	0.185	**2051**	0.103	**2061**	0.058

Table 20 – Proposal Benefits and Costs Summary

Proposal: _____

Agency: _____

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)
Enhanced Stormwater Capture and Recharge Along the Santa Ana River	SBVMWD, WMWD, RPU, SBVWCD	$7,091,244	$30,233,125	n/a	$30,233,125		Increased use of local stormwater, increase water supply reliability, improve water quality, possible reduction in imported water

(1) From Table 19, or RWMG method

(2) From Table 15 or RWMG method

(3) From Table 18 or RWMG method

Project J: Regional Residential Landscape Retrofit Program (Inland Empire Utilities Agency)

Tables 9(a), 9(b), 12, 15(a), 15(b), 19, and 20 are included in this document to quantify water supply costs and benefits for the Regional Residential Landscape Retrofit Project (the "Project") proposed by the Inland Empire Utilities Agency ("IEUA"). Narrative supporting the tables is provided below:

I. Narrative Description of the Project's Economic Costs

The Project's economic costs consist of costs contained in the Project budget (Attachment 4), as well as annual administration, maintenance, and replacement costs associated with the Project.

II. Cost Details

Budget categories (a) through (h) are included in the cost details as described in Table 7.

III. Estimates of Without-Project conditions; e.g. Current and Future Water Supplies and Demand.

The Project will improve water management and result in quantifiable water savings and reductions in energy consumption through water conservation. It will do so by evaluating residential landscape efficiency and retrofitting approximately 600 single family residential landscapes that currently use high water consuming devices, with high efficiency ones. Devices identified for retrofits include weather based irrigation controllers and high efficiency sprinkler nozzles. This Project is estimated to have an average annual water savings of approximately 1,000 acre feet per year ("AFY"), with an estimated lifespan of 10 years. Total water savings over the lifespan of this Project is anticipated to be 6,000 acre-feet. With an annual Project benefit of 1,000 AFY, the greenhouse gas emissions would be reduced by an estimated 1,297 metric tons (as CO2eq).

IEUA relies heavily on imported water from the Metropolitan Water District of Southern California ("MWD"). Moreover, average energy consumption for imported water is 2,689 kWh/AF and the water conserved through this Project is estimated to reduce average annual energy consumption by 2,689,080 kW/h. This Project intends to target the highest residential water users within the single family customer classification that are located within IEUA's service area over a three (3) year period.

The Project saves water through outdoor surveys and retrofits of landscape devices. The target audience is residential customers that fall within the top ten percent (10%) of the associated retail water providers' customer base. Retrofits include the installation of smart controllers and high efficiency sprinkler nozzles where the resident approves the changes.

This Project will provide a more reliable water supply and promote sustainable water solutions through reducing the need to import additional water supplies and maximizing water use efficiency, leveraging existing funding opportunities, building regional partnerships with local retail agencies, and meeting multiple goals across geographic and water resources service areas.

IV. Estimates of With-Project Conditions; e.g. Improvements in New Water Supplies Made Available to Meet Demand

This Project will save 1,000 AFY, reaching approximately 600 residents who fall within the top 10% tier of residential water use. This Project targets larger lot sizes that have a potential to save a great deal of water from inefficient irrigation and over-watering (minimum of 1 AF per site). The Project will also educate customers where costs of resources do not greatly impact them and where tiered rate structures have minimal impact on their water use decision-making. Reaching those customers through education and retrofits will result in increased landscape efficiency and water use reductions, regardless of their ability to pay.

More than 65% of residential water use occurs outdoors with many residents believing their highest water use occurs indoors. There is a great need for public education on water use habits and to assist them with ways to achieve reduction. With many residential customers lacking the knowledge required to make more efficient landscape modifications and upgrades, this Project will make available and provide the education and resources needed to achieve reductions in outdoor water use, while also serving as a demonstration to friends, relatives, and neighbors of efficient landscape options.

The numerous benefits resulting from the implementation of this Project align with IEUA's approved Water Use Efficiency Business Plan and are listed below:

- Assists in meeting compliance with the California Water Conservation Act of 2009 (Senate Bill X7-7);
- Assists in meeting compliance with Assembly Bill 1420 – Mandatory Demand Management Measures;
- Assists in meeting compliance with the California Urban Water Management Planning Act;
- Aligns with IEUA's core water use efficiency programs identified in reaching water savings goals.

The implementation of this Project assists IEUA's retail member agencies in meeting regional water use efficiency goals and targets for water supply reliability, and complying with the Water Conservation Act of 2009 (SBX 7-7).

The region surrounding the Santa Ana River Watershed is the fastest growing area in the United States. The Watershed's current population of 5.3 million is projected to increase by 2 million over the next 25 years. Most of that projected population growth is anticipated to occur in the Inland Empire region, which directly impacts IEUA's water supply and delivery. IEUA currently serves a population of 850,000; the most populous cities are the cities of Fontana (190,356), Rancho Cucamonga (178,904), and Ontario (174,536). Over the past five years, the cities which have experienced the most rapid annual growth were Fontana (15%), Montclair (6%), and Chino Hills (6%). The most recent population boom within IEUA's service area witnessed an increase of 150,000 residents between 2000-2007. Although the recent recession has slowed the pace of the population increase, IEUA projects an increase of almost 330,000 people within its service area over the next 25 years, with an average annual growth rate of 1.4%.

Of great concern to IEUA is how these population figures and increases affect the water use profile of the residential water sector. The increase in population has historically signaled an increase in development and outdoor water use. The majority of housing in the Inland Empire is detached, single-family homes. According to IEUA's 2010 Business Plan, single family homes within the service area can use up to 66% of their water outdoors; this is due, in part, to large lot sizes and the ubiquitous planting of cool weather turf grass. The lot sizes in the Inland Empire are larger than in any metropolitan area in the State, with an average residential lot size of 10,176 square feet and an average yard size (lot minus the building footprint) of 8,858 square feet; this is in comparison to the average residential lot sizes of other major metropolitan areas, the Sacramento region (9,159 sq. ft.), coastal areas of Los Angeles and San Diego counties (9,076 sq. ft.), and the San Francisco Bay Area (7,697 sq. ft.). Currently, single-family homes within the IEUA service area use 49% of the IEUA water supplies, while multi-family homes use 9.1%; this translates into 110,751 acre-feet used by single-family homes and 18,319 acre-feet used by multi-family homes (numbers based on 2008 totals).

The 1,000 AFY of savings is estimated from the landscape upgrades of residential sites. The estimated water savings for this Project is based on a program completed by Three Valleys Municipal Water District ("TVMWD"). The project was completed and the savings has been compiled that demonstrate significant water use savings for the targeted residential water customers who participated. The water savings are quantifiable through the examination of water use records pre- and post-survey/retrofits. All participating customers must agree to allow their water agency to review their water use records and report that water use accordingly.

SURVEY ONLY	SURVEY & SPRINKLER RETROFIT ONLY	SURVEY & CONTROLLER RETROFIT ONLY	SURVEY & SPRINKLER & CONTROLLER RETROFITS	PRE-SURVEY WATER USE (average per month-gals.)	AFTER SURVEY WATER USE (average per month-gals.)	AVERAGE SAVINGS per SITE per BILLING CYCLE (gals.)
16				118,053	109,203	8,850
	4			128,526	94,721	33,805
		23		90,593	52,462	38,131
			24	116,080	83,415	32,665

As shown in the table above, the average water savings per residential site, per month is 28,363 gallons. With these averages alone, the savings represents 1.04 acre-feet of water saved per residential site per year. However, the savings increases substantially when looking at larger lot sizes and higher water users. The TVMWD pilot program used data from the sites upgraded in the Walnut Valley Water District and City of La Verne service areas. The discrepancy in lot sizes makes an obvious difference. The residential sites in the Walnut Valley Water District's service area saved approximately 2.3 acre feet per year per residential site and the City of La Verne's savings was 0.30 acre-feet per residential site per year. The discrepancy between the average gallons saved is due to lot size differences. Overall, the percentages for each of the service areas results in an average savings of 26%.

Considering that IEUA's goal is to survey and upgrade at least 600 sites, the estimated water reduction will result in more than 6,000 acre-feet of water saved over a ten year period. This is a target figure, and is a conservative estimate. TVMWD's experience with this type of program clearly demonstrated that lot sizes are the primary variable.

To determine the 10-year projected water savings, IEUA used a conservative figure of melding both the Walnut Valley Water District's and City of La Verne's average monthly water savings associated with this program, to come up with a composite figure of 1.3 acre-feet per year per site, or a 26% reduction in monthly water use.

An average of 2.3 acre-feet/year saved (WVWD) and 0.30 acre-feet/year (La Verne) = 1.3 acre-feet/year per residential site.

The ten year lifespan of savings is what the California Urban Water Conservation Council ("CUWCC") and the Metropolitan Water District of Southern California ("MWD") use to determine the savings for this type of Project and landscape retrofits.

V. Description of Methods used to Estimate Without- and With-Project Conditions.

With and without Project conditions are based on discussions with the Project engineer, IEUA the cities of Ontario and Fontana, other cities within IEUA's service area, and various Project proponents, as well as information contained in the attached Exhibits described below.

VI. Description of the Distribution of Local, Regional, and Statewide Benefits

Benefits are primarily local in nature. However, any reduction in demand on SWP water will benefit water agencies throughout the state whose need for additional water exceeds that of IEUA and its cities.

VII. Identification of Beneficiaries

IEUA, the cities of Fontana and Ontario, the entire Inland Empire region, all local water users and rate payers, Metropolitan Water District, and all urban water suppliers intending to purchase SWP water in the future.

The Regional Residential Landscape Retrofit Program benefits multiple agencies and communities across the Chino Basin and provides an efficient and streamlined Project for multiple jurisdictions and their customers. The Program leverages funding to augment costs for all Project partners and participants.

VIII. When the Benefits will be Received

The benefits will be realized as of the completion of the first phase of Project retrofits in 2014-2015.

IX. Uncertainty of the Benefits

N/A

X. Description of any Adverse Effects

N/A

XI. Narrative Discussion that Describes, Qualifies, and Supports the Values Entered in the Tables

Water valuation is based on the Tier 2 full service treated volumetric cost for 2014, which is the actual amount paid by IEUA, various cities and water districts, and other local entities to purchase SWP water for designated uses and purposes.

Greenhouse gas ("GHG") valuation is based on 2013 Reserve Price Notices published by the California Environmental Protection Agency Air Resources Board ("ARB") as part of the State's Cap-and-Trade Program. The program is a central element of California's Global Warming Solutions Act (AB 32) and covers major sources of GHG emissions in the State such as refineries, power plants, industrial facilities, and transportation fuels. The regulation includes an enforceable GHG cap that will decline over time. ARB will distribute allowances, which are tradable permits, equal to the emission allowed under the cap. Not only do ARB auctions generally curtail the production of GHGs, but they also raise substantial funds for the State. *See* "California's First Carbon-Credit Auction Raises $290 Million," Los Angeles Times, November 20, 2012.

Estimated administration, operations, maintenance, and replacement costs for the Project are based on discussions with IEUA, various cities, and maintenance data collected by David Taussig & Associates, Inc. for comparable projects.

XII. Documentation to Support Information Presented

See the following attached:

Exhibit A *- Metropolitan Water District Rates and Charges*

Exhibit B *– 2013 Annual Auction Reserve Price Notice; California Cap-and-Trade Program Greenhouse Gas Allowance Auctions, Updated on January 15, 2013*

Water usage within IEUA's service area for FY2011/12 was 229,518 acre-feet of imported and local water supplies. This provides all the water supply for a population of approximately 850,000 people. Imported water supplies are received through the SWP (via Metropolitan Water District of Southern California). The amount of groundwater pumping varies from year to year based on the Chino Basin safe yield. Recycled water is conveyed from IEUA's recycled water treatment facilities and varying amounts of surface water are available from year to year based on local mountain snowpack and rising upgradient groundwater levels. A summary of IEUA's water supply for FY2010/11 is as follows:

Table 2 – Summary of IEUA's Water Supply

Water Source	Quantity of Supply (AF)
Chino Groundwater	62,150
Other Groundwater	41,788
Recycled Water	18,641
Surface Water	39,905
Desalted Water	14,203
Imported Water	52,831
Total Water Supplied Annually	**229,518**

The Project identified within this work plan will result in up to 1,000 AFY reduction in potable water use and a corresponding reduction of up to 1,000 acre-feet per year of imported water from northern California. All potable water not pumped from the Chino Basin will later be pumped and beneficially reused as a new local water supply.

The 1,000 AFY savings is estimated from the landscape upgrades of residential sites. As discussed earlier, the estimated water savings for this Project is based on a program completed by TVMWD. That project was completed and the savings has been compiled that demonstrate significant water use savings for the targeted residential water customers who participated. The water savings are quantifiable through the examination of water use records pre- and post-survey/retrofits.

Table 9(a) – Annual Project Physical Benefits

Project Name: Regional Residential Landscape Retrofit

Type of Benefit Claimed: Potable Water Savings

Measure of Benefit Claimed (Name of Units): Acre-Feet

Additional Information About this Measure: Acre-Feet of Potable Water Saved by Project.

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project (1)	Increase in Water Supply Resulting from Project (c) – (b)
2012	0	0	0
2013	0	0	0
2014	0	167	167
2015	0	585	585
2016	0	1000	1,000
2017	0	1000	1,000
2018	0	1000	1,000
2019	0	1000	1,000
2020	0	1000	1,000
2021	0	1000	1,000
2022	0	1000	1,000
2023	0	1000	1,000
2024	0	833	833
2025	0	418	418

Comments: During the Project's first year, 100 residences are expected to be retrofitted; 250 residences in the second year; and another 250 residences in the third year. A decline in the Project benefit beginning in 2024 has been modeled due to the staggering of the retrofit installation. Retrofit products have an estimated 10 year useful from the date of installation.

Table 9(b) – Annual Project Physical Benefits

Project Name: **Regional Residential Landscape Retrofit**

Type of Benefit Claimed: **Reduced Greenhouse Gas Emissions**

Measure of Benefit Claimed (Name of Units): **Metric Tons**

Additional Information About this Measure: **Metric Tons of Greenhouse Gases Emission**

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Decrease in GHGs Resulting from Project (c) – (b)
2012	0	0	0
2013	0	0	0
2014	0	217	217
2015	0	585	585
2016	0	1,297	1,297
2017	0	1,297	1,297
2018	0	1,297	1,297
2019	0	1,297	1,297
2020	0	1,297	1,297
2021	0	1,297	1,297
2022	0	1,297	1,297
2023	0	1,297	1,297
2024	0	1,080	1,080
2025	0	712	712

Comments: During the Project's first year, 100 residences are expected to be retrofitted; 250 residences in the second year; and another 250 residences in the third year. A decline in the Project benefit beginning in 2024 has been modeled due to the staggering of the retrofit installation. Retrofit products have an estimated 10 year useful from the date of installation.

Source: Carbonfund.org, based on a total estimate of 1,000 of water savings per year after all retrofits are completed, the CO2e is equal to 1,297 metric tons of CO2e per year.

Table 12 – Non-monetized Benefits Checklist		
No.	**Question**	**Enter "Yes", "No" or "Neg"**
	Community/Social Benefits **Will the proposal**	
1	**Provide education or technology benefits?**	Yes
	Examples are not limited to, but may include: - Include educational features that should result in water supply, water quality, or flood damage reduction benefits? - Develop, test, or document a new technology for water supply, water quality, or flood damage reduction management? - Provide some other education or technological benefit?	Yes, please see attachment 3 and attachment 8.
2	**Provide social recreation or access benefits?**	No
	Examples are not limited to, but may include: - Provide new or improved outdoor recreation opportunities? - Provide more access to open space? - Provide some other recreation or public access benefit?	
3	**Help avoid, reduce or resolve various public water resources conflicts?**	**Yes**
	Examples are not limited to, but may include: - Provide more opportunities for public involvement in water management? - Help avoid or resolve an existing conflict as evidenced by recurring fines or litigation? - Help meet an existing state mandate (e.g., water quality, water conservation, flood control)?	Yes, please see attachment 3 and attachment 8.
4	**Promote social health and safety?**	Yes
	Examples are not limited to, but may include: - Increase urban water supply reliability for fire-fighting and critical services following seismic events? - Reduce risk to life from dam failure or flooding? - Reduce exposure to water-related hazards?	Yes, please see attachment 3 and attachment 8.
5	**Have other social benefits?**	No
	Examples are not limited to, but may include: - Redress or increase inequitable distribution of environmental burdens? - Have disproportionate beneficial or adverse effects on disadvantaged communities, Native Americans, or other distinct cultural groups?	
	Environmental Stewardship Benefits: **Will the proposal**	
6	**Benefit wildlife or habitat in ways that were not quantified in Attachment 7?**	No
	Examples are not limited to, but may include: - Cause an increase in the amount or quality of terrestrial, aquatic, riparian or wetland habitat? - Contribute to an existing biological opinion or recovery plan for a listed special status species? - Preserve or restore designated critical habitat of a listed species? - Enhance wildlife protection or habitat?	
7	**Improve water quality in ways that were not quantified in Attachment 7?**	Yes
	Examples are not limited to, but may include: - Cause an improvement in water quality in an impaired water body or sensitive habitat? - Prevent water quality degradation? - Cause some other improvement in water quality?	Yes, please see attachment 3 and attachment 8.
8	**Reduce net emissions in ways that were not quantified in Attachment 7?**	Yes
	Examples are not limited to, but may include: - Reduce net production of greenhouse gasses? - Reduce net emissions of other harmful chemicals into the air or water?	Yes, please see attachment 3 and attachment 8.
9	**Provide other environmental stewardship benefits, other than those claimed in Sections D1, D3, or D4?**	Yes
	Sustainability Benefits: **Will the proposal**	Yes, please see attachment 3 and attachment 8.
10	**Improve the overall, long-term management of California groundwater resources?**	Yes
	Examples are not limited to, but may include: - Reduce extraction of non-renewable groundwater? - Promote aquifer storage or recharge?	Yes, please see attachment 3 and attachment 8.
11	**Reduce demand for net diversions for the regions from the Delta?**	Yes
12	**Provide a long-term solution in place of a short-term one?**	Yes
13	**Promote energy savings or replace fossil fuel based energy sources with renewable energy and resources?**	Yes
	Examples are not limited to, but may include: - Reduce net energy use on a permanent basis? - Increase renewable energy production? - Include new buildings or modify buildings to include certified LEED features? - Provide a net increase in recycling or reuse of materials? - Replace unsustainable land or water management practices with recognized sustainable practices?	Yes, please see attachment 3 and attachment 8.
14	**Improve water supply reliability in ways not quantified in Attachment 7?**	Yes
	Examples are not limited to, but may include: - Provide a more flexible mix of water sources? - Reduce likelihood of catastrophic supply outages? - Reduce supply uncertainty? - Reduce supply variability?	
15	**Other (If the above listed categories do not apply, provide non-monetized benefit description)?**	N/A

Table 15(a) – Annual Benefit (All benefits should be in 2012 dollars) Project: Regional Residential Landscape Retrofit									
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
Year	Type of Benefit	Measure of Benefit (Units)	Without Project	With Project (1)	Change Resulting from Project (e) – (d)	Unit $ Value (2)	Annual $ Value (2) (f) x (g)	Discount Factor (1)	Discounted Benefits (1) (h) x (i)
2012							$0	1.000	**$0**
2013							$0	0.943	**$0**
2014	Potable Water Savings (Reduced Importation)	Acre-Feet	0	167	167	$1,032	$172,344	0.890	**$153,386**
2015	Potable Water Savings (Reduced Importation)	Acre-Feet	0	585	585	$1,032	$603,204	0.840	**$506,462**
2016	Potable Water Savings (Reduced Importation)	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.792	**$817,441**
2017	Potable Water Savings (Reduced Importation)	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.747	**$771,170**
2018	Potable Water Savings (Reduced Importation)	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.705	**$727,519**
2019	Potable Water Savings (Reduced Importation)	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.665	**$686,339**
2020	Potable Water Savings (Reduced Importation)	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.627	**$647,490**
2021	Potable Water Savings (Reduced Importation)	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.592	**$610,839**
2022	Potable Water Savings (Reduced Importation)	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.558	**$576,263**
2023	Potable Water Savings (Reduced Importation)	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.527	**$543,645**
2024	Potable Water Savings (Reduced Importation)	Acre-Feet	0	833	833	$1,032	$859,656	0.497	**$427,223**
2025	Potable Water Savings (Reduced Importation)	Acre-Feet	0	418	418	$1,032	$430,860	0.469	**$202,004**
								Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)	**$6,669,780**
Comments:									

(1) The estimated water reduction may result in more than 6,000 acre-feet of water saved over a ten year period. This is a target figure, and is a conservative estimate. TVMWD's experience with this program showed that lot sizes made the biggest impact in time and budget.

Methodology: an average of 2.3 acre-feet/year saved (WVWD) and 0.30 acre-feet/year (La Verne) = 1.3 acre-feet/year per residential site.

(2) Water valuation is based on the Tier 2 full service treated volumetric cost for 2014, which is the actual amount paid by the Agency and other local entities to purchase State Water Project ("SWP") water for designated uses and purposes.

Table 15(b) – Annual Benefit (All benefits should be in 2012 dollars) Project: Regional Residential Landscape Retrofit									
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
Year	Type of Benefit	Measure of Benefit (Units)	Without Project	With Project	Change Resulting from Project (e) – (d)	Unit $ Value [1]	Annual $ Value (f) x (g)	Discount Factor (6%)	Discounted Benefits (h) x (i)
2012							$0	1.000	**$0**
2013							$0	0.943	**$0**
2014	Reduced Greenhouse Gas	Metric Tons	0	217	217	$11	$2,320	0.890	**$2,065**
2015	Reduced Greenhouse Gas	Metric Tons	0	585	585	$11	$6,265	0.840	**$5,260**
2016	Reduced Greenhouse Gas	Metric Tons	0	1,297	1,297	$11	$13,891	0.792	**$11,003**
2017	Reduced Greenhouse Gas	Metric Tons	0	1,297	1,297	$11	$13,891	0.747	**$10,380**
2018	Reduced Greenhouse Gas	Metric Tons	0	1,297	1,297	$11	$13,891	0.705	**$9,793**
2019	Reduced Greenhouse Gas	Metric Tons	0	1,297	1,297	$11	$13,891	0.665	**$9,238**
2020	Reduced Greenhouse Gas	Metric Tons	0	1,297	1,297	$11	$13,891	0.627	**$8,715**
2021	Reduced Greenhouse Gas	Metric Tons	0	1,297	1,297	$11	$13,891	0.592	**$8,222**
2022	Reduced Greenhouse Gas	Metric Tons	0	1,297	1,297	$11	$13,891	0.558	**$7,757**
2023	Reduced Greenhouse Gas	Metric Tons	0	1,297	1,297	$11	$13,891	0.527	**$7,318**
2024	Reduced Greenhouse Gas	Metric Tons	0	1,080	1,080	$11	$11,571	0.497	**$5,750**
2025	Reduced Greenhouse Gas	Metric Tons	0	712	712	$11	$7,627	0.469	**$3,576**
Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)									**$89,076**
Comments:									

(1) Greenhouse gas ("GHG") valuation is based on 2013 Reserve Price Notices published by the California Environmental Protection Agency Air Resources Board ("ARB") as part of the State's Cap-and-Trade Program.

Table 19 – Annual Costs of Project (All costs should be in 2012 Dollars) Project: Regional Residential Landscape Retrofit										
	Initial Costs Grand Total Cost from Table 7 (row (i), column	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)
2012	$50,000	$50,000						$100,000	1.000	**$100,000**
2013	$120,000	$120,000						$240,000	0.943	**$226,415**
2014	$120,000	$120,000						$240,000	0.890	**$213,599**
2015	$120,000	$120,000						$240,000	0.840	**$201,509**
2016	$90,000	$90,000						$180,000	0.792	**$142,577**
2017	$0	$0						$0	0.747	**$0**
2018	$0	$0						$0	0.705	**$0**
2019	$0	$0						$0	0.665	**$0**
2020	$0	$0						$0	0.627	**$0**
2021	$0	$0						$0	0.592	**$0**
2022	$0	$0						$0	0.558	**$0**
2023	$0	$0						$0	0.527	**$0**
2024	$0	$0						$0	0.497	**$0**
2025	$0	$0						$0	0.469	**$0**
2026	$0	$0						$0	0.442	**$0**
Total Present Value of Discounted Costs (Sum of column (j)) Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries										**$884,100**
Comments:										
(1) Based on opportunity costs, sunk costs, and associated costs										
(2) The incremental change in O&M costs attributable to the Project.										

COSTS AND BENEFITS SUMMARY

Table 20 summarizes the costs and benefits for the Project.

Table 20 – Proposal Benefits and Costs Summary Proposal: Regional Residential Landscape Retrofit Agency: IEUA							
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	Total		
(a)	(b)	(c)	(d)	(e)	(f) = (d) + (e)	(g)	(h)
		$884,100	$6,758,856	$0	$6,758,856		
(1) From Table 19, or RWMG method							
(2) From Table 15 or RWMG method							

Adopted Water Rates & Charges

Historical Water Rates

Effective January 1st	2012	2013	2014
Tier 1 Supply Rate ($/AF)	$106	$140	$148
Delta Supply Surcharge ($/AF)	$58	*	*
Tier 2 Supply Rate ($/AF)	$290	$290	$290
System Access Rate ($/AF)	$217	$223	$243
Water Stewardship Rate ($/AF)	$43	$41	$41
System Power Rate ($/AF)	$136	$189	$161
Full Service Untreated Volumetric Cost ($/AF)			
Tier 1	$560	$593	$593
Tier 2	$686	$743	$735
Replenishment Water Rate: untreated ($/AF)	$442	**	**
Interim Agricultural Water Program: untreated ($/AF)	$537	***	***
Treatment Surcharge ($/AF)	$234	$254	$297
Full Service Treated Volumetric Cost ($/AF)			
Tier 1	$794	$847	$890
Tier 2	$920	$997	$1,032
Treated Replenishment Water Rate ($/AF)	$651	**	**
Treated Interim Agricultural Water Program ($/AF)	$765	***	***
Readiness-to-Serve Charge (millions of dollars)	$146	$142	$166
Capacity Charge ($/cfs)	$7,400	$6,400	$8,600

* The Delta Supply Surcharge will be suspended after 2012
** Discussions on the replenishment program are continuing with the Member Agencies
*** The Interim Agricultural Water Program will be discontinued after 2012

Definitions

Tier 1 Supply Rate - recovers the of cost of maintaining a reliable amount of supply.

Delta Supply Surcharge - reflects the additional supply costs that Metropolitan faces along with other costs due to the pumping restrictions on the State Water Project.

Tier 2 Supply Rate - set at Metropolitan's cost of developing additional supply to encourage efficient use of local resources.

System Access Rate – recovers a portion of the costs associated with the delivery of supplies.

System Power Rate – recovers Metropolitan's power costs for pumping supplies to Southern California.

Water Stewardship Rate – recovers the cost of Metropolitan's financial commitment to conservation, water recycling, groundwater clean-up and other local resource management programs.

Replenishment Water Rate – a discounted rate for surplus system supplies available for the purpose of replenishing local storage.

Treated Replenishment Water Rate – a discounted rate for surplus system supplies available for the purpose of replenishing local storage.

Interim Agricultural Water Rate – discounted rate for surplus system supplies available for the purpose of growing agricultural, horticultural, or floricultural products.

Treated Interim Agricultural Water Program Rate – discounted rate for surplus system supplies available for the purpose of growing agricultural, horticultural, or floricultural products.

Treatment Surcharge – recovers the costs of treating imported water.

Readiness-to-Serve Charge - a fixed charge that recovers the cost of the portion of system capacity that is on standby to provide emergency service and operational flexibility.

Capacity Charge – the capacity charge recovers the cost of providing peak capacity within the distribution system.

Page updated: April 19, 2012

Air Resources Board

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Matthew Rodriquez
Secretary for Environmental Protection

Edmund G. Brown Jr.
Governor

2013 Annual Auction Reserve Price Notice

California Cap-and-Trade Program Greenhouse Gas Allowance Auctions

Issued on December 3, 2012

Updated on January 15, 2013

Auction Summary

This document, *2013 Annual Auction Reserve Price Notice,* specifies the 2013 Auction Reserve Price and the number of allowances to be auctioned in 2013 for the quarterly auctions as part of the Current Auction and Advance Auction. The 2013 quarterly GHG allowance auctions will offer 2013 vintage allowances and 2016 vintage allowances for sale.

The 2013 Auction Reserve Price and the annual budget of 2013 and 2016 vintage allowances for sale in 2013, is shown in Table 1 below.

Table 1: 2013 Auction Data

Auction Data Description	Auction Data
Auction Reserve Price	$10.71
Number of allowances to be auctioned in 2013 (2013 Vintage)	~~56,848,885*~~ 57,628,254
Number of advance allowances to be auctioned in 2013 (2016 Vintage)	38,240,000

~~* Amount could increase based on additional consignment from POUs as described in this notice.~~

The Auction Reserve Price

The Auction Reserve Price is a predetermined minimum price at which allowances will be sold to auction participants. The 2012 Auction Reserve Price was $10. Section 95911 of the Cap-and-Trade Regulation stipulates that the "Auction Reserve Price in U.S. dollars shall be the U.S. dollar Auction Reserve Price for the previous calendar year increased annually by 5 percent plus the rate of inflation as measured by the most recently available twelve months of the Consumer Price Index for All Urban Consumers." The rate of inflation used to calculate the 2013 Auction Reserve Price is 2.16 percent.

Current Auction Budget

The current auction budget describes the minimum number of current year vintage allowances to be sold in 2013. This number includes the State-owned allowances (approximately

10,600,000) and the remaining allowances to be consigned by the electricity distribution utilities. Some public owned utilities (POUs) were provided the flexibility to defer providing direction until January 1, 2013, on how to distribute their allowances between their Compliance and Limited Use Holding Accounts. ~~These deferred allowances total approximately 6,700,000. These are not included in the minimum 2013 annual auction budget. Once ARB receives direction from all of the remaining POUs, this notice will be updated to reflect the final 2013 annual auction budget presented in Table 1~~. ARB has now received direction from all POUs on how to distribute their allowances and Table 1 has been updated to reflect the final annual auction budget for 2013 vintage allowances. **This annual budget update does not change the amount of 2013 vintage allowances for sale in the February 19 auction.** Twenty-five percent of the State-owned allowances will be available at each auction. Utilities are required to notify ARB 75 days before each auction of the number of allowances they intend to consign. The total number of allowances to be auctioned in each auction will be published in the auction notice 60 days in advance. Utility allowances not consigned in the first three auctions will be included in the November 19, 2013 auction.

Advance Auction Budget

The advance auction budget represents ten percent of the allowances from the budget year three years subsequent to the current calendar year. Since the annual allowance budget of 2016 is 382,400,000, the advance auction budget for 2013 is 38,240,000. These allowances will be equally divided for sale across the four auctions in 2013.

2013 Quarterly Auction Dates

An *Auction Notice* with instructions on how to participate will be published 60 days prior to each auction. The *Auction Notice* provides information about eligibility, auction format, and GHG allowances to be auctioned for the applicable quarterly auction.

Table 2 provides additional information specific to the scheduled quarterly auctions.

Table 2: 2013 Quarterly Auction Critical Dates

Auction Consignment Due Date for EDUs	Auction Notice Posting Date	Auction Application Due Date	Auction Dates
12/6/2012	12/21/2012	1/22/2013	2/19/2013
3/4/2013	3/18/2013	4/16/2013	5/16/2013
6/3/2013	6/17/2013	7/17/2013	8/16/2013
9/5/2013	9/20/2013	10/21/2013	11/19/2013

Contact Information

For further information about participation in the 2013 auctions, please contact:
Mr. Chuck Seidler at (916) 324-0931 or cseidler@arb.ca.gov.

Updated on January 15, 2013

Project K: Canyon Lake Hybrid Treatment Process (Lake Elsinore & San Jacinto Watersheds Authority)

Tables 9, 12, 15, 19, and 20 are included in this document to quantify water supply costs and benefits for the Canyon Lake Hybrid Treatment Process (the "Project"), proposed by the Lake Elsinore and San Jacinto Watersheds Authority ("LESJWA"). Narrative supporting the tables is provided below:

I. Narrative Description of the Project's Economic Costs

The Project's economic costs consist of costs contained in the Project budget (Attachment 4), as well as annual administration, maintenance, and replacement costs associated with the Project.

Although there are pumping costs associated with moving the treated water from the Reservoir to end users, these costs would also be incurred using water purchased from the State Water Project ("SWP"). Since these costs offset each other, they were not included in the analysis.

II. Cost Details

Budget categories (a) through (h) are included in the cost details as described in Table 7.

III. Estimates of Without-Project conditions; e.g. Current and Future Water Supplies and Demand.

Canyon Lake is located in Riverside County, and is within the City of Canyon Lake. The reservoir, covers approximately 525 acres, has 14.9 miles of shoreline and has a storage capacity of 11,586 acre·ft. It is owned and operated by the Elsinore Valley Municipal Water District (EVMWD). EVMWD has used the reservoir as a potable water source since 1957 when the Canyon Lake water treatment plant began operation. The reservoir is supplied by storm water runoff from the San Jacinto River and Salt Creek. Water from the reservoir feeds the Canyon Lake Water Treatment Plant, which provides approximately 10% of the domestic water supply in the Lake Elsinore/Canyon Lake area.

The Central Body of Canyon Lake is a monomictic lake (*temperature and climate differences limit the lake to turning over once in the fall*) that typically stratifies (*water masses with different properties form layers that act as barriers to water mixing*) from about late-February/early-March through late-November/early-December each year.

Maximum depth of the main body of the lake is about 50 feet, with a mean depth of approximately 20 feet. In the Central Body of the lake the water column is divided into three depth zones, with the deep-water layer starting at about the 20 to 25 foot depths by mid-summer, with oxygen depletion at or near zero at 16 to 18 feet. The deep water becomes anaerobic and devoid of dissolved oxygen ("DO") by early summer each year. <u>This low oxygen condition causes the release of dissolved iron, manganese, ammonia, hydrogen sulfide, phosphorus, and other substances, many of which degrade potable water quality</u>. Internal phosphorus loading from phosphorus release from sediments under anaerobic conditions may increase eutrophication (*the ecosystem response to the addition of artificial or natural substances, to an aquatic system*).

EVMWD has been collecting weekly temperature, pH, and DO measurements from Canyon Lake near the Canyon Lake Water Treatment Plant for the past seven (7) years. Data indicates that from early April through November, Canyon Lake has low oxygen in the hypolimnion[1]. This is typical of deep reservoirs such as Canyon Lake without mechanical mixing or oxygen injection systems. The disadvantage of having low oxygen in bottom waters is that anaerobic conditions contribute to biogeochemical processes that release reduced constituents such as iron, manganese, phosphorus, ammonia, and sulfide into the water column. The dissolution of these constituents then causes immediate bacterial respiration of oxygen, but also high quantities of algal growth, and the decaying algae is ultimately consumed by bacteria and respired. The high rates of respiration cause additional oxygen depletion and additional nutrient dissolution. The reversal of this process is similar in that in theory it is exponentially beneficial: increases in bottom water oxygen will reduce nutrient dissolution, which decreases algal growth, which decreases bacterial respiration.

[1] For purposes of discussion, the top layer of lake water is referred to as the epilimnion, which is typically the warm, low-density water. The bottom layer of lake water is the hypoliminion, which consists of cool, high-density water. The layer in-between the epilimnion and hypolimnion is the thermocline, which is the layer of water with transitioning temperature.

As a result of the above circumstances, Canyon Lake is listed on the Clean Water Act Section 303(d) list as impaired for excessive nutrients. The Regional Water Quality Control Board, Santa Ana Region ("RWQCB"), adopted a resolution in 2004 to amend the Basin Plan to incorporate total maximum daily loads ("TMDLs") for Canyon Lake to control nutrients, specifically identifying numeric water quality targets for total phosphorus, total nitrogen, ammonia, chlorophyll A, and DO. This TMDL was subsequently approved by the State Water Resources Control Board and by the U.S. Environmental Protection Agency.

Canyon Lake is also 303(d) listed for bacterial indicators currently identified in the Santa Ana Region Regional Water Quality Control Board Water Quality Control Plan ("Basin Plan"). However, these indicators are no longer deemed accurate by US EPA or the RWQCB. The RWQCB is in the process of adopting new bacterial indicator water quality objectives.

IV. Estimates of With-Project Conditions; e.g. Improvements in New Water Supplies Made Available to Meet Demand

In total, EVMWD supplies approx. 32,000 ac-ft of water per year ("AFY"). Source: EVMWD Urban Water Management Plan. Of that amount, approximately 10% (or 3,200 AFY/267 AF per month) is derived from the Canyon Lake Reservoir. Source: EVMWD Consumer Confidence Report 2005.

Generally, algal blooms in Canyon Lake occur at similar times of year and are primarily a function of nutrient loading trends. The first algal bloom occurs around February, and the second algal bloom occurs around October (see Attachment 3 – Work Plan). **Without the Project, approximately two (2) months would be affected during each algae bloom, resulting in the need for treatment of approximately 1,070 AFY of water**. Not only does the reduction in algal blooms and low DO conditions facilitate more efficient treatment of water by EVMWD, but also the prevention of fish kills and the improved aesthetics and recreational use potential for residents of Canyon Lake.

The Lake Elsinore and Canyon Lake TMDL Task Force ("Task Force"), inclusive of the LESJWA, whom serves as the Task Force administrator; 20 plus local, state and federal agencies including EVMWD, the Regional Board, Riverside County and the City of Canyon Lake; and private interests including dairy and agricultural operators; have considered a wide range of management options, ranging from oxygenation, aeration, mixing, dredging to application of aluminum sulfate ("alum"), phoslock, and other nutrient binders. These alternatives are discussed in various studies and reports that serve to inform required compliance plans. The entities that are required or will be required to submit these compliance plans are coordinating their proposed in-lake management activities through the Task Force. LESJWA, the Task Force Administrator, has agreed to manage these projects on behalf of the underlying Project partners.

Based on the underlying science developed by the Task Force and the recommendations of Task Force experts, a three part program to protect the lake is being developed. Step One consists of implementing watershed based source controls where feasible to eliminate sources of nutrients to the lake. Step Two consists of **supplementing source control with alum treatments to reduce the impacts of remaining nutrients on the lake (see Figure 1 below)**. Step Three consists of an evaluation of success of steps one and two at the end of 2015, followed by recommendations for supplemental projects necessary to attain the final TMDL response targets by 2020.

The Project involves five (5) distinct alum additions to Canyon Lake. The date and approximate application amounts are shown in the Figure 1 below:

FIGURE 1

Date	Main Body Application (kg dry alum)	East Bay Application (kg dry alum)	Total Application (kg dry alum)
September 2013	140,000	50,000	190,000
February 2014	70,000	50,000	120,000
September 2014	140,000	50,000	190,000
February 2015	70,000	50,000	120,000
September 2015	140,000	50,000	190,000

In-Lake Remediation Activities: Canyon Lake

To control algae in the lake, the Task Force's initial effort proposes to first conduct five (5) alum applications over a three-year period. By binding phosphorus and reducing algae growth, the continued use of alum will reduce the cycling of nutrients and associated sediment oxygen demand in the lake bottom. The expected result is compliance with the interim and final chlorophyll-A response targets by the end of the test period. Changes in biogeochemical processes should also indirectly increase DO in the hypolimnion as well as reduce the frequency of ammonia toxicity, which should be sufficient to achieve the interim DO response targets and may be sufficient to achieve the final DO response targets.

Canyon Lake In-Lake Best Management Plan ("BMP") Implementation

After the fifth alum application in September of 2015, the participating Task Force agencies will evaluate water quality data in the lake, and determine whether response targets are achieved. Modification to the alum application plan or potential supplemental BMPs may be needed to achieve response targets in Canyon Lake for chlorophyll-a and DO. The Task Force will also be conducting studies to support revision of the TMDL final targets by 2016 to incorporate consideration of the impacts of natural nutrient loads on exceedances of the final target.

Compliance Analysis for Canyon Lake

The Task Force has completed detailed evaluations of aeration, oxygenation, and chemical addition. Based on these evaluations, the Task Force has determined that chemical addition, using alum, will be the most effective in-lake nutrient control strategy to achieve interim response targets, chlorophyll-A and DO.

V. Description of Methods used to Estimate Without- and With-Project Conditions.

With and without Project conditions are based on discussions with the Project engineer, the Task Force, EVMWD, and various Project proponents, as well as information contained in the attached Exhibits described below.

VI. Description of the Distribution of Local, Regional, and Statewide Benefits

Benefits are primarily local in nature. However, any reduction in demand on SWP treatment will benefit water agencies throughout the state whose need for additional treatment and water exceeds that of EVMWD.

VII. Identification of Beneficiaries

EVMWD, the Task Force, all local water users and rate payers, Metropolitan Water District, and all urban water suppliers intending to purchase treated SWP water in the future.

Agencies affected by the Project are participating in the planning and implementation of the alum application to Canyon Lake.

VIII. When the Benefits will be Received

The benefits will be realized as of the completion date of the first alum application (projected September 2013, see Figure 1above).

IX. Uncertainty of the Benefits

N/A

X. Description of any Adverse Effects

N/A

XI. Narrative Discussion that Describes, Qualifies, and Supports the Values Entered in the Tables

Water treatment valuation is based on the treatment surcharge per acre foot for 2014, which is the actual amount charged by Metropolitan Water District local entities for treatment of State Water Project ("SWP") water for designated uses and purposes.

EVMWD supplies approx. 32,000 ac-ft of water per year (““AFY”“). Source: EVMWD Urban Water Management Plan. Of that amount, approximately 10% (or 3,200 AFY and 267 AF per month) is derived from the Canyon Lake Reservoir (source: EVMWD Consumer Confidence Report 2005). The first algal bloom occurs around February, and the second algal bloom occurs around October (see Work Plan - Attachment 3). For purposes of this analysis, it is expected that without the Project, approximately two (2) months would be affected during each algae bloom (for a total of four (4) months per year and approximately 1,070 AFY) and water from the Canyon Lake reservoir would require additional treatment at a cost of $297 per ac-ft (source: MWD Adopted Water Rates and Charges, 2014). Because the Project will reduce the algae blooms over time and the nutrient content in the lake is expected to decrease by 50% every ten (10) years (see Technical Justification - Attachment 7), the analysis assumes the potential cost without the Project will decrease by 50% every ten (10) years.

Estimated administration, operations, maintenance, and replacement costs for the Project are based on discussions with the Task Force, LESJWA, EVMWD, and maintenance data collected by David Taussig & Associates, Inc. for comparable projects.

XII. Documentation to Support Information Presented

The Canyon Lake TMDL focused on requiring watershed based source control of nutrients to Canyon Lake. However, an In-lake Sediment Nutrient Treatment Plan was also required to evaluate opportunities for regulating cycling of sediments from the nutrients as a partial alternative and complimentary action to watershed based source control. In-lake management was deemed an appropriate alternative as the bulk of nutrient loading to Canyon Lake arrives during extreme wet years when source control activities are likely to be ineffective. A study was prepared and strategies were evaluated to prevent the release of excess nutrients from lake sediments. The plan was completed and submitted to the Regional Board in July 2007. This study was followed-up with additional analysis; the **“Predicted Effects of External Load Reductions and In-Lake Treatment on Water Quality in Canyon Lake – a Supplemental Simulation Study,”** completed in December 2008. This report, prepared by Dr. Michael Anderson, demonstrates that in-lake oxygenation treatment could enhance oxygen levels in the hypolimnion and may assist with sediment phosphorus load reductions, but both in-lake oxygenation treatment and a large reduction in external nutrient sources from the watershed are required to approach meeting RWQCB TMDL targets.

Additional studies conducted from 2010 through 2012 by Dr. Michael Anderson of UC-Riverside also determined that alum treatment was an effective control measure for phosphorus and that, applied appropriately, could quickly achieve both interim and final response targets for chlorophyll a and interim response targets for DO. Its ability to achieve final DO target remains in question and will be the target of further study.

See the following attached:

Exhibit A *- Metropolitan Water District Rates and Charges*

Exhibit B *– EVMWD Urban Water Management Plan*

Table 9 – Annual Project Physical Benefits Project Name: Canyon Lake Hybrid Treatment Process Type of Benefit Claimed: Reduced Water Treatment Cost Measure of Benefit Claimed (Name of Units): Dollars Additional Information About this Measure: The Reduction in the Treatment Costs			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Reduction in Water Treatment Costs Resulting from Project (c) – (b)
2012	0	0	0
2013	0	0	0
2014	0	$316,800	$316,800
2015	0	$316,800	$316,800
2016	0	$316,800	$316,800
2017	0	$316,800	$316,800
2018	0	$316,800	$316,800
2019	0	$316,800	$316,800
2020	0	$316,800	$316,800
2021	0	$316,800	$316,800
2022	0	$316,800	$316,800
2023	0	$316,800	$316,800
2024	0	$158,400	$158,400
2025	0	$158,400	$158,400
2026	0	$158,400	$158,400
2027	0	$158,400	$158,400
2028	0	$158,400	$158,400
2029	0	$158,400	$158,400
2030	0	$158,400	$158,400
2031	0	$158,400	$158,400
2032	0	$158,400	$158,400
2033	0	$158,400	$158,400
2034	0	$79,200	$79,200
2035	0	$79,200	$79,200
2036	0	$79,200	$79,200
2037	0	$79,200	$79,200
2038	0	$79,200	$79,200
2039	0	$79,200	$79,200
2040	0	$79,200	$79,200
2041	0	$79,200	$79,200
2042	0	$79,200	$79,200
2043	0	$79,200	$79,200

Comments:

EVMWD supplies approx. 32,000 ac-ft of water per year ("AFY"). Source: EVMWD Urban Water Management Plan. Of that amount, approximately 10% (or 3,200 AFY and 267 AF per month) is derived from the Canyon Lake Reservoir (source: EVMWD Consumer Confidence Report 2005). The first algal bloom occurs around February, and the second algal bloom occurs around October (see Work Pan - Attachment 3). For purposes of this analysis, it is expected that without the Project, approximately two (2) months would be affected during each algae bloom (for a total of four (4) months per year and approximately 1,070 AFY) and water from the Canyon Lake reservoir would require additional treatment at a cost of $297 per ac-ft (source: MWD Adopted Water Rates and Charges, 2014). Because the Project will reduce the algae blooms over time and the nutrient content in the lake is expected to decrease by 50% every ten (10) years (see Technical Justification - Attachment 7), the analysis assumes the potential cost without the Project will decrease by 50% every ten (10) years.

Table 12 – Non-monetized Benefits Checklist		
No.	**Question**	**Enter "Yes", "No" or "Neg"**
	Community/Social Benefits **Will the proposal**	
1	**Provide education or technology benefits?**	Yes
	Examples are not limited to, but may include: - Include educational features that should result in water supply, water quality, or flood damage reduction benefits? - Develop, test, or document a new technology for water supply, water quality, or flood damage reduction management? - Provide some other education or technological benefit?	Yes, please see attachment 3 and attachment 8.
2	**Provide social recreation or access benefits?**	Yes
	Examples are not limited to, but may include: - Provide new or improved outdoor recreation opportunities? - Provide more access to open space? - Provide some other recreation or public access benefit?	Yes, please see attachment 3 and attachment 8.
3	**Help avoid, reduce or resolve various public water resources conflicts?**	Yes
	Examples are not limited to, but may include: - Provide more opportunities for public involvement in water management? - Help avoid or resolve an existing conflict as evidenced by recurring fines or litigation? - Help meet an existing state mandate (e.g., water quality, water conservation, flood control)?	Yes, please see attachment 3 and attachment 8.
4	**Promote social health and safety?**	Yes
	Examples are not limited to, but may include: - Increase urban water supply reliability for fire-fighting and critical services following seismic events? - Reduce risk to life from dam failure or flooding? - Reduce exposure to water-related hazards?	Yes, please see attachment 3 and attachment 8.
5	**Have other social benefits?**	Yes
	Examples are not limited to, but may include: - Redress or increase inequitable distribution of environmental burdens? - Have disproportionate beneficial or adverse effects on disadvantaged communities, Native Americans, or other distinct cultural groups?	Yes, please see attachment 3 and attachment 8.
	Environmental Stewardship Benefits: **Will the proposal**	
6	**Benefit wildlife or habitat in ways that were not quantified in Attachment 7?**	Yes
	Examples are not limited to, but may include: - Cause an increase in the amount or quality of terrestrial, aquatic, riparian or wetland habitat? - Contribute to an existing biological opinion or recovery plan for a listed special status species? - Preserve or restore designated critical habitat of a listed species? - Enhance wildlife protection or habitat?	Yes, please see attachment 3 and attachment 8.
7	**Improve water quality in ways that were not quantified in Attachment 7?**	Yes
	Examples are not limited to, but may include: - Cause an improvement in water quality in an impaired water body or sensitive habitat? - Prevent water quality degradation? - Cause some other improvement in water quality?	Yes, please see attachment 3 and attachment 8.
8	**Reduce net emissions in ways that were not quantified in Attachment 7?**	Yes
	Examples are not limited to, but may include: - Reduce net production of greenhouse gasses? - Reduce net emissions of other harmful chemicals into the air or water?	Yes, please see attachment 3 and attachment 8.
9	**Provide other environmental stewardship benefits, other than those claimed in Sections D1, D3, or D4?**	Yes
	Sustainability Benefits: **Will the proposal**	Yes, please see attachment 3 and attachment 8.
10	**Improve the overall, long-term management of California groundwater resources?**	Yes
	Examples are not limited to, but may include: - Reduce extraction of non-renewable groundwater? - Promote aquifer storage or recharge?	Yes, please see attachment 3 and attachment 8.
11	**Reduce demand for net diversions for the regions from the Delta?**	No
12	**Provide a long-term solution in place of a short-term one?**	Yes
13	**Promote energy savings or replace fossil fuel based energy sources with renewable energy and resources?**	Yes
	Examples are not limited to, but may include: - Reduce net energy use on a permanent basis? - Increase renewable energy production? - Include new buildings or modify buildings to include certified LEED features? - Provide a net increase in recycling or reuse of materials? - Replace unsustainable land or water management practices with recognized sustainable practices?	Yes, please see attachment 3 and attachment 8.
14	**Improve water supply reliability in ways not quantified in Attachment 7?**	Yes
	Examples are not limited to, but may include: - Provide a more flexible mix of water sources? - Reduce likelihood of catastrophic supply outages? - Reduce supply uncertainty? - Reduce supply variability?	
15	**Other (If the above listed categories do not apply, provide non-monetized benefit description)?**	N/A

Table 15 – Annual Benefit (All benefits should be in 2012 dollars) Project: Canyon Lake Hybrid Treatment Process									
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
Year	Type of Benefit	Measure of Benefit (Units)	Without Project	With Project (1)	Change Resulting from Project (e) – (d)	Unit $ Value (2)	Annual $ Value (f) x (g)	Discount Factor (6%)	Discounted Benefits (h) x (i)
2012						$297	$0	1.000	**$0**
2013						$297	$0	0.943	**$0**
2014	Reduced Water Treatment	Acre-Feet	0	1,067	1,067	$297	$316,800	0.890	**$281,951**
2015	Reduced Water Treatment	Acre-Feet	0	1,067	1,067	$297	$316,800	0.840	**$265,991**
2016	Reduced Water Treatment	Acre-Feet	0	1,067	1,067	$297	$316,800	0.792	**$250,935**
2017	Reduced Water Treatment	Acre-Feet	0	1,067	1,067	$297	$316,800	0.747	**$236,731**
2018	Reduced Water Treatment	Acre-Feet	0	1,067	1,067	$297	$316,800	0.705	**$223,331**
2019	Reduced Water Treatment	Acre-Feet	0	1,067	1,067	$297	$316,800	0.665	**$210,690**
2020	Reduced Water Treatment	Acre-Feet	0	1,067	1,067	$297	$316,800	0.627	**$198,764**
2021	Reduced Water Treatment	Acre-Feet	0	1,067	1,067	$297	$316,800	0.592	**$187,513**
2022	Reduced Water Treatment	Acre-Feet	0	1,067	1,067	$297	$316,800	0.558	**$176,899**
2023	Reduced Water Treatment	Acre-Feet	0	1,067	1,067	$297	$316,800	0.527	**$166,886**
2024	Reduced Water Treatment	Acre-Feet	0	533	533	$297	$158,400	0.497	**$78,720**
2025	Reduced Water Treatment	Acre-Feet	0	533	533	$297	$158,400	0.469	**$74,264**
2026	Reduced Water Treatment	Acre-Feet	0	533	533	$297	$158,400	0.442	**$70,060**
2027	Reduced Water Treatment	Acre-Feet	0	533	533	$297	$158,400	0.417	**$66,095**
2028	Reduced Water Treatment	Acre-Feet	0	533	533	$297	$158,400	0.394	**$62,354**
2029	Reduced Water Treatment	Acre-Feet	0	533	533	$297	$158,400	0.371	**$58,824**
2030	Reduced Water Treatment	Acre-Feet	0	533	533	$297	$158,400	0.350	**$55,494**
2031	Reduced Water Treatment	Acre-Feet	0	533	533	$297	$158,400	0.331	**$52,353**
2032	Reduced Water Treatment	Acre-Feet	0	533	533	$297	$158,400	0.312	**$49,390**
2033	Reduced Water Treatment	Acre-Feet	0	533	533	$297	$158,400	0.294	**$46,594**
2034	Reduced Water Treatment	Acre-Feet	0	267	267	$297	$79,200	0.278	**$21,978**
2035	Reduced Water Treatment	Acre-Feet	0	267	267	$297	$79,200	0.262	**$20,734**
2036	Reduced Water Treatment	Acre-Feet	0	267	267	$297	$79,200	0.247	**$19,561**
2037	Reduced Water Treatment	Acre-Feet	0	267	267	$297	$79,200	0.233	**$18,453**
2038	Reduced Water Treatment	Acre-Feet	0	267	267	$297	$79,200	0.220	**$17,409**
2039	Reduced Water Treatment	Acre-Feet	0	267	267	$297	$79,200	0.207	**$16,424**
2040	Reduced Water Treatment	Acre-Feet	0	267	267	$297	$79,200	0.196	**$15,494**
2041	Reduced Water Treatment	Acre-Feet	0	267	267	$297	$79,200	0.185	**$14,617**
2042	Reduced Water Treatment	Acre-Feet	0	267	267	$297	$79,200	0.174	**$13,790**
2043	Reduced Water Treatment	Acre-Feet	0	267	267	$297	$79,200	0.164	**$13,009**
							Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)		**$2,985,311**
Comments:									

(1) EVMWD supplies approx. 32,000 ac-ft of water per year ("AFY"). Source: EVMWD Urban Water Management Plan. Of that amount, approximately 10% (or 3,200 AFY and 267 AF per month) is derived from the Canyon Lake Reservoir. Source: EVMWD Consumer Confidence Report 2005.

The first algal bloom occurs around February, and the second algal bloom occurs around October (see Work Plan - Attachment 3). For purposes of this analys it is expected that without the Project, approximately two (2) months would be affected during each algae bloom (for a total of four (4) months per year and approximately 1,070 AFY). Because the Project will reduce the algae blooms over time and the nutrient content in the lake is expected to decrease by 50% every ten (10) years (see Technical Justification - Attachment 7), the analysis assumes the potential cost without the Project wi decrease by 50% every ten (10) years.

(2) Water treatment valuation is based on the treatment surcharge per acre foot for 2014, which is the actual amount charged by Metropolitan Water District for treatment of State Water Project ("SWP") water for designated uses and purposes.

Table 19 – Annual Costs of Project

(All costs should be in 2012 Dollars)

Project: Canyon Lake Hybrid Treatment Process

	Initial Costs Grand Total Cost from Table 7 (row (i), column (d))	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)
2012								$0	1.000	**$0**
2013								$0	0.943	**$0**
2014	$260,420	$192,750	$0	$0	$0	$0	$0	$453,170	0.890	**$403,320**
2015	$260,420	$192,750	$0	$0	$0	$0	$0	$453,170	0.840	**$380,490**
2016	$0	$0	$0	$0	$0	$0	$0	$0	0.792	**$0**
2017	$0	$0	$0	$0	$0	$0	$0	$0	0.747	**$0**
2018	$0	$0	$0	$0	$0	$0	$0	$0	0.705	**$0**
2019	$0	$0	$0	$0	$0	$0	$0	$0	0.665	**$0**
2020	$0	$0	$0	$0	$0	$0	$0	$0	0.627	**$0**
2021	$0	$0	$0	$0	$0	$0	$0	$0	0.592	**$0**
2022	$0	$0	$0	$0	$0	$0	$0	$0	0.558	**$0**
2023	$0	$0	$0	$0	$0	$0	$0	$0	0.527	**$0**
2024	$0	$0	$0	$0	$0	$0	$0	$0	0.497	**$0**
2025	$0	$0	$0	$0	$0	$0	$0	$0	0.469	**$0**
2026	$0	$0	$0	$0	$0	$0	$0	$0	0.442	**$0**
2027	$0	$0	$0	$0	$0	$0	$0	$0	0.417	**$0**
2028	$0	$0	$0	$0	$0	$0	$0	$0	0.394	**$0**
2029	$0	$0	$0	$0	$0	$0	$0	$0	0.371	**$0**
2030	$0	$0	$0	$0	$0	$0	$0	$0	0.350	**$0**
2031	$0	$0	$0	$0	$0	$0	$0	$0	0.331	**$0**
2032	$0	$0	$0	$0	$0	$0	$0	$0	0.312	**$0**
2033	$0	$0	$0	$0	$0	$0	$0	$0	0.294	**$0**
2034	$0	$0	$0	$0	$0	$0	$0	$0	0.278	**$0**
2035	$0	$0	$0	$0	$0	$0	$0	$0	0.262	**$0**
2036	$0	$0	$0	$0	$0	$0	$0	$0	0.247	**$0**
2037	$0	$0	$0	$0	$0	$0	$0	$0	0.233	**$0**
2038	$0	$0	$0	$0	$0	$0	$0	$0	0.220	**$0**
2039	$0	$0	$0	$0	$0	$0	$0	$0	0.207	**$0**
2040	$0	$0	$0	$0	$0	$0	$0	$0	0.196	**$0**
2041	$0	$0	$0	$0	$0	$0	$0	$0	0.185	**$0**
2042	$0	$0	$0	$0	$0	$0	$0	$0	0.174	**$0**
Total Present Value of Discounted Costs (Sum of column (j)) Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries										**$783,810**

Comments:

(1) Based on opportunity costs, sunk costs, and associated costs.

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

COSTS AND BENEFITS SUMMARY

Table 20 summarizes the costs and benefits for the Project.

Table 20 – Proposal Benefits and Costs Summary Proposal: Canyon Lake Hybrid Treatment Process Agency: LESJWA							
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	Total		
(a)	(b)	(c)	(d)	(e)	(f) = (d) + (e)	(g)	(h)
		$783,810	$2,985,311	$0	$2,985,311		
(1) From Table 19, or RWMG method							
(2) From Table 15 or RWMG method							

Adopted Water Rates & Charges

Historical Water Rates

Effective January 1st	2012	2013	2014
Tier 1 Supply Rate ($/AF)	$106	$140	$148
Delta Supply Surcharge ($/AF)	$58	*	*
Tier 2 Supply Rate ($/AF)	$290	$290	$290
System Access Rate ($/AF)	$217	$223	$243
Water Stewardship Rate ($/AF)	$43	$41	$41
System Power Rate ($/AF)	$136	$189	$161
Full Service Untreated Volumetric Cost ($/AF)			
Tier 1	$560	$593	$593
Tier 2	$686	$743	$735
Replenishment Water Rate: untreated ($/AF)	$442	**	**
Interim Agricultural Water Program: untreated ($/AF)	$537	***	***
Treatment Surcharge ($/AF)	$234	$254	$297
Full Service Treated Volumetric Cost ($/AF)			
Tier 1	$794	$847	$890
Tier 2	$920	$997	$1,032
Treated Replenishment Water Rate ($/AF)	$651	**	**
Treated Interim Agricultural Water Program ($/AF)	$765	***	***
Readiness-to-Serve Charge (millions of dollars)	$146	$142	$166
Capacity Charge ($/cfs)	$7,400	$6,400	$8,600

* The Delta Supply Surcharge will be suspended after 2012
** Discussions on the replenishment program are continuing with the Member Agencies
*** The Interim Agricultural Water Program will be discontinued after 2012

Definitions

Tier 1 Supply Rate - recovers the of cost of maintaining a reliable amount of supply.

Delta Supply Surcharge - reflects the additional supply costs that Metropolitan faces along with other costs due to the pumping restrictions on the State Water Project.

Tier 2 Supply Rate - set at Metropolitan's cost of developing additional supply to encourage efficient use of local resources.

System Access Rate – recovers a portion of the costs associated with the delivery of supplies.

System Power Rate – recovers Metropolitan's power costs for pumping supplies to Southern California.

Water Stewardship Rate – recovers the cost of Metropolitan's financial commitment to conservation, water recycling, groundwater clean-up and other local resource management programs.

Replenishment Water Rate – a discounted rate for surplus system supplies available for the purpose of replenishing local storage.

Treated Replenishment Water Rate – a discounted rate for surplus system supplies available for the purpose of replenishing local storage.

Interim Agricultural Water Rate – discounted rate for surplus system supplies available for the purpose of growing agricultural, horticultural, or floricultural products.

Treated Interim Agricultural Water Program Rate – discounted rate for surplus system supplies available for the purpose of growing agricultural, horticultural, or floricultural products.

Treatment Surcharge – recovers the costs of treating imported water.

Readiness-to-Serve Charge - a fixed charge that recovers the cost of the portion of system capacity that is on standby to provide emergency service and operational flexibility.

Capacity Charge – the capacity charge recovers the cost of providing peak capacity within the distribution system.

Page updated: April 19, 2012

Air Resources Board

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Sacramento, California 95812 • www.arb.ca.gov

Matthew Rodriquez
Secretary for Environmental Protection

Edmund G. Brown Jr.
Governor

2013 Annual Auction Reserve Price Notice

California Cap-and-Trade Program Greenhouse Gas Allowance Auctions

Issued on December 3, 2012

Updated on January 15, 2013

Auction Summary

This document, *2013 Annual Auction Reserve Price Notice,* specifies the 2013 Auction Reserve Price and the number of allowances to be auctioned in 2013 for the quarterly auctions as part of the Current Auction and Advance Auction. The 2013 quarterly GHG allowance auctions will offer 2013 vintage allowances and 2016 vintage allowances for sale.

The 2013 Auction Reserve Price and the annual budget of 2013 and 2016 vintage allowances for sale in 2013, is shown in Table 1 below.

Table 1: 2013 Auction Data

Auction Data Description	Auction Data
Auction Reserve Price	$10.71
Number of allowances to be auctioned in 2013 (2013 Vintage)	~~56,848,885*~~ 57,628,254
Number of advance allowances to be auctioned in 2013 (2016 Vintage)	38,240,000

~~* Amount could increase based on additional consignment from POUs as described in this notice.~~

The Auction Reserve Price

The Auction Reserve Price is a predetermined minimum price at which allowances will be sold to auction participants. The 2012 Auction Reserve Price was $10. Section 95911 of the Cap-and-Trade Regulation stipulates that the "Auction Reserve Price in U.S. dollars shall be the U.S. dollar Auction Reserve Price for the previous calendar year increased annually by 5 percent plus the rate of inflation as measured by the most recently available twelve months of the Consumer Price Index for All Urban Consumers." The rate of inflation used to calculate the 2013 Auction Reserve Price is 2.16 percent.

Current Auction Budget

The current auction budget describes the minimum number of current year vintage allowances to be sold in 2013. This number includes the State-owned allowances (approximately

10,600,000) and the remaining allowances to be consigned by the electricity distribution utilities. Some public owned utilities (POUs) were provided the flexibility to defer providing direction until January 1, 2013, on how to distribute their allowances between their Compliance and Limited Use Holding Accounts. ~~These deferred allowances total approximately 6,700,000. These are not included in the minimum 2013 annual auction budget. Once ARB receives direction from all of the remaining POUs, this notice will be updated to reflect the final 2013 annual auction budget presented in Table 1~~. ARB has now received direction from all POUs on how to distribute their allowances and Table 1 has been updated to reflect the final annual auction budget for 2013 vintage allowances. **This annual budget update does not change the amount of 2013 vintage allowances for sale in the February 19 auction.** Twenty-five percent of the State-owned allowances will be available at each auction. Utilities are required to notify ARB 75 days before each auction of the number of allowances they intend to consign. The total number of allowances to be auctioned in each auction will be published in the auction notice 60 days in advance. Utility allowances not consigned in the first three auctions will be included in the November 19, 2013 auction.

Advance Auction Budget

The advance auction budget represents ten percent of the allowances from the budget year three years subsequent to the current calendar year. Since the annual allowance budget of 2016 is 382,400,000, the advance auction budget for 2013 is 38,240,000. These allowances will be equally divided for sale across the four auctions in 2013.

2013 Quarterly Auction Dates

An *Auction Notice* with instructions on how to participate will be published 60 days prior to each auction. The *Auction Notice* provides information about eligibility, auction format, and GHG allowances to be auctioned for the applicable quarterly auction.

Table 2 provides additional information specific to the scheduled quarterly auctions.

Table 2: 2013 Quarterly Auction Critical Dates

Auction Consignment Due Date for EDUs	Auction Notice Posting Date	Auction Application Due Date	Auction Dates
12/6/2012	12/21/2012	1/22/2013	2/19/2013
3/4/2013	3/18/2013	4/16/2013	5/16/2013
6/3/2013	6/17/2013	7/17/2013	8/16/2013
9/5/2013	9/20/2013	10/21/2013	11/19/2013

Contact Information

For further information about participation in the 2013 auctions, please contact:
Mr. Chuck Seidler at (916) 324-0931 or cseidler@arb.ca.gov.

Updated on January 15, 2013

Project L: 14th Street Groundwater Recharge and Storm Water Quality Treatment Integration Facility (City of Upland)

Water Supply Benefit

Based on past rainfall data, the proposed project, upon completion, will capture approximately 400 AF of storm water per year for recharge, which is for ground water production at a later date instead of purchasing imported water from Metropolitan Water District (MWD) of Southern California. The savings due to this "avoidance" can be calculated as below.

Benefit Analysis for the Upland's 14th Street Collection/Recharge Basin

MWD Full Service Untreated Rates Established for 2012 and 2013

	2012	2013	Avg. of 2012-13
Tier MWD 1 Rate	$560.00	$593.00	$576.50
Tier MWD 2 Rate	$686.00	$743.00	$714.50
Avg. of Each Year	**$623.00**	**$668.00**	**$645.50**
Captured Volume [AFY] (a)	400	400	400
Value [$] (b)	$249,200	$267,200	$258,200
Project Life [Year]	50	50	50
(Imported Water Purchase) Savings [$](c)	$12,460,000	$13,360,000	$12,910,000
Project Cost [$]	$5,000,000	$5,000,000	$5,000,000
Benefit-To-Cost Ratio (d)	2.5	2.7	**2.6**

Note

(a) Based on past records of rainstorm data and basin area
(b) Value = Captured Volume x Avg. of MWD Tier 1 and 2 rate
(c) Savings = Value x Project Life
(d) Benefit-To-Cost Ration = Savings / Project Cost

The above benefit-to-cost ratio is positioned to be higher in the future, due to the constant increase of MWD rate as evidenced historically.

In addition, the storm water captured can also serve as a blending source for future recycled water recharge implementation (if so desired). At a 50/50 blending ratio, 400 AFY of recycled water can be utilized, thus further reducing the MWD imported volume by 400 AFY (for a total of 800 AFY). The recycled water recharge most likely increases the benefit-to-cost ratio; however, it is premature to determine at this time as it involves recycled water rate and construction cost of recycled water supply line.

Flood Damages Avoidance Benefit Determined by DWR Method

Based on the DWR method of calculating the Present Value of Expected Annual Damage Benefits outlined in Table 12 of the application guideline, the City estimates the proposed project has an annual benefit of $279,196 or $4.67 million during the project life.

Table 12 - Present Value of Expected Annual Damage Benefits			
Project: 14th Street Storm Water Collection/Integration Project			
(a)	Expected Annual Damage Without Project (1)		$279,196
(b)	Expected Annual Damage With Project (1)		$0
(c)	Expected Annual Benefit	(a) - (b)	$279,196
(d)	Present Value Coefficient (2)		17
(e)	**Present Value of Future Benefits Transfer to Table 17, column (d).**	(c) x (d)	**$4,665,361**

(1) This program assumes no land use changes in the floodplain. So, the expected annual damage (EAD) will be constant over analysis period. Please refer to the attached tables (Table 9, 10 and 11) for calculation of $279,196.

Other Environmental/Water Resource Benefits

There are valuable benefits associated with water resources management goals mentioned in Attachment 3. Those benefits fit in the benefit criteria listed in Table 8 of the Grant Guidance Application. These benefits are difficult to be quantified; however, they are real, not only for the City but also to the Santa Ana watershed region.

Summary of Benefits

Summary Quantified Benefits		**Value/Year**
Water Supply	Imported Water Purchase Savings	**$258,200**
Water Quality	Difficult to quantify	
Ecosystem Improvement	Difficult to quantify	
Recreation & Public Access	Difficult to quantify	
Power Cost Savings and Power Production	Elimination of CO2 emission (1) [Metric Ton of CO2]	**690**
Reduction in Flood Damage Cost	Avoidance Cost for emergency response and damage due to flood damages	**$279,196**

(1) According to the Natural Resource Defense Council, pumping 1 ac-ft of State Water Project water to southern California requires 3,000 kWh and pumping 1 ac-ft of Colorado River Aqueduct water to the region requires about 2,000 kWh. As a result, using both sources, on average, requires 2,500 kWh for 1 ac-ft volume. The EPA estimated an emission factor of 6.8956 x (10^(-4)) metric tons CO2 per kWh. Therefore, for 400 ac-ft per year, the proposed Basin will eliminate 690 metric tons of CO2 each year.

Project M: Customer Handbook to Using Water Efficiently in the Landscape (Western Municipal Water District)

Tables 9, 12, 15, 19, and 20 are included in this document to quantify water supply costs and benefits for the "Customer Handbook for Using Water Efficiently in the Landscape" (the "Handbook" or "Project") to be developed by the Western Municipal Water District ("Western"). Narrative supporting the tables is provided below:

I. Narrative Description of the Project's Economic Costs

The Project's economic costs consist of costs contained in the Project budget (Attachment 4), as well as annual administration costs associated with the Project.

II. Cost Details

Budget categories (a) through (h) are included in the cost details as described in Table 7.

III. Estimates of Without-Project conditions; e.g. Current and Future Water Supplies and Demand.

The Santa Ana Watershed Project Authority ("SAWPA") watershed covers 2,650 square miles with a population of six million people. The region primarily covers the hot southern California Inland Empire stretching from the San Bernardino Mountains to the Orange County coast. Life in the region is dependent upon water for commerce, agriculture, quality of life, and a healthy environment. A major use of water goes to maintain a healthy local environment, including landscapes at schools, parks, homes, right-of-ways, and around businesses. Those landscapes cool the urban and suburban built space, clean the air of pollutants (carbon sequestration), enhance property values, and provide habitat for local wildlife. The landscape in the SAWPA watershed is key to the quality of life paid for by local residents.

<u>However, landscapes in the SAWPA region use a significant amount of water, perhaps as much as 60% of the total urban water demand</u>. This Customer Handbook Project is designed to acknowledge the value of home and commercial landscapes, and motivate the owners and managers of landscapes to: (1) understand the water requirements of their landscapes; (2) manage those landscapes within the State guidelines for water use efficiency; and (3) change landscapes to fit the local climates while maintaining property values, wildlife habitat, and environmental quality with less water.

IV. Estimates of With-Project Conditions; e.g. Improvements in New Water Supplies Made Available to Meet Demand

This work plan details the process for completing a comprehensive Handbook on landscape water use efficiency. <u>The effort will utilize the latest in University of California research on landscape plant materials, design, irrigation equipment and maintenance, limiting the use of chemicals that can enter into the non-target environment, and the benefits of an efficient landscape in the watershed</u>. It will also draw expertise from leaders in the landscape world, public agencies, and the private sector. The Handbook will build a sense of responsibility for the end-user to manage their landscape efficiently. It will provide tools to assist with changing the end-user's landscape to use less water and eliminate water runoff that harms the watershed and costs every user.

<u>The Customer Handbook will educate users on how to be water efficient in the landscape, and it will ultimately reduce overall watershed water use by 7,240 acre-feet per year ("AFY")</u>.

The overall objective is to produce an engaging, credible, useful, and practical Handbook to water efficient landscaping in the SAWPA watershed. It is envisioned that this Handbook and its recommendations will be useful for at least a decade and beyond. It will be made accessible to residents, businesses, and the landscape industry via the Internet and water agency promotion.

Specifically, the Handbook will be an education tool that will relate water efficient landscapes to the major issues facing the SAWPA watershed, including, but not limited to: water runoff, water quality, water supply, and water costs to end users. It will educate users about the efficient water management of existing landscapes, how to create a water efficient landscape at a new site, and how to retrofit existing landscapes for increased water efficiency.

V. Description of Methods used to Estimate Without- and With-Project Conditions.

The estimate of 7,240 Acre-feet per year is based on the following assumptions: Total imported water per year in the watershed of 402,247 acre-feet, multiplied by 60% (outdoor water use factor estimated from Western's water budget rate structure that highlights 65%-75% outdoor water usage), multiplied by 30% (the average water savings that can be achieved by implementation of the handbook, based on the study prepared by University of California Cooperative Extension), multiplied by 10% (Western's estimate of the percentage of customers that will implement the handbook).

VI. Description of the Distribution of Local, Regional, and Statewide Benefits

Benefits are primarily local in nature. However, any reduction in demand on water will benefit all water agencies throughout the state.

VII. Identification of Beneficiaries

All local and regional water users and rate payers, Metropolitan Water District, Western, and all urban water suppliers intending to purchase water in the future.

VIII. When the Benefits will be Received

The benefits will be realized as of the completion date of the Project, when the Customer Handbook will be available for distribution.

IX. Uncertainty of the Benefits

N/A

X. Description of any Adverse Effects

N/A

XI. Narrative Discussion that Describes, Qualifies, and Supports the Values Entered in the Tables

Water valuation is based on the Tier 2 full service treated volumetric cost for 2014, which is the actual amount paid Western and other local entities to purchase State Water Project ("SWP") water for designated uses and purposes.

Estimated administration costs for the Project are based on discussions with Western and SAWPA.

XII. Documentation to Support Information Presented

A number of studies have been completed by local water agencies and the University of California Cooperative Extension. These demonstrate that not only does utilizing the latest in water efficient technology and devices save water and prevent runoff, but also so does simply educating users to use water efficiently. Some of these studies include:

- *Burger, D. W., J. S. Hartin, D. R. Hodel, T. A. Lukaszewski, S. A. Tjosvold, and S. A. Wagner. 1987. Water use in California's ornamental nurseries. Cal. Ag. 41(9, 10): 7-8.*
- *Hartin, J.S. 2007. Conserving Water and Improving Plant Health in Large Southern California Landscapes*

- *Haver, D.L. (2008, March). Mitigation of pesticides in urbanized environments. Riverside, CA, Santa Ana Regional Water Quality Control Board.*
- *Hodel, D. R. 1986. Drought tolerance of selected non-irrigated trees. Landscape & Irrigation 10: 66-69.*
- *Hodel, D. R. 1992. Guidelines for irrigating plants in the landscape accurately and economically. University of California, Cooperative Extension, Los Angeles. 10 pp.*
- *Metropolitan Water District of Orange County. 2008. Smart Timer and Edgescape Evaluation Study*
- *Metropolitan Water District of Orange County. 2004. Residential Runoff Reduction Study*
- *Oki, L. and D.L. Haver (2011, March). Evaluating Best Management Practices (BMPs) Effectiveness to Reduce Volumes of Runoff and Improve the Quality of Runoff from Urban Environments Final Report. California State Water Resources Control Board, Sacramento, CA.*
- *Pittenger, D. R., D. R. Hodel, D. A. Shaw, and D. B. Holt. 1992. Determination of minimum irrigation needs of non-turf groundcovers in the landscape. Technical completion report to the University of California, Water Resources Center, Project No. UCAL-WRC-W-741. 24 pp.*
- *Pittenger, D. R. and D. R. Hodel. 1992. Minimum irrigation of landscape groundcovers. HortSci. 27(6): 82.*
- *Hodel, D. R. 1994. Quantify accurate irrigation schedules with ET data. Cal. Lands. Feb.: 23-25, 56.*
- *Pittenger, D. R., W. E. Richie, and D. R. Hodel. 1997. Performance and quality of landscape tree species under two irrigation regimes, pp. 2-32 in: R. L. Green, V. A. Gibeault, D. R. Pittenger, and W. E. Richie (eds.), Turfgrass and Landscape Irrigation Studies Progress Report 1998-1999. University of California, Riverside.*
- *Pittenger, D. R., D. A. Shaw, D. R. Hodel, and D. B. Holt. 2001. Responses of landscape groundcovers to minimum irrigation. J. Environ. Hort. 19: 78-84.*
- *Shaw, D. A., P. F. Zellman, V. A. Gibeault, J. S. Hartin, J. M. Henry, D. R. Hodel, J. Kabashima, and D. R. Pittenger. 1992. Landscape irrigation system evaluation and scheduling for southern California. University of California, Riverside. 36 pp.*

Table 9 – Annual Project Physical Benefits			
Project Name: Customer Handbook for Using Water Efficiently in the Landscape			
Type of Benefit Claimed: Potable Water Savings			
Measure of Benefit Claimed (Name of Units): Acre-Feet			
Additional Information About this Measure: Acre-Feet of Potable Water Saved by Project.			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Increase in Water Supply Resulting from Project (c) – (b)
2012	0	0	0
2013	0	0	0
2014	0	0	0
2015	0	0	0
2016	0	0	0
2017	0	7,240	7,240
2018	0	7,240	7,240
2019	0	7,240	7,240
2020	0	7,240	7,240
2021	0	7,240	7,240
2022	0	7,240	7,240
2023	0	7,240	7,240
2024	0	7,240	7,240
2025	0	7,240	7,240
2026	0	7,240	7,240
Comments:			

Table 12 – Non-monetized Benefits Checklist		
No.	**Question**	**Enter "Yes", "No" or "Neg"**
	Community/Social Benefits **Will the proposal**	
1	**Provide education or technology benefits?**	Yes
	Examples are not limited to, but may include: - Include educational features that should result in water supply, water quality, or flood damage reduction benefits? - Develop, test, or document a new technology for water supply, water quality, or flood damage reduction management? - Provide some other education or technological benefit?	Yes, please see attachment 3 and attachment 8.
2	**Provide social recreation or access benefits?**	No
	Examples are not limited to, but may include: - Provide new or improved outdoor recreation opportunities? - Provide more access to open space? - Provide some other recreation or public access benefit?	
3	**Help avoid, reduce or resolve various public water resources conflicts?**	Yes
	Examples are not limited to, but may include: - Provide more opportunities for public involvement in water management? - Help avoid or resolve an existing conflict as evidenced by recurring fines or litigation? - Help meet an existing state mandate (e.g., water quality, water conservation, flood control)?	Yes, please see attachment 3 and attachment 8.
4	**Promote social health and safety?**	No
	Examples are not limited to, but may include: - Increase urban water supply reliability for fire-fighting and critical services following seismic events? - Reduce risk to life from dam failure or flooding? - Reduce exposure to water-related hazards?	
5	**Have other social benefits?**	No
	Examples are not limited to, but may include: - Redress or increase inequitable distribution of environmental burdens? - Have disproportionate beneficial or adverse effects on disadvantaged communities, Native Americans, or other distinct cultural groups?	
	Environmental Stewardship Benefits: **Will the proposal**	
6	**Benefit wildlife or habitat in ways that were not quantified in Attachment 7?**	No
	Examples are not limited to, but may include: - Cause an increase in the amount or quality of terrestrial, aquatic, riparian or wetland habitat? - Contribute to an existing biological opinion or recovery plan for a listed special status species? - Preserve or restore designated critical habitat of a listed species? - Enhance wildlife protection or habitat?	
7	**Improve water quality in ways that were not quantified in Attachment 7?**	No
	Examples are not limited to, but may include: - Cause an improvement in water quality in an impaired water body or sensitive habitat? - Prevent water quality degradation? - Cause some other improvement in water quality?	
8	**Reduce net emissions in ways that were not quantified in Attachment 7?**	No
	Examples are not limited to, but may include: - Reduce net production of greenhouse gasses? - Reduce net emissions of other harmful chemicals into the air or water?	
9	**Provide other environmental stewardship benefits, other than those claimed in Sections D1, D3, or D4?**	No
	Sustainability Benefits: **Will the proposal**	
10	**Improve the overall, long-term management of California groundwater resources?**	Yes
	Examples are not limited to, but may include: - Reduce extraction of non-renewable groundwater? - Promote aquifer storage or recharge?	Yes, please see attachment 3 and attachment 8.
11	**Reduce demand for net diversions for the regions from the Delta?**	No
12	**Provide a long-term solution in place of a short-term one?**	No
13	**Promote energy savings or replace fossil fuel based energy sources with renewable energy and resources?**	No
	Examples are not limited to, but may include: - Reduce net energy use on a permanent basis? - Increase renewable energy production? - Include new buildings or modify buildings to include certified LEED features? - Provide a net increase in recycling or reuse of materials? - Replace unsustainable land or water management practices with recognized sustainable practices?	
14	**Improve water supply reliability in ways not quantified in Attachment 7?**	Yes
	Examples are not limited to, but may include: - Provide a more flexible mix of water sources? - Reduce likelihood of catastrophic supply outages? - Reduce supply uncertainty? - Reduce supply variability?	Yes, please see attachment 3 and attachment 8.
15	**Other (If the above listed categories do not apply, provide non-monetized benefit description)?**	N/A

Table 15 – Annual Benefit (All benefits should be in 2012 dollars) Project: Customer Handbook for Using Water Efficiently in the Landscape									
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
Year	Type of Benefit	Measure of Benefit (Units)	Without Project	With Project (1)	Change Resulting from Project (e) – (d)	Unit $ Value (2)	Annual $ Value (2) (f) x (g)	Discount Factor (6%)	Discounted Benefits (h) x (i)
2012							$0	1.000	**$0**
2013							$0	0.943	**$0**
2014							$0	0.890	**$0**
2015							$0	0.840	**$0**
2016							$0	0.792	**$0**
2017	Potable Water Savings (Reduced Importation)	Acre-Feet	0	7,240	7,240	$1,032	$7,471,680	0.747	**$5,583,274**
2018	Potable Water Savings (Reduced Importation)	Acre-Feet	0	7,240	7,240	$1,032	$7,471,680	0.705	**$5,267,240**
2019	Potable Water Savings (Reduced Importation)	Acre-Feet	0	7,240	7,240	$1,032	$7,471,680	0.665	**$4,969,094**
2020	Potable Water Savings (Reduced Importation)	Acre-Feet	0	7,240	7,240	$1,032	$7,471,680	0.627	**$4,687,824**
2021	Potable Water Savings (Reduced Importation)	Acre-Feet	0	7,240	7,240	$1,032	$7,471,680	0.592	**$4,422,476**
2022	Potable Water Savings (Reduced Importation)	Acre-Feet	0	7,240	7,240	$1,032	$7,471,680	0.558	**$4,172,147**
2023	Potable Water Savings (Reduced Importation)	Acre-Feet	0	7,240	7,240	$1,032	$7,471,680	0.527	**$3,935,988**
2024	Potable Water Savings (Reduced Importation)	Acre-Feet	0	7,240	7,240	$1,032	$7,471,680	0.497	**$3,713,196**
2025	Potable Water Savings (Reduced Importation)	Acre-Feet	0	7,240	7,240	$1,032	$7,471,680	0.469	**$3,503,015**
2026	Potable Water Savings (Reduced Importation)	Acre-Feet	0	7,240	7,240	$1,032	$7,471,680	0.442	**$3,304,731**
2027	Potable Water Savings (Reduced Importation)	Acre-Feet	0	7,240	7,240	$1,032	$7,471,680	0.417	**$3,117,671**
								Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)	**$46,676,656**
Comments:									

(1) Total imported water per year in the watershed of 402,247 acre-feet, multiplied by 60% (outdoor water use factor estimated from Western budget rate structure that highlights 65%-75% outdoor water usage), multiplied by 30% (the average water savings that can be achieved by implementation of the handbook, based on the study prepared by University of California Cooperative Extension), multiplied by 10% (Western's estimate of the percentage of customers that will implement the handbook).

(2) Water valuation is based on the Tier 2 full service treated volumetric cost for 2014, which is the actual amount paid by Western and other local entities to purchase State Water Project ("SWP") water for designated uses and purposes.

Table 19 – Annual Costs of Project (All costs should be in 2012 Dollars) Project: Customer Handbook for Using Water Efficiently in the Landscape										
	Initial Costs Grand Total Cost from Table 7 (row (i), column	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)
2012	$0	$0						$0	1.000	**$0**
2013	$0	$0						$0	0.943	**$0**
2014	$24,375	$8,125						$32,500	0.890	**$28,925**
2015	$37,875	$12,625						$50,500	0.840	**$42,401**
2016	$57,750	$19,250	$5,000	$0	$0	$0	$0	$82,000	0.792	**$64,952**
2017	$0	$0	$10,000	$0	$0	$0	$0	$10,000	0.747	**$7,473**
2018	$0	$0	$10,000	$0	$0	$0	$0	$10,000	0.705	**$7,050**
2019	$0	$0	$10,000	$0	$0	$0	$0	$10,000	0.665	**$6,651**
2020	$0	$0	$10,000	$0	$0	$0	$0	$10,000	0.627	**$6,274**
2021	$0	$0	$10,000	$0	$0	$0	$0	$10,000	0.592	**$5,919**
2022	$0	$0	$10,000	$0	$0	$0	$0	$10,000	0.558	**$5,584**
2023	$0	$0	$10,000	$0	$0	$0	$0	$10,000	0.527	**$5,268**
2024	$0	$0	$10,000	$0	$0	$0	$0	$10,000	0.497	**$4,970**
2025	$0	$0	$10,000	$0	$0	$0	$0	$10,000	0.469	**$4,688**
2026	$0	$0	$10,000	$0	$0	$0	$0	$10,000	0.442	**$4,423**
2027	$0	$0	$10,000	$0	$0	$0	$0	$10,000	0.417	**$4,173**
Total Present Value of Discounted Costs (Sum of column (j)) Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries										**$198,749**
Comments:										
(1) Based on opportunity costs, sunk costs, and associated costs										
(2) The incremental change in O&M costs attributable to the Project.										

COSTS AND BENEFITS SUMMARY

Table 20 summarizes the costs and benefits for the Project.

Table 20 – Proposal Benefits and Costs Summary Proposal: Customer Handbook for Using Water Efficiently in the Landscape Agency: Western Municipal Water District							
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)
		$198,749	$46,676,656	$0	$46,676,656		
(1) From Table 19, or RWMG method							
(2) From Table 15 or RWMG method							
(3) From Table 18 or RWMG method							

Adopted Water Rates & Charges

Historical Water Rates

Effective January 1st	2012	2013	2014
Tier 1 Supply Rate ($/AF)	$106	$140	$148
Delta Supply Surcharge ($/AF)	$58	*	*
Tier 2 Supply Rate ($/AF)	$290	$290	$290
System Access Rate ($/AF)	$217	$223	$243
Water Stewardship Rate ($/AF)	$43	$41	$41
System Power Rate ($/AF)	$136	$189	$161
Full Service Untreated Volumetric Cost ($/AF)			
Tier 1	$560	$593	$593
Tier 2	$686	$743	$735
Replenishment Water Rate: untreated ($/AF)	$442	**	**
Interim Agricultural Water Program: untreated ($/AF)	$537	***	***
Treatment Surcharge ($/AF)	$234	$254	$297
Full Service Treated Volumetric Cost ($/AF)			
Tier 1	$794	$847	$890
Tier 2	$920	$997	$1,032
Treated Replenishment Water Rate ($/AF)	$651	**	**
Treated Interim Agricultural Water Program ($/AF)	$765	***	***
Readiness-to-Serve Charge (millions of dollars)	$146	$142	$166
Capacity Charge ($/cfs)	$7,400	$6,400	$8,600

* The Delta Supply Surcharge will be suspended after 2012
** Discussions on the replenishment program are continuing with the Member Agencies
*** The Interim Agricultural Water Program will be discontinued after 2012

Definitions

Tier 1 Supply Rate - recovers the of cost of maintaining a reliable amount of supply.

Delta Supply Surcharge - reflects the additional supply costs that Metropolitan faces along with other costs due to the pumping restrictions on the State Water Project.

Tier 2 Supply Rate - set at Metropolitan's cost of developing additional supply to encourage efficient use of local resources.

System Access Rate – recovers a portion of the costs associated with the delivery of supplies.

System Power Rate – recovers Metropolitan's power costs for pumping supplies to Southern California.

Water Stewardship Rate – recovers the cost of Metropolitan's financial commitment to conservation, water recycling, groundwater clean-up and other local resource management programs.

Replenishment Water Rate – a discounted rate for surplus system supplies available for the purpose of replenishing local storage.

Treated Replenishment Water Rate – a discounted rate for surplus system supplies available for the purpose of replenishing local storage.

Interim Agricultural Water Rate – discounted rate for surplus system supplies available for the purpose of growing agricultural, horticultural, or floricultural products.

Treated Interim Agricultural Water Program Rate – discounted rate for surplus system supplies available for the purpose of growing agricultural, horticultural, or floricultural products.

Treatment Surcharge – recovers the costs of treating imported water.

Readiness-to-Serve Charge - a fixed charge that recovers the cost of the portion of system capacity that is on standby to provide emergency service and operational flexibility.

Capacity Charge – the capacity charge recovers the cost of providing peak capacity within the distribution system.

Page updated: April 19, 2012

Air Resources Board

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Matthew Rodriquez
Secretary for Environmental Protection

Edmund G. Brown Jr.
Governor

2013 Annual Auction Reserve Price Notice

California Cap-and-Trade Program Greenhouse Gas Allowance Auctions

Issued on December 3, 2012

Updated on January 15, 2013

Auction Summary

This document, *2013 Annual Auction Reserve Price Notice,* specifies the 2013 Auction Reserve Price and the number of allowances to be auctioned in 2013 for the quarterly auctions as part of the Current Auction and Advance Auction. The 2013 quarterly GHG allowance auctions will offer 2013 vintage allowances and 2016 vintage allowances for sale.

The 2013 Auction Reserve Price and the annual budget of 2013 and 2016 vintage allowances for sale in 2013, is shown in Table 1 below.

Table 1: 2013 Auction Data

Auction Data Description	Auction Data
Auction Reserve Price	$10.71
Number of allowances to be auctioned in 2013 (2013 Vintage)	~~56,848,885*~~ 57,628,254
Number of advance allowances to be auctioned in 2013 (2016 Vintage)	38,240,000

~~* Amount could increase based on additional consignment from POUs as described in this notice.~~

The Auction Reserve Price

The Auction Reserve Price is a predetermined minimum price at which allowances will be sold to auction participants. The 2012 Auction Reserve Price was $10. Section 95911 of the Cap-and-Trade Regulation stipulates that the "Auction Reserve Price in U.S. dollars shall be the U.S. dollar Auction Reserve Price for the previous calendar year increased annually by 5 percent plus the rate of inflation as measured by the most recently available twelve months of the Consumer Price Index for All Urban Consumers." The rate of inflation used to calculate the 2013 Auction Reserve Price is 2.16 percent.

Current Auction Budget

The current auction budget describes the minimum number of current year vintage allowances to be sold in 2013. This number includes the State-owned allowances (approximately

10,600,000) and the remaining allowances to be consigned by the electricity distribution utilities. Some public owned utilities (POUs) were provided the flexibility to defer providing direction until January 1, 2013, on how to distribute their allowances between their Compliance and Limited Use Holding Accounts. ~~These deferred allowances total approximately 6,700,000. These are not included in the minimum 2013 annual auction budget. Once ARB receives direction from all of the remaining POUs, this notice will be updated to reflect the final 2013 annual auction budget presented in Table 1~~. ARB has now received direction from all POUs on how to distribute their allowances and Table 1 has been updated to reflect the final annual auction budget for 2013 vintage allowances. **This annual budget update does not change the amount of 2013 vintage allowances for sale in the February 19 auction.** Twenty-five percent of the State-owned allowances will be available at each auction. Utilities are required to notify ARB 75 days before each auction of the number of allowances they intend to consign. The total number of allowances to be auctioned in each auction will be published in the auction notice 60 days in advance. Utility allowances not consigned in the first three auctions will be included in the November 19, 2013 auction.

Advance Auction Budget

The advance auction budget represents ten percent of the allowances from the budget year three years subsequent to the current calendar year. Since the annual allowance budget of 2016 is 382,400,000, the advance auction budget for 2013 is 38,240,000. These allowances will be equally divided for sale across the four auctions in 2013.

2013 Quarterly Auction Dates

An *Auction Notice* with instructions on how to participate will be published 60 days prior to each auction. The *Auction Notice* provides information about eligibility, auction format, and GHG allowances to be auctioned for the applicable quarterly auction.

Table 2 provides additional information specific to the scheduled quarterly auctions.

Table 2: 2013 Quarterly Auction Critical Dates

Auction Consignment Due Date for EDUs	Auction Notice Posting Date	Auction Application Due Date	Auction Dates
12/6/2012	12/21/2012	1/22/2013	2/19/2013
3/4/2013	3/18/2013	4/16/2013	5/16/2013
6/3/2013	6/17/2013	7/17/2013	8/16/2013
9/5/2013	9/20/2013	10/21/2013	11/19/2013

Contact Information

For further information about participation in the 2013 auctions, please contact:
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Updated on January 15, 2013

Project N: Vulcan Pit Flood Control and Aquifer Recharge Project (City of Fontana)

The Project provides improved flood protection, water conservation, and water quality. The drainage systems will capture and convey storm water to the Vulcan Basin. The system captures runoff from a watershed area of 2,467 acres and during average rainfall years, will deliver 1,800 acre-feet of storm water to the basins for recharge. The Project will eliminate 1,150 acres of flood inundation area of a commuter rail corridor and mixed residential, commercial, and industrial properties, as shown on Attachment 7-1.

The Project, when completed, will operate as a passive system. When precipitation occurs, water will conveyed through the Arrow Storm Drain and the Sultana/Valencia Storm Drain to the Vulcan Basin for recharge. The Project will provide immediate flood protection to the existing flood hazard area. There are no uncertainties related to the project benefits and the Project will not create any adverse effects. Additionally, when precipitation is not occurring, recycled water will be delivered to the site through a new recycled waterline which outlets to the Sultana/Valencia Storm Drain for conveyance to the Basin site.

The Project's economic costs related to flood control include expansion of an abandoned mining pit to a volume of approximately 2,000 acre-feet, including inlets, outlets, and water quality and water level monitoring systems, and 21,838 linear feet of storm drain conveyance facilities. As shown on Table 7, the drainage conveyance and basin improvements are estimated at $14.7 million. The Project's total costs are shown on Table 8 in Attachment 4.

The Project's flood damage reduction benefit analysis was calculated using the data presented in Attachment 7 and DWR's Flood Rapid Assessment Model (F-RAM). Expected annual damage without the Project is approximately $1.2 million, as shown on Table 17, due to the greater economic impacts to the commercial and industrial communities through flood damage and lost revenue. As shown on Table 18, the present value of expected annual damage is $18.8 million. F-RAM analysis is included as Attachment 8-1.

In addition to flood protection, the volume of the Vulcan Basin will provide additional storage for both storm and recycled waters facilitating greater aquifer recharge. The Project's recharge benefit analysis is presented Table 15 and described further below. The Project will provide a water supply benefit through avoided imported water supply costs. The total present value of the recharge benefit is $41.1 million.

Imported water supplies reliability will continue to be at risk. Reducing dependence on these supplies will benefit the entire State. For the cost analysis, MWD Tier 2 water rates are used since Tier 1 water is not available and is not anticipated to be available in the future. MWD's Tier 2 water rate for 2013 is $743 per acre-foot.

Approximately 3,800 acre-feet per year of storm and recycled waters will be recharged at the basins reducing the City dependence on import water. Without the project, no new yield will be captured. Capture and recharge of the new yield will benefit all Chino Basin water producers serving an estimated population of 2.2 million.

The Project's non-monetized benefit are improving water quality, reducing greenhouse gas (GHG) emissions, improve groundwater management, reduce demand on the Delta, and improving water supply reliability. Non-monetized benefits are presented on Table 12. GHG reduction of 5,400 tons CO_2 per year for the project is further described in Attachment 7.

Project costs include initial construction and ongoing maintenance. It is estimated that every 5 years the basin will require removal of sediment build-up and scouring of the basin floor. At these 5 year intervals, over the Projects 50 year life, operation and maintenance costs will increase to account for the additional work. The total present value of discounted costs is $21.3 million, as shown on Table 19. All values for total present value Project costs (Table 19), flood damage reduction (Table 18), and monetized Project benefits (Table 15) are summarized on Table 20. The Project's benefit cost summary (Table 20) show that Project benefits outweigh Project cost by 3:1.

All included tables have been described, qualified, and/or supported here and in the comment section of each table.

Table 12 – Non-monetized Benefits Checklist		
	Project: Vulcan Pit Flood Control and Aquifer Recharge Project	
No.	**Question**	**Enter "Yes", "No" or "Neg"**
	Community/Social Benefits: **Will the proposal**	
1	**Provide education or technology benefits?**	**No**
2	**Provide social recreation or access benefits?**	**No**
3	**Help avoid, reduce or resolve various public water resources conflicts?**	**No**
4	**Promote social health and safety?**	**No**
5	**Have other social benefits?**	**No**
	Environmental Stewardship Benefits: **Will the proposal**	
6	**Benefit wildlife or habitat in ways that were not quantified in Attachment 7?**	**No**
7	**Improve water quality in ways that were not quantified in Attachment 7?**	**Yes**
	The Project will reduce urban runoff discharge pollutants that increase downstream erosion potential and associated water quality impairment to the Santa Ana River; which is on the Santa Ana Regional Water Quality Control Board 303(d) List of Water Quality Limited Segments.	
8	**Reduce net emissions in ways that were not quantified in Attachment 7?**	**Yes**
	The Project will reduce greenhouse gas emissions through development of new local water supplies that eliminates the need for imported water to be delivered from the Bay-Delta of the same quantity. By avoiding delivery through the state's system, a significant reduction in greenhouse gas emissions is attained.	
9	**Provide other environmental stewardship benefits, other than those claimed in Sections D1, D3 or D4?**	**No**
	Sustainability Benefits: **Will the proposal**	
10	**Improve the overall, long-term management of California groundwater resources?**	**Yes**
	The Project will promote aquifer storage and recharge of stormwater runoff, that is currently lost to the Santa Ana River and ultimately the Pacific Ocean, and recycled water. Recharged water will help reduce overdraft in the Chino Basin.	
11	**Reduce demand for net diversions for the regions from the Delta?**	**Yes**
	See number 8, above.	
12	**Provide a long-term solution in place of a short-term one?**	**No**
13	**Reduce water consumption on a permanent basis?**	**No**
14	**Promote energy savings or replace fossil fuel based energy sources with renewable energy and resources?**	**No**
15	**Improve water supply reliability in ways not quantified in Attachment 7?**	**Yes**
	Import water from the Bay-Delta is often subject to supply uncertainty and supply variability. Development of local water supply sources will reduce the City's dependence on import water and, as a result, reduce water supply uncertainty and variability.	
16	**Other (If the above listed categories do not apply, provide non-monetized benefit description)?**	**N/A**

Table 15 - Annual Benefit
(All Costs should be in 2012 Dollars)

Project: Vulcan Pit Flood Control and Aquifer Recharge 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)*(g)	Discount Factor[1.)]	Discounted Benefits[1.)] (h)*(i)
2012	Stormwater Capture and Storage	Acre-Feet	0	0	0	$ 743	$ -	1.000	$ -
2013	Stormwater Capture and Storage	Acre-Feet	0	0	0	$ 743	$ -	0.943	$ -
2014	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.890	$ 2,479,763
2015	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.840	$ 2,340,450
2016	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.792	$ 2,206,710
2017	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.747	$ 2,081,329
2018	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.705	$ 1,964,306
2019	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.665	$ 1,852,856
2020	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.627	$ 1,746,979
2021	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.592	$ 1,649,460
2022	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.558	$ 1,554,728
2023	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.527	$ 1,468,354
2024	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.497	$ 1,384,766
2025	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.469	$ 1,306,751
2026	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.442	$ 1,231,523
2027	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.417	$ 1,161,866
2028	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.394	$ 1,097,783
2029	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.371	$ 1,033,699
2030	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.350	$ 975,188
2031	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.331	$ 922,249
2032	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.312	$ 869,310
2033	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.294	$ 819,158
2034	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.278	$ 774,578
2035	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.262	$ 729,998
2036	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.247	$ 688,204
2037	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.233	$ 649,196
2038	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.220	$ 612,975
2039	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.207	$ 576,754
2040	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.196	$ 546,105
2041	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.185	$ 515,456
2042	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.174	$ 484,808
2043	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.164	$ 456,945
2044	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.155	$ 431,869
2045	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.146	$ 406,793
2046	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.138	$ 384,503
2047	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.130	$ 362,213
2048	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.123	$ 342,709
2049	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.116	$ 323,205
2050	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.109	$ 303,701
2051	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.103	$ 286,984
2052	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.097	$ 270,266
2053	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.092	$ 256,335
2054	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.087	$ 242,404
2055	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.082	$ 228,473
2056	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.077	$ 214,541
2057	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.073	$ 203,396
2058	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.069	$ 192,251
2059	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.065	$ 181,106
2060	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.061	$ 169,961
2061	Stormwater Capture and Storage	Acre-Feet	0	3,750	3,750	$ 743	$2,786,250	0.058	$ 161,603
							Total Present Value of Discounted Benefits Based on Unit Value (Sum of Column (j) for all Benefits shown in Table)		**$ 41,144,554**

Notes:
1.) Complete these columns if dollar value is being claimed for the benefit.
2.) Refer to Attachment 7 and Table 9 for benefit details.

Table 17 - Expected Annual Damage

Project: Vulcan Pit Flood Control and Aquifer Recharge Project

Hydrologic Event	Event Probability	Damage if Flood Structures Fail	Probability Structural Failure		Event Damage		Interval Probability	Average Damage in Interval		Average Damage in Interval times Interval Probability	
			Without Project	With Project	Without Project	With Project		Without Project	With Project	Without Project	With Project
					(f)	(g)	(i)	(j)	(k)	(l)	(m)
(a)	(b)	(c)	(d)	(e)	(c)*(d)	(c)*(e)	from (b)	from (f)	from (g)	(i) x (j)	(i) x (k)
25-Year	0.040	$ 34,781,093	0.60	0.00	$20,868,656	$ -	0.020	$ 20,868,656	$ -	$ 417,373	$ -
50-Year	0.020	$ 52,171,639	0.75	0.00	$39,128,729	$ -	0.010	$ 39,128,729	$ -	$ 391,287	$ -
100-Year	0.010	$ 77,199,383	1.00	0.00	$77,199,383	$ -	0.005	$ 77,199,383	$ -	$ 385,997	$ -
									Expected Annual Damages, Without and With Project	**$1,194,657**	**$ -**

Notes:

1.) Expected annual damage determined using DWR's Flood Rapid Assessment Model (FRAM). Detailed FRAM analysis is included as part of this

Table 18 - Present Value of Expected Annual Damage

Project: Vulcan Pit Flood Control and Aquifer Recharge Project

(a)	Expected Annual Damage Without Project[1.)]		$ 1,194,657
(b)	Expected Annual Damage With Project[1.)]		$ -
(c)	Expected Annual Benefit	(a)-(b)	$ 1,194,657
(d)	Present Value Coefficient[2.)]		15.76
(e)	**Present Value of Future Benefits Transfer to Table 20, Column (e).**	**(c)*(d)**	**$ 18,827,799**

Notes:

1.) This program assumes no land use changes in the floodplain. So, EAD will be constant over analysis period.

2.) 6% discount rate; 50-year analysis period (could vary depending upon life cycle of project).

Table 19 - Annual Costs of Project

(All Costs should be in 2012 Dollars)

Project: Vulcan Pit Flood Control and Aquifer Recharge Project

	Initial Costs Grand Total Cost from Table 7 (row (i), coulmn (d))	Adjusted Grant Total Cost[1.)]	Annual Costs[2.)]						Discounting Calculations	
			Admin	Operation	Maintainance	Replacement	Other	Total Costs (a)+...+(g)	Discount Factor	Discounted Costs (h)*(i)
Year	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
2012	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	1.000	$ -
2013	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.943	$ -
2014	$ 23,650,000	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 23,661,000	0.890	$ 21,058,290
2015	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.840	$ 9,240
2016	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.792	$ 8,712
2017	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.747	$ 8,217
2018	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.705	$ 7,755
2019	$ -	$ -	$ 2,000	$ 9,000	$ 9,000	$ 61,185	$ -	$ 81,185	0.665	$ 53,988
2020	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.627	$ 6,897
2021	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.592	$ 6,512
2022	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.558	$ 6,138
2023	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.527	$ 5,797
2024	$ -	$ -	$ 2,000	$ 9,000	$ 9,000	$ 61,185	$ -	$ 81,185	0.497	$ 40,349
2025	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.469	$ 5,159
2026	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.442	$ 4,862
2027	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.417	$ 4,587
2028	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.394	$ 4,334
2029	$ -	$ -	$ 2,000	$ 9,000	$ 9,000	$ 61,185	$ -	$ 81,185	0.371	$ 30,120
2030	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.350	$ 3,850
2031	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.331	$ 3,641
2032	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.312	$ 3,432
2033	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.294	$ 3,234
2034	$ -	$ -	$ 2,000	$ 9,000	$ 9,000	$ 61,185	$ -	$ 81,185	0.278	$ 22,570
2035	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.262	$ 2,882
2036	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.247	$ 2,717
2037	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.233	$ 2,563
2038	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.220	$ 2,420
2039	$ -	$ -	$ 2,000	$ 9,000	$ 9,000	$ 61,185	$ -	$ 81,185	0.207	$ 16,805
2040	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.196	$ 2,156
2041	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.185	$ 2,035
2042	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.174	$ 1,914
2043	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.164	$ 1,804
2044	$ -	$ -	$ 2,000	$ 9,000	$ 9,000	$ 61,185	$ -	$ 81,185	0.155	$ 12,584
2045	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.146	$ 1,606
2046	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.138	$ 1,518
2047	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.130	$ 1,430
2048	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.123	$ 1,353
2049	$ -	$ -	$ 2,000	$ 9,000	$ 9,000	$ 61,185	$ -	$ 81,185	0.116	$ 9,417
2050	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.109	$ 1,199
2051	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.103	$ 1,133
2052	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.097	$ 1,067
2053	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.092	$ 1,012
2054	$ -	$ -	$ 2,000	$ 9,000	$ 9,000	$ 61,185	$ -	$ 81,185	0.087	$ 7,063
2055	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.082	$ 902
2056	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.077	$ 847
2057	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.073	$ 803
2058	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.069	$ 759
2059	$ -	$ -	$ 2,000	$ 9,000	$ 9,000	$ 61,185	$ -	$ 81,185	0.065	$ 5,277
2060	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.061	$ 671
2061	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.058	$ 638
								Total Present Value of Discounted Costs (Sum of Column (j))		**$ 21,382,259**
								Transfer to Table 17, column (c), Proposal Benefits and Costs Summaries		

Notes:

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

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

Comments:

(a) Capital and Other Initial Costs are take from and further described in Tables 7 and 8.

(b) Not Applicable.

(c) Administrative costs are estimated to include two weeks of work per year at a rate of $25 per hour.

(d) Operation costs are estimated to include one and a half weeks of work per year at a rate of $75 per hour. Additionally, pipe repair, sediment build-up removal, and scouring of the basin floor, will require extra costs every five years estimated at three weeks of work at a rate of $75 per hour.

(e) Maintenance costs are estimated to include one and a half weeks of work per year at a rate of $75 per hour. Additionally, pipe repair, sediment build-up removal, and scouring of the basin floor, will require extra costs every five years estimated at three weeks of work at a rate of $75 per hour.

(f) Replacement costs include sediment build-up removal (20,400 cubic-yards) and scouring of the basin floor at a rate of $3 per cubic-yard, to be done every 5 years.

(g) Other costs were not applicable.

(h) Total Costs are the summation of columns (a) through (f).

(i) Discount Factors are based on a 6% discount rate and a 50 year analysis period, as provided in the application.

(j) Discounted Costs are Total Costs multiplied by the Discount Factor.

Table 20 - Proposal Benefits and Costs Summary

Project: Vulcan Pit Flood Control and Aquifer Recharge Project
Agency: City of Fontana

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[4.)]
			From Section D3 – Monetized[2.)]	From Section D4 – Flood Damage Reduction[3.)]	Total		
(a)	(b)	(c)	(d)	(e)	(f)=(d)+(e)	(g)	(g)
Vulcan Pit Flood Control and Aquifer Recharge Project	City of Fontana	$ 21,382,259	$ 41,144,554	$ 18,827,799	$59,972,353	$ -	The Project will: -Improve water quality -Improve water supply reliability -Reduce GHG emissions -Improve management of groundwater resources -Reduce demand on the Delta

Notes:
1.) Refer to Table 19.
2.) Refer to Table 15.
3.) Refer to Table 18.
4.) Refer to Attachment 7, Table 9, and Table 12 for details.

Discount Factors	
Year	**Discount Factor**
2012	1.000
2013	0.943
2014	0.890
2015	0.840
2016	0.792
2017	0.747
2018	0.705
2019	0.665
2020	0.627
2021	0.592
2022	0.558
2023	0.527
2024	0.497
2025	0.469
2026	0.442
2027	0.417
2028	0.394
2029	0.371
2030	0.350
2031	0.331
2032	0.312
2033	0.294
2034	0.278
2035	0.262
2036	0.247
2037	0.233
2038	0.220
2039	0.207
2040	0.196
2041	0.185
2042	0.174
2043	0.164
2044	0.155
2045	0.146
2046	0.138
2047	0.130
2048	0.123
2049	0.116
2050	0.109
2051	0.103
2052	0.097
2053	0.092
2054	0.087
2055	0.082
2056	0.077
2057	0.073
2058	0.069
2059	0.065
2060	0.061
2061	0.058

Attachment 8-1
FRAM Analysis

DWR Levee Mitigation Prioritization Tool

To Read Instructions:	Read Instructions
To Enter Project Information:	Enter Project Information
To Enter Special Cases:	Enter Special Cases
View Cost-Benefit Analysis:	Cost-Benefit Analysis
View Stage Damage Graph:	Stage v Damage Curve
View AAD Graph (Actual):	Loss Probability Curve

Instructions

Return to Menu

Project information should be entered in the 'Inputs' tab only. Information is required in all cells highlighted green. Example:

Output information is provided in the 'BCA Summary' tab. Project calculations are performed in the sheets described in the Model Map.

Model Map

Sheet Name	Description
Menu:	Front page of model, with links to key sheets
Instructions:	Description of how this model should be used
Inputs:	Project information to be entered by user
BCA Summary:	Summary data resulting from Cost-Benefit Analysis
Assumptions:	Master page containing unit damage assumptions
Depth Damage Curves	Data describing stage damage relationships
Residential:	Direct residential building and contents costs
Commercial & Industrial:	Direct commercial and industrial building and contents costs
Agricultural:	Direct losses to agricultural production
Roads	Direct Losses to roads and infrastructure
Special Cases:	Table for entering information about special case buildings
Without Project EAD	Calculation of Estimated Annual Damages (EAD) without-project
Graph Data	Data used to develop graphical outputs
With Project EAD	Calculation of Estimated Annual Damages (EAD) with-project
Stage v Damage Curve	Graph of flood stage v flood damages
Loss Probability Curve	Graph of flood exceedance probability v flood damages

Inputs

Return to Menu

Project Name: Vulcan Pit Flood Control and Aquifer Recharge Project

Cost of Project: $ 23,650,000

Description: The project will mitigat flooding for a tributary area of 2,467 acres and includes various storm drain improvements and construction of a basin for flood control and aquifer recharge.

Number of Events Modeled: 3

		Without Project						With Project					
		Event 1	**Event 2**	**Event 3**	**Event 4**	**Event 5**	**Event 6**	**Event 1**	**Event 2**	**Event 3**	**Event 4**	**Event 5**	**Event 6**
Average Return Interval (ARI)		25	50	100				25	50	100			
Annual Probability of Exceedance		0.040	0.020	0.010	#DIV/0!	#DIV/0!	#DIV/0!	0.040	0.020	0.010	#DIV/0!	#DIV/0!	#DIV/0!
Probability of Levee Failure		1.00	1.00	1.00				0.00	0.00	0.00			
Water Surface Elevation - channel (f)		1249.50	1249.75	1250.00									
Flood Warning Time (hours)		0.5	0.5	0.5									
Flood Experience		Y	Y	Y				N	N	N			
Period of Inundation (days)		1	1	1									
HEC-FIA DATA INPUTS		N											
Residential Structural Damages ($)													
Residential Contents Damages ($)													
Residential Debris & Cleanup ($)													
Commercial Structural Damages ($)													
Commercial Contents Damages ($)													
Commercial Debris & Cleanup ($)													
Industrial Structural Damages ($)													
Industrial Contents Damages ($)													
Industrial Debris & Cleanup ($)													
Agricultural Structural Damages ($)													
Agricultural Contents Damages ($)													
Agricultural Debris & Cleanup ($)													
Residential Properties													
Ratio Depreciated Value to Replacement Value		100%	100%	100%									
Average Flood depth above ground level (f)		0.50	0.75	1.00									
Rural - Res: Homesteads													
Rural - Other: Barns, sheds													
Urban Res: Single story (no base)		221	331	441									
Urban Res: Single story (basement)													
Urban Res: Two plus story (no base)		277	416	554									
Urban Res: Two plus story (basement)													
Mobile home													
Commercial Properties													
Ratio Depreciated Value to Replacement Value		100%	100%	100%									
Average Flood depth above ground level (f)		0.50	0.75	1.00									
low value	building area inundated (sq.f.)	224,228	336,342	448,456									
medium value	building area inundated (sq.f.)	224,228	336,342	448,456									
high value	building area inundated (sq.f.)												
Industrial Properties													
Ratio Depreciated Value to Replacement Value		100%	100%	100%									
Average Flood depth above ground level (f)		0.50	0.75	1.00									
low value	building area inundated (sq.f.)	1,143,538	1,715,306	2,287,075									
medium value	building area inundated (sq.f.)	1,143,538	1,715,306	2,287,075									
high value	building area inundated (sq.f.)												
Agricultural Production													
Corn	ac.												
Rice	ac.												
Walnuts	ac.												
Almonds	ac.												
Cotton	ac.												
Tomatoes	ac.												
Wine Grapes	ac.												
Alfalfa	ac.												
Pasture	ac.												
Safflower	ac.												
Sugar Beets	ac.												
Beans	ac.												
Other	ac.												
Roads													
length of arterial roads inundated (miles)		2.25	3.38	4.5									
length of major roads inundated (miles)		1.15	1.73	2.3									
length of minor roads inundated (miles)		1.60	2.40	3.2									
length of unsealed roads inundated (miles)													

Extrapolate Y-intercept: N

Summary of Cost-Benefit Analysis

Return to Menu

Project Name: **Vulcan Pit Flood Control and Aquifer Recharge Project**

Description: The project will mitigat flooding for a tributary area of 2,467 acres and includes various storm drain improvements and construction of a basin for flood control and aquifer recharge.

Proposed project capital cost:	$ 23,650,000	[Note: construction costs which are assumed to occur in one year.]
Change in annual O&M costs:	$ -	[Note: the change in annual O&M costs compared to without project conditions.]
PV of future O&M costs:	$ -	(at 6% discount rate over 50 years)
PV of future costs	$ 23,650,000	[Note: the sum of capital costs plus the PV of O&M costs.]

Benefits

	Actual	Potential	
EAD without project	$ 2,248,637	$ 2,288,376	[Note: for stormwater projects use "Potential" damage which ignores storm warning effects.]
EAD with project	$ -	$ -	
Annual Benefit:	$ 2,248,637	$ 2,288,376	
PV of Future Benefits:	$ 35,442,710	$ 36,069,068	(at 6% discount rate over 50 years)

Cost-Benefit Analysis

	Actual	Potential	
Net Present Value (NPV)	$ 11,792,710	$ 12,419,068	(at 6% discount rate over 50 years)
Benefit:Cost Ratio	1.499	1.525	

NPV Sensitivity to Discount Rate:

	Actual	Potential
4%	$ 24,655,645	$ 25,509,321
5%	$ 17,400,958	$ 18,126,427
6%	$ 11,792,710	$ 12,419,068
7%	$ 7,382,875	$ 7,931,300
8%	$ 3,858,672	$ 4,344,816

Model Assumptions

Residential

Foundation heights

Structure Category	Foundation Height (ft)
Rural - Res: Homesteads	1.5
Rural - Other: Barns, sheds	0
Urban Res: Single story (no base)	1.1
Urban Res: Two plus story (no base)	1.1
Mobile home	2.0
Commercial: Low	1
Commercial: Medium	1
Commercial: High	1
Industrial: Low	0.5
Industrial: Medium	0.5
Industrial: High	0.5

Estimate Replacement Value (assumed proxy for depreciated value)

Structure Category	Unit Cost $/ft^2 (2)	Average Size ft^2 (1)	Construction Cost
Rural - Res: Homesteads	159	1900	302100
Rural - Other: Barns, sheds	98	4000	392000
Urban Res: Single story (no base)	159	1900	302100
Urban Res: Two plus story (no base)	155	2200	341000
Mobile home (3)	98	1180	115640
Commercial: Low	120		0
Commercial: Medium	142		0
Commercial: High	207		0
Industrial: Low	120		0
Industrial: Medium	142		0
Industrial: High	207		0

1. Residential Square Footage Source: Sacramento County Tax Assessor Unit Cost and Commercial/Industrial/Public Square Footage Assumptions Source: Saylor Publications, Inc, 2007 Current Construction Costs

2. Replacement unit cost per square foot reflects average costs in the San Franc

3. According to FEMA guidance, replacement costs per square foot for mobile homes and barns and outbuildings are similar.

Other

External damages garden/outdoor areas $/building	$	5,000
Cleanup $/building	$	4,000
Number of residents per residential property		2.6

Commercial / Industrial Buildings

Clean-up costs as a percentage of direct structural damages	30%

Calculation of Other Direct Damages

Percentage of residential direct damages applied as indirect:	25%
Percentage of comm/ind. direct damages applied as indirect:	25%
HEC-FIA only: Percentage all building direct damages applied as indirect	25%
Percentage of roads direct damages applied as indirect:	25%

NPV Calculation

Discount Rate	6%
Time Horizon	50 years

Roads

Cost per mile of highway road inundated	$	250,000
Cost per mile of major road inundated	$	100,000
Cost per mile of minor road inundated	$	30,000
Cost per mile of unsealed road inundated	$	10,000

Agricultural Damages

	Weighted, Average Annual Damages ($/acre)	Establishment Costs ($/acre)	Land Cleanup & rehabilitation ($/acre)	Total <5 d) ($/acre)	Total (>=5 d) ($/acre)
Corn	$48	$0	$246	$293	$293
Rice	$227	$0	$243	$471	$471

Walnuts	$585	$5,284	$243	$828	$6,112
Almonds	$1,618	$3,514	$243	$1,862	$5,376
Cotton	$301	$0	$246	$547	$547
Tomatoes	$1,015	$0	$235	$1,250	$1,250
Wine Grapes	$3,241	$3,240	$235	$3,476	$6,716
Alfalfa	$250	$246	$243	$493	$739
Pasture	($15)	$82	$272	$257	$339
Safflower	$164	$0	$241	$405	$405
Sugar Beets	$313	$0	$262	$575	$575
Beans	$111	$0	$246	$356	$356
Other	$0	0	$246	$246	$246

Source: Comp Study

Establishment Costs are 50% costs of total establishment costs

Calculation of Actual to Potential Damages Ratio

		Without Project						With Project					
		Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6
Warning Time:	hours	0.5	0.5	0.5	0	0	0	0	0	0	0	0	0
Recent Flood Expe	Y / N	Y	Y	Y	0	0	0	N	N	N	0	0	0
Actual : Potential Ratio		0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9

Warning Time	Experienced Community	Inexperienced Community
< 2 hours	0.8	0.9
2-12 hours	Linear reduction from 0.8 at 2 hours to 0.4 at 12 hours	0.8
>12 hours	0.4	0.7

Occ_Name	Cat_Name	Occ_Description	Parameter	Depth (ft) above First Finished Floor (FFE)																		
1ST-NB	RES	one story, no basement	Stage	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1ST-NB	RES		S	0	2.5	13.4	23.3	32.1	40.1	47.1	53.2	58.6	63.2	67.2	70.5	73.2	75.4	77.2	78.5	79.5	80.2	80.7
1ST-NB	RES		C	0	2.4	8.1	13.3	17.9	22	25.7	28.8	31.5	33.8	35.7	37.2	38.4	39.2	39.7	40	40	40	40
2ST-NB	RES	two or more stories, no basement	Stage	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
2ST-NB	RES		S	0	3	9.3	15.2	20.9	26.3	31.4	36.2	40.7	44.9	48.8	52.4	55.7	58.7	61.4	63.8	65.9	67.7	69.2
2ST-NB	RES		C	0	1	5	8.7	12.2	15.5	18.5	21.3	23.9	26.3	28.4	30.3	32	33.4	34.7	35.6	36.4	36.9	37.2
FARM	FAR	Farm Homesteads	Stage	-10	-3	-2	-1	0	1	2	3	4	5	6	7	8	10	13	15	19	21	25
FARM	FAR		S	0	0	0	0	4	9	13	18	22	27	31	35	38	49	49	49	49	49	49
FARM	FAR		C	0	0	0	0	0	6	30	54	69	75	78	80	80	80	100	100	100	100	100
MOBILE	MOB	Mobile homes	Stage	-10	-3	-2	-1	0	1	2	3	4	5	6	7	8	10	13	15	19	21	25
MOBILE	MOB		S	0	0	0	0	8	44	63	73	78	80	81	82	82	82	82	82	82	82	82
MOBILE	MOB		C	0	0	0	0	0	27	49	64	70	76	78	79	81	83	83	83	83	83	83
PUBLIC	PUB	Public buildings	Stage	-10	-3	-2	-1	0	1	2	3	4	5	6	7	8	10	13	15	19	21	25
PUBLIC	PUB		S	0	0	0	0	8	22	30	35	39	41	44	46	48	49	49	49	49	49	49
PUBLIC	PUB		C	0	0	0	0	0	17.5	25	30	34	37	39	40.5	41.5	42	42	42	42	42	42
INDUSTRY	IND	Industrial Buildings	Stage	-10	-3	-2	-1	0	1	2	3	4	5	6	7	8	10	13	15	19	21	25
INDUSTRY	IND		S	0	0	0	0	4	9	13	18	22	27	31	35	38	49	49	49	49	49	49
INDUSTRY	IND		C	0	0	0	0	0	72	75	76.5	78	81	84	87	90	96	102	108	114	120	120
COMMERCIAL	COM	Commercial Buildings	Stage	-10	-3	-2	-1	0	1	2	3	4	5	6	7	8	10	13	15	19	21	25
COMMERCIAL	COM		S	0	0	0	0	4	9	13	18	22	27	31	35	38	49	49	49	49	49	49
COMMERCIAL	COM		C	0	0	0	0	0	11	30	54	69	75	78	80	80	80	100	100	100	100	100

NOT USED

SL-NB	RES	split level, no basement	Stage	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SL-NB	RES		S	0	6.4	7.2	9.4	12.9	17.4	22.8	28.9	35.5	42.3	49.2	56.1	62.6	68.6	73.9	78.4	81.7	83.8	84.4
SL-NB	RES		SN	0	2.9	2.1	1.9	1.9	2	2.2	2.4	2.7	3.2	3.8	4.5	5.3	6	6.7	7.4	7.9	8.3	8.7
SL-NB	RES		C	0	2.2	2.9	4.7	7.5	11.1	15.3	20.1	25.2	30.5	35.7	40.9	45.8	50.2	54.1	57.2	59.4	60.5	60.5
SL-NB	RES		CN	0	2.2	1.5	1.2	1.3	1.4	1.5	1.6	1.8	2.1	2.5	3	3.5	4.1	4.6	5	5.4	5.7	6
SL-NB	RES		Struct	N		0.8																
1ST-B	RES	one story, with basement	Stage	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1ST-B	RES		S	0	0	0.7	0.8	2.4	5.2	9	13.8	19.4	25.5	32	38.7	45.5	52.2	58.6	64.5	69.8	74.2	77.7	80.1	81.1	81.1	81.1	81.1	81.1	81.1
1ST-B	RES		SN	0	0	1.34	1.06	0.94	0.91	0.88	0.85	0.83	0.85	0.96	1.14	1.37	1.63	1.89	2.14	2.35	2.52	2.66	2.77	2.88	2.88	2.88	2.88	2.88	2.88
1ST-B	RES		C	0	0.1	0.8	2.1	3.7	5.7	8	10.5	13.2	16	18.9	21.8	24.7	27.4	30	32.4	34.5	36.3	37.7	38.6	39.1	39.1	39.1	39.1	39.1	39.1
1ST-B	RES		CN	0	1.6	1.16	0.92	0.81	0.78	0.76	0.74	0.72	0.74	0.83	0.98	1.17	1.39	1.6	1.81	1.99	2.13	2.25	2.35	2.45	2.45	2.45	2.45	2.45	2.45
1ST-B	RES		Struct	N		0.8																							
2ST-B	RES	two or more stories, with basement	Stage	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
2ST-B	RES		S	0	1.7	1.7	1.9	2.9	4.7	7.2	10.2	13.9	17.9	22.3	27	31.9	36.9	41.9	46.9	51.8	56.4	60.8	64.8	68.4	71.4	73.7	75.4	76.4	76.4
2ST-B	RES		SN	0	2.7	2.7	2.11	1.8	1.66	1.56	1.47	1.37	1.32	1.35	1.5	1.75	2.04	2.34	2.63	2.89	3.13	3.38	3.71	4.22	5.02	6.19	7.79	9.84	12.36
2ST-B	RES		C	0	0	1	2.3	3.7	5.2	6.8	8.4	10.1	11.9	13.8	15.7	17.7	19.8	22	24.3	26.7	29.1	31.7	34.4	37.2	40	43	46.1	49.3	52.6
2ST-B	RES		CN	0	0	2.27	1.76	1.49	1.37	1.29	1.21	1.13	1.09	1.11	1.23	1.43	1.67	1.92	2.15	2.36	2.56	2.76	3.04	3.46	4.12	5.08	6.39	8.08	10.15
2ST-B	RES		Struct	N		0.8																							
SL-B	RES	split level, with basement	Stage	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SL-B	RES		S	0	0	0	2.5	3.1	4.7	7.2	10.4	14.2	18.5	23.2	28.2	33.4	38.6	43.8	48.8	53.5	57.8	61.6	64.8	67.2	68.8	69.3	69.3	69.3	69.3
SL-B	RES		SN	0	0	0	1.8	1.6	1.5	1.6	1.6	1.6	1.6	1.7	1.9	2.1	2.4	2.6	2.9	3.2	3.4	3.6	3.9	4.2	4.8	5.7	5.7	5.7	5.7
SL-B	RES		C	0	0.6	0.7	1.4	2.4	3.8	5.4	7.3	9.4	11.6	13.8	16.1	18.2	20.2	22.1	23.6	24.9	25.8	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.3
SL-B	RES		CN	0	2.09	1.49	1.14	1.01	1	1.02	1.03	1.04	1.06	1.12	1.23	1.38	1.57	1.76	1.95	2.13	2.28	2.44	2.44	2.44	2.44	2.44	2.44	2.44	2.44
SL-B	RES		Struct	N		0.8																							

Residential Buildings

	Without Project						With Project					
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6
ARI:	25	50	100	0	0	0	25	50	100	0	0	0
Probability of Levee Failure	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Flood depth above ground level (ft)	0.50	0.75	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Buildings Inundated (no.)												
Rural - Res: Homesteads	0	0	0	0	0	0	0	0	0	0	0	0
Rural - Other: Barns, sheds	0	0	0	0	0	0	0	0	0	0	0	0
Urban Res: Single story (no base)	221	331	441	0	0	0	0	0	0	0	0	0
Urban Res: Two plus story (no base)	277	416	554	0	0	0	0	0	0	0	0	0
Mobile home	0	0	0	0	0	0	0	0	0	0	0	0
Structural Damages												
Rural - Res: Homesteads	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Rural - Other: Barns, sheds	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Urban Res: Single story (no base)	$ 1,665,326	$ 2,497,989	$ 3,330,653	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Urban Res: Two plus story (no base)	$ 2,833,710	$ 4,250,565	$ 5,667,420	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Mobile home	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Structual Damages HEC-FIA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Structural Damages	$ 4,499,036	$ 6,748,554	$ 8,998,073	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Content Damages												
Rural - Res: Homesteads	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Rural - Other: Barns, sheds	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Urban Res: Single story (no base)	$ 1,598,713	$ 2,398,070	$ 3,197,426	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Urban Res: Two plus story (no base)	$ 944,570	$ 1,416,855	$ 1,889,140	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Mobile home	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Contents Damage HEC-FIA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Actual:Potential Ratio	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Total Contents Damages: Actual	$ 2,034,627	$ 3,051,940	$ 4,069,253	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Contents Damages: Potential	$ 2,543,283	$ 3,814,925	$ 5,086,566	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Clean-Up/ Other Costs												
External	$ 2,487,500	$ 3,731,250	$ 4,975,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cleanup	$ 1,990,000	$ 2,985,000	$ 3,980,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other Costs HEC-FIA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Other Costs: Potential	$ 4,477,500	$ 6,716,250	$ 8,955,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Sum Actual Damages	**$ 11,011,163**	**$ 16,516,744**	**$ 22,022,326**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Sum Potential Damages	**$ 11,519,819**	**$ 17,279,729**	**$ 23,039,639**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Total Actual Damage with levee failure ($):	**$ 11,011,163**	**$ 16,516,744**	**$ 22,022,326**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Total Potential Damage with levee failure ($):	**$ 11,519,819**	**$ 17,279,729**	**$ 23,039,639**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Indirect Actual Damage	$ 2,752,791	$ 4,129,186	$ 5,505,581	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Indirect Potential Damage	$ 2,879,955	$ 4,319,932	$ 5,759,910	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Commercial & Industrial Buildings

	Without Project						With Project					
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6
ARI:	25	50	100	0	0	0	25	50	100	0	0	0
Probability of Levee Failure	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Commercial												
'Flood depth above ground level (ft)	0.50	0.75	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
low building size	224228	336342	448456	0	0	0	0	0	0	0	0	0
medium building size	224228	336342	448456	0	0	0	0	0	0	0	0	0
high building size	0	0	0	0	0	0	0	0	0	0	0	0
Industrial												
'Flood depth above ground level (ft)	0.50	0.75	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
low building size	1143538	1715306	2287075	0	0	0	0	0	0	0	0	0
medium building size	1143538	1715306	2287075	0	0	0	0	0	0	0	0	0
high building size	0	0	0	0	0	0	0	0	0	0	0	0
Structural Damages												
Commercial												
low	$ -	$ -	$ 2,152,586	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
medium	$ -	$ -	$ 2,547,227	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
high	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Commercial HEC-FIA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Industrial												
low	$ 5,488,980	$ 8,233,470	$ 10,977,960	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
medium	$ 6,495,293	$ 9,742,940	$ 12,990,586	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
high	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Industrial HEC-FIA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Structural Damages	$ 11,984,273	$ 17,976,410	$ 28,668,360	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Contents Damages												
Commercial												
low	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
medium	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
high	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Commercial HEC-FIA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Industrial												
low	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
medium	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
high	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Industrial HEC-FIA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Actual:Potential Ratio	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Total Contents Damages: Actual	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Contents Damages: Potential	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Clean-up/ Other Costs	$ 3,595,282	$ 5,392,923	$ 8,600,508	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Clean-Up/ Other Costs: HEC-FIA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Sum Actual Damages	**$ 15,579,555**	**$ 23,369,332**	**$ 37,268,868**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Sum Potential Damages	**$ 15,579,555**	**$ 23,369,332**	**$ 37,268,868**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Total Damage with levee failure ($):	**$ 15,579,555**	**$ 23,369,332**	**$ 37,268,868**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Total Damage with levee failure ($):	**$ 15,579,555**	**$ 23,369,332**	**$ 37,268,868**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Indirect Actual Damages	$ 3,894,889	$ 5,842,333	$ 9,317,217	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Indirect Potentail Damages	$ 3,894,889	$ 5,842,333	$ 9,317,217	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Agricultural Damages

		Without Project						With Project					
		Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6
ARI:		25	50	100	0	0	0	25	50	100	0	0	0
Probability of Levee Failure		1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Length of Inundation <5d Y/N		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Agricultural Land Inundated													
Corn	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Rice	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Walnuts	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Almonds	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Cotton	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Tomatoes	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Wine Grapes	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Alfalfa	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Pasture	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Safflower	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Sugar Beets	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Beans	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Other	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Potential Damages													
Corn		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Rice		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Walnuts		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Almonds		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cotton		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tomatoes		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Wine Grapes		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Alfalfa		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pasture		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Safflower		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Sugar Beets		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Beans		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Potential Damages		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Damage with levee failure ($):		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Roads

	Without Project						With Project					
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6
ARI	25	50	100	0	0	0	25	50	100	0	0	0
Probability of Levee failure	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Roads Inundated												
length of arterial roads inundated (miles)	2.25	3.38	4.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
length of major roads inundated (miles)	1.15	1.73	2.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
length of minor roads inundated (miles)	1.60	2.40	3.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
length of unsealed roads inundated (miles)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Potential Damages												
length of arterial roads inundated (miles)	$ 562,500	$ 843,750	$ 1,125,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
length of major roads inundated (miles)	$ 115,000	$ 172,500	$ 230,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
length of minor roads inundated (miles)	$ 48,000	$ 72,000	$ 96,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
length of unsealed roads inundated (miles)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Damages:	*$ 725,500*	*$ 1,088,250*	*$ 1,451,000*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*
Total Damage with levee failure ($):	$ 725,500	$ 1,088,250	$ 1,451,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Special Cases - Dollar Damages Incurred

Return to Menu

	Without Project						With Project					
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6
ARI	25	50	100	0	0	0	25	50	100	0	0	0
Probability of Levee failure	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Description / Site ID												
Total Damages:	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Damage with levee failure ($):	0	0	0	0	0	0	0	0	0	0	0	0

Calculation of Without Project EAD

	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Y Intercept
Average Recurrence Interval (ARI)	25	50	100	0	0	0	
AEP	0.040	0.020	0.010	#DIV/0!	#DIV/0!	#DIV/0!	0
Actual Damage to Residential Buildings ($)	$ 11,011,163	$ 16,516,744	$ 22,022,326	$ -	$ -	$ -	
Potential Damage to Residential Buildings ($)	$ 11,519,819	$ 17,279,729	$ 23,039,639	$ -	$ -	$ -	
Actual Damage to Commercial/Industrial Buildings ($)	$ 15,579,555	$ 23,369,332	$ 37,268,868	$ -	$ -	$ -	
Potential Damage to Commercial/Industrial Buildings ($)	$ 15,579,555	$ 23,369,332	$ 37,268,868	$ -	$ -	$ -	
Damage to Agriculture ($)	$ -	$ -	$ -	$ -	$ -	$ -	
Damage to Roads ($)	$ 725,500	$ 1,088,250	$ 1,451,000	$ -	$ -	$ -	
Actual Indirect Costs	$ 6,829,054	$ 10,243,582	$ 15,185,548	$ -	$ -	$ -	
Potential Indirect Costs	$ 6,956,219	$ 10,434,328	$ 15,439,877	$ -	$ -	$ -	
Special Cases	$ -	$ -	$ -	$ -	$ -	$ -	
Total Actual Damages	$ 34,145,272	$ 51,217,908	$ 75,927,741	$ -	$ -	$ -	$ 75,927,741
Total Potential Damages	$ 34,781,093	$ 52,171,639	$ 77,199,383	$ -	$ -	$ -	$ 77,199,383
EAD (Actual)	$ 2,248,637						
EAD (Potential)	$ 2,288,376						

Potential Damages

	Without Project							With Project						
Water Surface Elevation - channel (f)	1249.5	1249.75	1250	1250	1250	1250		0	0	0	0	0	0	
ARI	25	50	100	0	0	0		25	50	100	0	0	0	
Probability of Exceedence (AEP)	0.040	0.020	0.010	#DIV/0!	#DIV/0!	#DIV/0!		0.040	0.020	0.010	#DIV/0!	#DIV/0!	#DIV/0!	
Damages incurred	$ 34,781,093	$ 52,171,639	$ 77,199,383	$ -	$ -	$ -	$ 77,199,383	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Actual Damages

	Without Project							With Project						
Water Surface Elevation - channel (f)	1249.5	1249.75	1250	0	0	0		0	0	0	0	0	0	
ARI	25	50	100	0	0	0		25	50	100	0	0	0	
Probability of Exceedence (AEP)	0.040	0.020	0.010	#DIV/0!	#DIV/0!	#DIV/0!		0.040	0.020	0.010	#DIV/0!	#DIV/0!	#DIV/0!	
Damages incurred	$ 34,145,272	$ 51,217,908	$ 75,927,741	$ -	$ -	$ -	$ 75,927,741	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Without Project

Water Surface Elevation - channel (f)	25	50	100	0	0	0
Probability of Exceedence (AEP)	0.040	0.020	0.010	0.010	0.010	0.010
Potential	$ 34,781,093	$ 52,171,639	$ 77,199,383	$ 77,199,383	$ 77,199,383	$ 77,199,383
Actual	$ 34,145,272	$ 51,217,908	$ 75,927,741	$ 75,927,741	$ 75,927,741	$ 75,927,741

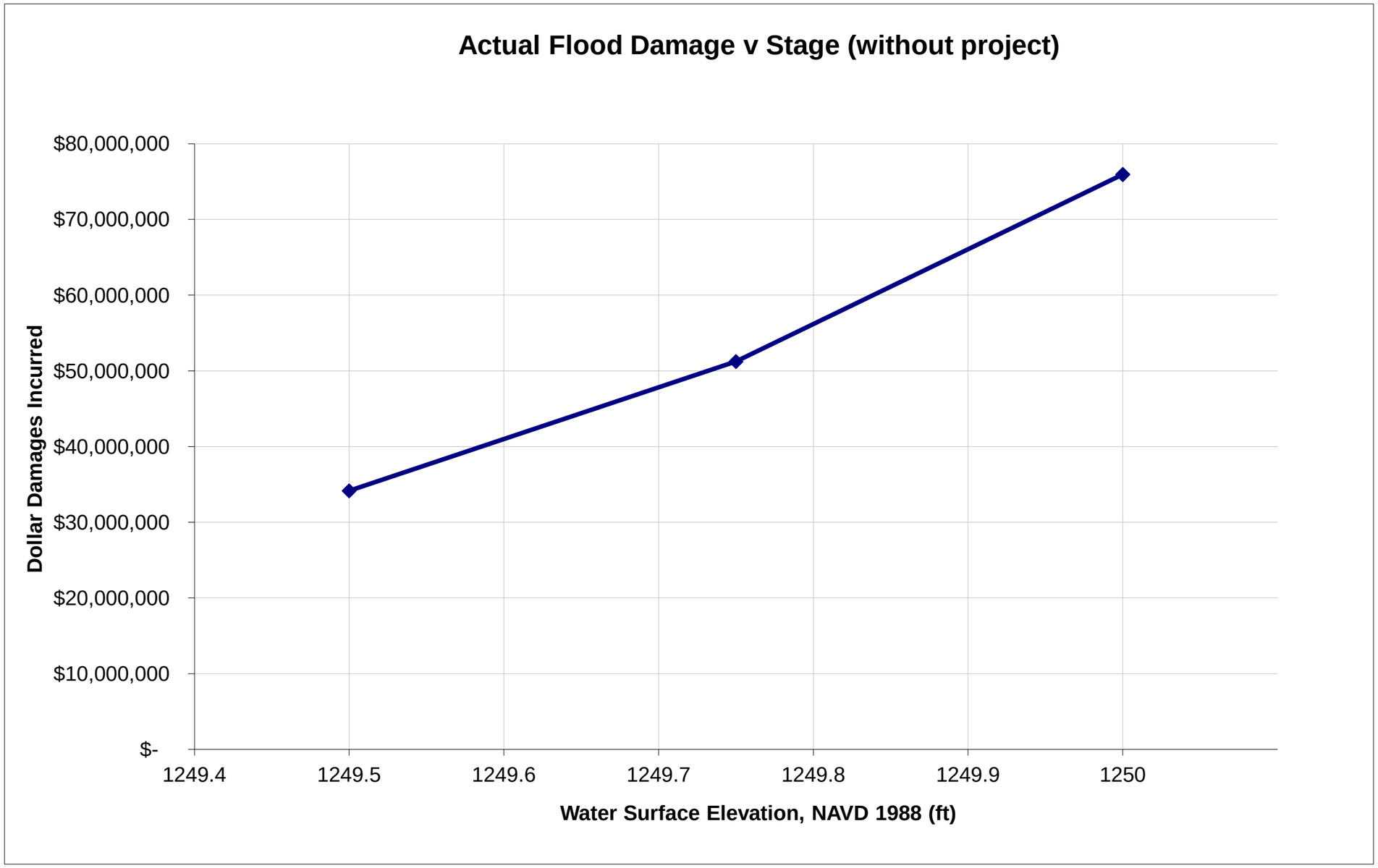
With Project

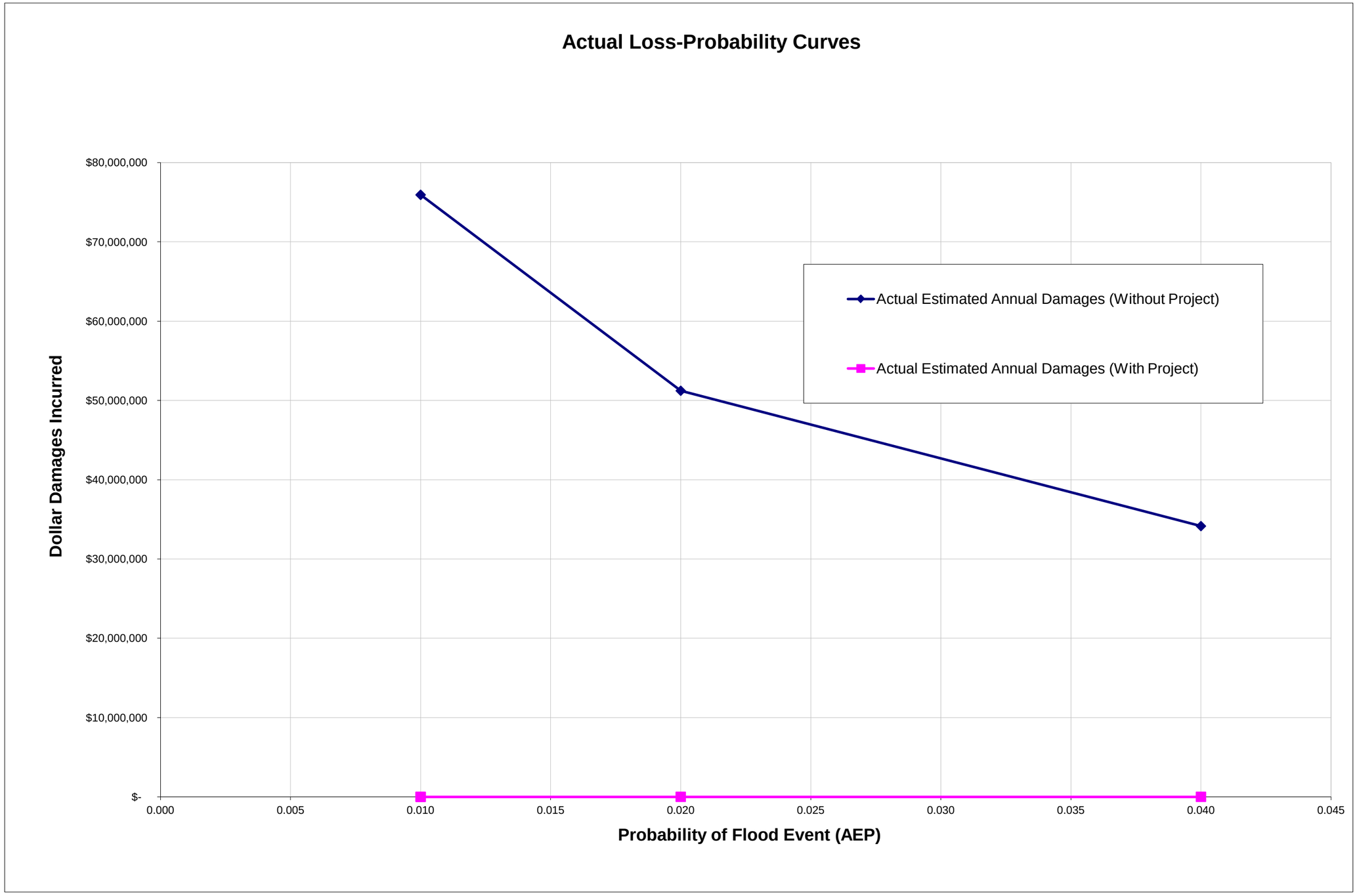
Water Surface Elevation - channel (f)	25	50	100	0	0	0
Probability of Exceedence (AEP)	0.040	0.020	0.010	0.010	0.010	0.010
Potential	$ -	$ -	$ -	$ -	$ -	$ -
Actual	$ -	$ -	$ -	$ -	$ -	$ -

Calculation of With Project EAD

	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	
Average Recurrence Interval (ARI)	25	50	100	0	0	0	
AEP	0.040	0.020	0.010	#DIV/0!	#DIV/0!	#DIV/0!	0
Actual Damage to Residential Buildings ($)	$ -	$ -	$ -	$ -	$ -	$ -	
Potential Damage to Residential Buildings ($)	$ -	$ -	$ -	$ -	$ -	$ -	
Actual Damage to Commercial/Industrial Buildings ($)	$ -	$ -	$ -	$ -	$ -	$ -	
Potential Damage to Commercial/Industrial Buildings ($)	$ -	$ -	$ -	$ -	$ -	$ -	
Damage to Agriculture ($)	$ -	$ -	$ -	$ -	$ -	$ -	
Damage to Roads ($)	$ -	$ -	$ -	$ -	$ -	$ -	
Actual Indirect Costs	$ -	$ -	$ -	$ -	$ -	$ -	
Potential Indirect Costs	$ -	$ -	$ -	$ -	$ -	$ -	
Special Cases	$ -	$ -	$ -	$ -	$ -	$ -	
Total Actual Damages	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Potential Damages	$ -	$ -	$ -	$ -	$ -	$ -	$ -

EAD (Actual)	$ -
EAD (Potential)	$ -


Actual Flood Damage v Stage (without project)
$80,000,000
$70,000,000
$60,000,000
$50,000,000
$40,000,000
$30,000,000
$20,000,000
$10,000,000
$-
Dollar Damages Incurred
1249.4
1249.5
1249.6
1249.7
1249.8
1249.9
1250
Water Surface Elevation, NAVD 1988 (ft)


Actual Loss-Probability Curves
$80,000,000
$70,000,000
$60,000,000
$50,000,000
$40,000,000
$30,000,000
$20,000,000
$10,000,000
$-
Dollar Damages Incurred
0.000
0.005
0.010
0.015
0.020
0.025
0.030
0.035
0.040
0.045
Probability of Flood Event (AEP)
Actual Estimated Annual Damages (Without Project)
Actual Estimated Annual Damages (With Project)

Project O: Francis Street Storm Drain and Ely Basin Flood Control and Aquifer Recharge Project (City of Ontario)

The Project provides improved flood protection, water conservation, and water quality. The drainage system will capture and convey storm water to the expanded Ely Basins. The system captures runoff from a watershed area of 956 acres and during average rainfall years, will deliver 722 acre-feet of storm water to the basins for recharge. The Project will eliminate 277 acres of flood inundation area of mixed residential, commercial, and industrial properties, as shown on Attachment 7-1.

The Project, when completed, will operate as a passive system. When precipitation occurs, water will conveyed through the Francis Street Storm Drain to the Ely Basins for recharge. The Project will provide immediate flood protection to the existing flood hazard area. There are no uncertainties related to the project benefits and the Project will not create any adverse effects.

The Project's economic costs related to flood control include expansion of 310 acre-feet to the Ely Basins, including water quality and water level monitoring systems, and 8,500 linear feet of storm drain conveyance facilities. As shown on Table 7, the drainage conveyance and basin improvements are estimated at $12.8 million. The Project's total costs are shown on Table 8 in Attachment 4.

The Project's flood damage reduction benefit analysis was calculated using the data presented in Attachment 7 and DWR's Flood Rapid Assessment Model (F-RAM). Expected annual damage without the Project is approximately $3.5 million, as shown on Table 17, due to the greater economic impacts to the commercial and industrial communities through flood damage and lost revenue. As shown on Table 18, the present value of expected annual damage is $55 million. F-RAM analysis is included as Attachment 8-1.

In addition to flood protection, the Ely Basins will be excavated to provide additional flood storage for greater aquifer recharge. The Project's recharge benefit analysis is presented Table 15 and described further below. The Project will provide a water supply benefit through avoided imported water supply costs. The total present value of the recharge benefit is $8.5 million.

Imported water supplies reliability will continue to be at risk. Reducing dependence on these supplies will benefit the entire State. For the cost analysis, MWD Tier 2 water rates are used since Tier 1 water is not available and is not anticipated to be available in the future. MWD's Tier 2 water rate for 2013 is $743 per acre-foot.

Approximately 722 acre-feet per year of storm water will be recharged at the basins reducing the City dependence on import water. Without the project, no new yield will be captured. Capture and recharge of the new yield will benefit all Chino Basin water producers serving an estimated population of 2.2 million.

The Project's non-monetized benefit are improving water quality, reducing greenhouse gas (GHG) emissions, improve groundwater management, reduce demand on the Delta, and improving water supply reliability. Non-monetized benefits are presented on Table 12. GHG reduction of 1,100 tons CO_2 per year for the project is further described in Attachment 7.

Project costs include initial construction and ongoing maintenance. It is estimated that every 5 years the basin will require removal of sediment build-up and scouring of the basin floor. At these 5 year intervals, over the Projects 50 year life, operation and maintenance costs will increase to account for the additional work. The total present value of discounted costs is $15.1 million, as shown on Table 19. All values for total present value Project costs (Table 19), flood damage reduction (Table 18), and monetized Project benefits (Table 15) are summarized on Table 20. The Project's benefit cost summary (Table 20) show that Project benefits outweigh Project cost by 4:1.

All included tables have been described, qualified, and/or supported here and in the comment section of each table.

Table 12 – Non-monetized Benefits Checklist		
	Project: Francis Street Storm Drain and Ely Basin Flood Control and Aquifer Recharge Project	
No.	**Question**	**Enter "Yes", "No" or "Neg"**
	Community/Social Benefits: **Will the proposal**	
1	**Provide education or technology benefits?**	**No**
2	**Provide social recreation or access benefits?**	**No**
3	**Help avoid, reduce or resolve various public water resources conflicts?**	**No**
4	**Promote social health and safety?**	**No**
5	**Have other social benefits?**	**No**
	Environmental Stewardship Benefits: **Will the proposal**	
6	**Benefit wildlife or habitat in ways that were not quantified in Attachment 7?**	**No**
7	**Improve water quality in ways that were not quantified in Attachment 7?**	**Yes**
	The Project will reduce urban runoff discharge pollutants that increase downstream erosion potential and associated water quality impairment to the Santa Ana River; which is on the Santa Ana Regional Water Quality Control Board 303(d) List of Water Quality Limited Segments.	
8	**Reduce net emissions in ways that were not quantified in Attachment 7?**	**Yes**
	The Project will reduce greenhouse gas emissions through development of new local water supplies that eliminates the need for imported water to be delivered from the Bay-Delta of the same quantity. By avoiding delivery through the state's system, a significant reduction in greenhouse gas emissions is attained.	
9	**Provide other environmental stewardship benefits, other than those claimed in Sections D1, D3 or D4?**	**No**
	Sustainability Benefits: **Will the proposal**	
10	**Improve the overall, long-term management of California groundwater resources?**	**Yes**
	The Project will promote aquifer storage and recharge of stormwater runoff that is currently lost to the Santa Ana River and ultimately the Pacific Ocean. Recharged water will help reduce overdraft in the Chino Basin.	
11	**Reduce demand for net diversions for the regions from the Delta?**	**Yes**
	See number 8, above.	
12	**Provide a long-term solution in place of a short-term one?**	**No**
14	**Promote energy savings or replace fossil fuel based energy sources with renewable energy and resources?**	**No**
15	**Improve water supply reliability in ways not quantified in Attachment 7?**	**Yes**
	Import water from the Bay-Delta is often subject to supply uncertainty and supply variability. Development of loacl water supply sources will reduce the City's dependence on improt water and, as a result, reduce water supply uncertainty and variability.	
16	**Other (If the above listed categories do not apply, provide non-monetized benefit description)?**	**N/A**

Table 15 - Annual Benefit
(All Costs should be in 2012 Dollars)
Project: Francis Street Storm Drain and Ely Basin Flood Control and Aquifer Recharge 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)*(g)	Discount Factor[1.)]	Discounted Benefits[1.)] (h)*(i)
2012	Stormwater Capture and Storage	Acre-Feet	0	0	0	$ 743	$ -	1.000	$ -
2013	Stormwater Capture and Storage	Acre-Feet	0	0	0	$ 743	$ -	0.943	$ -
2014	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.890	$ 510,500
2015	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.840	$ 481,821
2016	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.792	$ 454,288
2017	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.747	$ 428,476
2018	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.705	$ 404,385
2019	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.665	$ 381,441
2020	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.627	$ 359,645
2021	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.592	$ 339,569
2022	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.558	$ 320,067
2023	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.527	$ 302,285
2024	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.497	$ 285,077
2025	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.469	$ 269,017
2026	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.442	$ 253,529
2027	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.417	$ 239,190
2028	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.394	$ 225,997
2029	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.371	$ 212,804
2030	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.350	$ 200,759
2031	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.331	$ 189,860
2032	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.312	$ 178,962
2033	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.294	$ 168,637
2034	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.278	$ 159,460
2035	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.262	$ 150,282
2036	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.247	$ 141,678
2037	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.233	$ 133,648
2038	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.220	$ 126,191
2039	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.207	$ 118,734
2040	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.196	$ 112,425
2041	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.185	$ 106,115
2042	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.174	$ 99,806
2043	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.164	$ 94,070
2044	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.155	$ 88,907
2045	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.146	$ 83,745
2046	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.138	$ 79,156
2047	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.130	$ 74,567
2048	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.123	$ 70,552
2049	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.116	$ 66,537
2050	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.109	$ 62,522
2051	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.103	$ 59,080
2052	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.097	$ 55,639
2053	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.092	$ 52,771
2054	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.087	$ 49,903
2055	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.082	$ 47,035
2056	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.077	$ 44,167
2057	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.073	$ 41,873
2058	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.069	$ 39,578
2059	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.065	$ 37,284
2060	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.061	$ 34,989
2061	Stormwater Capture and Storage	Acre-Feet	0	772	772	$ 743	$573,596	0.058	$ 33,269
					Total Present Value of Discounted Benefits Based on Unit Value (Sum of Column (j) for all Benefits shown in Table)				**$ 8,470,292**

Notes:
1.) Complete these columns if dollar value is being claimed for the benefit.
2.) Refer to Attachment 7 and Table 7 for benefit details.

Table 17 - Expected Annual Damage

Project: Francis Street Storm Drain and Ely Basin Flood Control and Aquifer Recharge Project

Hydrologic Event	Event Probability	Damage if Flood Structures Fail	Probability Structural Failure		Event Damage		Interval Probability	Average Damage in Interval		Average Damage in Interval times Interval Probability	
			Without Project	With Project	Without Project	With Project		Without Project	With Project	Without Project	With Project
					(f)	(g)	(i)	(j)	(k)	(l)	(m)
(a)	(b)	(c)	(d)	(e)	(c)*(d)	(c)*(e)	from (b)	from (f)	from (g)	(i) x (j)	(i) x (k)
10-Year	0.100	$ 21,109,778	0.60	0.00	$ 12,665,867	$ -	0.050	$ 20,770,569	$ -	$ 1,038,528	$ -
25-Year	0.040	$ 49,362,457	0.75	0.00	$ 37,021,843	$ -	0.020	$ 47,542,838	$ -	$ 950,857	$ -
100-Year	0.010	$362,532,239	1.00	0.00	$ 362,532,239	$ -	0.005	$305,676,717	$ -	$ 1,528,384	$ -
Expected Annual Damages, Without and With Project										**$3,517,769**	**$ -**

Notes:

1.) Expected annual damage determined using DWR's Flood Rapid Assessment Model (FRAM). Detailed FRAM analysis is included as part of this attachment.

Table 18 - Present Value of Expected Annual Damage Reduction Benefit

Project: Francis Street Storm Drain and Ely Basin Flood Control and Aquifer Recharge Project

(a)	Expected Annual Damage Without Project[1.)]		$ 3,517,769
(b)	Expected Annual Damage With Project[1.)]		$ -
(c)	Expected Annual Benefit	(a)-(b)	$ 3,517,769
(d)	Present Value Coefficient[2.)]		15.76
(e)	**Present Value of Future Benefits Transfer to Table 17, Column (d).**	**(c)*(d)**	**$ 55,440,036**

Notes:

1.) This program assumes no land use changes in the floodplain. So, EAD will be constant over analysis period.

2.) 6% discount rate; 50-year analysis period (could vary depending upon life cycle of project).

Table 19 - Annual Costs of Project

(All Costs should be in 2012 Dollars)

Project: Francis Street Storm Drain and Ely Basin Flood Control and Aquifer Recharge Project

			Annual Costs[2.)]						Discounting Calculations	
Year	Initial Costs Grand Total Cost from Table 6 (row (i), coulmn (d))	Adjusted Grant Total Cost[1.)]	Admin	Operation	Maintainance	Replacement	Other	Total Costs (a)+...+(g)	Discount Factor	Discounted Costs (h)*(i)
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
2012	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	1.000	$ -
2013	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.943	$ -
2014	$ 16,640,000	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 16,651,000	0.890	$ 14,819,390
2015	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.840	$ 9,240
2016	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.792	$ 8,712
2017	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.747	$ 8,217
2018	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.705	$ 7,755
2019	$ -	$ -	$ 2,000	$ 9,000	$ 9,000	$ 58,156	$ -	$ 78,156	0.665	$ 51,974
2020	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.627	$ 6,897
2021	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.592	$ 6,512
2022	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.558	$ 6,138
2023	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.527	$ 5,797
2024	$ -	$ -	$ 2,000	$ 9,000	$ 9,000	$ 58,156	$ -	$ 78,156	0.497	$ 38,843
2025	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.469	$ 5,159
2026	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.442	$ 4,862
2027	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.417	$ 4,587
2028	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.394	$ 4,334
2029	$ -	$ -	$ 2,000	$ 9,000	$ 9,000	$ 58,156	$ -	$ 78,156	0.371	$ 28,996
2030	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.350	$ 3,850
2031	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.331	$ 3,641
2032	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.312	$ 3,432
2033	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.294	$ 3,234
2034	$ -	$ -	$ 2,000	$ 9,000	$ 9,000	$ 58,156	$ -	$ 78,156	0.278	$ 21,727
2035	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.262	$ 2,882
2036	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.247	$ 2,717
2037	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.233	$ 2,563
2038	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.220	$ 2,420
2039	$ -	$ -	$ 2,000	$ 9,000	$ 9,000	$ 58,156	$ -	$ 78,156	0.207	$ 16,178
2040	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.196	$ 2,156
2041	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.185	$ 2,035
2042	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.174	$ 1,914
2043	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.164	$ 1,804
2044	$ -	$ -	$ 2,000	$ 9,000	$ 9,000	$ 58,156	$ -	$ 78,156	0.155	$ 12,114
2045	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.146	$ 1,606
2046	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.138	$ 1,518
2047	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.130	$ 1,430
2048	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.123	$ 1,353
2049	$ -	$ -	$ 2,000	$ 9,000	$ 9,000	$ 58,156	$ -	$ 78,156	0.116	$ 9,066
2050	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.109	$ 1,199
2051	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.103	$ 1,133
2052	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.097	$ 1,067
2053	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.092	$ 1,012
2054	$ -	$ -	$ 2,000	$ 9,000	$ 9,000	$ 58,156	$ -	$ 78,156	0.087	$ 6,800
2055	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.082	$ 902
2056	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.077	$ 847
2057	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.073	$ 803
2058	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.069	$ 759
2059	$ -	$ -	$ 2,000	$ 9,000	$ 9,000	$ 58,156	$ -	$ 78,156	0.065	$ 5,080
2060	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.061	$ 671
2061	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.058	$ 638
								Total Present Value of Discounted Costs (Sum of Column (j))		**$ 15,135,964**
								Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries		

Notes:

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

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

Comments:

(a) Capital and Other Initial Costs are take from and further described in Tables 7 and 8.

(b) Not Applicable.

(c) Administrative costs are estimated to include two weeks of work per year at a rate of $25 per hour.

(d) Operation costs are estimated to include one and a half weeks of work per year at a rate of $75 per hour. Additionally, pipe repair, sediment build-up removal, and scouring of the basin floor, will require extra costs every five years estimated at three weeks of work at a rate of $75 per hour.

(e) Maintenance costs are estimated to include one and a half weeks of work per year at a rate of $75 per hour. Additionally, pipe repair, sediment build-up removal, and scouring of the basin floor, will require extra costs every five years estimated at three weeks of work at a rate of $75 per hour.

(f) Replacement costs include sediment build-up removal (19,300 cubic-yards) and scouring of the basin floor at a rate of $3 per cubic-yard, to be done every 5 years.

(g) Other costs were not applicable.

(h) Total Costs are the summation of columns (a) through (f).

(i) Discount Factors are based on a 6% discount rate and a 50 year analysis period, as provided in the application.

(j) Discounted Costs are Total Costs multiplied by the Discount Factor.

Table 20 - Proposal Benefits and Costs Summary

Proposal: Francis Street Storm Drain and Ely Basin Flood Control and Aquifer Recharge Project
Agency: City of Ontario

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[4.)]
			From Section D3 – Monetized[2.)]	From Section D4 – Flood Damage Reduction[3.)]	Total		
(a)	(b)	(c)	(d)	(e)	(f)=(d)+(e)	(g)	(g)
Francis Street Storm Drain and Ely Basin Flood Control and Aquifer Recharge Project	City of Ontario	$ 15,135,964	$ 8,470,292	$ 55,440,036	$63,910,328	$ -	The Project will: -Improve water quality -Improve water supply reliability -Reduce GHG emissions -Improve management of groundwater resources -Reduce demand on the Delta

Notes:
1.) Refer to Table 19.
2.) Refer to Table 15.
3.) Refer to Table 18.
4.) Refer to Attachment 7, Table 9, and Table 12 for details.

Discount Factors	
Year	**Discount Factor**
2012	1.000
2013	0.943
2014	0.890
2015	0.840
2016	0.792
2017	0.747
2018	0.705
2019	0.665
2020	0.627
2021	0.592
2022	0.558
2023	0.527
2024	0.497
2025	0.469
2026	0.442
2027	0.417
2028	0.394
2029	0.371
2030	0.350
2031	0.331
2032	0.312
2033	0.294
2034	0.278
2035	0.262
2036	0.247
2037	0.233
2038	0.220
2039	0.207
2040	0.196
2041	0.185
2042	0.174
2043	0.164
2044	0.155
2045	0.146
2046	0.138
2047	0.130
2048	0.123
2049	0.116
2050	0.109
2051	0.103
2052	0.097
2053	0.092
2054	0.087
2055	0.082
2056	0.077
2057	0.073
2058	0.069
2059	0.065
2060	0.061
2061	0.058

Attachment 8-1
FRAM Analysis

DWR Levee Mitigation Prioritization Tool

To Read Instructions:	Read Instructions
To Enter Project Information:	Enter Project Information
To Enter Special Cases:	Enter Special Cases

View Cost-Benefit Analysis:	Cost-Benefit Analysis
View Stage Damage Graph:	Stage v Damage Curve
View AAD Graph (Actual):	Loss Probability Curve

Instructions

Return to Menu

Project information should be entered in the 'Inputs' tab only. Information is required in all cells highlighted green. Example:

Output information is provided in the 'BCA Summary' tab. Project calculations are performed in the sheets described in the Model Map.

Model Map

Sheet Name	Description
Menu:	Front page of model, with links to key sheets
Instructions:	Description of how this model should be used
Inputs:	Project information to be entered by user
BCA Summary:	Summary data resulting from Cost-Benefit Analysis
Assumptions:	Master page containing unit damage assumptions
Depth Damage Curves	Data describing stage damage relationships
Residential:	Direct residential building and contents costs
Commercial & Industrial:	Direct commercial and industrial building and contents costs
Agricultural:	Direct losses to agricultural production
Roads	Direct Losses to roads and infrastructure
Special Cases:	Table for entering information about special case buildings
Without Project EAD	Calculation of Estimated Annual Damages (EAD) without-project
Graph Data	Data used to develop graphical outputs
With Project EAD	Calculation of Estimated Annual Damages (EAD) with-project
Stage v Damage Curve	Graph of flood stage v flood damages
Loss Probability Curve	Graph of flood exceedance probability v flood damages

Inputs

Return to Menu

Project Name: Francis Street Storm Drain and Ely Basin Flood Control and Aquifer Recharge Project

Cost of Project: $ 16,640,000

Description: The project will mitigat flooding for a tributary area of 956 acres and includes: storm drain improvements along Francis Street from Campus Avenue to the West Cucamonga Creek with a total pipeline length of approximately 8,500 linear feet and diameters ranging from 18" to 132", and expansion of the existing Ely Basins by approximately 310 acre-feet for additional aquifer recharge.

Number of Events Modeled: 3

		Without Project						With Project					
		Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6
Average Return Interval (ARI)		10	25	100				10	25	100			
Annual Probability of Exceedance		0.100	0.040	0.010	#DIV/0!	#DIV/0!	#DIV/0!	0.100	0.040	0.010	#DIV/0!	#DIV/0!	#DIV/0!
Probability of Levee Failure		1.00	1.00	1.00				0.00	0.00	0.00			
Water Surface Elevation - channel (f)		875.90	876.13	876.50									
Flood Warning Time (hours)		0.5	0.5	0.5									
Flood Experience		Y	Y	Y				N	N	N			
Period of Inundation (days)		1	1	1									
HEC-FIA DATA INPUTS		N											
Residential Structural Damages ($)													
Residential Contents Damages ($)													
Residential Debris & Cleanup ($)													
Commercial Structural Damages ($)													
Commercial Contents Damages ($)													
Commercial Debris & Cleanup ($)													
Industrial Structural Damages ($)													
Industrial Contents Damages ($)													
Industrial Debris & Cleanup ($)													
Agricultural Structural Damages ($)													
Agricultural Contents Damages ($)													
Agricultural Debris & Cleanup ($)													
Residential Properties													
Ratio Depreciated Value to Replacement Value		100%	100%	100%									
Average Flood depth above ground level (f)		0.90	1.13	1.50									
Rural - Res: Homesteads													
Rural - Other: Barns, sheds													
Urban Res: Single story (no base)		82	102	136									
Urban Res: Single story (basement)													
Urban Res: Two plus story (no base)		224	281	374									
Urban Res: Two plus story (basement)													
Mobile home													
Commercial Properties													
Ratio Depreciated Value to Replacement Value		100%	100%	100%									
Average Flood depth above ground level (f)		0.90	1.13	1.50									
low value	building area inundated (sq.f.)	200,413	250,516	334,021									
medium value	building area inundated (sq.f.)	200,413	250,516	334,021									
high value	building area inundated (sq.f.)												
Industrial Properties													
Ratio Depreciated Value to Replacement Value		100%	100%	100%									
Average Flood depth above ground level (f)		0.90	1.13	1.50									
low value	building area inundated (sq.f.)	692,486	865,607	1,154,143									
medium value	building area inundated (sq.f.)	692,486	865,607	1,154,143									
high value	building area inundated (sq.f.)												
Agricultural Production													
Corn	ac.												
Rice	ac.												
Walnuts	ac.												
Almonds	ac.												
Cotton	ac.												
Tomatoes	ac.												
Wine Grapes	ac.												
Alfalfa	ac.												
Pasture	ac.												
Safflower	ac.												
Sugar Beets	ac.												
Beans	ac.												
Other	ac.												
Roads													
length of arterial roads inundated (miles)		0.93	1.16	1.5									
length of major roads inundated (miles)		1.78	2.23	3.0									
length of minor roads inundated (miles)		0.69	0.87	1.2									
length of unsealed roads inundated (miles)													

Extrapolate Y-intercept: N

Summary of Cost-Benefit Analysis

Return to Menu

Project Name: **Francis Street Storm Drain and Ely Basin Flood Control and Aquifer Recharge Project**

Description: The project will mitigat flooding for a tributary area of 956 acres and includes: storm drain improvements along Francis Street from Campus Avenue to the West Cucamonga Creek with a total pipeline length of approximately 8,500 linear feet and diameters ranging from 18" to 132", and expansion of the existing Ely Basins by approximately 310 acre-feet for additional aquifer recharge.

Proposed project capital cost:	$ 16,640,000	[Note: construction costs which are assumed to occur in one year.]
Change in annual O&M costs:	$ -	[Note: the change in annual O&M costs compared to without project conditions.]
PV of future O&M costs:	$ -	(at 6% discount rate over 50 years)
PV of future costs	$ 16,640,000	[Note: the sum of capital costs plus the PV of O&M costs.]

Benefits

	Actual	Potential	
EAD without project	$ 10,404,463	$ 11,917,910	[Note: for stormwater projects use "Potential" damage which ignores storm warning effects.]
EAD with project	$ -	$ -	
Annual Benefit:	$ 10,404,463	$ 11,917,910	
PV of Future Benefits:	$ 163,993,691	$ 187,848,435	(at 6% discount rate over 50 years)

Cost-Benefit Analysis

	Actual	Potential	
Net Present Value (NPV)	$ 147,353,691	$ 171,208,435	(at 6% discount rate over 50 years)
Benefit:Cost Ratio	9.855	11.289	

NPV Sensitivity to Discount Rate:

	Actual	Potential
4%	$ 206,870,589	$ 239,382,741
5%	$ 173,303,096	$ 200,932,475
6%	$ 147,353,691	$ 171,208,435
7%	$ 126,949,350	$ 147,836,051
8%	$ 110,642,835	$ 129,157,568

Model Assumptions

Residential

Foundation heights

Structure Category	Foundation Height (ft)
Rural - Res: Homesteads	1.5
Rural - Other: Barns, sheds	0
Urban Res: Single story (no base)	1.1
Urban Res: Two plus story (no base)	1.1
Mobile home	2.0
Commercial: Low	1
Commercial: Medium	1
Commercial: High	1
Industrial: Low	0.5
Industrial: Medium	0.5
Industrial: High	0.5

Estimate Replacement Value (assumed proxy for depreciated value)

Structure Category	Unit Cost $/ft^2 (2)	Average Size ft^2 (1)	Construction Cost
Rural - Res: Homesteads	159	1900	302100
Rural - Other: Barns, sheds	98	4000	392000
Urban Res: Single story (no base)	159	1900	302100
Urban Res: Two plus story (no base)	155	2200	341000
Mobile home (3)	98	1180	115640
Commercial: Low	120		0
Commercial: Medium	142		0
Commercial: High	207		0
Industrial: Low	120		0
Industrial: Medium	142		0
Industrial: High	207		0

1. Residential Square Footage Source: Sacramento County Tax Assessor Unit Cost and Commercial/Industrial/Public Square Footage Assumptions Source: Saylor Publications, Inc, 2007 Current Construction Costs

2. Replacement unit cost per square foot reflects average costs in the San Franci

3. According to FEMA guidance, replacement costs per square foot for mobile homes and barns and outbuildings are similar.

Other

External damages garden/outdoor areas $/building	$	5,000
Cleanup $/building	$	4,000
Number of residents per residential property		2.6

Commercial / Industrial Buildings

Clean-up costs as a percentage of direct structural damages	30%

Calculation of Other Direct Damages

Percentage of residential direct damages applied as indirect:	25%
Percentage of comm/ind. direct damages applied as indirect:	25%
HEC-FIA only: Percentage all building direct damages applied as indirect	25%
Percentage of roads direct damages applied as indirect:	25%

NPV Calculation

Discount Rate	6%
Time Horizon	50 years

Roads

Cost per mile of highway road inundated	$	250,000
Cost per mile of major road inundated	$	100,000
Cost per mile of minor road inundated	$	30,000
Cost per mile of unsealed road inundated	$	10,000

Agricultural Damages

	Weighted, Average Annual Damages ($/acre)	Establishment Costs ($/acre)	Land Cleanup & rehabilitation ($/acre)	Total <5 d) ($/acre)	Total (>=5 d) ($/acre)
Corn	$48	$0	$246	$293	$293
Rice	$227	$0	$243	$471	$471
Walnuts	$585	$5,284	$243	$828	$6,112
Almonds	$1,618	$3,514	$243	$1,862	$5,376

Cotton	$301	$0	$246	$547	$547
Tomatoes	$1,015	$0	$235	$1,250	$1,250
Wine Grapes	$3,241	$3,240	$235	$3,476	$6,716
Alfalfa	$250	$246	$243	$493	$739
Pasture	($15)	$82	$272	$257	$339
Safflower	$164	$0	$241	$405	$405
Sugar Beets	$313	$0	$262	$575	$575
Beans	$111	$0	$246	$356	$356
Other	$0	0	$246	$246	$246

Source: Comp Study

Establishment Costs are 50% costs of total establishment costs

Calculation of Actual to Potential Damages Ratio

		Without Project						With Project					
		Event 1	**Event 2**	**Event 3**	**Event 4**	**Event 5**	**Event 6**	**Event 1**	**Event 2**	**Event 3**	**Event 4**	**Event 5**	**Event 6**
Warning Time:	hours	0.5	0.5	0.5	0	0	0	0	0	0	0	0	0
Recent Flood Expe	Y / N	Y	Y	Y	0	0	0	N	N	N	0	0	0
Actual : Potential Ratio		0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9

Warning Time	**Experienced Community**	**Inexperienced Community**
< 2 hours	0.8	0.9
2-12 hours	Linear reduction from 0.8 at 2 hours to 0.4 at 12 hours	0.8
>12 hours	0.4	0.7

Occ_Name	Cat_Name	Occ_Description	Parameter	Depth (ft) above First Finished Floor (FFE)																									
1ST-NB	RES	one story, no basement	Stage	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16							
1ST-NB	RES		S	0	2.5	13.4	23.3	32.1	40.1	47.1	53.2	58.6	63.2	67.2	70.5	73.2	75.4	77.2	78.5	79.5	80.2	80.7							
1ST-NB	RES		C	0	2.4	8.1	13.3	17.9	22	25.7	28.8	31.5	33.8	35.7	37.2	38.4	39.2	39.7	40	40	40	40							
2ST-NB	RES	two or more stories, no basement	Stage	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16							
2ST-NB	RES		S	0	3	9.3	15.2	20.9	26.3	31.4	36.2	40.7	44.9	48.8	52.4	55.7	58.7	61.4	63.8	65.9	67.7	69.2							
2ST-NB	RES		C	0	1	5	8.7	12.2	15.5	18.5	21.3	23.9	26.3	28.4	30.3	32	33.4	34.7	35.6	36.4	36.9	37.2							
FARM	FAR	Farm Homesteads	Stage	-10	-3	-2	-1	0	1	2	3	4	5	6	7	8	10	13	15	19	21	25							
FARM	FAR		S	0	0	0	0	4	9	13	18	22	27	31	35	38	49	49	49	49	49	49							
FARM	FAR		C	0	0	0	0	0	6	30	54	69	75	78	80	80	80	100	100	100	100	100							
MOBILE	MOB	Mobile homes	Stage	-10	-3	-2	-1	0	1	2	3	4	5	6	7	8	10	13	15	19	21	25							
MOBILE	MOB		S	0	0	0	0	8	44	63	73	78	80	81	82	82	82	82	82	82	82	82							
MOBILE	MOB		C	0	0	0	0	0	27	49	64	70	76	78	79	81	83	83	83	83	83	83							
PUBLIC	PUB	Public buildings	Stage	-10	-3	-2	-1	0	1	2	3	4	5	6	7	8	10	13	15	19	21	25							
PUBLIC	PUB		S	0	0	0	0	8	22	30	35	39	41	44	46	48	49	49	49	49	49	49							
PUBLIC	PUB		C	0	0	0	0	0	17.5	25	30	34	37	39	40.5	41.5	42	42	42	42	42	42							
INDUSTRY	IND	Industrial Buildings	Stage	-10	-3	-2	-1	0	1	2	3	4	5	6	7	8	10	13	15	19	21	25							
INDUSTRY	IND		S	0	0	0	0	4	9	13	18	22	27	31	35	38	49	49	49	49	49	49							
INDUSTRY	IND		C	0	0	0	0	0	72	75	76.5	78	81	84	87	90	96	102	108	114	120	120							
COMMERCI	COM	Commercial Buildings	Stage	-10	-3	-2	-1	0	1	2	3	4	5	6	7	8	10	13	15	19	21	25							
COMMERCI	COM		S	0	0	0	0	4	9	13	18	22	27	31	35	38	49	49	49	49	49	49							
COMMERCI	COM		C	0	0	0	0	0	11	30	54	69	75	78	80	80	80	100	100	100	100	100							
NOT USED																													
SL-NB	RES	split level, no basement	Stage	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16							
SL-NB	RES		S	0	6.4	7.2	9.4	12.9	17.4	22.8	28.9	35.5	42.3	49.2	56.1	62.6	68.6	73.9	78.4	81.7	83.8	84.4							
SL-NB	RES		SN	0	2.9	2.1	1.9	1.9	2	2.2	2.4	2.7	3.2	3.8	4.5	5.3	6	6.7	7.4	7.9	8.3	8.7							
SL-NB	RES		C	0	2.2	2.9	4.7	7.5	11.1	15.3	20.1	25.2	30.5	35.7	40.9	45.8	50.2	54.1	57.2	59.4	60.5	60.5							
SL-NB	RES		CN	0	2.2	1.5	1.2	1.3	1.4	1.5	1.6	1.8	2.1	2.5	3	3.5	4.1	4.6	5	5.4	5.7	6							
SL-NB	RES		Struct	N		0.8																							
1ST-B	RES	one story, with basement	Stage	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1ST-B	RES		S	0	0	0.7	0.8	2.4	5.2	9	13.8	19.4	25.5	32	38.7	45.5	52.2	58.6	64.5	69.8	74.2	77.7	80.1	81.1	81.1	81.1	81.1	81.1	81.1
1ST-B	RES		SN	0	0	1.34	1.06	0.94	0.91	0.88	0.85	0.83	0.85	0.96	1.14	1.37	1.63	1.89	2.14	2.35	2.52	2.66	2.77	2.88	2.88	2.88	2.88	2.88	2.88
1ST-B	RES		C	0	0.1	0.8	2.1	3.7	5.7	8	10.5	13.2	16	18.9	21.8	24.7	27.4	30	32.4	34.5	36.3	37.7	38.6	39.1	39.1	39.1	39.1	39.1	39.1
1ST-B	RES		CN	0	1.6	1.16	0.92	0.81	0.78	0.76	0.74	0.72	0.74	0.83	0.98	1.17	1.39	1.6	1.81	1.99	2.13	2.25	2.35	2.45	2.45	2.45	2.45	2.45	2.45
1ST-B	RES		Struct	N		0.8																							
2ST-B	RES	two or more stories, with basement	Stage	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
2ST-B	RES		S	0	1.7	1.7	1.9	2.9	4.7	7.2	10.2	13.9	17.9	22.3	27	31.9	36.9	41.9	46.9	51.8	56.4	60.8	64.8	68.4	71.4	73.7	75.4	76.4	76.4
2ST-B	RES		SN	0	2.7	2.7	2.11	1.8	1.66	1.56	1.47	1.37	1.32	1.35	1.5	1.75	2.04	2.34	2.63	2.89	3.13	3.38	3.71	4.22	5.02	6.19	7.79	9.84	12.36
2ST-B	RES		C	0	0	1	2.3	3.7	5.2	6.8	8.4	10.1	11.9	13.8	15.7	17.7	19.8	22	24.3	26.7	29.1	31.7	34.4	37.2	40	43	46.1	49.3	52.6
2ST-B	RES		CN	0	0	2.27	1.76	1.49	1.37	1.29	1.21	1.13	1.09	1.11	1.23	1.43	1.67	1.92	2.15	2.36	2.56	2.76	3.04	3.46	4.12	5.08	6.39	8.08	10.15
2ST-B	RES		Struct	N		0.8																							
SL-B	RES	split level, with basement	Stage	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SL-B	RES		S	0	0	0	2.5	3.1	4.7	7.2	10.4	14.2	18.5	23.2	28.2	33.4	38.6	43.8	48.8	53.5	57.8	61.6	64.8	67.2	68.8	69.3	69.3	69.3	69.3
SL-B	RES		SN	0	0	0	1.8	1.6	1.5	1.6	1.6	1.6	1.6	1.7	1.9	2.1	2.4	2.6	2.9	3.2	3.4	3.6	3.9	4.2	4.8	5.7	5.7	5.7	5.7
SL-B	RES		C	0	0.6	0.7	1.4	2.4	3.8	5.4	7.3	9.4	11.6	13.8	16.1	18.2	20.2	22.1	23.6	24.9	25.8	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.3
SL-B	RES		CN	0	2.09	1.49	1.14	1.01	1	1.02	1.03	1.04	1.06	1.12	1.23	1.38	1.57	1.76	1.95	2.13	2.28	2.44	2.44	2.44	2.44	2.44	2.44	2.44	2.44
SL-B	RES		Struct	N		0.8																							

Residential Buildings

	Without Project						With Project					
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6
ARI:	10	25	100	0	0	0	10	25	100	0	0	0
Probability of Levee Failure	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Flood depth above ground level (ft)	0.90	1.13	1.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Buildings Inundated (no.)												
Rural - Res: Homesteads	0	0	0	0	0	0	0	0	0	0	0	0
Rural - Other: Barns, sheds	0	0	0	0	0	0	0	0	0	0	0	0
Urban Res: Single story (no base)	82	102	136	0	0	0	0	0	0	0	0	0
Urban Res: Two plus story (no base)	224	281	374	0	0	0	0	0	0	0	0	0
Mobile home	0	0	0	0	0	0	0	0	0	0	0	0
Structural Damages												
Rural - Res: Homesteads	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Rural - Other: Barns, sheds	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Urban Res: Single story (no base)	$ 616,284	$ 4,129,103	$ 5,505,470	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Urban Res: Two plus story (no base)	$ 2,295,612	$ 8,895,497	$ 11,860,662	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Mobile home	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Structual Damages HEC-FIA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Structural Damages	$ 2,911,896	$ 13,024,599	$ 17,366,132	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Content Damages												
Rural - Res: Homesteads	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Rural - Other: Barns, sheds	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Urban Res: Single story (no base)	$ 591,633	$ 2,495,950	$ 3,327,934	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Urban Res: Two plus story (no base)	$ 765,204	$ 4,782,525	$ 6,376,700	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Mobile home	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Contents Damage HEC-FIA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Actual:Potential Ratio	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Total Contents Damages: Actual	$ 1,085,469	$ 5,822,780	$ 7,763,707	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Contents Damages: Potential	$ 1,356,837	$ 7,278,475	$ 9,704,634	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Clean-Up/ Other Costs												
External	$ 1,530,000	$ 1,912,500	$ 2,550,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cleanup	$ 1,224,000	$ 1,530,000	$ 2,040,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other Costs HEC-FIA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Other Costs: Potential	$ 2,754,000	$ 3,442,500	$ 4,590,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Sum Actual Damages	**$ 6,751,365**	**$ 22,289,879**	**$ 29,719,839**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Sum Potential Damages	**$ 7,022,733**	**$ 23,745,575**	**$ 31,660,766**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Total Actual Damage with levee failure ($):	**$ 6,751,365**	**$ 22,289,879**	**$ 29,719,839**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Total Potential Damage with levee failure ($):	**$ 7,022,733**	**$ 23,745,575**	**$ 31,660,766**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Indirect Actual Damage	$ 1,687,841	$ 5,572,470	$ 7,429,960	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Indirect Potential Damage	$ 1,755,683	$ 5,936,394	$ 7,915,192	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Commercial & Industrial Buildings

	Without Project						With Project					
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6
ARI:	10	25	100	0	0	0	10	25	100	0	0	0
Probability of Levee Failure	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Commercial												
'Flood depth above ground level (ft)	0.90	1.13	1.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
low building size	200413	250516	334021	0	0	0	0	0	0	0	0	0
medium building size	200413	250516	334021	0	0	0	0	0	0	0	0	0
high building size	0	0	0	0	0	0	0	0	0	0	0	0
Industrial												
'Flood depth above ground level (ft)	0.90	1.13	1.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
low building size	692486	865607	1154143	0	0	0	0	0	0	0	0	0
medium building size	692486	865607	1154143	0	0	0	0	0	0	0	0	0
high building size	0	0	0	0	0	0	0	0	0	0	0	0
Structural Damages												
Commercial												
low	$ -	$ 1,202,476	$ 1,603,302	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
medium	$ -	$ 1,422,930	$ 1,897,240	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
high	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Commercial HEC-FIA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Industrial												
low	$ 3,323,931	$ 4,154,913	$ 12,464,740	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
medium	$ 3,933,318	$ 4,916,647	$ 14,749,942	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
high	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Industrial HEC-FIA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Structural Damages	$ 7,257,249	$ 11,696,967	$ 30,715,224	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Contents Damages												
Commercial												
low	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
medium	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
high	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Commercial HEC-FIA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Industrial												
low	$ -	$ -	$ 99,717,918	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
medium	$ -	$ -	$ 117,999,537	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
high	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Industrial HEC-FIA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Actual:Potential Ratio	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Total Contents Damages: Actual	$ -	$ -	$ 174,173,964	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Contents Damages: Potential	$ -	$ -	$ 217,717,455	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Clean-up/ Other Costs	$ 2,177,175	$ 3,509,090	$ 9,214,567	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Clean-Up/ Other Costs: HEC-FIA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Sum Actual Damages	**$ 9,434,423**	**$ 15,206,057**	**$ 214,103,756**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Sum Potential Damages	**$ 9,434,423**	**$ 15,206,057**	**$ 257,647,247**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Total Damage with levee failure ($):	**$ 9,434,423**	**$ 15,206,057**	**$ 214,103,756**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Total Damage with levee failure ($):	**$ 9,434,423**	**$ 15,206,057**	**$ 257,647,247**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Indirect Actual Damages	$ 2,358,606	$ 3,801,514	$ 53,525,939	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Indirect Potentail Damages	$ 2,358,606	$ 3,801,514	$ 64,411,812	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Agricultural Damages

		Without Project						With Project					
		Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6
ARI:		10	25	100	0	0	0	10	25	100	0	0	0
Probability of Levee Failure		1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Length of Inundation <5d Y/N		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Agricultural Land Inundated													
Corn	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Rice	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Walnuts	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Almonds	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Cotton	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Tomatoes	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Wine Grapes	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Alfalfa	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Pasture	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Safflower	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Sugar Beets	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Beans	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Other	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Potential Damages													
Corn		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Rice		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Walnuts		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Almonds		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cotton		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tomatoes		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Wine Grapes		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Alfalfa		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pasture		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Safflower		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Sugar Beets		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Beans		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Potential Damages		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Damage with levee failure ($):		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Roads

	Without Project						With Project					
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6
ARI	10	25	100	0	0	0	10	25	100	0	0	0
Probability of Levee failure	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Roads Inundated												
length of arterial roads inundated (miles)	0.93	1.16	1.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
length of major roads inundated (miles)	1.78	2.23	2.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
length of minor roads inundated (miles)	0.69	0.87	1.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
length of unsealed roads inundated (miles)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Potential Damages												
length of arterial roads inundated (miles)	$ 231,847	$ 289,808	$ 386,411	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
length of major roads inundated (miles)	$ 178,045	$ 222,557	$ 296,742	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
length of minor roads inundated (miles)	$ 20,775	$ 25,969	$ 34,625	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
length of unsealed roads inundated (miles)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Damages:	*$ 430,667*	*$ 538,334*	*$ 717,778*	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Damage with levee failure ($):	$ 430,667	$ 538,334	$ 717,778	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Special Cases - Dollar Damages Incurred

Return to Menu

	Without Project						With Project					
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6
ARI	10	25	100	0	0	0	10	25	100	0	0	0
Probability of Levee failure	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Description / Site ID												
Total Damages:	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Damage with levee failure ($):	0	0	0	0	0	0	0	0	0	0	0	0

Calculation of Without Project EAD

	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Y Intercept
Average Recurrence Interval (ARI)	10	25	100	0	0	0	
AEP	0.100	0.040	0.010	#DIV/0!	#DIV/0!	#DIV/0!	0
Actual Damage to Residential Buildings ($)	$ 6,751,365	$ 22,289,879	$ 29,719,839	$ -	$ -	$ -	
Potential Damage to Residential Buildings ($)	$ 7,022,733	$ 23,745,575	$ 31,660,766	$ -	$ -	$ -	
Actual Damage to Commercial/Industrial Buildings ($)	$ 9,434,423	$ 15,206,057	$ 214,103,756	$ -	$ -	$ -	
Potential Damage to Commercial/Industrial Buildings ($)	$ 9,434,423	$ 15,206,057	$ 257,647,247	$ -	$ -	$ -	
Damage to Agriculture ($)	$ -	$ -	$ -	$ -	$ -	$ -	
Damage to Roads ($)	$ 430,667	$ 538,334	$ 717,778	$ -	$ -	$ -	
Actual Indirect Costs	$ 4,154,114	$ 9,508,568	$ 61,135,343	$ -	$ -	$ -	
Potential Indirect Costs	$ 4,221,956	$ 9,872,491	$ 72,506,448	$ -	$ -	$ -	
Special Cases	$ -	$ -	$ -	$ -	$ -	$ -	
Total Actual Damages	$ 20,770,569	$ 47,542,838	$ 305,676,717	$ -	$ -	$ -	$ 305,676,717
Total Potential Damages	$ 21,109,778	$ 49,362,457	$ 362,532,239	$ -	$ -	$ -	$ 362,532,239
EAD (Actual)	$ 10,404,463						
EAD (Potential)	$ 11,917,910						

Potential Damages

	Without Project							With Project						
Water Surface Elevation - channel (f)	875.9	876.125	876.5	876.5	876.5	876.5		0	0	0	0	0	0	
ARI	10	25	100	0	0	0		10	25	100	0	0	0	
Probability of Exceedence (AEP)	0.100	0.040	0.010	#DIV/0!	#DIV/0!	#DIV/0!		0.100	0.040	0.010	#DIV/0!	#DIV/0!	#DIV/0!	
Damages incurred	$ 21,109,778	$ 49,362,457	$ 362,532,239	$ -	$ -	$ -	$ 362,532,239	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Actual Damages

	Without Project							With Project						
Water Surface Elevation - channel (f)	875.9	876.125	876.5	0	0	0		0	0	0	0	0	0	
ARI	10	25	100	0	0	0		10	25	100	0	0	0	
Probability of Exceedence (AEP)	0.100	0.040	0.010	#DIV/0!	#DIV/0!	#DIV/0!		0.100	0.040	0.010	#DIV/0!	#DIV/0!	#DIV/0!	
Damages incurred	$ 20,770,569	$ 47,542,838	$ 305,676,717	$ -	$ -	$ -	$ 305,676,717	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Without Project

Water Surface Elevation - channel (f)	10	25	100	0	0	0
Probability of Exceedence (AEP)	0.100	0.040	0.010	0.010	0.010	0.010
Potential	$ 21,109,778	$ 49,362,457	$ 362,532,239	$ 362,532,239	$ 362,532,239	$ 362,532,239
Actual	$ 20,770,569	$ 47,542,838	$ 305,676,717	$ 305,676,717	$ 305,676,717	$ 305,676,717

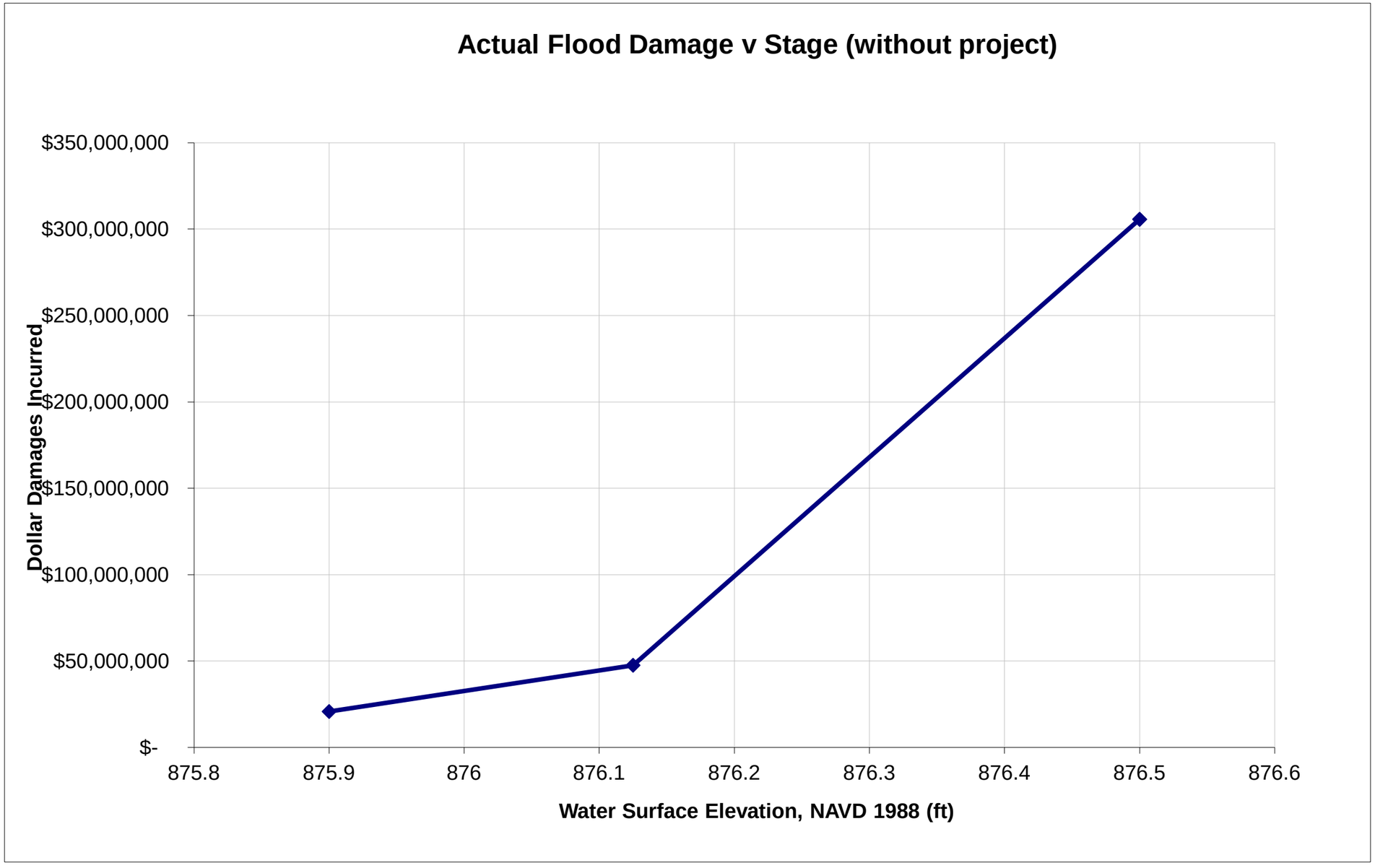
With Project

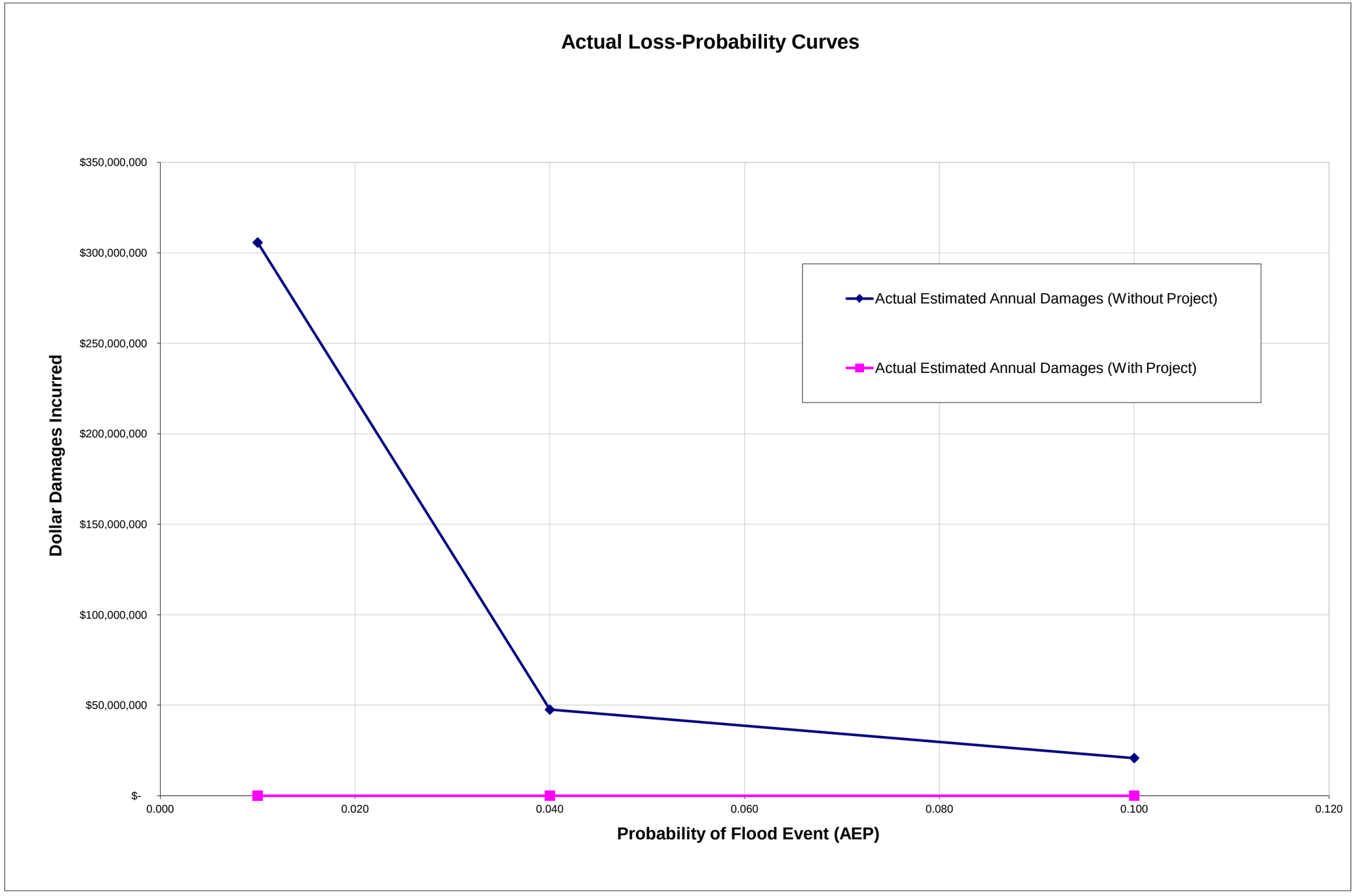
Water Surface Elevation - channel (f)	10	25	100	0	0	0
Probability of Exceedence (AEP)	0.100	0.040	0.010	0.010	0.010	0.010
Potential	$ -	$ -	$ -	$ -	$ -	$ -
Actual	$ -	$ -	$ -	$ -	$ -	$ -

Calculation of With Project EAD

	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	
Average Recurrence Interval (ARI)	10	25	100	0	0	0	
AEP	0.100	0.040	0.010	#DIV/0!	#DIV/0!	#DIV/0!	0
Actual Damage to Residential Buildings ($)	$ -	$ -	$ -	$ -	$ -	$ -	
Potential Damage to Residential Buildings ($)	$ -	$ -	$ -	$ -	$ -	$ -	
Actual Damage to Commercial/Industrial Buildings ($)	$ -	$ -	$ -	$ -	$ -	$ -	
Potential Damage to Commercial/Industrial Buildings ($)	$ -	$ -	$ -	$ -	$ -	$ -	
Damage to Agriculture ($)	$ -	$ -	$ -	$ -	$ -	$ -	
Damage to Roads ($)	$ -	$ -	$ -	$ -	$ -	$ -	
Actual Indirect Costs	$ -	$ -	$ -	$ -	$ -	$ -	
Potential Indirect Costs	$ -	$ -	$ -	$ -	$ -	$ -	
Special Cases	$ -	$ -	$ -	$ -	$ -	$ -	
Total Actual Damages	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Potential Damages	$ -	$ -	$ -	$ -	$ -	$ -	$ -

EAD (Actual)	$ -
EAD (Potential)	$ -


Actual Flood Damage v Stage (without project)
$350,000,000
$300,000,000
$250,000,000
$200,000,000
$150,000,000
$100,000,000
$50,000,000
$-
Dollar Damages Incurred
875.8
875.9
876
876.1
876.2
876.3
876.4
876.5
876.6
Water Surface Elevation, NAVD 1988 (ft)


Actual Loss-Probability Curves
$350,000,000
$300,000,000
$250,000,000
$200,000,000
$150,000,000
$100,000,000
$50,000,000
$-
Dollar Damages Incurred
0.000
0.020
0.040
0.060
0.080
0.100
0.120
Probability of Flood Event (AEP)
Actual Estimated Annual Damages (Without Project)
Actual Estimated Annual Damages (With Project)

Project P: Commercial/Industrial/Institutional Performance-Based Water Use Efficiency Program (Metropolitan Water District of Orange County)

I. Non-Monetized Benefits Analysis

Additional non-monetized benefits yielded from this CII Performance-Based Water Use Efficiency Program are denoted in Table 12 and described below.

Community/Social Benefits

Education or Technology Benefits: Through the engineering surveys and subsequent reports provided as part of this Program for industrial sites, educational and technological benefits are provided directly to the participant. The site surveys identify major water uses, potential water savings measures, and summarize recommended retrofits and changes to operating practices that will result in significant water savings. Typical engineering assistance includes researching new products and operations.

Environmental Stewardship Benefits

The following environmental stewardship benefits were not quantified in Attachment 7.

Improve Water Quality: In addition to how this Program contributes to: 1) reduce the rate of dry weather runoff resulting in pollution prevention from existing landscapes; 2) encourage the use of low impact development practices in the landscape to help preserve sustainability and watershed health; and 3) increase water use efficiency by using landscape water beneficially, and not wastefully, thereby resulting in sustainable water resource management. The Program will also improve the water quality within a site. At industrial sites, the water process improvements will oft times result in the recirculation or treating of water onsite, rather than sending piloted water directly to the sanitation district.

Reduce Net Emissions: In addition to the greenhouse gas emission reduction resulting from a decrease in water demand as a result of the Program, process improvements at the industrial sites will reduce net emissions of other harmful chemicals into the water through the potential treatment of water onsite.

Sustainability Benefits

Improve Overall Long-Term Management: The Municipal Water District of Orange County (MWDOC) in collaboration with its retail agencies as well as the cities of Anaheim, Fullerton, and Santa Ana, established the Orange County 20x2020 Regional Alliance (Regional Alliance) in MWDOC's 2010 Regional Urban Water Management Plan (RUWMP). The Regional Alliance was created to provide flexibility to meet the per capita reductions on a regional basis without adding additional risk to the retail agencies, who can still achieve compliance on the individual level. Under the Regional Alliance, all retail water agencies can benefit from pooling their investments in water use efficiency.

Long-term Sustainability Practices: As the recommendations provide water efficient equipment changes and not just operational procedures, the water savings provides a long-term solution in place of short-term modifications.

Reduce Demand from the Delta: MWDOC purchases imported water from the Metropolitan Water District of Southern California, of the imported water supply, 31% is from the State Water Project. Conserved water from the proposed Program could result in decreased net demand on Delta Diversions. See the *Local Water Demand* or section of Attachment 7 for more information.

Promote Energy Savings: In-line with the recommendations from the USBR Water and Energy Efficiency Program, this Program modify existing CII buildings and operations on a permanent basis to promote the water-energy nexus. As part of Program development and implementation, MWDOC partners with source control inspectors from local sanitation districts and account representatives from energy utilities for additional technical assistance. See the *Technical Justification* section of Attachment 7 for more information.

Table 12 – Non-monetized Benefits Checklist		
No.	**Question**	**Enter "Yes", "No" or "Neg"**
	Community/Social Benefits **Will the proposal**	
1	**Provide education or technology benefits?**	**Yes**
	Examples are not limited to, but may include: • Include educational features that should result in water supply, water quality, or flood damage reduction benefits? • Develop, test, or document a new technology for water supply, water quality, or flood damage reduction management? • Provide some other education or technological benefit?	
2	**Provide social recreation or access benefits?**	**No**
	Examples are not limited to, but may include: • Provide new or improved outdoor recreation opportunities? • Provide more access to open space? • Provide some other recreation or public access benefit?	
3	**Help avoid, reduce or resolve various public water resources conflicts?**	**No**
	Examples are not limited to, but may include: • Provide more opportunities for public involvement in water management? • Help avoid or resolve an existing conflict as evidenced by recurring fines or litigation? • Help meet an existing state mandate (e.g., water quality, water conservation, flood control)?	
4	**Promote social health and safety?**	**No**
	Examples are not limited to, but may include: • Increase urban water supply reliability for fire-fighting and critical services following seismic events? • Reduce risk to life from dam failure or flooding? • Reduce exposure to water-related hazards?	
5	**Have other social benefits?**	**No**
	• Examples are not limited to, but may include: • Redress or increase inequitable distribution of environmental burdens? • Have disproportionate beneficial or adverse effects on disadvantaged communities, Native Americans, or other distinct cultural groups?	
	Environmental Stewardship Benefits: **Will the proposal**	
6	**Benefit wildlife or habitat in ways that were not quantified in Attachment 7?**	**No**

	Examples are not limited to, but may include: • Cause an increase in the amount or quality of terrestrial, aquatic, riparian or wetland habitat? • Contribute to an existing biological opinion or recovery plan for a listed special status species? • Preserve or restore designated critical habitat of a listed species? • Enhance wildlife protection or habitat?	
7	**Improve water quality in ways that were not quantified in Attachment 7?**	**Yes**
	Examples are not limited to, but may include: • Cause an improvement in water quality in an impaired water body or sensitive habitat? • Prevent water quality degradation? • Cause some other improvement in water quality?	
8	**Reduce net emissions in ways that were not quantified in Attachment 7?**	**Yes**
	Examples are not limited to, but may include: • Reduce net production of greenhouse gasses? • Reduce net emissions of other harmful chemicals into the air or water?	
9	**Provide other environmental stewardship benefits, other than those claimed in Sections D1, D3, or D4?**	**No**
	Sustainability Benefits: **Will the proposal**	
10	**Improve the overall, long-term management of California groundwater resources?**	**Yes**
	Examples are not limited to, but may include: • Reduce extraction of non-renewable groundwater? • Promote aquifer storage or recharge?	
11	**Reduce demand for net diversions for the regions from the Delta?**	**Yes**
12	**Provide a long-term solution in place of a short-term one?**	**Yes**
13	**Promote energy savings or replace fossil fuel based energy sources with renewable energy and resources?**	**Yes**
	Examples are not limited to, but may include: • Reduce net energy use on a permanent basis? • Increase renewable energy production? • Include new buildings or modify buildings to include certified LEED features? • Provide a net increase in recycling or reuse of materials? • Replace unsustainable land or water management practices with recognized sustainable practices?	
14	**Improve water supply reliability in ways not quantified in Attachment 7?**	**No**
	Examples are not limited to, but may include: • Provide a more flexible mix of water sources? • Reduce likelihood of catastrophic supply outages? • Reduce supply uncertainty? • Reduce supply variability?	
15	**Other (If the above listed categories do not apply, provide non-monetized benefit description)?**	**No**

II. Monetized Benefits Analysis

Narrative for Project Water Supply Benefits

a. Estimates of without- and with-project conditions; e.g. improvements in new water supplies made available to meet demand

In Orange County, the California CII water use accounts 72,000 irrigation, commercial, industrial, and institutional connections. Without the Program, the current and future water demand is expected to remain consistent, yielding no level of benefit for the without-project condition. The with-project condition yielded a net reduction of 450 acre-feet per year (AFY) and a gross water savings reduction of 5,860 acre-feet lifetime water savings. The water savings benefit is comprised of 75 AFY for process improvement projects, 170 AFY for CII device upgrades, and 205 AFY large landscape improvements. The gross water savings were calculated based on the varying water savings life based on project type.

b. Identification of beneficiaries

Beneficiaries of project implementation include participating CII property owners, cities, water agencies, and the environment. The CII property owners will benefit from improved, process efficiency, lower water bills, lower sanitation bills, and landscape aesthetics. Cities will benefit from reduced maintenance costs and avoided collateral damage such as street surface erosion as a result of irrigation runoff. Water agencies will benefit from reduced water use, progress towards meeting their 20% by 2020 water savings goal and improved water supply reliability. And the environment will benefit from reduced dry weather runoff and non-point source pollution.

c. When the benefits will be received

Benefits will be received as the industrial process water is reduced, commercial and institutional devices are upgraded, and non-functional turf is removed and the California Friendly landscapes are installed at large landscape sites. It is anticipated that the full annual benefits will be realized by the end of the forth year of program implementation.

d. Uncertainty of the benefits

The uncertainty of benefits includes lower or higher water use of traditional industrial process or turf-intensive landscape than anticipated. The actual uncertainty will be measured through the statistical water savings evaluation that will be performed on the project.

e. Description of any adverse effects

No adverse effects are anticipated from project implementation.

III. Narrative for Values in Tables 15-19

a. Project Benefits

Table 15: Annual Benefits
Table 15 quantifies annual benefits in the form of regional cost savings due to a reduced need for imported water supply purchases. The project will result in a net reduction of 450 acre-feet per year as a result of lower water needs in existing CII sites. These water savings are included through the year 2033, which represents the end of the project's useful life. The economic value of these savings is the projected future cost of Treated Full Service Tier 1 water from Metropolitan's *Draft 2010 Long Range Finance Plan* (December, 2010).

A significant portion of the projected benefits occurs many years into the project's life. By accounting for the time value of money with a 6.0% discount factor, these benefits are significantly diminished on a present value basis. The total present value of this avoided imported water costs reported in Table 15, is $4,364,416.

Table 16: Annual Costs of Avoided Projects
Not Applicable

Table 17: Expected Annual Damage
Not Applicable

Table 18: Present Value of Annual Damage Reduction Benefits
Not Applicable

Table 19: Project Economic Costs

The total projected cost of the proposal through the year 2033 is $2,427,512. The net present value of these costs as calculated in Table 19 is $2,083,291. The initial costs are expected to occur over a four year period from 2013 to 2016 as the installations occur. These initial costs are identical to those included in Budget Table 7. There are no costs of the program after the installations are complete. The present value costs are based on an application of a 6.0% annual discount factor to all costs occurring in years beyond 2012.

If the project includes a suite of projects, describe the relationship of each project to the overall projects costs and to the overall water supply benefits of the entire project.

The project does not include a suite of projects.

Table 15 – Annual Benefit

(All benefits should be in 2012 dollars)

Project: CII Performance-Based Water Use Efficiency 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)**
2012	Water Savings	acre-foot	0	0.00	0.00	$794.00	$0.00	1.000	**$0.00**
2013	Water Savings	acre-foot	0	18.75	18.75	$847.00	$15,881.25	0.943	**$14,976.02**
2014	Water Savings	acre-foot	0	162.25	162.25	$890.00	$144,402.50	0.890	**$128,518.23**
2015	Water Savings	acre-foot	0	326.25	326.25	$920.00	$300,150.00	0.840	**$252,126.00**
2016	Water Savings	acre-foot	0	450.00	450.00	$970.00	$436,500.00	0.792	**$345,708.00**
2017	Water Savings	acre-foot	0	450.00	450.00	$1,023.00	$460,350.00	0.742	**$341,579.70**
2018	Water Savings	acre-foot	0	450.00	450.00	$1,079.00	$485,550.00	0.705	**$342,312.75**
2019	Water Savings	acre-foot	0	450.00	450.00	$1,146.00	$515,700.00	0.665	**$342,940.50**
2020	Water Savings	acre-foot	0	450.00	450.00	$1,214.00	$546,300.00	0.627	**$342,530.10**
2021	Water Savings	acre-foot	0	450.00	450.00	$1,274.70	$573,615.00	0.592	**$339,580.08**
2022	Water Savings	acre-foot	0	450.00	450.00	$1,338.44	$602,295.75	0.558	**$336,081.03**
2023	Water Savings	acre-foot	0	439.75	439.75	$1,405.36	$618,005.63	0.527	**$325,688.97**
2024	Water Savings	acre-foot	0	355.75	355.75	$1,475.62	$524,953.45	0.497	**$260,901.86**
2025	Water Savings	acre-foot	0	251.25	251.25	$1,549.41	$389,288.21	0.469	**$182,576.17**
2026	Water Savings	acre-foot	0	170.00	170.00	$1,626.88	$276,568.94	0.442	**$122,243.47**
2027	Water Savings	acre-foot	0	170.00	170.00	$1,708.22	$290,397.39	0.417	**$121,095.71**
2028	Water Savings	acre-foot	0	170.00	170.00	$1,793.63	$304,917.25	0.394	**$120,137.40**
2029	Water Savings	acre-foot	0	170.00	170.00	$1,883.31	$320,163.12	0.371	**$118,780.52**
2030	Water Savings	acre-foot	0	170.00	170.00	$1,977.48	$336,171.27	0.350	**$117,659.95**
2031	Water Savings	acre-foot	0	161.50	161.50	$2,076.35	$335,330.84	0.331	**$110,994.51**
2032	Water Savings	acre-foot	0	102.00	102.00	$2,180.17	$222,377.30	0.312	**$69,381.72**
2033	Water Savings	acre-foot	0	42.50	42.50	$2,289.18	$97,290.07	0.294	**$28,603.28**
Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)									**$4,364,415.95**

Table 19 – Annual Costs of Project
(All costs should be in 2012 Dollars)

Project: CII Performance-Based Water Use Efficiency Project

	Grand Total Cost from Table 7 (row (i), column (d))	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)**
2012	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	1.000	**$-**
2013	$242,751.20	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$242,751.20	0.943	**$228,914.38**
2014	$849,629.20	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$849,629.20	0.890	**$756,169.99**
2015	$849,629.20	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$849,629.20	0.840	**$713,688.53**
2016	$485,502.40	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$485,502.40	0.792	**$384,517.90**
2017	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0.742	**$-**
2018	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0.705	**$-**
2019	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0.665	**$-**
2020	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0.627	**$-**
2021	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0.592	**$-**
2022	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0.558	**$-**
2023	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0.527	**$-**
2024	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0.497	**$-**
2025	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0.469	**$-**
2026	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0.442	**$-**
2027	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0.417	**$-**
2028	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0.394	**$-**
2029	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0.371	**$-**
2030	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0.350	**$-**
2031	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0.331	**$-**
2032	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0.312	**$-**
2033	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	0.294	**$-**
								Total Present Value of Discounted Costs (Sum of column (j)) Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries		**$2,083,290.80**

Table 16 – Annual Costs of Avoided Projects (All avoided costs should be in 2012 dollars) Project: CII Performance-Based Water Use Efficiency 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)		
2012					1.000	
2013					0.943	
2014					0.890	
2015					0.840	
2016					0.792	
2017					0.747	
2018					0.705	
2019					0.665	
2020					0.627	
2021					0.592	
2022					0.558	
2023					0.527	
2024					0.497	
2025					0.469	
2026					0.442	
2027					0.417	
2028					0.394	
2029					0.371	
2030					0.350	
2031					0.331	
2032					0.312	
2033					0.294	
Total Present Value of Discounted Costs (Sum of Column (g))						
(%) Avoided Cost Claimed by Project						
Total Present Value of Discounted Avoided Project Costs Claimed by Alternative Project (Total Present Value of Discounted Costs x % Avoided Cost Claimed by Project)						
Comments:						

Table 17 – Example Calculation of Expected Annual Damage											
Hydrologic Event	Event Exceedance Probability	Event Damage if Flood Structures Fail	Probability Structural Failure		Expected Event Damage		Interval Probability	Average Damage in Interval		Average Damage in Interval times Interval Probability	
			Without	With Project	Without Project	With Project		Without Project	With Project	Without	With Project
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(i)	(j)	(k)	(l)	(m)
					(c) x (d)	(c) x (e)	from (b)	from (f)	from (g)	(i) x (j)	(i) x (k)
5-year	0.2	$100	0	0	$0	$0					
10-Year	0.1	$200	0.5	0	$100	$0	0.1	$50	$0	$5	$0
15-Year	0.067	$400	0.75	0	$300	$0	0.033	$200	$0	$7	$0
20-Year	0.05	$600	1	0	$600	$0	0.017	$450	$0	$8	$0
25-Year	0.04	$800	1	1	$800	$800	0.01	$700	$400	$7	$4
Expected Annual Damages, Without and With Project										$26.25	$4.00

Table 18 – Present Value of Expected Annual Damage Reduction Benefits			
Project: CII Performance-Based Water Use Efficiency Project			
(a)	Expected Annual Damage Without Project (1)		
(b)	Expected Annual Damage With Project (1)		
(c)	Expected Annual Benefit	(a) – (b)	
(d)	Present Value Coefficient (2)		
(e)	**Present Value of Future Benefits Transfer to Table 20, column (e).**	**(c) x (d)**	
(1)	*This program assumes no land use changes in the floodplain. So, EAD will be constant over analysis period.*		
(2)	*6% discount rate; 50-year analysis period (could vary depending upon lifecycle of project).*		

Table 20 – Proposal Benefits and Costs Summary							
Project: CII Performance-Based Water Use Efficiency Project							
Agency: Municipal Water District of Orange County							
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)
CII Performance-Based Water Use Efficiency Program	Municipal Water District of Orange County	##########	$4,364,415.95	$ -	$4,364,415.95		
(1)	*From Table 19, or RWMG method*						
(2)	*From Table 15 or RWMG method*						
(3)	*From Table 18 or RWMG method*						

Project Q: Peters Canyon Channel Water Capture and Reuse Pipeline (City of Irvine)

Table 12 – Non-monetized Benefits Checklist		
No.	**Question**	**Enter "Yes", "No" or "Neg"**
	Community/Social Benefits **Will the proposal**	
1	**Provide education or technology benefits?**	**No**
2	**Provide social recreation or access benefits?**	No
3	**Help avoid, reduce or resolve various public water resources conflicts?**	**Yes**
	The Reuse Pipeline will contribute to selenium and nitrogen TMDL load reductions in the Newport Bay watershed.	
4	**Promote social health and safety?**	No
5	**Have other social benefits? No.**	No
	Environmental Stewardship Benefits: **Will the proposal**	
6	**Benefit wildlife or habitat in ways that were not quantified in Attachment 7?**	Yes
	The project will reduce selenium loading in Peters Canyon Channel which will result in reduced risks to wildlife reproduction due to potential selenium toxicity.	
7	**Improve water quality in ways that were not quantified in Attachment 7?**	No
8	**Reduce net emissions in ways that were not quantified in Attachment 7?**	No
9	**Provide other environmental stewardship benefits, other than those claimed in Sections D1, D3, or D4?**	
	Sustainability Benefits: **Will the proposal**	
10	**Improve the overall, long-term management of California groundwater resources?**	Yes
	The project will promote groundwater recharge by providing water to the Orange County Water District Groundwater Replenishment System through diverting flows to Orange County Sanitation District.	
11	**Reduce demand for net diversions for the regions from the Delta?** *Yes. The Orange County aquifer is used as a local water supply?*	Yes
	The diverted flows will be used by OCWD to recharge the Orange County aquifer through the Groundwater Replenishment System. The Orange County aquifer is used as a local source of water supply.	
12	**Provide a long-term solution in place of a short-term one?**	Yes
	Yes, a portion of the flows to be diverted into the Reuse Pipeline are currently discharged to the Irvine Ranch Water District's treatment plant that is unable to remove selenium and returns reclaimed water back to the watershed. Due to the closed nature of IRWD's treatment system and the need to remove selenium from the watershed, IRWD cannot accept these flows on a permanent basis.	
13	**Promote energy savings or replace fossil fuel based energy sources with renewable energy and resources?**	No
14	**Improve water supply reliability in ways not quantified in Attachment 7?**	No
15	**Other (If the above listed categories do not apply, provide non-monetized benefit description)?**	None

Table 15 – Annual Benefit

(All benefits should be in 2012 dollars)

Project: Peters Canyon Channel Water Capture and Reuse Pipeline

(a) Year	(b) Type of Benefit	(c) Measure of Benefit (Units)	(d) Without Project	(e) With Project	(f) Change Resulting from Project (e) – (d)	(g) Unit $ Value (1)	(h) Annual $ Value (1) (f) x (g)	(i) Discount Factor (1)	(j) Discounted Benefits (1) (h) x (i)	Project Yea
2013	Se & N Removal	lbs of Selenium	0	0	0	0	0	1.000	**0**	0
	Water Supply	af	0	0	0	0	0	1.000	**0**	0
	GHG Reduction	metric tons	0	0	0	0	0	1.000	**0**	0
2014	Se & N Removal	lbs of Selenium	0	0	0	0	0	0.943	**0**	0
	Water Supply	af	0	0	0	0	0	0.943	**0**	0
	GHG Reduction	metric tons	0	0	0	0	0	0.943	**0**	0
2015	Se & N Removal	lbs of Selenium	0	229	229	14,800	3,389,200	0.890	**3,016,376**	1
	Water Supply	af	0	1,774	1,774	847	1,502,424	0.890	**1,337,152**	1
	GHG Reduction	metric tons	0	1,040	1,040	10	10,400	0.890	**9,256**	1
2016	Se & N Removal	lbs of Selenium	0	229	229	14,800	3,389,200	0.943	**3,197,358**	2
	Water Supply	af	0	1,774	1,774	847	1,502,424	0.943	**1,417,381**	2
	GHG Reduction	metric tons	0	1,040	1,040	10	10,400	0.943	**9,811**	2
2017	Se & N Removal	lbs of Selenium	0	229	229	14,800	3,389,200	0.890	**3,016,376**	3
	Water Supply	af	0	1,774	1,774	847	1,502,424	0.890	**1,337,152**	3
	GHG Reduction	metric tons	0	1,040	1,040	10	10,400	0.890	**9,256**	3
2018	Se & N Removal	lbs of Selenium	0	229	229	14,800	3,389,200	0.840	**2,845,638**	4
	Water Supply	af	0	1,774	1,774	847	1,502,424	0.840	**1,261,464**	4
	GHG Reduction	metric tons	0	1,040	1,040	10	10,400	0.840	**8,732**	4
2019	Se & N Removal	lbs of Selenium	0	229	229	14,800	3,389,200	0.792	**2,684,564**	5
	Water Supply	af	0	1,774	1,774	847	1,502,424	0.792	**1,190,061**	5
	GHG Reduction	metric tons	0	1,040	1,040	10	10,400	0.792	**8,238**	5
2020	Se & N Removal	lbs of Selenium	0	229	229	14,800	3,389,200	0.747	**2,532,607**	6
	Water Supply	af	0	1,774	1,774	847	1,502,424	0.747	**1,122,699**	6
	GHG Reduction	metric tons	0	1,040	1,040	10	10,400	0.747	**7,771**	6
2021	Se & N Removal	lbs of Selenium	0	229	229	14,800	3,389,200	0.705	**2,389,252**	7
	Water Supply	af	0	1,774	1,774	847	1,502,424	0.705	**1,059,150**	7
	GHG Reduction	metric tons	0	1,040	1,040	10	10,400	0.705	**7,332**	7
2022	Se & N Removal	lbs of Selenium	0	229	229	14,800	3,389,200	0.665	**2,254,012**	8
	Water Supply	af	0	1,774	1,774	847	1,502,424	0.665	**999,198**	8
	GHG Reduction	metric tons	0	1,040	1,040	10	10,400	0.665	**6,917**	8
2023	Se & N Removal	lbs of Selenium	0	229	229	14,800	3,389,200	0.627	**2,126,426**	9
	Water Supply	af	0	1,774	1,774	847	1,502,424	0.627	**942,639**	9
	GHG Reduction	metric tons	0	1,040	1,040	10	10,400	0.627	**6,525**	9
2024	Se & N Removal	lbs of Selenium	0	229	229	14,800	3,389,200	0.592	**2,006,062**	10
	Water Supply	af	0	1,774	1,774	847	1,502,424	0.592	**889,282**	10
	GHG Reduction	metric tons	0	1,040	1,040	10	10,400	0.592	**6,156**	10
2025	Se & N Removal	lbs of Selenium	0	229	229	14,800	3,389,200	0.558	**1,892,512**	11
	Water Supply	af	0	1,774	1,774	847	1,502,424	0.558	**838,946**	11
	GHG Reduction	metric tons	0	1,040	1,040	10	10,400	0.558	**5,807**	11
2026	Se & N Removal	lbs of Selenium	0	229	229	14,800	3,389,200	0.527	**1,785,388**	12
	Water Supply	af	0	1,774	1,774	847	1,502,424	0.527	**791,458**	12
	GHG Reduction	metric tons	0	1,040	1,040	10	10,400	0.527	**5,479**	12
2027	Se & N Removal	lbs of Selenium	0	229	229	14,800	3,389,200	0.497	**1,684,329**	13
	Water Supply	af	0	1,774	1,774	847	1,502,424	0.497	**746,659**	13
	GHG Reduction	metric tons	0	1,040	1,040	10	10,400	0.497	**5,168**	13
2028	Se & N Removal	lbs of Selenium	0	229	229	14,800	3,389,200	0.469	**1,588,989**	14
	Water Supply	af	0	1,774	1,774	847	1,502,424	0.469	**704,395**	14
	GHG Reduction	metric tons	0	1,040	1,040	10	10,400	0.469	**4,876**	14
2029	Se & N Removal	lbs of Selenium	0	229	229	14,800	3,389,200	0.442	**1,499,046**	15
	Water Supply	af	0	1,774	1,774	847	1,502,424	0.442	**664,524**	15
	GHG Reduction	metric tons	0	1,040	1,040	10	10,400	0.442	**4,600**	15
2030	Se & N Removal	lbs of Selenium	0	229	229	14,800	3,389,200	0.417	**1,414,195**	16
	Water Supply	af	0	1,774	1,774	847	1,502,424	0.417	**626,909**	16
	GHG Reduction	metric tons	0	1,040	1,040	10	10,400	0.417	**4,340**	16
2031	Se & N Removal	lbs of Selenium	0	229	229	14,800	3,389,200	0.394	**1,334,146**	17
	Water Supply	af	0	1,774	1,774	847	1,502,424	0.394	**591,424**	17
	GHG Reduction	metric tons	0	1,040	1,040	10	10,400	0.394	**4,094**	17
2032	Se & N Removal	lbs of Selenium	0	229	229	14,800	3,389,200	0.371	**1,258,628**	18
	Water Supply	af	0	1,774	1,774	847	1,502,424	0.371	**557,947**	18
	GHG Reduction	metric tons	0	1,040	1,040	10	10,400	0.371	**3,862**	18
2033	Se & N Removal	lbs of Selenium	0	229	229	14,800	3,389,200	0.350	**1,187,385**	19
	Water Supply	af	0	1,774	1,774	847	1,502,424	0.350	**526,365**	19
	GHG Reduction	metric tons	0	1,040	1,040	10	10,400	0.350	**3,644**	19
Last Year of Project	Se & N Removal	lbs of Selenium	0	229	229	14,800	3,389,200	0.331	**1,120,175**	20
	Water Supply	af	0	1,774	1,774	847	1,502,424	0.331	**496,571**	20
	GHG Reduction	metric tons	0	1,040	1,040	10	10,400	0.331	**3,437**	20
							Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)		**59,060,139**	

Comments:

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

Table 16 – Annual Costs of Avoided Projects (All avoided costs should be in 2012 dollars) Project: Peters Canyon Channel Water Capture and Reuse Pipeline								
	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)			Year	Project year
2013	0	0	$0	$0	1.000	**$0**	0	0
2014	0	0	$0	$0	0.943	**$0**	1	0
2015	0	0	$835,000	$835,000	0.890	**$743,147**	2	1
2016	0	0	$835,000	$835,000	0.840	**$701,082**	3	2
2017	0	0	$835,000	$835,000	0.792	**$661,398**	4	3
2018	0	0	$835,000	$835,000	0.747	**$623,961**	5	4
2019	0	0	$835,000	$835,000	0.705	**$588,642**	6	5
2020	0	0	$835,000	$835,000	0.665	**$555,323**	7	6
2021	0	0	$835,000	$835,000	0.627	**$523,889**	8	7
2022	0	0	$835,000	$835,000	0.592	**$494,235**	9	8
2023	0	0	$835,000	$835,000	0.558	**$466,260**	10	9
2024	0	0	$835,000	$835,000	0.527	**$439,868**	11	10
2025	0	0	$835,000	$835,000	0.497	**$414,969**	12	11
2026	0	0	$835,000	$835,000	0.469	**$391,481**	13	12
2027	0	0	$835,000	$835,000	0.442	**$369,321**	14	13
2028	0	0	$835,000	$835,000	0.417	**$348,416**	15	14
2029	0	0	$835,000	$835,000	0.394	**$328,695**	16	15
2030	0	0	$835,000	$835,000	0.371	**$310,089**	17	16
2031	0	0	$835,000	$835,000	0.350	**$292,537**	18	17
2032	0	0	$835,000	$835,000	0.331	**$275,978**	19	18
2033	0	0	$835,000	$835,000	0.312	**$260,357**	20	19
Last Year of Project Life	0	0	$835,000	$835,000	0.294	**$245,620**	21	20
Total Present Value of Discounted Costs (Sum of Column (g))						**$9,035,268**		
(%) Avoided Cost Claimed by Project						**42%**		
Total Present Value of Discounted Avoided Project Costs Claimed by Alternative Project (Total Present Value of Discounted Costs x % Avoided Cost Claimed by Project)						**$9,035,268**		
Comments:								

Table 17 – Example Calculation of Expected Annual Damage											
Hydrologic Event	Event Exceedance Probability	Event Damage if Flood Structures Fail	Probability Structural Failure		Expected Event Damage		Interval Probability	Average Damage in Interval		Average Damage in Interval times Interval Probability	
			Without	With Project	Without Project	With Project		Without Project	With Project	Without	With Project
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(i)	(j)	(k)	(l)	(m)
					(c) x (d)	(c) x (e)	from (b)	from (f)	from (g)	(i) x (j)	(i) x (k)
5-year	0.2	$0	0	0	$0	$0					
10-Year	0.1	$0	0	0	$0	$0	0.1	$0	$0	$0	$0
15-Year	0.067	$0	0	0	$0	$0	0.033	$0	$0	$0	$0
20-Year	0.05	$0	0	0	$0	$0	0.017	$0	$0	$0	$0
25-Year	0.04	$0	0	0	$0	$0	0.01	$0	$0	$0	$0
Expected Annual Damages, Without and With Project										$0.00	$0.00

Table 18 – Present Value of Expected Annual Damage Reduction Benefits

Project: Peters Canyon Channel Water Capture and Reuse Pipeline

(a)	Expected Annual Damage Without Project [1]		**$0**
(b)	Expected Annual Damage With Project [1]		**$0**
(c)	Expected Annual Benefit	(a) – (b)	**$0**
(d)	Present Value Coefficient [2]		**0.31**
(e)	**Present Value of Future Benefits Transfer to Table 20, column (e).**	**(c) x (d)**	**$0**

(1) This program assumes no land use changes in the floodplain. So, EAD will be constant over analysis period.

(2) 6% discount rate; 50-year analysis period (could vary depending upon lifecycle of project).

Table 19 – Annual Costs of Project

(All costs should be in 2012 Dollars)

Project: Peters Canyon Channel Water Capture and Reuse Pipeline

	Initial Costs Grand Total Cost from Table 7 (row (i), column	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)	Year	Project Year
2013	$7,678,612	$0	$0	$0	$0	$0	$0	$7,678,612	1.000	**$7,678,612**	0	0
2014	$0	$0	$0	$0	$0	$0	$0	$0	0.943	**$0**	1	0
2015	$0	$0	$10,000	$30,000	$19,100	$10,100	$603,000	$672,200	0.890	**$598,256**	2	1
2016	$0	$0	$10,000	$30,000	$19,100	$10,100	$603,000	$672,200	0.840	**$564,392**	3	2
2017	$0	$0	$10,000	$30,000	$19,100	$10,100	$603,000	$672,200	0.792	**$532,445**	4	3
2018	$0	$0	$10,000	$30,000	$19,100	$10,100	$603,000	$672,200	0.747	**$502,307**	5	4
2019	$0	$0	$10,000	$30,000	$19,100	$10,100	$603,000	$672,200	0.705	**$473,874**	6	5
2020	$0	$0	$10,000	$30,000	$19,100	$10,100	$603,000	$672,200	0.665	**$447,051**	7	6
2021	$0	$0	$10,000	$30,000	$19,100	$10,100	$603,000	$672,200	0.627	**$421,747**	8	7
2022	$0	$0	$10,000	$30,000	$19,100	$10,100	$603,000	$672,200	0.592	**$397,874**	9	8
2023	$0	$0	$10,000	$30,000	$19,100	$10,100	$603,000	$672,200	0.558	**$375,353**	10	9
2024	$0	$0	$10,000	$30,000	$19,100	$10,100	$603,000	$672,200	0.527	**$354,107**	11	10
2025	$0	$0	$10,000	$30,000	$19,100	$10,100	$603,000	$672,200	0.497	**$334,063**	12	11
2026	$0	$0	$10,000	$30,000	$19,100	$10,100	$603,000	$672,200	0.469	**$315,154**	13	12
2027	$0	$0	$10,000	$30,000	$19,100	$10,100	$603,000	$672,200	0.442	**$297,315**	14	13
2028	$0	$0	$10,000	$30,000	$19,100	$10,100	$603,000	$672,200	0.417	**$280,486**	15	14
2029	$0	$0	$10,000	$30,000	$19,100	$10,100	$603,000	$672,200	0.394	**$264,609**	16	15
2030	$0	$0	$10,000	$30,000	$19,100	$10,100	$603,000	$672,200	0.371	**$249,631**	17	16
2031	$0	$0	$10,000	$30,000	$19,100	$10,100	$603,000	$672,200	0.350	**$235,501**	18	17
2032	$0	$0	$10,000	$30,000	$19,100	$10,100	$603,000	$672,200	0.331	**$222,171**	19	18
2033	$0	$0	$10,000	$30,000	$19,100	$10,100	$603,000	$672,200	0.312	**$209,595**	20	19
Last Year of Project Life	$0	$0	$10,000	$30,000	$19,100	$10,100	$603,000	$672,200	0.312	**$209,595**	21	20
									Total Present Value of Discounted Costs (Sum of column (j)) Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries	**$14,964,137**		

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

Table 20 – Proposal Benefits and Costs Summary

Project: Peters Canyon Channel Water Capture and Reuse Pipeline

Agency: City or Irvine

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)
Reuse Pipeline	Irvine	$14,964,137	$59,060,139	$0	$59,060,139		

(1) From Table 19, or RWMG method

(2) From Table 15 or RWMG method

(3) From Table 18 or RWMG method

Adopted Water Rates & Charges

Historical Water Rates

Effective January 1st	2012	2013	2014
Tier 1 Supply Rate ($/AF)	$106	$140	$148
Delta Supply Surcharge ($/AF)	$58	*	*
Tier 2 Supply Rate ($/AF)	$290	$290	$290
System Access Rate ($/AF)	$217	$223	$243
Water Stewardship Rate ($/AF)	$43	$41	$41
System Power Rate ($/AF)	$136	$189	$161
Full Service Untreated Volumetric Cost ($/AF)			
Tier 1	$560	$593	$593
Tier 2	$686	$743	$735
Replenishment Water Rate: untreated ($/AF)	$442	**	**
Interim Agricultural Water Program: untreated ($/AF)	$537	***	***
Treatment Surcharge ($/AF)	$234	$254	$297
Full Service Treated Volumetric Cost ($/AF)			
Tier 1	$794	$847	$890
Tier 2	$920	$997	$1,032
Treated Replenishment Water Rate ($/AF)	$651	**	**
Treated Interim Agricultural Water Program ($/AF)	$765	***	***
Readiness-to-Serve Charge (millions of dollars)	$146	$142	$166
Capacity Charge ($/cfs)	$7,400	$6,400	$8,600

* The Delta Supply Surcharge will be suspended after 2012
** Discussions on the replenishment program are continuing with the Member Agencies
*** The Interim Agricultural Water Program will be discontinued after 2012

Definitions

Tier 1 Supply Rate - recovers the of cost of maintaining a reliable amount of supply.

Delta Supply Surcharge - reflects the additional supply costs that Metropolitan faces along with other costs due to the pumping restrictions on the State Water Project.

Tier 2 Supply Rate - set at Metropolitan's cost of developing additional supply to encourage efficient use of local resources.

System Access Rate – recovers a portion of the costs associated with the delivery of supplies.

System Power Rate – recovers Metropolitan's power costs for pumping supplies to Southern California.

Water Stewardship Rate – recovers the cost of Metropolitan's financial commitment to conservation, water recycling, groundwater clean-up and other local resource management programs.

Replenishment Water Rate – a discounted rate for surplus system supplies available for the purpose of replenishing local storage.

Treated Replenishment Water Rate – a discounted rate for surplus system supplies available for the purpose of replenishing local storage.

Interim Agricultural Water Rate – discounted rate for surplus system supplies available for the purpose of growing agricultural, horticultural, or floricultural products.

Treated Interim Agricultural Water Program Rate – discounted rate for surplus system supplies available for the purpose of growing agricultural, horticultural, or floricultural products.

Treatment Surcharge – recovers the costs of treating imported water.

Readiness-to-Serve Charge - a fixed charge that recovers the cost of the portion of system capacity that is on standby to provide emergency service and operational flexibility.

Capacity Charge – the capacity charge recovers the cost of providing peak capacity within the distribution system.

Page updated: April 19, 2012

Air Resources Board

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Matthew Rodriquez
Secretary for Environmental Protection

Edmund G. Brown Jr.
Governor

2013 Annual Auction Reserve Price Notice

California Cap-and-Trade Program Greenhouse Gas Allowance Auctions

Issued on December 3, 2012

Updated on January 15, 2013

Auction Summary

This document, *2013 Annual Auction Reserve Price Notice,* specifies the 2013 Auction Reserve Price and the number of allowances to be auctioned in 2013 for the quarterly auctions as part of the Current Auction and Advance Auction. The 2013 quarterly GHG allowance auctions will offer 2013 vintage allowances and 2016 vintage allowances for sale.

The 2013 Auction Reserve Price and the annual budget of 2013 and 2016 vintage allowances for sale in 2013, is shown in Table 1 below.

Table 1: 2013 Auction Data

Auction Data Description	Auction Data
Auction Reserve Price	$10.71
Number of allowances to be auctioned in 2013 (2013 Vintage)	~~56,848,885*~~ 57,628,254
Number of advance allowances to be auctioned in 2013 (2016 Vintage)	38,240,000

~~* Amount could increase based on additional consignment from POUs as described in this notice.~~

The Auction Reserve Price

The Auction Reserve Price is a predetermined minimum price at which allowances will be sold to auction participants. The 2012 Auction Reserve Price was $10. Section 95911 of the Cap-and-Trade Regulation stipulates that the "Auction Reserve Price in U.S. dollars shall be the U.S. dollar Auction Reserve Price for the previous calendar year increased annually by 5 percent plus the rate of inflation as measured by the most recently available twelve months of the Consumer Price Index for All Urban Consumers." The rate of inflation used to calculate the 2013 Auction Reserve Price is 2.16 percent.

Current Auction Budget

The current auction budget describes the minimum number of current year vintage allowances to be sold in 2013. This number includes the State-owned allowances (approximately

10,600,000) and the remaining allowances to be consigned by the electricity distribution utilities. Some public owned utilities (POUs) were provided the flexibility to defer providing direction until January 1, 2013, on how to distribute their allowances between their Compliance and Limited Use Holding Accounts. ~~These deferred allowances total approximately 6,700,000. These are not included in the minimum 2013 annual auction budget. Once ARB receives direction from all of the remaining POUs, this notice will be updated to reflect the final 2013 annual auction budget presented in Table 1~~. ARB has now received direction from all POUs on how to distribute their allowances and Table 1 has been updated to reflect the final annual auction budget for 2013 vintage allowances. **This annual budget update does not change the amount of 2013 vintage allowances for sale in the February 19 auction.** Twenty-five percent of the State-owned allowances will be available at each auction. Utilities are required to notify ARB 75 days before each auction of the number of allowances they intend to consign. The total number of allowances to be auctioned in each auction will be published in the auction notice 60 days in advance. Utility allowances not consigned in the first three auctions will be included in the November 19, 2013 auction.

Advance Auction Budget

The advance auction budget represents ten percent of the allowances from the budget year three years subsequent to the current calendar year. Since the annual allowance budget of 2016 is 382,400,000, the advance auction budget for 2013 is 38,240,000. These allowances will be equally divided for sale across the four auctions in 2013.

2013 Quarterly Auction Dates

An *Auction Notice* with instructions on how to participate will be published 60 days prior to each auction. The *Auction Notice* provides information about eligibility, auction format, and GHG allowances to be auctioned for the applicable quarterly auction.

Table 2 provides additional information specific to the scheduled quarterly auctions.

Table 2: 2013 Quarterly Auction Critical Dates

Auction Consignment Due Date for EDUs	Auction Notice Posting Date	Auction Application Due Date	Auction Dates
12/6/2012	12/21/2012	1/22/2013	2/19/2013
3/4/2013	3/18/2013	4/16/2013	5/16/2013
6/3/2013	6/17/2013	7/17/2013	8/16/2013
9/5/2013	9/20/2013	10/21/2013	11/19/2013

Contact Information

For further information about participation in the 2013 auctions, please contact:
Mr. Chuck Seidler at (916) 324-0931 or cseidler@arb.ca.gov.

Updated on January 15, 2013

Project R: Soboba Band of Luiseño Indians Wastewater Project (Soboba Tribe)

Table 20 – Proposal Benefits and Costs Summary							
Proposal: Soboba Wastewater Treatment Facility Development Plan							
Agency: __Soboba Band of Luiseno Indians_____							
Project	**Project Proponent**	**Total Present Value Project**	**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**	**Total**		
(a)	**(b)**	**(c)**	**(d)**	**(e)**	**(f) = (d) +**	**(g)**	**(h)**
Development Plan	Soboba Tribal Council	141,450	0	0	141,450	Once the development of the plan is completed the cost savings can avarage in the amount of $23,981,383 respectively for the implementation of the on reservation wastewater treatment facility.	The non monetized benefits of this project is the informed decision to move from septic system in order to prevent leakage, failure, and assocaited cost in the future. This allows for a safe environment in regards to public health.

(1) From Table 19, or RWMG method
(2) From Table 15 or RWMG method
(3) From Table 18, or RWMG method

Project S: Recycled Water Project Phase I (Arlington-Central Avenue Pipeline) (City of Riverside)

Tables 9(a), 9(b), 12, 15(a), 15(b), 19, and 20 are included in this document to quantify water supply costs and benefits for the Recycled Water Project Phase 1: Arlington/Central Avenue Pipeline (the "Project") proposed by the Riverside Public Utilities Department ("RPU"). Narrative supporting the tables is provided below:

I. Narrative Description of the Project's Economic Costs

The Project's economic costs consist of costs contained in the Project budget (Attachment 4), as well as annual administration, maintenance, and replacement costs associated with the Project.

Although there are pumping costs associated with moving the recycled water from the Project to end users, these costs would also be incurred using water purchased from alternate sources. Since these costs offset each other, they were not included in the analysis.

II. Cost Details

Budget categories (a) through (h) are included in the cost details as described in Table 5.

III. Estimates of Without-Project conditions; e.g. Current and Future Water Supplies and Demand.

The Riverside Public Utilities Department ("RPU") is a unique utility in the Southern California region in that it produces its water supply from local groundwater sources and as a strategic goal, wants to be water independent and reduce reliance on imported water. To accomplish this goal, RPU is evaluating ways to diversify its water supply by developing projects that promote sustainable water solutions and provide a reliable supply to the City of Riverside (the "City") and neighboring communities. As such, RPU has developed this Project.

Projections show that by as early as year 2020, RPU's water demands will exceed its available water supply. This Project provides the infrastructure needed to utilize local reliable recycled water to offset potable water irrigation demands, as well as the infrastructure necessary for inter-agency collaboration for groundwater recharge efforts.

IV. Estimates of With-Project Conditions; e.g. Improvements in New Water Supplies Made Available to Meet Demand

The Project adds value to the Santa Ana Watershed as it will reduce imported water and local groundwater demand and aligns with the Santa Ana Watershed Integrated Regional Water Management Plan's goals and objectives by:

- Promoting the use of recycled water and the Santa Ana Watershed goal to recycle and reuse 100% of the wastewater in the watershed;
- Improves water supply reliability in the region;
- Promotes a sustainable water supply solution;
- Economically benefits the region; and
- Promotes regional collaboration.

The Project promotes the expanded use of recycled water within a relatively short time frame (less than 5 years) and provides up to 8,600 acre-feet per year ("AFY") of new water supply to the region, which is broken down as follows:

- Up to 1,000 AFY for landscape irrigation to RPU customer adjacent or nearby the project alignment;
- Up to 2,600 AFY of supply to Western Municipal Water District ("WMWD") for landscape and groundwater recharge off-setting current groundwater production from the Riverside Basin; and
- An additional 5,000 AFY of water supply for groundwater recharge, comprised of recycled water and diluent water.

Crucially, the Project is an essential element to RPU remaining water independent. The Project provides the following additional benefits as well:

- **Promoting the use of recycled water and the Watershed goal to recycle and reuse 100% of the wastewater in the watershed.** As a strategic goal, the One Water One Watershed ("OWOW") Plan established a long-term goal to "recycle and reuse 100 percent of wastewater in the Watershed". This Project is in alignment with the OWOW Plan by utilizing recycled water previously discharged into the Santa Ana River and potentially lost to the Pacific Ocean.

- **Improves water supply reliability in the region** by constructing an interconnection with WMWD, thereby increasing their available non-potable supply for direct and indirect uses. Furthermore, this interconnection will reduce RPU's pumping from the Riverside Groundwater Basin. Currently, WMWD relies on RPU to provide non-potable water pumped from the Riverside Groundwater Basin in order to supplement their non-potable system. The Project will provide recycled water to WMWD thereby reducing Riverside Groundwater Basin pumping demands. Additionally, RPU will convert existing potable water landscape users along the alignment thus reducing its potable water supply demand. <u>The increase in available water supply to both agencies further reduces reliance on State Water Project ("SWP") water supplies today and in the future</u>.

- **Promotes a sustainable water supply solution** by maximizing recycled water uses within the region. Currently, under Order Number WR2008-0024, the Regional Water Quality Control Board approved the City of Riverside Wastewater Change Petition WW-0045 which permits the use of up to 41,400 AFY of recycled water from the City's Regional Water Quality Control Plant ("RWQCP"). To date, due to lack of infrastructure, the City supplies on average 290 AFY of recycled water. This Project will provide the necessary infrastructure to supply recycled water to RPU, WMWD, and other neighboring agencies. Furthermore, recycled water is a reliable source as wastewater treatment capacity will continue to expand.

- **Economically benefits the region** by providing a low-cost alternative water supply to the region. The Project will offset existing potable landscape demands with recycled water and provide the ability to recharge groundwater, thereby reducing WMWD's reliance on SWP and increases RPU's available local water supply further guaranteeing RPU water independence. Furthermore, with the continued increase in SWP costs, alternative low-cost local sources such as recycled water provide a regional economic benefit by ensuring water costs remain as low as possible.

- **Promotes regional collaboration** by providing a low-cost reliable water supply to both RPU and WMWD. Additionally, through collaboration with the City of Riverside's Public Works Department and the County of Riverside Transportation Department RPU made provisions to construct a recycled waterline pipeline within the newly expanded Van Buren Boulevard. In all, the recycled water produced at the City's RWQCP will be available to WMWD and other neighboring agencies.

V. Description of Methods used to Estimate Without- and With-Project Conditions.

With and without Project conditions are based on discussions with the Project engineer, RPU, various city of Riverside departments, other cities within RPU's service area, WMWD, and various Project proponents, as well as information contained in the attached Exhibits described below.

VI. Description of the Distribution of Local, Regional, and Statewide Benefits

Benefits are primarily local in nature. However, any reduction in demand on SWP water will benefit water agencies throughout the state whose need for additional water exceeds that of RPU, its basins, and its cities.

VII. Identification of Beneficiaries

RPU, the city of Riverside, WMWD, the entire Inland Empire region, all local water users and rate payers, Metropolitan Water District, and all urban water suppliers intending to purchase SWP water in the future.

As uncertainties continue to impact the Colorado River and environmental regulations jeopardize the reliability of the SWP, projects that promote local collaborative water supplies become more vital to the economic stability of the region. The Project provides an economic, integrated approach to maintaining water supply reliability within the region. The Project benefits RPU, WMWD, and other neighboring agencies as it provides the necessary infrastructure to facilitate the use of recycled water. The Project provides both agencies with the opportunity to reduce potable demands by converting direct irrigation customers to recycled water. Furthermore, the inter-tie increases WMWD's access to recycled water which provides them the opportunity to further distribute recycled water south to Murrieta or within their Riverside service area.

The Project also facilitates future planning efforts by RPU and WMWD for groundwater recharge. As drought conditions continue to impact local groundwater water levels, projects that facilitate the ability to augment natural groundwater recharge will greatly improve local water supply sustainability.

By extension, the increase in available local water supply to both agencies further reduces demands on the SWP and Colorado River for the region.

VIII. When the Benefits will be Received

The full benefits will be realized as of the completion of the improvements in June of 2018.

IX. Uncertainty of the Benefits

The benefits were calculated based on monitoring of dry weather flows. There will be variation in these flows, but it is expected that the demand for non-potable water will not exceed the amount extracted from various sources.

X. Description of any Adverse Effects

N/A

XI. Narrative Discussion that Describes, Qualifies, and Supports the Values Entered in the Tables

Potable water valuation is based on the Tier 2 full service treated volumetric cost for 2014, which is the rate assigned by Metropolitan Water District, and paid by various cities, water districts, and other local entities to purchase SWP water for designated uses and purposes.

The estimated valuation of groundwater was provided by the San Bernardino Valley Water Conservation District, and is based on the average purchase price for groundwater that is not included as part of a cooperative recharge program.

Estimated administration, operations, maintenance, and replacement costs for the Project are based on discussions with RPU, various cities, and maintenance data collected by David Taussig & Associates, Inc. for comparable projects.

XII. Documentation to Support Information Presented

Recycled Water Facilities Plan: In July of 2011, RPU, in contract with HDR Inc., finalized its Recycled Water Facilities Plan ("RWFP") which evaluated the necessary infrastructure to supply 10,083 AFY of recycled water City-wide. The RWFP incorporated approximately 172 miles of pipeline infrastructure, three booster pump stations, and two reservoirs at a cost of $544,000,000. The RWFP provided a basis for planning, conducted a market analysis, recycled water supply assessment, and a hydraulic analysis, evaluated potential groundwater augmentation and satellite wastewater treatment plant sites, recommended distribution system alternatives, and developed a capital improvement and program implementation plan. In the end, RPU determined the cost to implement a city-wide plan was not

economically feasible as it would drastically impact rate payers in the order of a $42 per month increase to the water bill and instead, developed an alternative plan as described below.

Recycled Water Program Outline: In early 2011, RPU staff utilized the Draft RWFP to develop an alternative recycled water system capable of increasing RPU's available water supply by 25,000 AFY. Staff's plan was formalized in the Recycled Water Program Outline ("RWPO") published in March of 2011. **The RWPO evaluated a two phased approach with two main transmission lines; one along Arlington Avenue and Central Avenue with an inter-tie connection to WMWD** and a second extending north along the Santa Ana River from the RWQCP to property RPU owns called Pellessier Ranch.

The Project constructs vital infrastructure necessary for RPU to access and distribute recycled water to its customers and provides an inter-tie connection with WMWD and other neighboring agencies. In this Project, RPU will be designing the necessary infrastructure to deliver approximately 6,100 AFY of recycled water to both RPU customers and WMWD. In order to deliver the supply, RPU conducted a hydraulic analysis as reported within the Draft Arlington/Central Project Planning Report which is anticipated to be finalized by April of 2014. The hydraulic analysis analyzed peaking factors due to watering windows, flow balancing between irrigation customers and delivery to WMWD, and pipelines sizing to ensure customer demands can be achieved with reasonable pipe velocity and pressure loss. Furthermore, the hydraulic analysis identified the need to construct a booster pump station thereby developing a two zone system.

Also, see the following attached:

Exhibit A *- Metropolitan Water District Rates and Charges*

Table 9 (a) – Annual Project Physical Benefits

Project Name: Recycled Water Project Phase 1

Type of Benefit Claimed: New Potable Water Supply

Measure of Benefit Claimed (Name of Units): Acre-Feet

Additional Information About this Measure: Acre-Feet of New Potable Water Supplied to the System

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Increase in Water Supply Resulting from Project (c) – (b)
2012	0	0	0
2013	0	0	0
2014	0	0	0
2015	0	0	0
2016	0	0	0
2017	0	0	0
2018	0	0	0
2019	0	1,000	1,000
2020	0	1,000	1,000
2021	0	1,000	1,000
2022	0	1,000	1,000
2023	0	1,000	1,000
2024	0	1,000	1,000
2025	0	1,000	1,000
2026	0	1,000	1,000
2027	0	1,000	1,000
2028	0	1,000	1,000
2029	0	1,000	1,000
2030	0	1,000	1,000
2031	0	1,000	1,000
2032	0	1,000	1,000
2033	0	1,000	1,000
2034	0	1,000	1,000
2035	0	1,000	1,000
2036	0	1,000	1,000
2037	0	1,000	1,000
2038	0	1,000	1,000
2039	0	1,000	1,000
2040	0	1,000	1,000
2041	0	1,000	1,000
2042	0	1,000	1,000
2043	0	1,000	1,000
2044	0	1,000	1,000
2045	0	1,000	1,000
2046	0	1,000	1,000
2047	0	1,000	1,000
2048	0	1,000	1,000
2049	0	1,000	1,000
2050	0	1,000	1,000
2051	0	1,000	1,000
2052	0	1,000	1,000
2053	0	1,000	1,000
2054	0	1,000	1,000
2055	0	1,000	1,000
2056	0	1,000	1,000
2057	0	1,000	1,000
2058	0	1,000	1,000
2059	0	1,000	1,000
2060	0	1,000	1,000
2061	0	1,000	1,000

Comments:

Table 9 (b) – Annual Project Physical Benefits

Project Name: Recycled Water Project Phase 1

Type of Benefit Claimed: New Groundwater Recharge & Offset to Groundwater Pumping

Measure of Benefit Claimed (Name of Units): Acre-Feet

Additional Information About this Measure: Acre-Feet of New Groundwater Recharge & Offset to Groundwater

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Increase in Water Supply Resulting from Project (c) – (b)
2012	0	0	0
2013	0	0	0
2014	0	0	0
2015	0	0	0
2016	0	0	0
2017	0	0	0
2018	0	0	0
2019	0	7,600	7,600
2020	0	7,600	7,600
2021	0	7,600	7,600
2022	0	7,600	7,600
2023	0	7,600	7,600
2024	0	7,600	7,600
2025	0	7,600	7,600
2026	0	7,600	7,600
2027	0	7,600	7,600
2028	0	7,600	7,600
2029	0	7,600	7,600
2030	0	7,600	7,600
2031	0	7,600	7,600
2032	0	7,600	7,600
2033	0	7,600	7,600
2034	0	7,600	7,600
2035	0	7,600	7,600
2036	0	7,600	7,600
2037	0	7,600	7,600
2038	0	7,600	7,600
2039	0	7,600	7,600
2040	0	7,600	7,600
2041	0	7,600	7,600
2042	0	7,600	7,600
2043	0	7,600	7,600
2044	0	7,600	7,600
2045	0	7,600	7,600
2046	0	7,600	7,600
2047	0	7,600	7,600
2048	0	7,600	7,600
2049	0	7,600	7,600
2050	0	7,600	7,600
2051	0	7,600	7,600
2052	0	7,600	7,600
2053	0	7,600	7,600
2054	0	7,600	7,600
2055	0	7,600	7,600
2056	0	7,600	7,600
2057	0	7,600	7,600
2058	0	7,600	7,600
2059	0	7,600	7,600
2060	0	7,600	7,600
2061	0	7,600	7,600

Comments:

Table 12 – Non-monetized Benefits Checklist		
No.	**Question**	**Enter "Yes", "No" or "Neg"**
	Community/Social Benefits **Will the proposal**	
1	**Provide education or technology benefits?**	No
	Examples are not limited to, but may include: - Include educational features that should result in water supply, water quality, or flood damage reduction benefits? - Develop, test, or document a new technology for water supply, water quality, or flood damage reduction management? - Provide some other education or technological benefit?	
2	**Provide social recreation or access benefits?**	No
	Examples are not limited to, but may include: - Provide new or improved outdoor recreation opportunities? - Provide more access to open space? - Provide some other recreation or public access benefit?	
3	**Help avoid, reduce or resolve various public water resources conflicts?**	Yes
	Examples are not limited to, but may include: - Provide more opportunities for public involvement in water management? - Help avoid or resolve an existing conflict as evidenced by recurring fines or litigation? - Help meet an existing state mandate (e.g., water quality, water conservation, flood control)?	Yes, please see attachment 3 and attachment 8.
4	**Promote social health and safety?**	Yes
	Examples are not limited to, but may include: - Increase urban water supply reliability for fire-fighting and critical services following seismic events? - Reduce risk to life from dam failure or flooding? - Reduce exposure to water-related hazards?	Yes, please see attachment 3 and attachment 8.
5	**Have other social benefits?**	No
	Examples are not limited to, but may include: - Redress or increase inequitable distribution of environmental burdens? - Have disproportionate beneficial or adverse effects on disadvantaged communities, Native Americans, or other distinct cultural groups?	
	Environmental Stewardship Benefits: **Will the proposal**	
6	**Benefit wildlife or habitat in ways that were not quantified in Attachment 7?**	No
	Examples are not limited to, but may include: - Cause an increase in the amount or quality of terrestrial, aquatic, riparian or wetland habitat? - Contribute to an existing biological opinion or recovery plan for a listed special status species? - Preserve or restore designated critical habitat of a listed species? - Enhance wildlife protection or habitat?	
7	**Improve water quality in ways that were not quantified in Attachment 7?**	No
	Examples are not limited to, but may include: - Cause an improvement in water quality in an impaired water body or sensitive habitat? - Prevent water quality degradation? - Cause some other improvement in water quality?	
8	**Reduce net emissions in ways that were not quantified in Attachment 7?**	Yes
	Examples are not limited to, but may include: - Reduce net production of greenhouse gasses? - Reduce net emissions of other harmful chemicals into the air or water?	Yes, please see attachment 3 and attachment 8.
9	**Provide other environmental stewardship benefits, other than those claimed in Sections D1, D3, or D4?**	Yes
	Sustainability Benefits: **Will the proposal**	Yes, please see attachment 3 and attachment 8.
10	**Improve the overall, long-term management of California groundwater resources?**	Yes
	Examples are not limited to, but may include: - Reduce extraction of non-renewable groundwater? - Promote aquifer storage or recharge?	Yes, please see attachment 3 and attachment 8.
11	**Reduce demand for net diversions for the regions from the Delta?**	Yes
12	**Provide a long-term solution in place of a short-term one?**	Yes
13	**Promote energy savings or replace fossil fuel based energy sources with renewable energy and resources?**	Yes
	Examples are not limited to, but may include: - Reduce net energy use on a permanent basis? - Increase renewable energy production? - Include new buildings or modify buildings to include certified LEED features? - Provide a net increase in recycling or reuse of materials? - Replace unsustainable land or water management practices with recognized sustainable practices?	Yes, please see attachment 3 and attachment 8.
14	**Improve water supply reliability in ways not quantified in Attachment 7?**	Yes
	Examples are not limited to, but may include: - Provide a more flexible mix of water sources? - Reduce likelihood of catastrophic supply outages? - Reduce supply uncertainty? - Reduce supply variability?	
15	**Other (If the above listed categories do not apply, provide non-monetized benefit description)?**	N/A

Table 15 (a) – Annual Benefit

(All benefits should be in 2012 dollars)

Project: Recycled Water Project Phase 1

(a) Year	(b) Type of Benefit	(c) Measure of Benefit (Units)	(d) Without Project	(e) With Project	(f) Change Resulting from Project (e) – (d)	(g) Unit $ Value [1]	(h) Annual $ Value (f) x (g)	(i) Discount Factor (6%)	(j) Discounted Benefits (h) x (i)
2012							$0	1.000	$0
2013							$0	0.943	$0
2014							$0	0.890	$0
2015							$0	0.840	$0
2016							$0	0.792	$0
2017							$0	0.747	$0
2018							$0	0.705	$0
2019	Reduced Potable Water Use	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.665	$686,339
2020	Reduced Potable Water Use	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.627	$647,490
2021	Reduced Potable Water Use	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.592	$610,839
2022	Reduced Potable Water Use	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.558	$576,263
2023	Reduced Potable Water Use	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.527	$543,645
2024	Reduced Potable Water Use	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.497	$512,872
2025	Reduced Potable Water Use	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.469	$483,842
2026	Reduced Potable Water Use	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.442	$456,455
2027	Reduced Potable Water Use	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.417	$430,618
2028	Reduced Potable Water Use	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.394	$406,243
2029	Reduced Potable Water Use	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.371	$383,248
2030	Reduced Potable Water Use	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.350	$361,555
2031	Reduced Potable Water Use	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.331	$341,089
2032	Reduced Potable Water Use	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.312	$321,782
2033	Reduced Potable Water Use	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.294	$303,568
2034	Reduced Potable Water Use	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.278	$286,385
2035	Reduced Potable Water Use	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.262	$270,175
2036	Reduced Potable Water Use	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.247	$254,882
2037	Reduced Potable Water Use	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.233	$240,455
2038	Reduced Potable Water Use	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.220	$226,844
2039	Reduced Potable Water Use	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.207	$214,004
2040	Reduced Potable Water Use	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.196	$201,890
2041	Reduced Potable Water Use	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.185	$190,463
2042	Reduced Potable Water Use	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.174	$179,682
2043	Reduced Potable Water Use	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.164	$169,511
2044	Reduced Potable Water Use	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.155	$159,916
2045	Reduced Potable Water Use	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.146	$150,864
2046	Reduced Potable Water Use	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.138	$142,325
2047	Reduced Potable Water Use	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.130	$134,269
2048	Reduced Potable Water Use	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.123	$126,668
2049	Reduced Potable Water Use	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.116	$119,499
2050	Reduced Potable Water Use	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.109	$112,734
2051	Reduced Potable Water Use	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.103	$106,353
2052	Reduced Potable Water Use	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.097	$100,333
2053	Reduced Potable Water Use	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.092	$94,654
2054	Reduced Potable Water Use	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.087	$89,296
2055	Reduced Potable Water Use	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.082	$84,242
2056	Reduced Potable Water Use	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.077	$79,473
2057	Reduced Potable Water Use	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.073	$74,975
2058	Reduced Potable Water Use	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.069	$70,731
2059	Reduced Potable Water Use	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.065	$66,727
2060	Reduced Potable Water Use	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.061	$62,950
2061	Reduced Potable Water Use	Acre-Feet	0	1,000	1,000	$1,032	$1,032,000	0.058	$59,387
							Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)		$11,135,536

Comments:

(1) Water valuation is based on the Tier 1 full service treated volumetric cost for 2014, which is the actual amount paid by the City of Riverside and other local entities to purchase State Water Project ("SWP") water for designated uses and purposes.

Table 15 (b) – Annual Benefit

(All benefits should be in 2012 dollars)

Project: Recycled Water Project Phase 1

(a) Year	(b) Type of Benefit	(c) Measure of Benefit (Units)	(d) Without Project	(e) With Project	(f) Change Resulting from Project (e) – (d)	(g) Unit $ Value [1]	(h) Annual $ Value (f) x (g)	(i) Discount Factor (6%)	(j) Discounted Benefits (h) x (i)
2012							$0	1.000	**$0**
2013							$0	0.943	**$0**
2014							$0	0.890	**$0**
2015							$0	0.840	**$0**
2016							$0	0.792	**$0**
2017							$0	0.747	**$0**
2018							$0	0.705	**$0**
2019	Groundwater Offset & Recharge	Acre-Feet	0	7,600	7,600	$250	$1,900,000	0.665	**$1,263,609**
2020	Groundwater Offset & Recharge	Acre-Feet	0	7,600	7,600	$250	$1,900,000	0.627	**$1,192,084**
2021	Groundwater Offset & Recharge	Acre-Feet	0	7,600	7,600	$250	$1,900,000	0.592	**$1,124,607**
2022	Groundwater Offset & Recharge	Acre-Feet	0	7,600	7,600	$250	$1,900,000	0.558	**$1,060,950**
2023	Groundwater Offset & Recharge	Acre-Feet	0	7,600	7,600	$250	$1,900,000	0.527	**$1,000,896**
2024	Groundwater Offset & Recharge	Acre-Feet	0	7,600	7,600	$250	$1,900,000	0.497	**$944,242**
2025	Groundwater Offset & Recharge	Acre-Feet	0	7,600	7,600	$250	$1,900,000	0.469	**$890,794**
2026	Groundwater Offset & Recharge	Acre-Feet	0	7,600	7,600	$250	$1,900,000	0.442	**$840,372**
2027	Groundwater Offset & Recharge	Acre-Feet	0	7,600	7,600	$250	$1,900,000	0.417	**$792,804**
2028	Groundwater Offset & Recharge	Acre-Feet	0	7,600	7,600	$250	$1,900,000	0.394	**$747,928**
2029	Groundwater Offset & Recharge	Acre-Feet	0	7,600	7,600	$250	$1,900,000	0.371	**$705,592**
2030	Groundwater Offset & Recharge	Acre-Feet	0	7,600	7,600	$250	$1,900,000	0.350	**$665,653**
2031	Groundwater Offset & Recharge	Acre-Feet	0	7,600	7,600	$250	$1,900,000	0.331	**$627,975**
2032	Groundwater Offset & Recharge	Acre-Feet	0	7,600	7,600	$250	$1,900,000	0.312	**$592,429**
2033	Groundwater Offset & Recharge	Acre-Feet	0	7,600	7,600	$250	$1,900,000	0.294	**$558,895**
2034	Groundwater Offset & Recharge	Acre-Feet	0	7,600	7,600	$250	$1,900,000	0.278	**$527,260**
2035	Groundwater Offset & Recharge	Acre-Feet	0	7,600	7,600	$250	$1,900,000	0.262	**$497,415**
2036	Groundwater Offset & Recharge	Acre-Feet	0	7,600	7,600	$250	$1,900,000	0.247	**$469,259**
2037	Groundwater Offset & Recharge	Acre-Feet	0	7,600	7,600	$250	$1,900,000	0.233	**$442,697**
2038	Groundwater Offset & Recharge	Acre-Feet	0	7,600	7,600	$250	$1,900,000	0.220	**$417,639**
2039	Groundwater Offset & Recharge	Acre-Feet	0	7,600	7,600	$250	$1,900,000	0.207	**$393,999**
2040	Groundwater Offset & Recharge	Acre-Feet	0	7,600	7,600	$250	$1,900,000	0.196	**$371,697**
2041	Groundwater Offset & Recharge	Acre-Feet	0	7,600	7,600	$250	$1,900,000	0.185	**$350,658**
2042	Groundwater Offset & Recharge	Acre-Feet	0	7,600	7,600	$250	$1,900,000	0.174	**$330,809**
2043	Groundwater Offset & Recharge	Acre-Feet	0	7,600	7,600	$250	$1,900,000	0.164	**$312,084**
2044	Groundwater Offset & Recharge	Acre-Feet	0	7,600	7,600	$250	$1,900,000	0.155	**$294,419**
2045	Groundwater Offset & Recharge	Acre-Feet	0	7,600	7,600	$250	$1,900,000	0.146	**$277,754**
2046	Groundwater Offset & Recharge	Acre-Feet	0	7,600	7,600	$250	$1,900,000	0.138	**$262,032**
2047	Groundwater Offset & Recharge	Acre-Feet	0	7,600	7,600	$250	$1,900,000	0.130	**$247,200**
2048	Groundwater Offset & Recharge	Acre-Feet	0	7,600	7,600	$250	$1,900,000	0.123	**$233,207**
2049	Groundwater Offset & Recharge	Acre-Feet	0	7,600	7,600	$250	$1,900,000	0.116	**$220,007**
2050	Groundwater Offset & Recharge	Acre-Feet	0	7,600	7,600	$250	$1,900,000	0.109	**$207,554**
2051	Groundwater Offset & Recharge	Acre-Feet	0	7,600	7,600	$250	$1,900,000	0.103	**$195,805**
2052	Groundwater Offset & Recharge	Acre-Feet	0	7,600	7,600	$250	$1,900,000	0.097	**$184,722**
2053	Groundwater Offset & Recharge	Acre-Feet	0	7,600	7,600	$250	$1,900,000	0.092	**$174,266**
2054	Groundwater Offset & Recharge	Acre-Feet	0	7,600	7,600	$250	$1,900,000	0.087	**$164,402**
2055	Groundwater Offset & Recharge	Acre-Feet	0	7,600	7,600	$250	$1,900,000	0.082	**$155,096**
2056	Groundwater Offset & Recharge	Acre-Feet	0	7,600	7,600	$250	$1,900,000	0.077	**$146,317**
2057	Groundwater Offset & Recharge	Acre-Feet	0	7,600	7,600	$250	$1,900,000	0.073	**$138,035**
2058	Groundwater Offset & Recharge	Acre-Feet	0	7,600	7,600	$250	$1,900,000	0.069	**$130,222**
2059	Groundwater Offset & Recharge	Acre-Feet	0	7,600	7,600	$250	$1,900,000	0.065	**$122,851**
2060	Groundwater Offset & Recharge	Acre-Feet	0	7,600	7,600	$250	$1,900,000	0.061	**$115,897**
2061	Groundwater Offset & Recharge	Acre-Feet	0	7,600	7,600	$250	$1,900,000	0.058	**$109,337**
								Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)	**$20,501,471**

Comments:

(1) Valuation based on estimate of cost of purchasing groundwater that is not part of a cooperative recharge program.

Table 19 – Annual Costs of Project

(All costs should be in 2012 Dollars)

Project: Recycled Water Project Phase 1

	Initial Costs Grand Total Cost from Table 7 (row (i), column (d))	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)
2012								$0	1.000	**$0**
2013	$1,493,490							$1,493,490	0.943	**$1,408,361**
2014	$1,493,490							$1,493,490	0.890	**$1,329,206**
2015	$1,493,490							$1,493,490	0.840	**$1,254,532**
2016	$3,808,400							$3,808,400	0.792	**$3,016,252**
2017	$15,233,598							$15,233,598	0.747	**$11,379,498**
2018	$6,347,333							$6,347,333	0.705	**$4,474,869**
2019				$90,000	$10,000			$100,000	0.665	**$66,500**
2020				$90,000	$10,000			$100,000	0.627	**$62,700**
2021				$90,000	$10,000			$100,000	0.592	**$59,200**
2022				$90,000	$10,000			$100,000	0.558	**$55,800**
2023				$90,000	$10,000			$100,000	0.527	**$52,700**
2024				$90,000	$10,000			$100,000	0.497	**$49,700**
2025				$90,000	$10,000			$100,000	0.469	**$46,900**
2026				$90,000	$10,000			$100,000	0.442	**$44,200**
2027				$90,000	$10,000	$35,000		$135,000	0.417	**$56,295**
2028				$90,000	$10,000			$100,000	0.394	**$39,400**
2029				$90,000	$10,000			$100,000	0.371	**$37,100**
2030				$90,000	$10,000			$100,000	0.350	**$35,000**
2031				$90,000	$10,000			$100,000	0.331	**$33,100**
2032				$90,000	$10,000			$100,000	0.312	**$31,200**
2033				$90,000	$10,000			$100,000	0.294	**$29,400**
2034				$90,000	$10,000			$100,000	0.278	**$27,800**
2035				$90,000	$10,000			$100,000	0.262	**$26,200**
2036				$90,000	$10,000			$100,000	0.247	**$24,700**
2037				$90,000	$10,000			$100,000	0.233	**$23,300**
2038				$90,000	$10,000			$100,000	0.220	**$22,000**
2039				$90,000	$10,000			$100,000	0.207	**$20,700**
2040				$90,000	$10,000			$100,000	0.196	**$19,600**
2041				$90,000	$10,000			$100,000	0.185	**$18,500**
2042				$90,000	$10,000	$35,000		$135,000	0.174	**$23,490**
2043				$90,000	$10,000			$100,000	0.164	**$16,400**
2044				$90,000	$10,000			$100,000	0.155	**$15,500**
2045				$90,000	$10,000			$100,000	0.146	**$14,600**
2046				$90,000	$10,000			$100,000	0.138	**$13,800**
2047				$90,000	$10,000			$100,000	0.130	**$13,000**
2048				$90,000	$10,000			$100,000	0.123	**$12,300**
2049				$90,000	$10,000			$100,000	0.116	**$11,600**
2050				$90,000	$10,000			$100,000	0.109	**$10,900**
2051				$90,000	$10,000			$100,000	0.103	**$10,300**
2052				$90,000	$10,000			$100,000	0.097	**$9,700**
2053				$90,000	$10,000			$100,000	0.092	**$9,230**
2054				$90,000	$10,000			$100,000	0.087	**$8,700**
2055				$90,000	$10,000			$100,000	0.082	**$8,200**
2056				$90,000	$10,000			$100,000	0.077	**$7,700**
2057				$90,000	$10,000	$35,000		$135,000	0.073	**$9,855**
2058				$90,000	$10,000			$100,000	0.068	**$6,800**
2059				$90,000	$10,000			$100,000	0.065	**$6,500**
2060				$90,000	$10,000			$100,000	0.061	**$6,100**
2061				$90,000	$10,000			$100,000	0.058	**$5,800**
								Total Present Value of Discounted Costs (Sum of column (j))		**$23,965,188**
								Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries		

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

COSTS AND BENEFITS SUMMARY

Table 20 summarizes the costs and benefits for the Project.

Table 20 – Proposal Benefits and Costs Summary

Proposal: Recycled Water Project Phase 1

Agency: _____

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)
		$23,965,188	$31,637,007	$0	$31,637,007		

(1) From Table 19, or RWMG method

(2) From Table 15 or RWMG method

(3) From Table 18 or RWMG method

Adopted Water Rates & Charges

Historical Water Rates

Effective January 1st	2012	2013	2014
Tier 1 Supply Rate ($/AF)	$106	$140	$148
Delta Supply Surcharge ($/AF)	$58	*	*
Tier 2 Supply Rate ($/AF)	$290	$290	$290
System Access Rate ($/AF)	$217	$223	$243
Water Stewardship Rate ($/AF)	$43	$41	$41
System Power Rate ($/AF)	$136	$189	$161
Full Service Untreated Volumetric Cost ($/AF)			
Tier 1	$560	$593	$593
Tier 2	$686	$743	$735
Replenishment Water Rate: untreated ($/AF)	$442	**	**
Interim Agricultural Water Program: untreated ($/AF)	$537	***	***
Treatment Surcharge ($/AF)	$234	$254	$297
Full Service Treated Volumetric Cost ($/AF)			
Tier 1	$794	$847	$890
Tier 2	$920	$997	$1,032
Treated Replenishment Water Rate ($/AF)	$651	**	**
Treated Interim Agricultural Water Program ($/AF)	$765	***	***
Readiness-to-Serve Charge (millions of dollars)	$146	$142	$166
Capacity Charge ($/cfs)	$7,400	$6,400	$8,600

* The Delta Supply Surcharge will be suspended after 2012
** Discussions on the replenishment program are continuing with the Member Agencies
*** The Interim Agricultural Water Program will be discontinued after 2012

Definitions

Tier 1 Supply Rate - recovers the of cost of maintaining a reliable amount of supply.

Delta Supply Surcharge - reflects the additional supply costs that Metropolitan faces along with other costs due to the pumping restrictions on the State Water Project.

Tier 2 Supply Rate - set at Metropolitan's cost of developing additional supply to encourage efficient use of local resources.

System Access Rate – recovers a portion of the costs associated with the delivery of supplies.

System Power Rate – recovers Metropolitan's power costs for pumping supplies to Southern California.

Water Stewardship Rate – recovers the cost of Metropolitan's financial commitment to conservation, water recycling, groundwater clean-up and other local resource management programs.

Replenishment Water Rate – a discounted rate for surplus system supplies available for the purpose of replenishing local storage.

Treated Replenishment Water Rate – a discounted rate for surplus system supplies available for the purpose of replenishing local storage.

Interim Agricultural Water Rate – discounted rate for surplus system supplies available for the purpose of growing agricultural, horticultural, or floricultural products.

Treated Interim Agricultural Water Program Rate – discounted rate for surplus system supplies available for the purpose of growing agricultural, horticultural, or floricultural products.

Treatment Surcharge – recovers the costs of treating imported water.

Readiness-to-Serve Charge - a fixed charge that recovers the cost of the portion of system capacity that is on standby to provide emergency service and operational flexibility.

Capacity Charge – the capacity charge recovers the cost of providing peak capacity within the distribution system.

Page updated: April 19, 2012

Air Resources Board

Mary D. Nichols, Chairman
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Sacramento, California 95812 • www.arb.ca.gov

Matthew Rodriquez
Secretary for Environmental Protection

Edmund G. Brown Jr.
Governor

2013 Annual Auction Reserve Price Notice

California Cap-and-Trade Program Greenhouse Gas Allowance Auctions

Issued on December 3, 2012

Updated on January 15, 2013

Auction Summary

This document, *2013 Annual Auction Reserve Price Notice,* specifies the 2013 Auction Reserve Price and the number of allowances to be auctioned in 2013 for the quarterly auctions as part of the Current Auction and Advance Auction. The 2013 quarterly GHG allowance auctions will offer 2013 vintage allowances and 2016 vintage allowances for sale.

The 2013 Auction Reserve Price and the annual budget of 2013 and 2016 vintage allowances for sale in 2013, is shown in Table 1 below.

Table 1: 2013 Auction Data

Auction Data Description	Auction Data
Auction Reserve Price	$10.71
Number of allowances to be auctioned in 2013 (2013 Vintage)	~~56,848,885*~~ 57,628,254
Number of advance allowances to be auctioned in 2013 (2016 Vintage)	38,240,000

~~* Amount could increase based on additional consignment from POUs as described in this notice.~~

The Auction Reserve Price

The Auction Reserve Price is a predetermined minimum price at which allowances will be sold to auction participants. The 2012 Auction Reserve Price was $10. Section 95911 of the Cap-and-Trade Regulation stipulates that the "Auction Reserve Price in U.S. dollars shall be the U.S. dollar Auction Reserve Price for the previous calendar year increased annually by 5 percent plus the rate of inflation as measured by the most recently available twelve months of the Consumer Price Index for All Urban Consumers." The rate of inflation used to calculate the 2013 Auction Reserve Price is 2.16 percent.

Current Auction Budget

The current auction budget describes the minimum number of current year vintage allowances to be sold in 2013. This number includes the State-owned allowances (approximately

10,600,000) and the remaining allowances to be consigned by the electricity distribution utilities. Some public owned utilities (POUs) were provided the flexibility to defer providing direction until January 1, 2013, on how to distribute their allowances between their Compliance and Limited Use Holding Accounts. ~~These deferred allowances total approximately 6,700,000. These are not included in the minimum 2013 annual auction budget. Once ARB receives direction from all of the remaining POUs, this notice will be updated to reflect the final 2013 annual auction budget presented in Table 1~~. ARB has now received direction from all POUs on how to distribute their allowances and Table 1 has been updated to reflect the final annual auction budget for 2013 vintage allowances. **This annual budget update does not change the amount of 2013 vintage allowances for sale in the February 19 auction.** Twenty-five percent of the State-owned allowances will be available at each auction. Utilities are required to notify ARB 75 days before each auction of the number of allowances they intend to consign. The total number of allowances to be auctioned in each auction will be published in the auction notice 60 days in advance. Utility allowances not consigned in the first three auctions will be included in the November 19, 2013 auction.

Advance Auction Budget

The advance auction budget represents ten percent of the allowances from the budget year three years subsequent to the current calendar year. Since the annual allowance budget of 2016 is 382,400,000, the advance auction budget for 2013 is 38,240,000. These allowances will be equally divided for sale across the four auctions in 2013.

2013 Quarterly Auction Dates

An *Auction Notice* with instructions on how to participate will be published 60 days prior to each auction. The *Auction Notice* provides information about eligibility, auction format, and GHG allowances to be auctioned for the applicable quarterly auction.

Table 2 provides additional information specific to the scheduled quarterly auctions.

Table 2: 2013 Quarterly Auction Critical Dates

Auction Consignment Due Date for EDUs	Auction Notice Posting Date	Auction Application Due Date	Auction Dates
12/6/2012	12/21/2012	1/22/2013	2/19/2013
3/4/2013	3/18/2013	4/16/2013	5/16/2013
6/3/2013	6/17/2013	7/17/2013	8/16/2013
9/5/2013	9/20/2013	10/21/2013	11/19/2013

Contact Information

For further information about participation in the 2013 auctions, please contact:
Mr. Chuck Seidler at (916) 324-0931 or cseidler@arb.ca.gov.

Updated on January 15, 2013

Project T: Wilson III Basins Project and Wilson Basins/Spreading Grounds (City of Yucaipa)

The Project provides improved flood protection, water conservation, and water quality. The Wilson Creek will deliver runoff from a watershed area of 3,021 acres and during average rainfall years, will deliver 2,009 acre-feet of storm water to the proposed Wilson III basin for recharge. The Project will eliminate 562 acres of flood inundation area of mixed residential, commercial, and industrial properties, as shown on Attachment 7-1.

The Project, when completed, will operate as a passive system. When precipitation occurs, water will conveyed to the basin, through the Wilson Creek, for recharge. The Project will provide immediate flood protection to the existing flood hazard areas. There are no uncertainties related to the project benefits and the Project will not create any adverse effects.

The Project's economic costs related to flood control include construction a 245 acre-feet Wilson III Basin and modifications to the existing Freemont Basins to a volume of approximately 206 acre-feet. As shown on Table 7, the basin improvements are estimated at $13.8 million. The Project's total costs are shown on Table 8 in Attachment 4.

The Project's flood damage reduction benefit analysis was calculated using the data presented in Attachment 7 and DWR's Flood Rapid Assessment Model (F-RAM). Expected annual damage without the Project is approximately $375,000, as shown on Table 17, due to the greater economic impacts to the residential, commercial, and industrial communities through flood damage and lost revenue. As shown on Table 18, the present value of expected annual damage is $5.9 million. F-RAM analysis is included as Attachment 8-1.

In addition to flood protection, the proposed Wilson III basin and the Fremont Basins will provide additional flood storage for greater aquifer recharge. The Project's recharge benefit analysis is presented Table 15 and described further below. The Project will provide a water supply benefit through avoided imported water supply costs. The total present value of the recharge benefit is $24.9 million.

Imported water supplies reliability will continue to be at risk. Reducing dependence on these supplies will benefit the entire State. For the cost analysis, MWD Tier 2 water rates are used since Tier 1 water is not available and is not anticipated to be available in the future. MWD's Tier 2 water rate for 2013 is $743 per acre-foot.

Approximately 2,009 acre-feet per year of storm water will be recharged at the basins reducing the City dependence on import water. Without the project, no new yield will be captured. Capture and recharge of the new yield will benefit the entire groundwater basin.

The Project's non-monetized benefit are improving water quality, reducing greenhouse gas (GHG) emissions, improve groundwater management, reduce demand on the Delta, and improving water supply reliability. Non-monetized benefits are presented on Table 12. GHG reduction of 2,900 tons CO_2 per year for the project is further described in Attachment 7.

Project costs include initial construction and ongoing maintenance. It is estimated that every 5 years the basin will require removal of sediment build-up and scouring of the basin floor. At these 5 year intervals, over the Project's 50 year life, operation and maintenance costs will increase to account for the additional work. The total present value of discounted costs is $12.5 million, as shown on Table 19. All values for total present value Project costs (Table 19), flood damage reduction (Table 18), and monetized Project benefits (Table 15) are summarized on Table 20. The Project's benefit cost summary (Table 20) show that Project benefits outweigh Project cost by 2.5 to 1.

All included tables have been described, qualified, and/or supported here and in the comment section of each table.

Table 12 – Non-monetized Benefits Checklist		
Proposal Title: SAWPA ROUND 2		
Project Title: Wilson III Basins/Spreading Grounds		
No.	**Question**	**Enter "Yes", "No" or "Neg"**
	Community/Social Benefits **Will the proposal**	
1	**Provide education or technology benefits?**	**No**
2	**Provide social recreation or access benefits?**	**No**
3	**Help avoid, reduce or resolve various public water resources conflicts?**	**No**
4	**Promote social health and safety?**	**No**
5	**Have other social benefits?**	**No**
	Environmental Stewardship Benefits: **Will the proposal**	
6	**Benefit wildlife or habitat in ways that were not quantified in Attachment 7?**	**No**
7	**Improve water quality in ways that were not quantified in Attachment 7?**	**Yes**
	The Project will reduce urban runoff discharge pollutants that increase downstream erosion potential and associated water quality impairment to the Santa Ana River; which is on the Santa Ana Regional Water Quality Control Board 303(d) List of Water Quality Limited Segments.	
8	**Reduce net emissions in ways that were not quantified in Attachment 7?**	**Yes**
	The Project will reduce greenhouse gas emissions through development of new local water supplies that eliminates the need for imported water to be delivered from the Bay-Delta of the same quantity. By avoiding delivery through the state's system, a significant reduction in greenhouse gas emissions is attained.	
9	**Provide other environmental stewardship benefits, other than those claimed in Sections D1, D3, or D4?**	**No**
	Sustainability Benefits: **Will the proposal**	
10	**Improve the overall, long-term management of California groundwater resources?**	**Yes**
	The Project will promote aquifer storage and recharge of stormwater runoff that is currently lost to the Santa Ana River and ultimately the Pacific Ocean. Recharged water will help reduce overdraft in the Chino Basin.	
11	**Reduce demand for net diversions for the regions from the Delta?**	**Yes**
	See number 8, above.	
12	**Provide a long-term solution in place of a short-term one?**	**No**
13	**Promote energy savings or replace fossil fuel based energy sources with renewable energy and resources?**	**No**
14	**Improve water supply reliability in ways not quantified in Attachment 7?**	**Yes**
	Import water from the Bay-Delta is often subject to supply uncertainty and supply variability. Development of loacl water supply sources will reduce the City's dependence on improt water and, as a result, reduce water supply uncertainty and variability.	
15	**Other (If the above listed categories do not apply, provide non-monetized benefit description)?**	**N/A**

Table 15 – Annual Benefit

(All benefits should be in 2012 dollars)

Project Title: Wilson III Basins/Spreading Grounds

(a) Year	(b) Type of Benefit	(c) Measure of Benefit (Units)	(d) Without Project	(e) With Project	(f) Change Resulting from Project (e) – (d)	(g) Unit $ Value [1]	(h) Annual $ Value [1] (f) x (g)	(i) Discount Factor [1]	(j) Discounted Benefits [1] (h) x (i)
2012	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	1.000	$ 743,000
2013	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.943	$ 700,649
2014	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.890	$ 661,270
2015	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.840	$ 624,120
2016	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.792	$ 588,456
2017	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.747	$ 555,021
2018	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.705	$ 523,815
2019	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.665	$ 494,095
2020	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.627	$ 465,861
2021	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.592	$ 439,856
2022	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.558	$ 414,594
2023	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.527	$ 391,561
2024	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.497	$ 369,271
2025	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.469	$ 348,467
2026	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.442	$ 328,406
2027	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.417	$ 309,831
2028	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.394	$ 292,742
2029	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.371	$ 275,653
2030	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.350	$ 260,050
2031	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.331	$ 245,933
2032	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.312	$ 231,816
2033	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.294	$ 218,442
2034	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.278	$ 206,554
2035	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.262	$ 194,666
2036	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.247	$ 183,521
2037	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.233	$ 173,119
2038	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.220	$ 163,460
2039	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.207	$ 153,801
2040	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.196	$ 145,628
2041	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.185	$ 137,455
2042	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.174	$ 129,282
2043	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.164	$ 121,852
2044	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.155	$ 115,165
2045	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.146	$ 108,478
2046	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.138	$ 102,534
2047	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.130	$ 96,590
2048	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.123	$ 91,389
2049	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.116	$ 86,188
2050	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.109	$ 80,987
2051	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.103	$ 76,529
2052	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.097	$ 72,071
2053	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.092	$ 68,356
2054	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.087	$ 64,641
2055	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.082	$ 60,926
2056	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.077	$ 57,211
2057	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.073	$ 54,239
2058	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.069	$ 51,267
2059	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.065	$ 48,295
2060	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.061	$ 45,323
2061	Stormwater Capture and Storage	Acre-Feet	0	1,000	1,000	$ 743	$ 743,000	0.058	$ 43,094
								Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)	**$12,415,530**

Comments:

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

2.) Refer to Attachment 7 and Table 7 for benefit details.

Table 16 – Annual Costs of Avoided Projects (All avoided costs should be in 2012 dollars) 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)		
2012					1.000	
2013					0.943	
2014					0.899	
2015					0.839	
...					...	
Last Year of Project Life					...	
Total Present Value of Discounted Costs (Sum of Column (g))						
(%) Avoided Cost Claimed by Project						
Total Present Value of Discounted Avoided Project Costs Claimed by Alternative Project (Total Present Value of Discounted Costs x % Avoided Cost Claimed by Project)						
Comments:						

Table 17 – Example Calculation of Expected Annual Damage Project: Wilson III Basins/Spreading Grounds											
Hydrologic Event	Event Exceedance Probability	Event Damage if Flood Structures Fail	Probability Structural Failure		Expected Event Damage		Interval Probability	Average Damage in Interval		Average Damage in Interval times Interval Probability	
			Project	With Project	Without Project	With Project		Without Project	With Project	Without Project	With Project
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(i)	(j)	(k)	(l)	(m)
					(c) x (d)	(c) x (e)	from (b)	from (f)	from (g)	(i) x (j)	(i) x (k)
25-Year	0.04	$3,322,903	0.60	0	$1,993,742	$0	0.050	$1,993,742	$0	$99,687	$0
50-Year	0.02	$4,984,355	0.75	0	$3,738,266	$0	0.020	$3,738,266	$0	$74,765	$0
100-Year	0.01	$9,151,209	1.00	0	$9,151,209	$0	0.005	$9,151,209	$0	$45,756	$0
Expected Annual Damages, Without and With Project:										**$220,208**	**$0**

Table 18 – Present Value of Expected Annual Damage Reduction Benefits Project: Wilson III Basins/Spreading Grounds			
(a)	Expected Annual Damage Without Project (1)		**$ 220,208**
(b)	Expected Annual Damage With Project (1)		**$ -**
(c)	Expected Annual Benefit	(a) – (b)	**$ 220,208**
(d)	Present Value Coefficient (2)		**$ 15.76**
(e)	**Present Value of Future Benefits** **Transfer to Table 20, column (e).**	**(c) x (d)**	**$ 3,470,485**

(1) This program assumes no land use changes in the floodplain. So, EAD will be constant over analysis period.

(2) 6% discount rate; 50-year analysis period (could vary depending upon lifecycle of project).

Table 19 – Annual Costs of Project

(All costs should be in 2012 Dollars)

Project: Wilson III Basins/Spreading Grounds

	Initial Costs	Adjusted Grant	Annual Costs [2]						Discounting Calculations	
	Grand Total Cost from Table 7 (row (i), column (d))	Total Cost[1]	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)
2012	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	1.000	$ -
2013	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	0.943	$ -
2014	$ 13,837,786	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 13,848,786	0.890	$ 12,325,420
2015	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.840	$ 9,240
2016	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.792	$ 8,712
2017	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.747	$ 8,217
2018	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.705	$ 7,755
2019	$ -	$ -	$ 2,000	$ 9,000	$ 9,000	$ 30,000	$ -	$ 50,000	0.665	$ 33,250
2020	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.627	$ 6,897
2021	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.592	$ 6,512
2022	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.558	$ 6,138
2023	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.527	$ 5,797
2024	$ -	$ -	$ 2,000	$ 9,000	$ 9,000	$ 30,000	$ -	$ 50,000	0.497	$ 24,850
2025	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.469	$ 5,159
2026	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.442	$ 4,862
2027	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.417	$ 4,587
2028	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.394	$ 4,334
2029	$ -	$ -	$ 2,000	$ 9,000	$ 9,000	$ 30,000	$ -	$ 50,000	0.371	$ 18,550
2030	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.350	$ 3,850
2031	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.331	$ 3,641
2032	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.312	$ 3,432
2033	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.294	$ 3,234
2034	$ -	$ -	$ 2,000	$ 9,000	$ 9,000	$ 30,000	$ -	$ 50,000	0.278	$ 13,900
2035	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.262	$ 2,882
2036	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.247	$ 2,717
2037	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.233	$ 2,563
2038	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.220	$ 2,420
2039	$ -	$ -	$ 2,000	$ 9,000	$ 9,000	$ 30,000	$ -	$ 50,000	0.207	$ 10,350
2040	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.196	$ 2,156
2041	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.185	$ 2,035
2042	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.174	$ 1,914
2043	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.164	$ 1,804
2044	$ -	$ -	$ 2,000	$ 9,000	$ 9,000	$ 30,000	$ -	$ 50,000	0.155	$ 7,750
2045	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.146	$ 1,606
2046	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.138	$ 1,518
2047	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.130	$ 1,430
2048	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.123	$ 1,353
2049	$ -	$ -	$ 2,000	$ 9,000	$ 9,000	$ 30,000	$ -	$ 50,000	0.116	$ 5,800
2050	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.109	$ 1,199
2051	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.103	$ 1,133
2052	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.097	$ 1,067
2053	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.092	$ 1,012
2054	$ -	$ -	$ 2,000	$ 9,000	$ 9,000	$ 30,000	$ -	$ 50,000	0.087	$ 4,350
2055	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.082	$ 902
2056	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.077	$ 847
2057	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.073	$ 803
2058	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.069	$ 759
2059	$ -	$ -	$ 2,000	$ 9,000	$ 9,000	$ 30,000	$ -	$ 50,000	0.065	$ 3,250
2060	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.061	$ 671
2061	$ -	$ -	$ 2,000	$ 4,500	$ 4,500	$ -	$ -	$ 11,000	0.058	$ 638
								Total Present Value of Discounted Costs (Sum of column (j))		**$ 12,573,266**
								Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries		

Notes:

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

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

Comments:

(a) Capital and Other Initial Costs are take from and further described in Tables 7 and 8.

(b) Not Applicable.

(c) Administrative costs are estimated to include two weeks of work per year at a rate of $25 per hour.

(d) Operation costs are estimated to include one and a half weeks of work per year at a rate of $75 per hour. Additionally, pipe repair, sediment build-up removal, and scouring of the basin floor, will require extra costs every five years estimated at three weeks of work at a rate of $75 per hour.

(e) Maintenance costs are estimated to include one and a half weeks of work per year at a rate of $75 per hour. Additionally, pipe repair, sediment build-up removal, and scouring of the basin floor, will require extra costs every five years estimated at three weeks of work at a rate of $75 per hour.

(f) Replacement costs include sediment build-up removal (10,000 cubic-yards) and scouring of the basin floor at a rate of $3 per cubic-yard, to be done every 5 years.

(g) Other costs were not applicable.

(h) Total Costs are the summation of columns (a) through (f).

(i) Discount Factors are based on a 6% discount rate and a 50 year analysis period, as provided in the application.

(j) Discounted Costs are Total Costs multiplied by the Discount Factor.

Table 20 – Proposal Benefits and Costs Summary Project: Wilson III Basins/Spreading Grounds Agency: City of Yucaipa							
			Total Present Value Project Benefits				
Project	Project Proponent	Total Present Value Project Costs [1]	From Section D3 – Monetized [2]	From Section D4 – Flood Damage Reduction [3]	Total	From Section D1 – Cost-Effectiveness Analysis, Cost Savings	From Section D2 – Briefly describe the main Non-monetized benefits
(a)	(b)	(c)	(d)	(e)	(f) = (d) + (e)	(g)	(h)
Wilson III Basins / Spreading Grounds	City of Yucaipa	$ 12,573,266	$ 12,415,530	$ 3,470,485	$ 15,886,015	$ -	The Project will: -Improve water quality -Improve water supply reliability -Reduce GHG emissions -Improve management of groundwater resources -Reduce demand on the Delta

Notes:

(1) Refer to Table 19.

(2) Refer to Table 15.

(3) Refer to Table 18.

(4) Refer to Attachment 7, Table 9, and Table 12 for details.

Attachment 8-1
FRAM Analysis

DWR Levee Mitigation Prioritization Tool

To Read Instructions:	Read Instructions
To Enter Project Information:	Enter Project Information
To Enter Special Cases:	Enter Special Cases

View Cost-Benefit Analysis:	Cost-Benefit Analysis
View Stage Damage Graph:	Stage v Damage Curve
View AAD Graph (Actual):	Loss Probability Curve

Instructions

Return to Menu

Project information should be entered in the 'Inputs' tab only. Information is required in all cells highlighted green. Example:

Output information is provided in the 'BCA Summary' tab. Project calculations are performed in the sheets described in the Model Map.

Model Map

Sheet Name	Description
Menu:	Front page of model, with links to key sheets
Instructions:	Description of how this model should be used
Inputs:	Project information to be entered by user
BCA Summary:	Summary data resulting from Cost-Benefit Analysis
Assumptions:	Master page containing unit damage assumptions
Depth Damage Curves	Data describing stage damage relationships
Residential:	Direct residential building and contents costs
Commercial & Industrial:	Direct commercial and industrial building and contents costs
Agricultural:	Direct losses to agricultural production
Roads	Direct Losses to roads and infrastructure
Special Cases:	Table for entering information about special case buildings
Without Project EAD	Calculation of Estimated Annual Damages (EAD) without-project
Graph Data	Data used to develop graphical outputs
With Project EAD	Calculation of Estimated Annual Damages (EAD) with-project
Stage v Damage Curve	Graph of flood stage v flood damages
Loss Probability Curve	Graph of flood exceedance probability v flood damages

Inputs

Return to Menu

Project Name: Wilson III Basins/Spreading Grounds

Cost of Project: $ 13,837,786

Description: The project will mitigat flooding for a tributary area of 3,021 acres and includes construction of a basin and expansion of existing basins for flood control and aquifer recharge.

Number of Events Modeled: 3

		Without Project						With Project					
		Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6
Average Return Interval (ARI)		25	50	100				25	50	100			
Annual Probability of Exceedance		0.040	0.020	0.010	#DIV/0!	#DIV/0!	#DIV/0!	0.040	0.020	0.010	#DIV/0!	#DIV/0!	#DIV/0!
Probability of Levee Failure		1.00	1.00	1.00				0.00	0.00	0.00			
Water Surface Elevation - channel (f)		2650.50	2650.75	2651.00									
Flood Warning Time (hours)		0.5	0.5	0.5									
Flood Experience		Y	Y	Y				N	N	N			
Period of Inundation (days)		1	1	1									
HEC-FIA DATA INPUTS		N											
Residential Structural Damages ($)													
Residential Contents Damages ($)													
Residential Debris & Cleanup ($)													
Commercial Structural Damages ($)													
Commercial Contents Damages ($)													
Commercial Debris & Cleanup ($)													
Industrial Structural Damages ($)													
Industrial Contents Damages ($)													
Industrial Debris & Cleanup ($)													
Agricultural Structural Damages ($)													
Agricultural Contents Damages ($)													
Agricultural Debris & Cleanup ($)													
Residential Properties													
Ratio Depreciated Value to Replacement Value		100%	100%	100%									
Average Flood depth above ground level (f)		0.50	0.75	1.00									
Rural - Res: Homesteads													
Rural - Other: Barns, sheds													
Urban Res: Single story (no base)		90	135	180									
Urban Res: Single story (basement)													
Urban Res: Two plus story (no base)													
Urban Res: Two plus story (basement)													
Mobile home													
Commercial Properties													
Ratio Depreciated Value to Replacement Value		100%	100%	100%									
Average Flood depth above ground level (f)		0.50	0.75	1.00									
low value	building area inundated (sq.f.)	73,559	110,338	147,117									
medium value	building area inundated (sq.f.)	73,559	110,338	147,117									
high value	building area inundated (sq.f.)												
Industrial Properties													
Ratio Depreciated Value to Replacement Value		100%	100%	100%									
Average Flood depth above ground level (f)		0.50	0.75	1.00									
low value	building area inundated (sq.f.)	18,355	27,532	36,709									
medium value	building area inundated (sq.f.)	18,355	27,532	36,709									
high value	building area inundated (sq.f.)												
Agricultural Production													
Corn	ac.												
Rice	ac.												
Walnuts	ac.												
Almonds	ac.												
Cotton	ac.												
Tomatoes	ac.												
Wine Grapes	ac.												
Alfalfa	ac.												
Pasture	ac.												
Safflower	ac.												
Sugar Beets	ac.												
Beans	ac.												
Other	ac.												
Roads													
length of arterial roads inundated (miles)		0.45	0.68	0.9									
length of major roads inundated (miles)		0.95	1.43	1.9									
length of minor roads inundated (miles)		1.95	2.93	3.9									
length of unsealed roads inundated (miles)													

Extrapolate Y-intercept: N

Summary of Cost-Benefit Analysis

Return to Menu

Project Name: **Wilson III Basins/Spreading Grounds**

Description: The project will mitigat flooding for a tributary area of 3,021 acres and includes construction of a basin and expansion of existing basins for flood control and aquifer recharge.

Proposed project capital cost:	$ 13,837,786	[Note: construction costs which are assumed to occur in one year.]
Change in annual O&M costs:	$ -	[Note: the change in annual O&M costs compared to without project conditions.]
PV of future O&M costs:	$ -	(at 6% discount rate over 50 years)
PV of future costs	$ 13,837,786	[Note: the sum of capital costs plus the PV of O&M costs.]

Benefits

	Actual	Potential	
EAD without project	$ 235,067	$ 245,262	[Note: for stormwater projects use "Potential" damage which ignores storm warning effects.]
EAD with project	$ -	$ -	
Annual Benefit:	$ 235,067	$ 245,262	
PV of Future Benefits:	$ 3,705,087	$ 3,865,793	(at 6% discount rate over 50 years)

Cost-Benefit Analysis

	Actual	Potential	
Net Present Value (NPV)	-$ 10,132,699	-$ 9,971,993	(at 6% discount rate over 50 years)
Benefit:Cost Ratio	0.268	0.279	

NPV Sensitivity to Discount Rate:

	Actual	Potential
4%	-$ 8,788,041	-$ 8,569,012
5%	-$ 9,546,427	-$ 9,360,292
6%	-$ 10,132,699	-$ 9,971,993
7%	-$ 10,593,691	-$ 10,452,980
8%	-$ 10,962,102	-$ 10,837,371

Model Assumptions

Residential

Foundation heights

Structure Category	Foundation Height (ft)
Rural - Res: Homesteads	1.5
Rural - Other: Barns, sheds	0
Urban Res: Single story (no base)	1.1
Urban Res: Two plus story (no base)	1.1
Mobile home	2.0
Commercial: Low	1
Commercial: Medium	1
Commercial: High	1
Industrial: Low	0.5
Industrial: Medium	0.5
Industrial: High	0.5

Estimate Replacement Value (assumed proxy for depreciated value)

Structure Category	Unit Cost $/ft^2 (2)	Average Size ft^2 (1)	Construction Cost
Rural - Res: Homesteads	159	1900	302100
Rural - Other: Barns, sheds	98	4000	392000
Urban Res: Single story (no base)	159	1900	302100
Urban Res: Two plus story (no base)	155	2200	341000
Mobile home (3)	98	1180	115640
Commercial: Low	120		0
Commercial: Medium	142		0
Commercial: High	207		0
Industrial: Low	120		0
Industrial: Medium	142		0
Industrial: High	207		0

1. Residential Square Footage Source: Sacramento County Tax Assessor Unit Cost and Commercial/Industrial/Public Square Footage Assumptions Source: Saylor Publications, Inc, 2007 Current Construction Costs

2. Replacement unit cost per square foot reflects average costs in the San Franc

3. According to FEMA guidance, replacement costs per square foot for mobile homes and barns and outbuildings are similar.

Other

External damages garden/outdoor areas $/building	$	5,000
Cleanup $/building	$	4,000
Number of residents per residential property		2.6

Commercial / Industrial Buildings

Clean-up costs as a percentage of direct structural damages	30%

Calculation of Other Direct Damages

Percentage of residential direct damages applied as indirect:	25%
Percentage of comm/ind. direct damages applied as indirect:	25%
HEC-FIA only: Percentage all building direct damages applied as indirect	25%
Percentage of roads direct damages applied as indirect:	25%

NPV Calculation

Discount Rate	6%
Time Horizon	50 years

Roads

Cost per mile of highway road inundated	$	250,000
Cost per mile of major road inundated	$	100,000
Cost per mile of minor road inundated	$	30,000
Cost per mile of unsealed road inundated	$	10,000

Agricultural Damages

	Weighted, Average Annual Damages ($/acre)	Establishment Costs ($/acre)	Land Cleanup & rehabilitation ($/acre)	Total <5 d) ($/acre)	Total (>=5 d) ($/acre)
Corn	$48	$0	$246	$293	$293
Rice	$227	$0	$243	$471	$471

Walnuts	$585	$5,284	$243	$828	$6,112
Almonds	$1,618	$3,514	$243	$1,862	$5,376
Cotton	$301	$0	$246	$547	$547
Tomatoes	$1,015	$0	$235	$1,250	$1,250
Wine Grapes	$3,241	$3,240	$235	$3,476	$6,716
Alfalfa	$250	$246	$243	$493	$739
Pasture	($15)	$82	$272	$257	$339
Safflower	$164	$0	$241	$405	$405
Sugar Beets	$313	$0	$262	$575	$575
Beans	$111	$0	$246	$356	$356
Other	$0	0	$246	$246	$246

Source: Comp Study

Establishment Costs are 50% costs of total establishment costs

Calculation of Actual to Potential Damages Ratio

		Without Project						With Project					
		Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6
Warning Time:	hours	0.5	0.5	0.5	0	0	0	0	0	0	0	0	0
Recent Flood Expe	Y / N	Y	Y	Y	0	0	0	N	N	N	0	0	0
Actual : Potential Ratio		0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9

Warning Time	Experienced Community	Inexperienced Community
< 2 hours	0.8	0.9
2-12 hours	Linear reduction from 0.8 at 2 hours to 0.4 at 12 hours	0.8
>12 hours	0.4	0.7

Occ_Name	Cat_Name	Occ_Description	Parameter	Depth (ft) above First Finished Floor (FFE)																		
1ST-NB	RES	one story, no basement	Stage	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1ST-NB	RES		S	0	2.5	13.4	23.3	32.1	40.1	47.1	53.2	58.6	63.2	67.2	70.5	73.2	75.4	77.2	78.5	79.5	80.2	80.7
1ST-NB	RES		C	0	2.4	8.1	13.3	17.9	22	25.7	28.8	31.5	33.8	35.7	37.2	38.4	39.2	39.7	40	40	40	40
2ST-NB	RES	two or more stories, no basement	Stage	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
2ST-NB	RES		S	0	3	9.3	15.2	20.9	26.3	31.4	36.2	40.7	44.9	48.8	52.4	55.7	58.7	61.4	63.8	65.9	67.7	69.2
2ST-NB	RES		C	0	1	5	8.7	12.2	15.5	18.5	21.3	23.9	26.3	28.4	30.3	32	33.4	34.7	35.6	36.4	36.9	37.2
FARM	FAR	Farm Homesteads	Stage	-10	-3	-2	-1	0	1	2	3	4	5	6	7	8	10	13	15	19	21	25
FARM	FAR		S	0	0	0	0	4	9	13	18	22	27	31	35	38	49	49	49	49	49	49
FARM	FAR		C	0	0	0	0	0	6	30	54	69	75	78	80	80	80	100	100	100	100	100
MOBILE	MOB	Mobile homes	Stage	-10	-3	-2	-1	0	1	2	3	4	5	6	7	8	10	13	15	19	21	25
MOBILE	MOB		S	0	0	0	0	8	44	63	73	78	80	81	82	82	82	82	82	82	82	82
MOBILE	MOB		C	0	0	0	0	0	27	49	64	70	76	78	79	81	83	83	83	83	83	83
PUBLIC	PUB	Public buildings	Stage	-10	-3	-2	-1	0	1	2	3	4	5	6	7	8	10	13	15	19	21	25
PUBLIC	PUB		S	0	0	0	0	8	22	30	35	39	41	44	46	48	49	49	49	49	49	49
PUBLIC	PUB		C	0	0	0	0	0	17.5	25	30	34	37	39	40.5	41.5	42	42	42	42	42	42
INDUSTRY	IND	Industrial Buildings	Stage	-10	-3	-2	-1	0	1	2	3	4	5	6	7	8	10	13	15	19	21	25
INDUSTRY	IND		S	0	0	0	0	4	9	13	18	22	27	31	35	38	49	49	49	49	49	49
INDUSTRY	IND		C	0	0	0	0	0	72	75	76.5	78	81	84	87	90	96	102	108	114	120	120
COMMERCIAL	COM	Commercial Buildings	Stage	-10	-3	-2	-1	0	1	2	3	4	5	6	7	8	10	13	15	19	21	25
COMMERCIAL	COM		S	0	0	0	0	4	9	13	18	22	27	31	35	38	49	49	49	49	49	49
COMMERCIAL	COM		C	0	0	0	0	0	11	30	54	69	75	78	80	80	80	100	100	100	100	100

NOT USED

SL-NB	RES	split level, no basement	Stage	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SL-NB	RES		S	0	6.4	7.2	9.4	12.9	17.4	22.8	28.9	35.5	42.3	49.2	56.1	62.6	68.6	73.9	78.4	81.7	83.8	84.4
SL-NB	RES		SN	0	2.9	2.1	1.9	1.9	2	2.2	2.4	2.7	3.2	3.8	4.5	5.3	6	6.7	7.4	7.9	8.3	8.7
SL-NB	RES		C	0	2.2	2.9	4.7	7.5	11.1	15.3	20.1	25.2	30.5	35.7	40.9	45.8	50.2	54.1	57.2	59.4	60.5	60.5
SL-NB	RES		CN	0	2.2	1.5	1.2	1.3	1.4	1.5	1.6	1.8	2.1	2.5	3	3.5	4.1	4.6	5	5.4	5.7	6
SL-NB	RES		Struct	N		0.8																
1ST-B	RES	one story, with basement	Stage	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1ST-B	RES		S	0	0	0.7	0.8	2.4	5.2	9	13.8	19.4	25.5	32	38.7	45.5	52.2	58.6	64.5	69.8	74.2	77.7	80.1	81.1	81.1	81.1	81.1	81.1	81.1
1ST-B	RES		SN	0	0	1.34	1.06	0.94	0.91	0.88	0.85	0.83	0.85	0.96	1.14	1.37	1.63	1.89	2.14	2.35	2.52	2.66	2.77	2.88	2.88	2.88	2.88	2.88	2.88
1ST-B	RES		C	0	0.1	0.8	2.1	3.7	5.7	8	10.5	13.2	16	18.9	21.8	24.7	27.4	30	32.4	34.5	36.3	37.7	38.6	39.1	39.1	39.1	39.1	39.1	39.1
1ST-B	RES		CN	0	1.6	1.16	0.92	0.81	0.78	0.76	0.74	0.72	0.74	0.83	0.98	1.17	1.39	1.6	1.81	1.99	2.13	2.25	2.35	2.45	2.45	2.45	2.45	2.45	2.45
1ST-B	RES		Struct	N		0.8																							
2ST-B	RES	two or more stories, with basement	Stage	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
2ST-B	RES		S	0	1.7	1.7	1.9	2.9	4.7	7.2	10.2	13.9	17.9	22.3	27	31.9	36.9	41.9	46.9	51.8	56.4	60.8	64.8	68.4	71.4	73.7	75.4	76.4	76.4
2ST-B	RES		SN	0	2.7	2.7	2.11	1.8	1.66	1.56	1.47	1.37	1.32	1.35	1.5	1.75	2.04	2.34	2.63	2.89	3.13	3.38	3.71	4.22	5.02	6.19	7.79	9.84	12.36
2ST-B	RES		C	0	0	1	2.3	3.7	5.2	6.8	8.4	10.1	11.9	13.8	15.7	17.7	19.8	22	24.3	26.7	29.1	31.7	34.4	37.2	40	43	46.1	49.3	52.6
2ST-B	RES		CN	0	0	2.27	1.76	1.49	1.37	1.29	1.21	1.13	1.09	1.11	1.23	1.43	1.67	1.92	2.15	2.36	2.56	2.76	3.04	3.46	4.12	5.08	6.39	8.08	10.15
2ST-B	RES		Struct	N		0.8																							
SL-B	RES	split level, with basement	Stage	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SL-B	RES		S	0	0	0	2.5	3.1	4.7	7.2	10.4	14.2	18.5	23.2	28.2	33.4	38.6	43.8	48.8	53.5	57.8	61.6	64.8	67.2	68.8	69.3	69.3	69.3	69.3
SL-B	RES		SN	0	0	0	1.8	1.6	1.5	1.6	1.6	1.6	1.6	1.7	1.9	2.1	2.4	2.6	2.9	3.2	3.4	3.6	3.9	4.2	4.8	5.7	5.7	5.7	5.7
SL-B	RES		C	0	0.6	0.7	1.4	2.4	3.8	5.4	7.3	9.4	11.6	13.8	16.1	18.2	20.2	22.1	23.6	24.9	25.8	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.3
SL-B	RES		CN	0	2.09	1.49	1.14	1.01	1	1.02	1.03	1.04	1.06	1.12	1.23	1.38	1.57	1.76	1.95	2.13	2.28	2.44	2.44	2.44	2.44	2.44	2.44	2.44	2.44
SL-B	RES		Struct	N		0.8																							

Residential Buildings

	Without Project						With Project					
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6
ARI:	25	50	100	0	0	0	25	50	100	0	0	0
Probability of Levee Failure	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Flood depth above ground level (ft)	0.50	0.75	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Buildings Inundated (no.)												
Rural - Res: Homesteads	0	0	0	0	0	0	0	0	0	0	0	0
Rural - Other: Barns, sheds	0	0	0	0	0	0	0	0	0	0	0	0
Urban Res: Single story (no base)	90	135	180	0	0	0	0	0	0	0	0	0
Urban Res: Two plus story (no base)	0	0	0	0	0	0	0	0	0	0	0	0
Mobile home	0	0	0	0	0	0	0	0	0	0	0	0
Structural Damages												
Rural - Res: Homesteads	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Rural - Other: Barns, sheds	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Urban Res: Single story (no base)	$ 679,725	$ 1,019,588	$ 1,359,450	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Urban Res: Two plus story (no base)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Mobile home	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Structual Damages HEC-FIA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Structural Damages	$ 679,725	$ 1,019,588	$ 1,359,450	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Content Damages												
Rural - Res: Homesteads	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Rural - Other: Barns, sheds	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Urban Res: Single story (no base)	$ 652,536	$ 978,804	$ 1,305,072	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Urban Res: Two plus story (no base)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Mobile home	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Contents Damage HEC-FIA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Actual:Potential Ratio	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Total Contents Damages: Actual	$ 522,029	$ 783,043	$ 1,044,058	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Contents Damages: Potential	$ 652,536	$ 978,804	$ 1,305,072	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Clean-Up/ Other Costs												
External	$ 450,000	$ 675,000	$ 900,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cleanup	$ 360,000	$ 540,000	$ 720,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other Costs HEC-FIA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Other Costs: Potential	$ 810,000	$ 1,215,000	$ 1,620,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Sum Actual Damages	**$ 2,011,754**	**$ 3,017,631**	**$ 4,023,508**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Sum Potential Damages	**$ 2,142,261**	**$ 3,213,392**	**$ 4,284,522**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Total Actual Damage with levee failure ($):	**$ 2,011,754**	**$ 3,017,631**	**$ 4,023,508**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Total Potential Damage with levee failure ($):	**$ 2,142,261**	**$ 3,213,392**	**$ 4,284,522**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Indirect Actual Damage	$ 502,938	$ 754,408	$ 1,005,877	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Indirect Potential Damage	$ 535,565	$ 803,348	$ 1,071,131	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Commercial & Industrial Buildings

	Without Project						With Project					
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6
ARI:	25	50	100	0	0	0	25	50	100	0	0	0
Probability of Levee Failure	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Commercial												
'Flood depth above ground level (ft)	0.50	0.75	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
low building size	73559	110338	147117	0	0	0	0	0	0	0	0	0
medium building size	73559	110338	147117	0	0	0	0	0	0	0	0	0
high building size	0	0	0	0	0	0	0	0	0	0	0	0
Industrial												
'Flood depth above ground level (ft)	0.50	0.75	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
low building size	18355	27532	36709	0	0	0	0	0	0	0	0	0
medium building size	18355	27532	36709	0	0	0	0	0	0	0	0	0
high building size	0	0	0	0	0	0	0	0	0	0	0	0
Structural Damages												
Commercial												
low	$ -	$ -	$ 706,162	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
medium	$ -	$ -	$ 835,625	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
high	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Commercial HEC-FIA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Industrial												
low	$ 88,102	$ 132,152	$ 176,203	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
medium	$ 104,254	$ 156,380	$ 208,507	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
high	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Industrial HEC-FIA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Structural Damages	$ 192,355	$ 288,533	$ 1,926,496	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Contents Damages												
Commercial												
low	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
medium	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
high	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Commercial HEC-FIA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Industrial												
low	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
medium	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
high	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Industrial HEC-FIA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Actual:Potential Ratio	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Total Contents Damages: Actual	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Contents Damages: Potential	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Clean-up/ Other Costs	$ 57,707	$ 86,560	$ 577,949	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Clean-Up/ Other Costs: HEC-FIA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Sum Actual Damages	**$ 250,062**	**$ 375,093**	**$ 2,504,445**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Sum Potential Damages	**$ 250,062**	**$ 375,093**	**$ 2,504,445**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Total Damage with levee failure ($):	**$ 250,062**	**$ 375,093**	**$ 2,504,445**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Total Damage with levee failure ($):	**$ 250,062**	**$ 375,093**	**$ 2,504,445**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Indirect Actual Damages	$ 62,515	$ 93,773	$ 626,111	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Indirect Potentail Damages	$ 62,515	$ 93,773	$ 626,111	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Agricultural Damages

		Without Project						With Project					
		Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6
ARI:		25	50	100	0	0	0	25	50	100	0	0	0
Probability of Levee Failure		1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Length of Inundation <5d Y/N		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Agricultural Land Inundated													
Corn	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Rice	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Walnuts	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Almonds	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Cotton	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Tomatoes	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Wine Grapes	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Alfalfa	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Pasture	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Safflower	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Sugar Beets	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Beans	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Other	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Potential Damages													
Corn		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Rice		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Walnuts		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Almonds		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cotton		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tomatoes		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Wine Grapes		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Alfalfa		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pasture		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Safflower		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Sugar Beets		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Beans		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Potential Damages		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Damage with levee failure ($):		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Roads

	Without Project						With Project					
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6
ARI	25	50	100	0	0	0	25	50	100	0	0	0
Probability of Levee failure	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Roads Inundated												
length of arterial roads inundated (miles)	0.45	0.68	0.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
length of major roads inundated (miles)	0.95	1.43	1.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
length of minor roads inundated (miles)	1.95	2.93	3.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
length of unsealed roads inundated (miles)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Potential Damages												
length of arterial roads inundated (miles)	$ 112,500	$ 168,750	$ 225,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
length of major roads inundated (miles)	$ 95,000	$ 142,500	$ 190,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
length of minor roads inundated (miles)	$ 58,500	$ 87,750	$ 117,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
length of unsealed roads inundated (miles)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Damages:	*$ 266,000*	*$ 399,000*	*$ 532,000*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*	*$ -*
Total Damage with levee failure ($):	$ 266,000	$ 399,000	$ 532,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Special Cases - Dollar Damages Incurred

Return to Menu

	Without Project						With Project					
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6
ARI	25	50	100	0	0	0	25	50	100	0	0	0
Probability of Levee failure	1.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Description / Site ID												
Total Damages:	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Damage with levee failure ($):	0	0	0	0	0	0	0	0	0	0	0	0

Calculation of Without Project EAD

	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Y Intercept
Average Recurrence Interval (ARI)	25	50	100	0	0	0	
AEP	0.040	0.020	0.010	#DIV/0!	#DIV/0!	#DIV/0!	0
Actual Damage to Residential Buildings ($)	$ 2,011,754	$ 3,017,631	$ 4,023,508	$ -	$ -	$ -	
Potential Damage to Residential Buildings ($)	$ 2,142,261	$ 3,213,392	$ 4,284,522	$ -	$ -	$ -	
Actual Damage to Commercial/Industrial Buildings ($)	$ 250,062	$ 375,093	$ 2,504,445	$ -	$ -	$ -	
Potential Damage to Commercial/Industrial Buildings ($)	$ 250,062	$ 375,093	$ 2,504,445	$ -	$ -	$ -	
Damage to Agriculture ($)	$ -	$ -	$ -	$ -	$ -	$ -	
Damage to Roads ($)	$ 266,000	$ 399,000	$ 532,000	$ -	$ -	$ -	
Actual Indirect Costs	$ 631,954	$ 947,931	$ 1,764,988	$ -	$ -	$ -	
Potential Indirect Costs	$ 664,581	$ 996,871	$ 1,830,242	$ -	$ -	$ -	
Special Cases	$ -	$ -	$ -	$ -	$ -	$ -	
Total Actual Damages	$ 3,159,769	$ 4,739,654	$ 8,824,941	$ -	$ -	$ -	$ 8,824,941
Total Potential Damages	$ 3,322,903	$ 4,984,355	$ 9,151,209	$ -	$ -	$ -	$ 9,151,209
EAD (Actual)	$ 235,067						
EAD (Potential)	$ 245,262						

Potential Damages

	Without Project							With Project						
Water Surface Elevation - channel (f)	2650.5	2650.75	2651	2651	2651	2651		0	0	0	0	0	0	
ARI	25	50	100	0	0	0		25	50	100	0	0	0	
Probability of Exceedence (AEP)	0.040	0.020	0.010	#DIV/0!	#DIV/0!	#DIV/0!		0.040	0.020	0.010	#DIV/0!	#DIV/0!	#DIV/0!	
Damages incurred	$ 3,322,903	$ 4,984,355	$ 9,151,209	$ -	$ -	$ -	$ 9,151,209	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Actual Damages

	Without Project							With Project						
Water Surface Elevation - channel (f)	2650.5	2650.75	2651	0	0	0		0	0	0	0	0	0	
ARI	25	50	100	0	0	0		25	50	100	0	0	0	
Probability of Exceedence (AEP)	0.040	0.020	0.010	#DIV/0!	#DIV/0!	#DIV/0!		0.040	0.020	0.010	#DIV/0!	#DIV/0!	#DIV/0!	
Damages incurred	$ 3,159,769	$ 4,739,654	$ 8,824,941	$ -	$ -	$ -	$ 8,824,941	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Without Project

Water Surface Elevation - channel (f)	25	50	100	0	0	0
Probability of Exceedence (AEP)	0.040	0.020	0.010	0.010	0.010	0.010
Potential	$ 3,322,903	$ 4,984,355	$ 9,151,209	$ 9,151,209	$ 9,151,209	$ 9,151,209
Actual	$ 3,159,769	$ 4,739,654	$ 8,824,941	$ 8,824,941	$ 8,824,941	$ 8,824,941

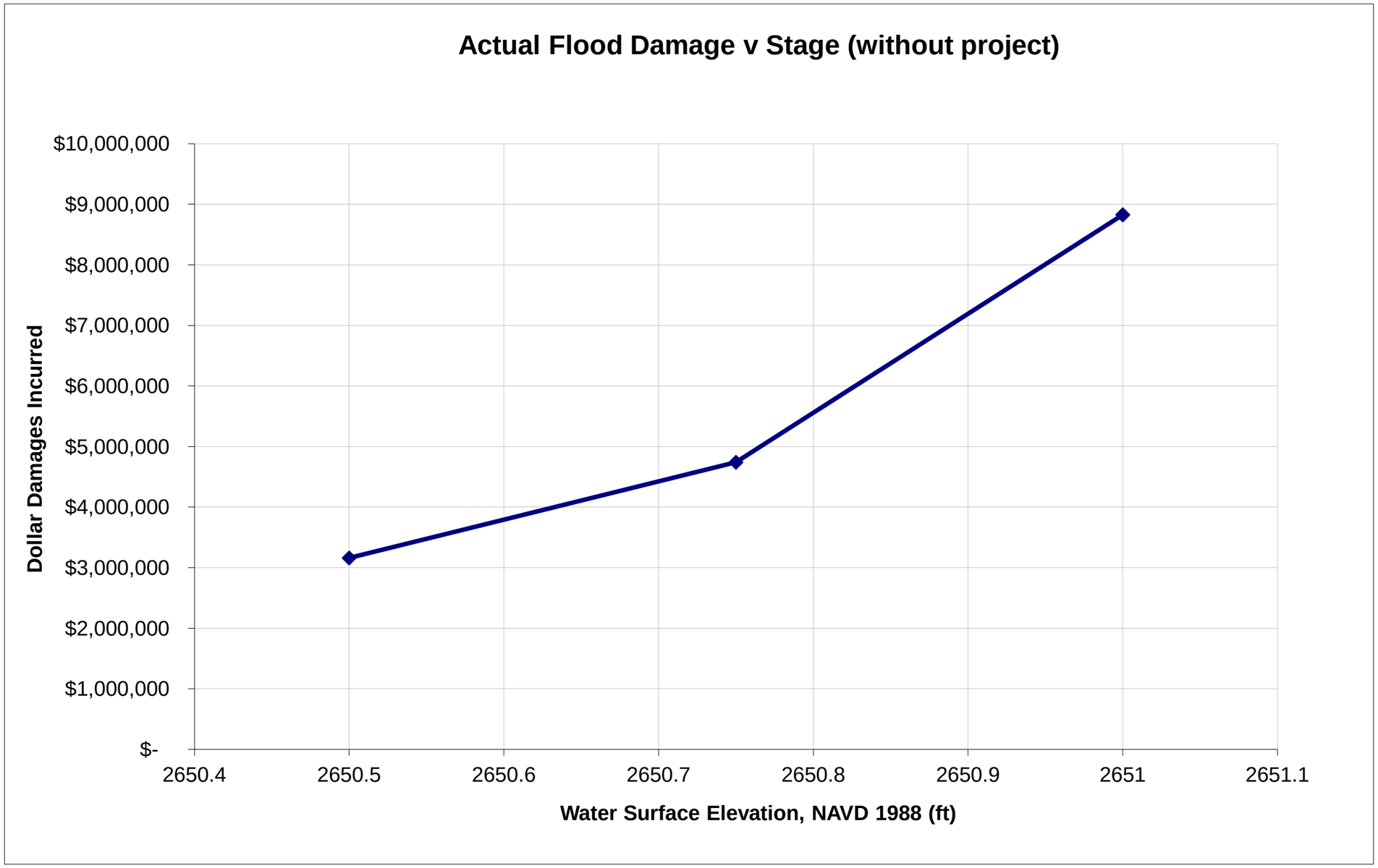
With Project

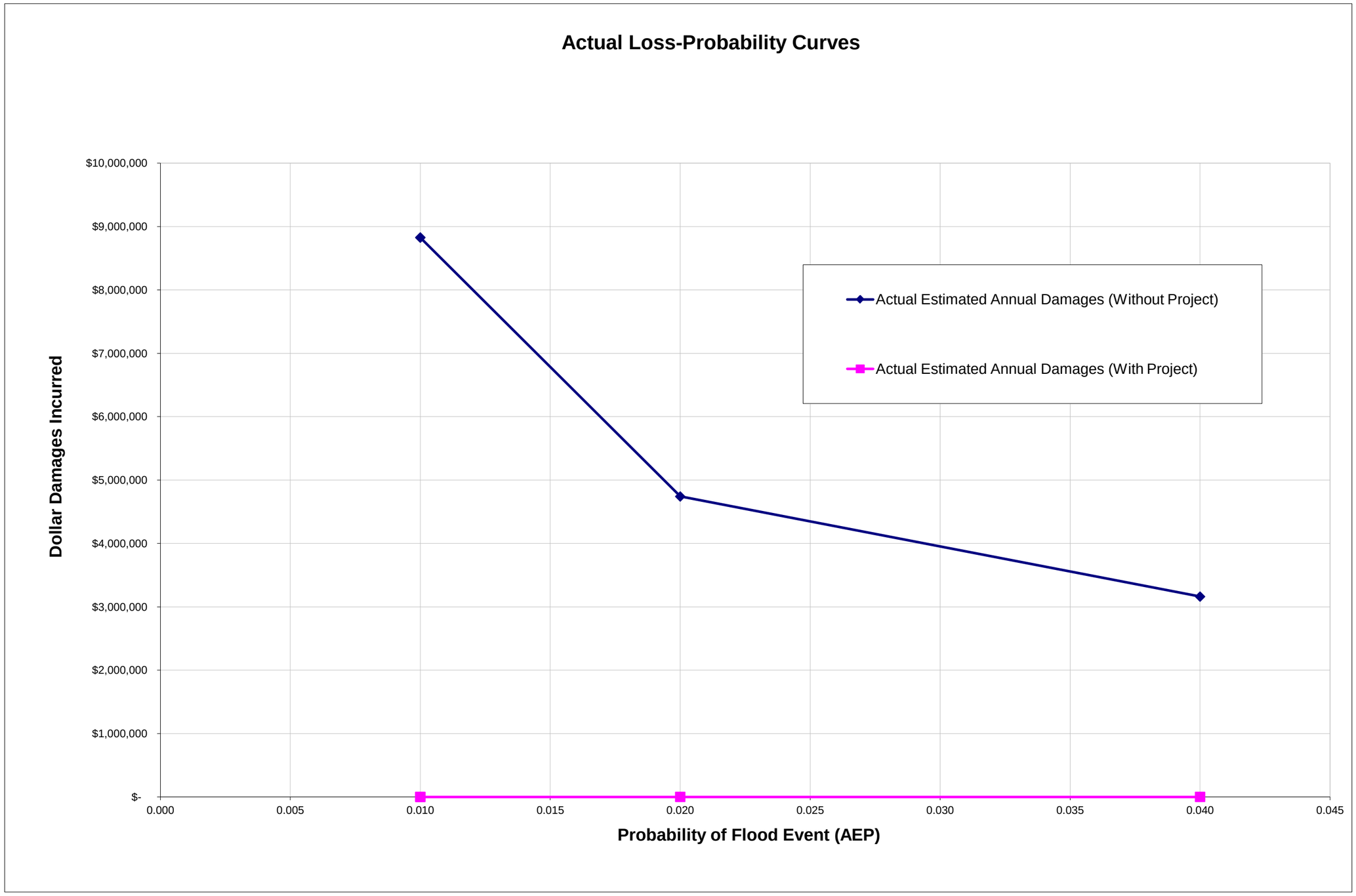
Water Surface Elevation - channel (f)	25	50	100	0	0	0
Probability of Exceedence (AEP)	0.040	0.020	0.010	0.010	0.010	0.010
Potential	$ -	$ -	$ -	$ -	$ -	$ -
Actual	$ -	$ -	$ -	$ -	$ -	$ -

Calculation of With Project EAD

	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	
Average Recurrence Interval (ARI)	25	50	100	0	0	0	
AEP	0.040	0.020	0.010	#DIV/0!	#DIV/0!	#DIV/0!	0
Actual Damage to Residential Buildings ($)	$ -	$ -	$ -	$ -	$ -	$ -	
Potential Damage to Residential Buildings ($)	$ -	$ -	$ -	$ -	$ -	$ -	
Actual Damage to Commercial/Industrial Buildings ($)	$ -	$ -	$ -	$ -	$ -	$ -	
Potential Damage to Commercial/Industrial Buildings ($)	$ -	$ -	$ -	$ -	$ -	$ -	
Damage to Agriculture ($)	$ -	$ -	$ -	$ -	$ -	$ -	
Damage to Roads ($)	$ -	$ -	$ -	$ -	$ -	$ -	
Actual Indirect Costs	$ -	$ -	$ -	$ -	$ -	$ -	
Potential Indirect Costs	$ -	$ -	$ -	$ -	$ -	$ -	
Special Cases	$ -	$ -	$ -	$ -	$ -	$ -	
Total Actual Damages	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Potential Damages	$ -	$ -	$ -	$ -	$ -	$ -	$ -

EAD (Actual)	$ -
EAD (Potential)	$ -


Actual Flood Damage v Stage (without project)
Dollar Damages Incurred
$10,000,000
$9,000,000
$8,000,000
$7,000,000
$6,000,000
$5,000,000
$4,000,000
$3,000,000
$2,000,000
$1,000,000
$-
2650.4
2650.5
2650.6
2650.7
2650.8
2650.9
2651
2651.1
Water Surface Elevation, NAVD 1988 (ft)


Actual Loss-Probability Curves
$10,000,000
$9,000,000
$8,000,000
$7,000,000
$6,000,000
$5,000,000
$4,000,000
$3,000,000
$2,000,000
$1,000,000
$-
Dollar Damages Incurred
0.000
0.005
0.010
0.015
0.020
0.025
0.030
0.035
0.040
0.045
Probability of Flood Event (AEP)
Actual Estimated Annual Damages (Without Project)
Actual Estimated Annual Damages (With Project)