14 ATTACHMENT 8: BENEFITS AND COSTS ANALYSIS

Consistent with the IRWM Program 2012 Guidelines, all projects must yield multiple benefits to be eligible for grant funding. Describe and quantify (if applicable) the benefits and costs of each project in the proposal. The content provided in this attachment will be evaluated in a collective manner to see how all project benefits (combined) compare against the costs of all projects in the proposal.

This attachment allows applicants to claim monetized and non-monetized benefits based on the physical benefit descriptions as documented in Attachment 7. Individual project benefit analysis requirements vary as they depend on the type of project or benefit type. A process is provided in Figure 1 to guide applicants in selecting analysis methods. For the entire proposal, the applicant can submit the analysis performed with the method of analysis of their choice (termed "RWMG Method") or the "DWR Method" of analysis. If the DWR Method is chosen, there are four possible options for analyzing each project. Regardless of the methods or options chosen, a benefits and costs analysis must be completed for every project in the proposal. Whether the applicant chooses to use the DWR Method or the RWMG Method, the analysis will be evaluated and scored using the same scoring criterion.

Scoring will be based on the magnitude of benefits and quality of analysis. Magnitude includes both monetized and non-monetized benefits and will be evaluated relative to total proposal costs. For proposals where a cost effectiveness evaluation is provided, scores will be based on the quality and completeness of the evaluation. Scoring is designed to not bias types of projects with respect to each other.

Points will be allocated based on: 1) the benefits realized through implementation of the Proposal relative to proposal costs and 2) the quality of the analysis and supporting documentation demonstrating those benefits. Points will be allocated from a range of scores based on the consideration of all project(s) in the Proposal. If the reviewers find that important costs are not included in the analysis, points will be deducted.

Are the costs and benefits claimed supported with clear and complete documentation? Is the benefit analysis appropriate considering the size of the project and the type of benefit claimed? Are the benefits of all projects taken together large relative to costs of the Proposal? For proposals with a cost effectiveness evaluation, did the evaluation prove that the least cost alternative was utilized? If not, why?

Note the following:

• Applicants must not split a single project into multiple smaller components or phases in order to be eligible for the Cost Effectiveness Analysis Option (Section D1).
• Points will be reduced if DWR determines that the benefits described in the Non-Monetized Benefit Analysis (Section D2) or the FDR benefits (Section D4) could readily be quantified in dollar terms and the applicant did not monetize the benefits. This

judgment may involve the type of benefit, the size of the project, and the availability of information.

Table 14-1: Round 2 Implementation Grant Proposal Benefits and Costs Summary

Table 20 – Proposal Benefits and Costs Summary

Proposal: 2013 Groundwater Recharge and Water Quality Projection Projects Proposal

Agency: Kaweah Delta Water Conservation 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)
Packwood Creek Recharge Project	City of Visalia	$2,226,632.60	$3,125,443.00	$0.00	$3,125,443.00	--	--
Well 15 Water Quality Project	City of Lindsay	$466,213.00	--	--	--	$745,135.00	--

(1) From Table 19, or RWMG method

(2) From Table 15\16 or RWMG method

(3) From Table 18 or RWMG method

14.1 Packwood Creek Recharge Project B/C Analysis

The Packwood Creek Recharge Project is a very important project for the City of Visalia. To be complaint with current State law the City has to develop additional water supplies in order to justify planned City growth over the next several years. Although the cost to develop an additional 400 AF/year of groundwater recharge capacity is on the order of $1.88 Million, these costs are small in terms of alternative projects. The pricing issue is driven by the City's need to have groundwater recharge efforts benefit the wells the City relies on, and these areas are either already developed to homes or are very expensive because they boarder the City where land is now valued at between $20,000 – 40,000/acre. So the development of five new structures to increase the

recharge capacity of the Packwood Creek channel made sense because the effort didn't require right-of-way acquisition, the City already had surplus surface water agreements with Project partners and the facility was in the right place to benefit the groundwater wells that support the City's domestic groundwater supply. Over the expected 50 year life of this project the facility development cost per acre-foot of groundwater recharged appears to be approximately $94, which is low in terms of most local recharge project that require property acquisition.

14.1.1 Local Benefits

Project Benefits: Project benefits will include the following:

- Water conservation
- Groundwater recharge
- Storm and flood water capture
- Increase in groundwater levels
- Preservation of groundwater resources
- Improved water reliability
- Improved water management
- Increased energy efficiency at nearby wells
- Water marketing
- Further development of Regional Partnerships
- Avoided seepage in areas that do not benefit City groundwater wells

The total cost of the Project is $1,882,560. The average annual amount of water conserved and better managed from the Project is approximately 400 AF, and 29,360 per year, respectively.

The Project costs used are based on actual recent project costs from completed similar District projects. A detailed estimate of probable Project costs is summarized in **Appendix A of Attachment 4**.

$$\frac{\$1,882,560}{400 \text{ Acre-Feet Conserved} \times 50 \text{ Years}} = \$94.13/\text{Acre-Foot}$$

$$\frac{\$1,882,560}{29,360 \text{ Acre-Feet Better Managed} \times 50 \text{ Years}} = \$1.28/\text{Acre-Foot}$$

There is a high certainty that these listed benefits will be realized for the following reasons:

- The feasibility of the project was investigated and confirmed through the HEC-RAS evaluation of Packwood Creek, 2012 WEEG Grant application to the USBR, and the Project's Basis of Design.
- The design of the five structures in Packwood Creek is now 75% complete.
- Preliminary Biological assessment has been accomplished on the Project site.
- Permitting for the project is underway. A CEQA Mitigated Negative Declaration (MND) and a NEPA Finding Of No Significant Impact (FONSI) is under preparation and planned for public circulation in June 2013.
- The City of Visalia has an arrangement with Tulare ID that has been in place for several years to obtain surplus water supplies through the seepage in Packwood Creek.
- The City has recently obtained a new exchange agreement with Tulare ID for surface water supplies delivered to the east side of Visalia for recharge purposes. These agreements are discussed in more detail in Attachment 7, Section 13.1.1.1.1.
- Partial federal grant funding has been obtained in support of the Project that must be used by June 2015.

Both Application Table 15 and 16 were completed, but the benefits associated with avoided project costs were much greater than the Project's annual benefits, so Table 16 was included as per the PSP instruction on page 50.

The following assumptions were made in the analysis of Project benefits:

1. The average cost to purchase water for the project is $35/AF, which is the current cost of surplus CVP Class Two from Tulare ID. It is assumed that this agreement will be remain valid for the 50 years of the Project life span.
2. Operations costs for the proposed project include water purchase costs of $35 x 400 AF/year or $14,000/year.
3. Estimated maintenance for the 5 automated gates would require 8 hours by a KDWCD staff member ($35/hour) every year. Operation for the average 20 day water run would also require another 8 hours by this same individual. This effort costs approximately $600/year.

4. The avoided cost is the cost to develop a new recharge basin near the Project area. Recharge basins are common in the area and would be able to provide the same water supply benefits.
    a. The Alternative Basin (Avoided Cost) Project requires the acquisition of 85 acres for the development of an 80 acre recharge basin that could likely produce a recharge rate of 20 AF/day in order to develop an average annual recharge volume of 400 AF/year (please refer to the description of this Alternative facility in Attachment 7, Section 13.1.2).
    b. A preliminary Engineers Estimate was developed for the Alternative Basin (Avoided Cost) Project. This estimate assumed land acquisition costs of $25,000/acre, earthwork costs of $1.50/cubic-yard and structural concrete costs of $1,000/cubic-yard.
    c. Avoided capital costs for the Alternative Basin project were the estimated project development costs for the new 80 acre recharge basin in the southeast part of Visalia somewhere proximate to Packwood Creek.
    d. No avoided replacement costs were included in this estimate as it was viewed that all project components had roughly the same expected project life span.
    e. The avoided operations and maintenance costs associated with the Alternative Basin project were the effort by Kaweah Delta WCD staff members to disk the basin twice a year to keep down weeds and the time needed to operate the diversion structures sluice gate and manage flows into the basin while available.
5. Not addressing the groundwater overdraft by doing nothing is not considered a suitable alternative or avoided cost because the groundwater levels are declining, and it is not a sustainable water supply.
6. The Proposed Project and Avoided Cost Project are assumed to use the same water supplies. The water supplies secured for the project are very affordable at $35/AF. In comparison, spot market water purchases in the area have ranged from $100 to $500/AF over the past ten years. The economic analysis did not use these higher spot market prices as an avoided water purchase cost. As a result, the economic analysis is conservative and likely underestimates the benefit-cost ratio.
7. All costs are in 2012 dollars and are discounted using the factors provided by DWR in the PSP.

Table 14-2: Packwood Creek Recharge Project Table 15

Table 15 – Annual Benefit

(All benefits should be in 2012 dollars)

Project: Packwood Creek Recharge Project

(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	Recharge	AF	280	680	400				
2013	Recharge	AF	280	680	400				
2014	Recharge	AF	280	680	400				
2015	Recharge	AF	280	680	400				
2016	Recharge	AF	280	680	400				
2017	Recharge	AF	280	680	400				
2018	Recharge	AF	280	680	400				
2019	Recharge	AF	280	680	400				
2020	Recharge	AF	280	680	400				
2021	Recharge	AF	280	680	400				
2022	Recharge	AF	280	680	400				
2023	Recharge	AF	280	680	400				
2024	Recharge	AF	280	680	400				
2025	Recharge	AF	280	680	400				
2026	Recharge	AF	280	680	400				
2027	Recharge	AF	280	680	400				
2028	Recharge	AF	280	680	400				
2029	Recharge	AF	280	680	400				
2030	Recharge	AF	280	680	400				
2031	Recharge	AF	280	680	400				
2032	Recharge	AF	280	680	400				
2033	Recharge	AF	280	680	400				
2034	Recharge	AF	280	680	400				
2035	Recharge	AF	280	680	400				
2036	Recharge	AF	280	680	400				
2037	Recharge	AF	280	680	400				
2038	Recharge	AF	280	680	400				
2039	Recharge	AF	280	680	400				
2040	Recharge	AF	280	680	400				

Table 15 – Annual Benefit

(All benefits should be in 2012 dollars)

Project: Packwood Creek Recharge Project

(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)
2041	Recharge	AF	280	680	400				
2042	Recharge	AF	280	680	400				
2043	Recharge	AF	280	680	400				
2044	Recharge	AF	280	680	400				
2045	Recharge	AF	280	680	400				
2046	Recharge	AF	280	680	400				
2047	Recharge	AF	280	680	400				
2048	Recharge	AF	280	680	400				
2049	Recharge	AF	280	680	400				
2050	Recharge	AF	280	680	400				
2051	Recharge	AF	280	680	400				
2052	Recharge	AF	280	680	400				
2053	Recharge	AF	280	680	400				
2054	Recharge	AF	280	680	400				
2055	Recharge	AF	280	680	400				
2056	Recharge	AF	280	680	400				
2057	Recharge	AF	280	680	400				
2058	Recharge	AF	280	680	400				
2059	Recharge	AF	280	680	400				
2060	Recharge	AF	280	680	400				
Last Year of Project Life	Recharge	AF	280	680	400				
								Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)	**$0**

Comments:

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

Application Table 16 for the Packwood Creek Recharge Project shows the annual costs associated with an avoided alternative project that has identical recharge benefits to the Packwood Creek Recharge Project.

Table 14-3: Packwood Creek Recharge Project Table 16

Table 16 – Annual Costs of Avoided Projects (All avoided in 2012 dollars) Project: _Packwood Creek Recharge Project___						
	Costs				Discounting Calculations	
(a)	(b)	(c)	(d)	(e)	(f)	(g)
Year	Alternative (Avoided Project Name): _New Basin Recharge Project___ Avoided Project Description: Develop a new basin with equivalent recharge capability				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	$2,837,950	$0	$0	$2,837,950	1.000	**$2,837,950.00**
2013	$0	$0	$18,300	$18,300	0.943	**$17,256.90**
2014	$0	$0	$18,300	$18,300	0.890	**$16,287.00**
2015	$0	$0	$18,300	$18,300	0.840	**$15,372.00**
2016	$0	$0	$18,300	$18,300	0.792	**$14,493.60**
2017	$0	$0	$18,300	$18,300	0.747	**$13,670.10**
2018	$0	$0	$18,300	$18,300	0.705	**$12,901.50**
2019	$0	$0	$18,300	$18,300	0.665	**$12,169.50**
2020	$0	$0	$18,300	$18,300	0.627	**$11,474.10**
2021	$0	$0	$18,300	$18,300	0.592	**$10,833.60**
2022	$0	$0	$18,300	$18,300	0.558	**$10,211.40**
2023	$0	$0	$18,300	$18,300	0.527	**$9,644.10**
2024	$0	$0	$18,300	$18,300	0.497	**$9,095.10**
2025	$0	$0	$18,300	$18,300	0.469	**$8,582.70**
2026	$0	$0	$18,300	$18,300	0.442	**$8,088.60**
2027	$0	$0	$18,300	$18,300	0.417	**$7,631.10**
2028	$0	$0	$18,300	$18,300	0.394	**$7,210.20**
2029	$0	$0	$18,300	$18,300	0.371	**$6,789.30**
2030	$0	$0	$18,300	$18,300	0.350	**$6,405.00**
2031	$0	$0	$18,300	$18,300	0.331	**$6,057.30**
2032	$0	$0	$18,300	$18,300	0.312	**$5,709.60**
2033	$0	$0	$18,300	$18,300	0.294	**$5,380.20**
2034	$0	$0	$18,300	$18,300	0.278	**$5,087.40**
2035	$0	$0	$18,300	$18,300	0.262	**$4,794.60**

Table 16 – Annual Costs of Avoided Projects

(All avoided in 2012 dollars)

Project: Packwood Creek Recharge Project

	Costs				Discounting Calculations	
(a)	(b)	(c)	(d)	(e)	(f)	(g)
Year	Alternative (Avoided Project Name): New Basin Recharge Project Avoided Project Description: Develop a new basin with equivalent recharge capability				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)		
2036	$0	$0	$18,300	$18,300	0.247	**$4,520.10**
2037	$0	$0	$18,300	$18,300	0.233	**$4,263.90**
2038	$0	$0	$18,300	$18,300	0.220	**$4,026.00**
2039	$0	$0	$18,300	$18,300	0.207	**$3,788.10**
2040	$0	$0	$18,300	$18,300	0.196	**$3,586.80**
2041	$0	$0	$18,300	$18,300	0.185	**$3,385.50**
2042	$0	$0	$18,300	$18,300	0.174	**$3,184.20**
2043	$0	$0	$18,300	$18,300	0.164	**$3,001.20**
2044	$0	$0	$18,300	$18,300	0.155	**$2,836.50**
2045	$0	$0	$18,300	$18,300	0.146	**$2,671.80**
2046	$0	$0	$18,300	$18,300	0.138	**$2,525.40**
2047	$0	$0	$18,300	$18,300	0.130	**$2,379.00**
2048	$0	$0	$18,300	$18,300	0.123	**$2,250.90**
2049	$0	$0	$18,300	$18,300	0.116	**$2,122.80**
2050	$0	$0	$18,300	$18,300	0.109	**$1,994.70**
2051	$0	$0	$18,300	$18,300	0.103	**$1,884.90**
2052	$0	$0	$18,300	$18,300	0.097	**$1,775.10**
2053	$0	$0	$18,300	$18,300	0.092	**$1,683.60**
2054	$0	$0	$18,300	$18,300	0.087	**$1,592.10**
2055	$0	$0	$18,300	$18,300	0.082	**$1,500.60**
2056	$0	$0	$18,300	$18,300	0.077	**$1,409.10**
2057	$0	$0	$18,300	$18,300	0.073	**$1,335.90**
2058	$0	$0	$18,300	$18,300	0.069	**$1,262.70**
2059	$0	$0	$18,300	$18,300	0.065	**$1,189.50**
2060	$0	$0	$18,300	$18,300	0.061	**$1,116.30**

Table 16 – Annual Costs of Avoided Projects

(All avoided in 2012 dollars)

Project: Packwood Creek Recharge Project

	Costs				Discounting Calculations	
(a)	(b)	(c)	(d)	(e)	(f)	(g)
Year	Alternative (Avoided Project Name): New Basin Recharge Project Avoided Project Description: Develop a new basin with equivalent recharge capability				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)		
Last Year of Project Life	$0	$0	$18,300	$18,300	0.058	**$1,061.40**
				Total Present Value of Discounted Costs (Sum of Column (g))		**$3,125,443.00**
				(%) 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)		**$3,125,443.00**
Comments:						

There are no Flood Damage Reduction benefits associated with the Packwood Creek Recharge Project and therefore Application Table 17 and 18 were filled out or included.

Application Table 19 for the Packwood Creek Recharge Project shows the annual costs associated with the Project. The Project development costs were included in the first year and are the total project development costs consistent with the total in Application Table 7. Annual Operation and Maintenance costs were applied every year after that. The operations and maintenance costs associated with the Project were the effort by Kaweah Delta WCD staff members to service and maintain the automated gates one time peer year and to operate the facilities while available. Also this cost included the water cost of $35/AF for 400 AF/year. Again, the groundwater recharge values generated that drive water costs for the Project were average annual values and are therefore the same in each year. However, when the Project facility is operated the amount of water available should vary considerably from year to year depending on hydrology.

All costs are in 2012 dollars and are discounted using the factors provided by DWR in the PSP.

Table 14-4: Packwood Creek Recharge Project Table 19

Table 19 – Annual Costs of Project (All costs in 2012 Dollars) Project: _Packwood Creek Recharge Project__										
	Initial Costs Grand Total Cost from Table 7 (row (i), column (d))	Adjusted Grant Total Cost[1]	Annual Costs [2]						Discounting Calculations	
			Admin	Operation	Maint-enance	Replace-ment	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	$1,882,560	$0	$0	$0	$0	$0	$0	$1,882,560	1.000	**$1,882,560**
2013	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.943	**$13,730**
2014	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.890	**$12,958**
2015	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.840	**$12,230**
2016	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.792	**$11,532**
2017	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.747	**$10,876**
2018	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.705	**$10,265**
2019	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.665	**$9,682**
2020	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.627	**$9,129**
2021	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.592	**$8,620**
2022	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.558	**$8,124**
2023	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.527	**$7,673**
2024	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.497	**$7,236**
2025	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.469	**$6,829**
2026	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.442	**$6,436**
2027	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.417	**$6,072**
2028	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.394	**$5,737**
2029	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.371	**$5,402**
2030	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.350	**$5,096**
2031	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.331	**$4,819**
2032	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.312	**$4,543**
2033	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.294	**$4,281**
2034	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.278	**$4,048**
2035	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.262	**$3,815**
2036	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.247	**$3,596**

Table 19 – Annual Costs of Project

(All costs in 2012 Dollars)

Project: _Packwood Creek Recharge Project__

	Initial Costs Grand Total Cost from Table 7 (row (i), column (d))	Adjusted Grant Total Cost[1]	Annual Costs [2]						Discounting Calculations	
			Admin	Operation	Maint-enance	Replace-ment	Other	Total Costs (a) +…+ (g)	Discount Factor	Discounted Project Costs (h) x (i)
Year	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
2037	$0	$0	$0	$14,280	$280	$495,000	$0	$509,560	0.233	**$118,727**
2038	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.220	**$3,203**
2039	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.207	**$3,014**
2040	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.196	**$2,854**
2041	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.185	**$2,694**
2042	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.174	**$2,533**
2043	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.164	**$2,388**
2044	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.155	**$2,257**
2045	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.146	**$2,126**
2046	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.138	**$2,009**
2047	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.130	**$1,893**
2048	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.123	**$1,791**
2049	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.116	**$1,689**
2050	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.109	**$1,587**
2051	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.103	**$1,500**
2052	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.097	**$1,412**
2053	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.092	**$1,340**
2054	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.087	**$1,267**
2055	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.082	**$1,194**
2056	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.077	**$1,121**
2057	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.073	**$1,063**
2058	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.069	**$1,005**
2059	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.065	**$946**
2060	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.061	**$888**
Last Year of Project Life	$0	$0	$0	$14,280	$280	$0	$0	$14,560	0.058	**$844**
Total Present Value of Discounted Costs (Sum of column (j)) Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries										**$2,226,633**

14.1.2 Regional Benefits

Groundwater Overdraft

In 2001, as a result of an agreement between Kaweah Delta WCD and City of Visalia, the Visalia Water Management Committee (Committee) was formed. The City of Visalia and Kaweah Delta WCD are voting members, and Tulare ID attends and participates in quarterly Committee meetings. The City of Visalia held a Proposition 218 election to raise assessments of landowners within the COV boundary. Through this election, $100,000/year (adjusted to CPI) is acquired by the City of Visalia, and utilized by the Committee, to maintain and enhance groundwater levels in and around the City of Visalia. The Committee acquires surface water for groundwater recharge, and identifies and implements projects to increase groundwater recharge potential. The Packwood Creek Recharge Project has been identified by the Committee as a project that will efficiently and advantageously recharge groundwater, since this location is up-gradient of the City of Visalia, meaning groundwater flows toward the City of Visalia, maximizing their use and minimizing water loss outside of Kaweah Delta WCD boundary; Kaweah Delta WCD's main purpose.

The Packwood Creek Recharge Project is a groundwater recharge project on the east side of the Kaweah Region in an area that has the ability to benefit both the unconfined and confined groundwater aquifers in the west of the Region. If the Project site were located in other areas in the Region, it would only have the ability to potentially benefit one of these aquifers. The Project site's location maximizes benefit to the largest number of groundwater users and thereby improves the Region's water management.

Water Marketing

With the implementation of this Project, Kaweah Delta WCD will facilitate a transfer of water from Tulare ID to the City of Visalia, both agencies being within the Kaweah Delta WCD boundary. With the current addition to the Visalia Water Conservation Plant (WCP), effluent tertiary treated water will be delivered from the WCP to a Tulare ID irrigation ditch. As part of this exchange, Tulare ID is expected to return wet year water to the City of Visalia for the purpose of recharging their municipal supply. The terms of this agreement is that for every 2 AF of tertiary treated water delivered to Tulare ID, Tulare ID will return 1 AF of wet year water. With the proposed project City of Visalia can recharge a maximum of 1,465 AF/yr. By way of the agreement, this will result in twice as much being market to Tulare ID from the tertiary treatment plant (2,930 AF/yr).

Kaweah Delta WCD has existing water marketing arrangements with City of Visalia to cooperatively work towards a stable and reliable water supply for City of Visalia. In recent years, Kaweah Delta WCD has marketed or developed transfer agreements for significant amounts of surface water to City of Visalia through this partnership. The specter of declining groundwater levels could significantly impact City of Visalia's only source of reliable drinking water. The Packwood Creek Recharge Project would develop the facility that would continue to facilitate these water marketing arrangements.

CAL-FED Bay-Delta Program Objective: Water Supply Reliability

As discussed in Attachment 3, the project will recharge an average of 400 acre-feet per year that will make groundwater supplies more reliable in the Kaweah River Basin Region. As this is new project, this is recharge capacity has historically not available to the region. Increasing the amount of groundwater recharge and the available groundwater recharge capacity is vital to the critically overdrafted Kaweah River Basin Region.

The project is also consistent with the following Statewide Priority:

- Drought Preparedness;
- Use and Reuse Water More Efficiently; and
- Climate Change Response Actions.

Drought Preparedness

The Project helps address drought preparedness within the City of Visalia and the Kaweah River region by increasing water conservation potential, reducing long-term groundwater overdraft, increasing the reliability of groundwater resources that will be relied on by growers during drought times, and increasing the region's and the District's ability to efficiently manage the groundwater basin. This project will increase the amount of surface water intentionally recharged by the City and will thereby increase groundwater reliability.

Since Tulare ID does not have sufficient surface water supplies to deliver irrigation water to growers all year long, every grower in the District must have a private groundwater well. Surface water is seasonally available to Tulare ID growers, and groundwater is the only reliable source of water to the District. Therefore the District is a conjunctive use district (conjunctively using surface and groundwater resources) and

this project will expand the District's conjunctive use efforts to be prepared for drought conditions through increased surface water deliveries from treated waste water supplies.

Use and Reuse Water More Efficiently

This statewide priority category includes projects that implement water use efficiency, water conservation, and increase water supply reliability. The Project implements all of these project aspects by conserving surplus wet year waters and transforming them into a dependable groundwater supply that can be accessed by the municipal City of Visalia wells that provide the City's drinking water supply and fire flows. The increased conservation from this project is conservation of wet year surface water that would otherwise be beyond the District's ability to put it to beneficial use.

The Packwood Creek Recharge Project will significantly improve the metering of flows through Packwood Creek in the Project area as the 5 new automated gates are equipped with metering equipment. These facilities will provide information that can be analyzed to determine the seepage losses in the Packwood Creek in this area, and thereby significantly improve water management.

The automated gates will allow the District to use existing basins to maximize recharge area and avoid spills during off-hours by creating a more flexible and reliable system.

Climate Change Response Actions

This statewide priority category states that desirable proposals include that advance and expand conjunctive management of multiple water supply sources. The partnership between Tulare ID and the City of Visalia expands the conjunctive management of multiple water supply sources as the City is a municipal provider that only has access to groundwater and Tulare ID is an agricultural surface water provider that does not deliver groundwater. Together their partnership can expand their water resource management of multiple supplies and increase water supply reliability through an increased diversity of supply.

Beneficial Use of Floodwater. This Project will construct a new basin that will allow the District to deliver surplus and floodwater from the Kaweah and St. Johns Rivers and the Friant Division CVP for a beneficial use and thereby reduce the hazardous floodwater that eventually reaches the Tulare Lake Bottom which is currently farmed. Also, this

project will increase the flood control protection for the disadvantaged City of Farmersville.

SCADA at the Packwood Creek sites will significantly improve the amount of remote information available to Kaweah Delta WCD, Tulare ID, and City of Visalia staff. Timely decisions can then be made in flood events with accurate information on current conditions. The existing system has no remote information in the Project area causing agency staffs to make decisions about safe diversions based on estimated flows that were often set hours before and miles away from the Project site.

Preservation of Groundwater Resources. Groundwater resources in Kaweah Delta WCD and the surrounding area will be preserved through additional surface water being delivered through the Project thus offsetting groundwater pumping and increasing groundwater recharge.

14.1.3 What if Not Implemented

If the Project is not implemented it would be a significant lost opportunity. If funding was not secured through the 2013 IRWM Implementation Grant (Round 2) the Visalia Water Management Committee would fund the project and their reserves would be reduced to a very low level. With low reserves it is unlikely that the VWMC would undertake another Project in the next several years.

14.2 Well 15 Water Quality Project B/C Analysis

The Well 15 Water Quality Project is proposed by the City of Lindsay, a disadvantaged community in rural Tulare County. The Project focuses on a somewhat new groundwater well that the City developed about 4 miles west of town. The City pursued a groundwater well in this area because the aquifer under the City is not very productive. Generally the well's groundwater quality is good, but there is a bacteriological issue that needs to be treated with chlorine. When this was discovered the California Department of Public Health became involved an required that several potential treatment alternatives be evaluated to determine the best and least cost alternatives. These alternatives have been used in this analysis to provide the benefits of developing the Project and the cost savings in comparison to developing a different project approach. First Table 11 summarizes the benefits developed through the Project and the lists the development and OM&R costs for the Project and two other alternatives. Then Alternatives 1 and 2 are described in a little greater detail to provide perspective on the costs associated with the efforts. Finally Table 19 is provided for the

Project and summarizes the costs involved in operating and maintaining the Project over its life span. Information from Table 11 and 19 are then used in Table 20 at the beginning of this section.

Table 14-5: Well 15 Water Quality Project Table 11

Table 11 – Statement of Cost-Effectiveness	
Project name: Well 15 Water Quality Project	
Question 1	Types of benefits provided: Water Supply and Water Quality
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. In 2009, the City of Lindsay (Lindsay), through their Consultant Engineer, completed a review of potential alternative solutions and their estimated costs to allow Lindsay to meet the California Department of Public Health's (CDPH) requirements under the Groundwater Rule, which occurs by achieving a 4-log inactivation of viruses. During the review, three (3) alternative solutions were developed, including the initial alternative that is now the proposed Project. A brief summary of those alternatives are as listed (Please note that all dollars have been updated to 2012 and exclude costs for grant administration, labor compliance and grant reporting: Proposed Project: $401,400 for Project development and $64,813 for 35 years OM&R totaling $466,213 (all in 2012 dollars). Alternative #1: U.V. Disinfection – $638,935 for Project development and $2,028,302 for 35 years OM&R totaling $2,667,237 (all in 2012 dollars): The proposed alternative would provide for the construction of an in-line, medium pressure UV system to treat the water being delivered from Well No. 15 at a disinfection dose of 40 mJ/cm^2. Energy costs in the operational phase made this alternative the least cost effective. Alternative #2: Contact Tank, Booster Pumps and Hydropneumatic Tank – $887,700 for Project development and $324,457 for 35 years OM&R totaling $1,212,157 (all in 2012 dollars): The proposed alternative would provide for the construction of a 207,000 gallon factory coated carbon steel water storage tank, a 10,000 gallon hydropneumatic tank and a multiple pump booster system and pipe manifold which would pump approximately 1,400 gpm. The costs associated with this alternative did not include additional costs to replace the existing pump and motor, if required, for Well No. 15 to pump to an open atmosphere tank, which would allow for detention time at the well site. In addition, annual costs for equipment maintenance and replacement and additional energy costs for boosting the water were also not included.
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.

Table 11 – Statement of Cost-Effectiveness	
Project name: Well 15 Water Quality Project	
	Not applicable. The Proposed Project is the least cost alternative.
Comments: The estimated benefits are understood to be difference between the Annual Costs over the life span of the projects for Alternative #2 and the Proposed Project ($745,944). This value was used in Table 20.	

Proposed Alternative #1 would provide for the construction of an in-line, medium pressure UV system to treat the water being delivered from Well No. 15 at a disinfection dose of 40 mJ/cm^2. The total Present Value of Discounted Costs for this project is estimated to be $2,667,237 over a 35 year period as shown in the table above. The estimated amount is based on the following conclusions. Initial project development costs are estimated to cost $638,935 and all administration, operation, maintenance and replacement (OM&R) costs are estimated to cost $2,028,302. The basis for all the OM&R costs are as follows:

- Administration Costs: Costs associated with project administration would consist of City of Lindsay administration staff's labor to manage power, labor and maintenance costs.
- Operational Costs: Costs associated with project operation would consist of City of Lindsay staff to operate the system at an annual cost of $1,500 and associated power costs to run the U.V. system at a cost of $8,000 per month. These costs are based on similar operations for a U.V. system that disinfects approximately three (3) acre feet per day, which is approximately the proposed project's operational point.
- Maintenance Costs: Costs associated with project maintenance cover labor time for City of Lindsay staff, on a semi-annual basis, to wash and scrub the U.V. system bulbs, which are required to be hand-scrubbed. In addition, regular maintenance on the projects electrical system would occur.
- Replacement Costs: Costs associated with project replacement would consist of the U.V. system Ballast's to be replaced every three (3) years at a cost of $100,000 each replacement.

Proposed Alternative #2 would provide for the construction of a 207,000 gallon factory coated carbon steel water storage tank, a 10,000 gallon hydropneumatic tank and a

multiple pump booster system and pipe manifold which would pump approximately 1,400 gpm. The total Present Value of Discounted Costs for this project is estimated to be $1,212,157 over a 35 year period as shown in the table above. The estimated amount is based on the following conclusions. Initial project development costs are estimated to cost $887,700 and all administration, operation, maintenance and replacement (OM&R) costs are estimated to cost $324,457. The basis for all the OM&R costs are as follows:

- Administration Costs: Costs associated with project administration would consist of City of Lindsay administration staff's labor to manage power, labor and maintenance costs.
- Operational Costs: Costs associated with project operation would consist of City of Lindsay staff to operate the system and associated power costs to run the U.V. system at an annual cost of $3,600. These costs are based on similar operations for similar systems.
- Maintenance Costs: Costs associated with project maintenance cover labor time for City of Lindsay staff operate and maintain the facilities. In addition, the steel water storage tank and the hydropneumatic tank will need to be repainted every ten (10) years at a cost of $35,000 every occurrence, and a tank inspection is required one in every three years at a cost of $25,000 for each inspection.
- Replacement Costs: Costs associated with project replacement would consist of the replacement of the interior of the steel water storage tank to be replaced at a cost of $0.35 to $0.45 per gallon, which equates to approximately $100,000. Replacement of the booster pumps will occur every twelve (12) years a cost of $12,000 per pump. These costs are based on similar replacements seen within the last year.

There is a high certainty that these listed benefits will be realized because the feasibility of the effort has already been investigated and the project concept was approved by CDPH. Also the City is very motivated to pursue the Project.

Table 14-6: Well 15 Water Quality Project Table 19

Table 19 – Annual Costs of Project
(All are in 2012 Dollars)

Project: Well 15 Water Quality Project

	Initial Costs Grand Total Cost from Table 7 (row (i), column (d))	Adjusted Grant Total Cost[1]	Annual Costs [2]						Discounting Calculations	
			Admin	Oper-ation	Mainte-nance	Replace-ment	Other	Total Costs (a) +…+ (g)	Discount Factor	Discounted Project Costs (h) x (i)
Year	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
2014	$401,400	$0	$75	$375	$0	$0	$0	$401,850	$1	**$401,850**
2015	$0	$0	$300	$1,500	$0	$0	$0	$1,800	$1	**$1,697**
2016	$0	$0	$300	$1,500	$100	$0	$0	$1,900	$1	**$1,691**
2017	$0	$0	$300	$1,500	$100	$0	$0	$1,900	$1	**$1,596**
2018	$0	$0	$300	$1,500	$200	$0	$0	$2,000	$1	**$1,584**
2019	$0	$0	$300	$1,500	$200	$0	$0	$2,000	$1	**$1,494**
2020	$0	$0	$300	$1,500	$300	$0	$0	$2,100	$1	**$1,481**
2021	$0	$0	$300	$1,500	$300	$0	$0	$2,100	$1	**$1,397**
2022	$0	$0	$300	$1,500	$400	$0	$0	$2,200	$1	**$1,379**
2023	$0	$0	$300	$1,500	$500	$0	$0	$2,300	$1	**$1,362**
2024	$0	$0	$300	$1,500	$500	$0	$0	$2,300	$1	**$1,283**
2025	$0	$0	$300	$1,500	$0	$45,000	$0	$46,800	$1	**$24,664**
2026	$0	$0	$300	$1,500	$0	$0	$0	$1,800	$0	**$895**
2027	$0	$0	$300	$1,500	$0	$0	$0	$1,800	$0	**$844**
2028	$0	$0	$300	$1,500	$100	$0	$0	$1,900	$0	**$840**
2029	$0	$0	$300	$1,500	$100	$0	$0	$1,900	$0	**$792**
2030	$0	$0	$300	$1,500	$200	$0	$0	$2,000	$0	**$788**
2031	$0	$0	$300	$1,500	$200	$0	$0	$2,000	$0	**$742**
2032	$0	$0	$300	$1,500	$300	$0	$0	$2,100	$0	**$735**
2033	$0	$0	$300	$1,500	$300	$0	$0	$2,100	$0	**$695**
2034	$0	$0	$300	$1,500	$400	$0	$0	$2,200	$0	**$686**
2035	$0	$0	$300	$1,500	$500	$0	$0	$2,300	$0	**$676**
2036	$0	$0	$300	$1,500	$500	$0	$0	$2,300	$0	**$639**
2037	$0	$0	$300	$1,500	$0	$45,000	$0	$46,800	$0	**$12,262**
2038	$0	$0	$300	$1,500	$0	$0	$0	$1,800	$0	**$445**
2039	$0	$0	$300	$1,500	$0	$0	$0	$1,800	$0	**$419**

Table 19 – Annual Costs of Project
(All are in 2012 Dollars)

Project: Well 15 Water Quality Project

	Initial Costs Grand Total Cost from Table 7 (row (i), column (d))	Adjusted Grant Total Cost[1]	Annual Costs [2]						Discounting Calculations	
			Admin	Oper-ation	Mainte-nance	Replace-ment	Other	Total Costs (a) +…+ (g)	Discount Factor	Discounted Project Costs (h) x (i)
Year	**(a)**	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**	**(g)**	**(h)**	**(i)**	**(j)**
2040	$0	$0	$300	$1,500	$100	$0	$0	$1,900	$0	**$418**
2041	$0	$0	$300	$1,500	$100	$0	$0	$1,900	$0	**$393**
2042	$0	$0	$300	$1,500	$200	$0	$0	$2,000	$0	**$392**
2043	$0	$0	$300	$1,500	$200	$0	$0	$2,000	$0	**$370**
2044	$0	$0	$300	$1,500	$300	$0	$0	$2,100	$0	**$365**
2045	$0	$0	$300	$1,500	$300	$0	$0	$2,100	$0	**$344**
2046	$0	$0	$300	$1,500	$400	$0	$0	$2,200	$0	**$341**
2047	$0	$0	$300	$1,500	$500	$0	$0	$2,300	$0	**$336**
2048 - Last Year of Project Life	$0	$0	$300	$1,500	$500	$0	$0	$2,300	$0	**$317**
Total Present Value of Discounted Costs (Sum of column (j)) Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries										**$466,213**
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