TUOLUMNE – STANISLAUS INTEGRATED REGIONAL WATER MANAGEMENT REGION

PROPOSITION 84 IMPLEMENTATION GRANT PROPOSAL ROUND 2

ATTACHMENT 8 – BENEFITS AND COST ANALYSIS

Integrated Regional Water Management Program
Applicant: Tuolumne County Resource Conservation District

ATTACHMENT 8 – BENEFITS AND COST ANALYSIS

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Murphys Sanitary District Wastewater Treatment Facility Sprayfield Improvement Project (TS-IRWM Project No. 2)

Project Summary

The Murphys Sanitary District (District) owns and operates a 0.20 Mgal/day dry weather flow secondary wastewater treatment facility (WWTF) serving the Disadvantaged Community of Murphys. The WWTF provides secondary effluent via pond treatment and chlorine disinfection. This disinfected secondary effluent is discharged to an effluent holding reservoir (Pond 4) where it is reclaimed by Hay Station Ranch as an agricultural irrigation water supply.

Based on ongoing communications between the District and Hay Station Ranch, and recent disposal capacity shortfall resulting in Regional Water Board issuance of Notices of Violation, it has become necessary to add supplemental effluent disposal capacity to back-up the current 0.45 Mgal/day (monthly average) effluent reclamation capacity provided by Hay Station Ranch. Under adverse climactic conditions, the reclamation capacity may not be adequate to dispose of the entire amount of effluent produced by the WWTF. To address this concern, the District purchased and evaluated 20 acres of land adjacent to the east/southeast border of the WWTF to provide supplemental/back-up effluent disposal capacity to that provided by Hay Station Ranch. This supplemental disposal capacity will provide redundancy and be utilized on an as-needed basis from year-to-year and season-to-season, depending on the irrigation needs of Hay Station Ranch and the disposal needs of the District.

The proposed Sprayfield Project would supplement the District's current effluent disposal capacity. Additional effluent disposal facilities would assure complete land containment of all effluent under foreseeable climactic conditions and Hay Station Ranch/District needs. The Sprayfield Project does not add capacity to the WWTF, but rather is added solely to provide redundant/back-up effluent disposal to that provided by Hay Station Ranch. The addition of this safety feature is needed to help avoid public health concerns and protect the environment. Notices of Violation related to the bypass of treatment protocols and the exceedance of regulated freeboard requirements were recently issued against the District as a result of inadequate disposal capacity.

The improvements described below will occur with the implementation of the proposed project as currently designed:

1. Site Preparation: The District will utilize and possibly upgrade existing access roads.
2. Irrigation Installation: Approximately 11.4 acres of sprinklers on 20 acres of land will be buried and/or installed above ground (TBD during detailed design) from the irrigation pump station to the individual sprinklers.
3. Effluent Runoff Containment Facilities: A ditch berm system will be installed around the toe of the property slopes to channel any effluent runoff to one of two catchment basins for re-circulation and re-application to the disposal area. These runoff containment facilities ensure that effluent will not runoff and enter any nearby waterways. The ditches/berms for these facilities will be small, ranging from 1 to 2 feet high and located strategically in areas to intercept any effluent runoff that may occur and route it to onsite containment facilities.
4. Irrigation Pump Station: An irrigation pump station will be located on the property adjacent to the WWTF ponds.

5. Monitoring Wells: Additional groundwater monitoring wells will be installed pending Regional Water Board requirements. The wells will consist of a small well pad and a stove-pipe well head for data collection.
6. Fencing & Signs: If necessary, the project areas will be restricted from public trespass by fencing & signs.
7. Operation: Under the proposed project, it is estimated that the total amount of effluent irrigation per year will depend on Hay Station Ranch effluent needs and climactic factors. The proposed effluent disposal system would be operated during dry weather to the extent needed to maintain compliance with Regional Water Board regulations. The irrigation areas will be maintained to prevent accumulation of debris that may create an atypical fire hazard for the area.

Without Project and With Project Comparison

The treatment facilities essentially take domestic wastewater, an unusable toxic material, and treat it into a usable, affordable, and necessary resource for nearby agricultural property. This in turn promotes water conservation and wastewater reuse in order to help achieve long term reduction of potable water use. Construction of the back-up disposal system would increase the ability to reliably contain the District's effluent. The project is estimated to provide 9.3 million gallons of supplemental disposal capacity during heavy precipitation years and 11.5 million gallons of supplemental disposal capacity during average precipitation years. Providing this supplemental disposal capacity would prevent surface water contamination from spilled effluent and potential costs associated with environmental cleanup. The project's implementation would protect beneficial uses of surrounding areas, help the District meet or exceed Waste Discharge Requirements, and comply with water quality regulations thereby ensuring public health and the environment are protected. Groundwater contamination reduction would be achieved by providing a disposal system that will utilize appropriate agronomic loading rates rather that requiring the current agricultural reclamation area to take more effluent than can be absorbed by the crops. Construction of the back-up disposal system would provide habitat & waterway protection by preventing failure to completely contain the District's effluent. Any spilled effluent or wastewater bypass of treatment facilities has the potential to harm nearby ecosystems and habitat that may come in contact with flowing wastewater.

The District recently received a planning grant to move forward with design of a Wastewater Treatment Facility upgrade. Final implementation of the upgrade is several years into the future. The upgrade would ultimately provide a Title-22 compliant tertiary wastewater treatment plant; however it would not provide the increased disposal capacity currently needed by the District to provide irrigation flexibility to Hay Station Ranch in years with average to heavy precipitation. Benefits from the future upgrade project would include increased water quality. For the Ranch, this translates into the District's ability to deliver better quality effluent which would result in increased agricultural options for use of the effluent (i.e. spray for frost protection). In this respect, the Sprayfield Project will complement the planned future upgrade by promoting irrigation flexibility and agricultural efficiency. Without the supplemental disposal capacity provided by the proposed Sprayfield Project the District would still need to "push" contractual effluent quantities onto the Ranch under adverse climactic conditions which causes strain in the relationship between the District and the Ranch. Because the Water Board considers even Title 22 compliant effluent as wastewater, the planned upgrade would still not address State water quality concerns related to reservoir freeboard, wastewater bypass, effluent disposal prohibitions, or wastewater spills.

During the 2010 disposal season, a disposal shortfall of 12.6 million gallons resulted in violations of Waste Discharge Requirements related to land disposal during rain events and exceedance of reservoir freeboard requirements. Without the Sprayfield Project, the District must rely on favorable climactic conditions to maintain compliance with Water Board regulations that pertain to reservoir freeboard, wastewater bypass, effluent disposal prohibitions, and wastewater spills.

Period of Analysis

The analysis is based on an assumed project life cycle of 50 years which includes the construction period and anticipated operational life of the Sprayfield Project.

Cost Effectiveness Analysis

The method of analysis that had been chosen by Murphys Sanitary District to analyze the benefits and cost of the proposed Sprayfield Project is the Cost Effectiveness Analysis in Section D1 of the Department of Water Resources (DWR) Proposal Solicitation Package. This method was chosen because the proposed Sprayfield Project will serve a Disadvantaged Community and project costs are less than $1 million.

Table 11 – Statement of Cost-Effectiveness **Project name: Murphys Sanitary District Wastewater Treatment Facility Sprayfield Improvement Project (TS-IRWM Project No. 2)**	
Question 1	**Types of benefits provided**
	The benefits provided by this project include: water quality protection of nearby drainages swales and streams from spilled wastewater, environmental benefits through protection of nearby ecosystems and habitat from spilled untreated wastewater, and water supply supplementation by promotion of wastewater reuse.
Question 2	**Have alternative methods of providing the same types and amounts of physical benefits as the proposed project been identified?** Yes. The following estimates and alternatives were identified and vetted: 1) Proposed Sprayfield Project- **$615,232** 2) Increased storage capacity- **$1,059,000** 3) Repair of sanitary sewer collection system to correct sources of inflow- **$1,363,035** 4) Hauling wastewater to another facility for disposal: **Not feasible**, volume is too large 5) Restricting water usage: **Not feasible**, domestic water is supplied by another entity 6) Installing temporary storage tanks: **Not feasible**, volume is too large
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.**
	The proposed Sprayfield Project is the least cost alternative. The Sprayfield Project will provide District owned and controlled supplemental effluent disposal capacity.

Comments: 1) Proposed Sprayfield Project costs are detailed in Attachment 4. 2) Increased storage capacity would include construction of additional storage pond(s) and costs are estimated to be $30,000 per acre foot of storage. The proposed Sprayfield Project would provide an estimated 11.5 million gallons of supplemental disposal capacity, therefore 35.3 acre feet (or 11.5 million gallons) at $30K per acre foot is $1,059,000. 3) A 10 year Capital Improvement Plan was established in 2008 in which the engineer's estimate of all improvements was $1,303,035 plus $6,000 per year.

Costs

The total cost to implement the proposed Sprayfield Project is approximately $615,000 of which grant funding requested under Proposition 84 is approximately $285,000. The District has already spent approximately $307,500 on property acquisition and technical studies related to the proposed project. The District is also prepared to provide approximately $22,500 in additional funds from the 2013/2014 and 2014/2015 operating budgets to implement the project.

Potential Adverse Effects

Adverse physical effects were evaluated in the project's environmental documentation. Impacts from the project can be reduced to less than significant with mitigation implemented during design and construction. Oak trees remaining within the sprayfields after construction may be negatively impacted by sprinkler irrigation. The District will continue to monitor oaks after project implementation and provide mitigation if warranted.

Table 19 – Annual Costs of Project

(All costs should be in 2012 Dollars)

Project: Murphys Sanitary District Wastewater Treatment Facility Sprayfield Improvement Project (TS-IRWM Project No. 2)

	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	$328,522		$0	$0	$0	$0	$0	$328,522	1.000	$328,522.00
2013	$27,360		$0	$0	$0	$0	$0	$27,360	0.943	$25,800.48
2014	$259,350		$1,500	$2,240	$0	$0	$0	$263,090	0.890	$234,150.10
2015			$1,500	$2,240	$1,000	$0	$0	$4,740	0.840	$3,981.60
2016			$1,500	$2,240	$1,000	$0	$0	$4,740	0.792	$3,754.08
2017			$1,500	$2,240	$1,000	$0	$0	$4,740	0.747	$3,540.78
2018			$1,500	$2,240	$1,000	$0	$0	$4,740	0.705	$3,341.70
2019			$1,500	$2,240	$3,000	$0	$0	$6,740	0.665	$4,482.10
2020			$1,500	$2,240	$1,000	$0	$0	$4,740	0.627	$2,971.98
2021			$1,500	$2,240	$1,000	$0	$0	$4,740	0.592	$2,806.08
2022			$1,500	$2,240	$1,000	$0	$0	$4,740	0.558	$2,644.92
2023			$21,500	$2,240	$1,000	$0	$0	$24,740	0.527	$13,037.98
2024			$1,500	$2,240	$3,000	$0	$0	$6,740	0.497	$3,349.78
2025			$1,500	$2,240	$1,000	$0	$0	$4,740	0.469	$2,223.06
2026			$1,500	$2,240	$1,000	$0	$0	$4,740	0.442	$2,095.08
2027			$1,500	$2,240	$1,000	$0	$0	$4,740	0.417	$1,976.58

2028			$1,500	$2,240	$1,000	$0	$0	$4,740	0.394	$1,867.56
2029			$1,500	$2,240	$3,000	$0	$0	$6,740	0.371	$2,500.54
2030			$1,500	$2,240	$1,000	$0	$0	$4,740	0.350	$1,659.00
2031			$1,500	$2,240	$1,000	$0	$0	$4,740	0.331	$1,568.94
2032			$1,500	$2,240	$1,000	$0	$0	$4,740	0.312	$1,478.88
2033			$21,500	$2,240	$1,000	$0	$0	$24,740	0.294	$7,273.56
2034			$1,500	$2,240	$3,000	$0	$0	$6,740	0.278	$1,873.72
2035			$1,500	$2,240	$1,000	$0	$0	$4,740	0.262	$1,241.88
2036			$1,500	$2,240	$1,000	$0	$0	$4,740	0.247	$1,170.78
2037			$1,500	$2,240	$1,000	$0	$0	$4,740	0.233	$1,104.42
2038			$1,500	$2,240	$1,000	$0	$0	$4,740	0.220	$1,042.80
2039			$1,500	$2,240	$3,000	$0	$0	$6,740	0.207	$1,395.18
2040			$1,500	$2,240	$1,000	$0	$0	$4,740	0.196	$929.04
2041			$1,500	$2,240	$1,000	$0	$0	$4,740	0.185	$876.90
2042			$1,500	$2,240	$1,000	$0	$0	$4,740	0.174	$824.76
2043			$21,500	$2,240	$1,000	$0	$0	$24,740	0.164	$4,057.36
2044			$1,500	$2,240	$3,000	$148,200	$0	$154,940	0.155	$24,015.70
2045			$1,500	$2,240	$1,000	$0	$0	$4,740	0.146	$692.04
2046			$1,500	$2,240	$1,000	$0	$0	$4,740	0.138	$654.12
2047			$1,500	$2,240	$1,000	$0	$0	$4,740	0.130	$616.20
2048			$1,500	$2,240	$1,000	$0	$0	$4,740	0.123	$583.02
2049			$1,500	$2,240	$3,000	$0	$0	$6,740	0.116	$781.84
2050			$1,500	$2,240	$1,000	$0	$0	$4,740	0.109	$516.66
2051			$1,500	$2,240	$1,000	$0	$0	$4,740	0.103	$488.22
2052			$1,500	$2,240	$1,000	$0	$0	$4,740	0.097	$459.78
2053			$21,500	$2,240	$1,000	$0	$0	$24,740	0.092	$2,276.08
2054			$1,500	$2,240	$3,000	$0	$0	$6,740	0.087	$586.38
2055			$1,500	$2,240	$1,000	$0	$0	$4,740	0.082	$388.68
2056			$1,500	$2,240	$1,000	$0	$0	$4,740	0.077	$364.98

2057			$1,500	$2,240	$1,000	$0	$0	$4,740	0.073	$346.02
2058			$1,500	$2,240	$1,000	$0	$0	$4,740	0.069	$327.06
2059			$1,500	$2,240	$3,000	$0	$0	$6,740	0.065	$438.10
2060			$1,500	$2,240	$1,000	$0	$0	$4,740	0.061	$289.14
2061			$1,500	$2,240	$1,000	$0	$0	$4,740	0.058	$274.92
Total Present Value of Discounted Costs (Sum of column (j)) **Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries**										**$703,642.56**

Comments: Administration costs are limited to assumed average monthly costs for Water Board permit compliance of $125 with increased administration costs of $20,000 for permit updates at assumed 10-year increments. Operation costs are estimated based on an assumed average of 1 operator for 1 hour/week at $35/hour and $35 per month for energy costs based on annual power bills (Vendor Report attached) for existing District pumping facilities. Maintenance costs are an assumed annual average of $1,000 with increased maintenance cost of $3,000 at 5-year increments. Replacement costs are assumed to be incurred after 30 years and are based on $13,000 per acre for 11.4 acres (preliminary engineers estimate of project is attached).

Stanislaus National Forest Upper South Fork Stanislaus River Watershed Restoration and Water Quality Enhancement Project (T-S IRWM Project No. 9)

Project Summary

The Stanislaus National Forest plans to implement the Upper South Fork Stanislaus River Watershed Restoration and Water Quality Enhancement Project. This project would restore seven degraded meadows and maintain road culverts currently contributing to erosion on the Stanislaus National Forest in a watershed that is of critical importance to the region. The Upper South Fork Stanislaus River Watershed not only hosts a diversity of meadows, fens, springs, and key aquatic species' habitat, but is also a headwater source for the municipal water supply of Tuolumne County. This project will restore Bloomer Lake, Bluff, Groundhog, and Coyote Meadows which currently have headcuts that are lowering the water table and must be stabilized to protect meadow values and ecosystem function. In addition, the stream channel in Coyote Meadow is flowing down the Coyote Meadow trail, degrading water quality and wetland habitat. Re-routing the trail will improve water quality and also prevent further degradation of a nearby Yosemite toad breeding pool. The project will also restore Leland Gully and Upper and Middle Three Meadows which have deep gullies that have dried these meadows and impaired their functionality. Filling these gullies and redesigning the stream channels will re-wet the meadows and restore their natural functioning. Additionally, the project will maintain 40 road culverts in the watershed that have been identified as at-risk of failure due to damage or plugging. These repairs will allow water, debris and sediment to pass normally through stream systems and will reduce erosion of road surfaces and fill material that would harm water quality and aquatic ecosystems.

Benefits of the project will include:

- Water Supply - Protection and improvement of water storage in meadows.
- Water Quality – Reduction of sediment from eroding streambanks, roads, and culverts. Protection and enhancement of natural meadow water filtration function.
- Environmental Benefits - Protection and restoration of meadows that have particular habitat values for mule deer, Yosemite toad, and Great Gray Owl.
- Recreation and Public Access – Improved trail conditions on a rerouted trail. Improved hunting opportunities by improving deer fawning conditions.
- Flood Control – Decreased magnitude of flood flows by protecting and restoring stream floodplain connectivity and water storage in meadows.
- Climate change - Protection and increase of carbon storage capacity in meadows.

Project costs and benefits are discussed in detail in the remainder of this attachment.

The Without Project Baseline

The Upper South Fork Stanislaus River Watershed is a headwater source of municipal water that serves over 80% of Tuolumne County. In addition it is of special value because this area supports an unusual diversity of meadow, fen, and spring habitats and is home to rare species including the Yosemite toad. Yet, watershed values are at risk from a number of threats including: wildfire, recreation, meadow degradation and sedimentation. The Stanislaus National Forest has already invested in ecosystem restoration to preserve the values of this important watershed. However, the watershed remains at risk from loss of meadow ecosystem function and reduced water quality from road sediment inputs.

Without project implementation, the stream channels in Coyote, Bloomer Lake, Bluff, and Groundhog Meadows will continue to incise, forming gullies and lowering groundwater elevation in these meadows. As a result, proper hydrologic function will eventually be lost in approximately 29 acres of meadow ecosystems located upstream of existing headcuts. This will result in reduced water storage capacity, increased sedimentation, degradation of wildlife habitat, decreased recreational opportunities, reduced flood attenuation capability, and reduced carbon storage. In Leland Gully, Upper Three Meadows, and Middle Three Meadows, gullies have substantially lowered the water table and riparian meadow vegetation has been replaced with sparse dry land plants. Failure to implement the project would mean a lost opportunity to restore proper functioning to 49 acres of meadow. Potential gains in water storage, water quality, wildlife habitat, recreation, flood attenuation, and carbon storage would not be realized.

Without project implementation, damaged and plugged culverts in the watershed will not be maintained to design specifications. These culverts will remain vulnerable to risk of failure, resulting in increased road surface erosion and complete fill failure at some locations. In the absence of this project increased sediment originating from the road system will be delivered to downstream meadow and stream environments, impairing water quality and ecosystem function.

	Table 12 – Non-monetized Benefits Checklist **Stanislaus National Forest Upper South Fork Stanislaus River Watershed Restoration and Water Quality Enhancement Project (T-S IRWM Project No. 9)**	
No.	**Question**	
	Community/Social Benefits	
	Will the proposal	
1	**Provide education or technology benefits?**	No
2	**Provide social recreation or access benefits?**	Yes
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?**	Yes
7	**Improve water quality in ways that were not quantified in Attachment 7?**	Yes
8	**Reduce net emissions in ways that were not quantified in Attachment 7?**	Yes
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?**	No
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?**	No
14	**Improve water supply reliability in ways not quantified in Attachment 7?**	Yes
15	**Other (If the above listed categories do not apply, provide non-monetized benefit description)?**	No

Non-monetized Benefits

Non monetized benefits are summarized in Table 12. All project benefits are non-monetized. While research at other sites in the Sierras indicates the types of benefits that will be realized, it is not possible to quantify all benefits of restoring these meadows and to monetize those benefits given existing data. Years of pre-implementation data collection is necessary to assemble accurate background information for comparison to post-implementation data for quantification of monetary benefits. The benefits from project implementation at Coyote, Bloomer Lake, Bluff, and Groundhog meadows all come in the form of protection of resource values that will be lost if the meadows are untreated. However we lack sufficient data to put a timetable on the expected loss of these functions. The rate of loss may be highly variable based on climactic conditions and the progression of vegetation changes in the meadows. The Stanislaus National Forest has recently implemented monitoring of the rate of headcut movement in several meadows which in the future will help us to predict how quickly values such as water storage, water quality benefits, wildlife habitat, and carbon storage will be lost. We also lack sufficient data on the frequency of culvert failure and on the proportional contribution of malfunctioning culverts to ongoing road erosion to fully quantify those benefits. Further, where benefits can be better quantified, such as acres of habitat improvement for Yosemite Toad, available market information is lacking for an evaluation of willingness to pay in order to monetize these benefits. Nonetheless, based on research at other sites in the Sierra Nevada and previous experience on the Stanislaus National Forest, there is a high degree of certainty that project implementation will lead to the following types of benefits:

Community/Social benefits

Provides social recreation or access benefits: One component of Coyote Meadow restoration is to reroute 0.3 miles of trail from adjacent to the stream to the forest edge of the meadow. This trail provides hiking, equestrian and backpacking access to the Emigrant Wilderness yet the current proximity to the stream channel and wet meadow location frequently results in wet and muddy conditions that discourage travel. Rerouting this trail will provide an improved travel path that will remain dry and provide a more beneficial recreational experience to forest visitors. As this is not a quota trailhead, current visitor use rates are not quantified.

Hunting, an important recreational activity for the local economy, will be improved in the watershed through improvement of deer habitat quality. All meadows proposed for restoration in this project will likely be utilized by mule deer for summer forage and as fawning habitat. By improving and protecting 78 acres of habitat, reproduction rates of local mule deer populations and genetic diversity will be enhanced. In addition to this contribution to mule deer population health, restoring these important habitats will allow for viable mule deer populations and sustainable hunting opportunities into the future.

Environmental Stewardship Benefits

Benefit wildlife or habitat: The proposed project would benefit wildlife and habitats by restoring and protecting 78 acres of degraded or threatened wet meadow habitat. Wet meadows are diversity hotspots for animal and plant species in the Sierra Nevada. In the current condition, wildlife habitat quality is severely compromised in 49 acres of meadow and 29 acres of meadow are at risk of becoming unsuitable habitat for meadow dependent plant and animal species. Stream and meadow wildlife habitat conditions continue to diminish as dysfunctional culverts increase sedimentation inputs from roads.

Three species that will particularly benefit from the proposed project are Yosemite toad, mule deer, and Great Gray Owl. The Yosemite toad is a Region Five Forest Service Sensitive species and a US Fish and Wildlife Service candidate species for listing in accordance with the Endangered Species Act. The Yosemite toad is dependent on wet meadow ecosystems for breeding and tadpole development. By increasing and maintaining meadow wetness, the proposed project would benefit 71 acres of meadow habitat in Coyote, Bluff, Bloomer Lake, Groundhog, Middle and Upper Three Meadows where Yosemite toad populations occur. In addition, the trail re-route at Coyote Meadow would move the trail away from an existing breeding pool, reducing the likelihood of trampling and improving water quality for eggs and tadpoles.

The project would also improve and protect 78 acres of meadow important for mule deer and Great Gray Owls. Meadows are the preferred fawning habitats for local mule deer populations. Wet meadows meet the requirements of pregnancy and lactation better than any other habitat. Wet meadows benefit Great Gray Owls by supporting foraging habitat with adequate prey. Maintaining the wet meadow habitat in Coyote, Bluff, Bloomer Lake, and Groundhog Meadows (29 acres) would protect critical deer fawning habitat and maintain habitat characteristics suitable for owls. Restoring the proper functioning of Leland Gully and Middle and Upper Three Meadows (49 acres) would improve habitat conditions for mule deer and Great Gray Owl in these meadows.

Improve water quality: This project will benefit water quality enhancing functionality in 49 acres of degraded meadow and protect 29 acres of meadow where this essential function is at risk. Functioning meadows improve water quality through several mechanisms. Native plant species that occupy moist or wet meadow ecosystems, such as sedges and willows, have deep and dense root systems that protect soil resources from erosion. These plant types are important components of functioning wet meadow ecosystems, but decline or are displaced by ecosystem change when meadow water tables are lowered. The proposed project will restore and protect these stabilizing plant communities by maintaining a natural water table and through active replanting of native species where necessary.
Properly functioning wet meadow and stream environments also benefit water quality by restoring stream floodplains. By restoring and protecting stream channel geomorphology, high flows will naturally overtop channels to deposit sediment in the floodplain instead of carrying it downstream and further increasing bank erosion. Gully formation prevents stream-floodplain interaction by concentrating flows that increase channel and bank erosion. By reconnecting streams to their natural floodplain in the degraded meadows (49 acres) and preventing floodplain disconnect in the threatened meadows (29 acres), this project will benefit water quality by decreasing sediment loads and sustaining stream-floodplain connectivity.

Wet meadows have the inherent ability to filter and transform nutrients, organic compounds, trace metals, sediments, and refractory chemicals from water as it interacts with moist meadow soils. This project would restore water quality enhancing functions that have already been degraded in Leland Gully, Upper Three Meadows, and Middle Three Meadows by restoring native plant communities have been altered, restoring floodplain connectivity, and rewetting meadow soils. Project activities would protect the water filtering and transformation benefits of meadow ecosystems in Coyote, Bloomer Lake, Bluff, and Groundhog Meadows where these functions are at risk due to headcut growth.
Returning road culverts to designed functionality will also benefit water quality by reducing sedimentation in the watershed. Plugged and damaged culverts divert storm water and streamflow onto road surfaces causing erosion. Non-functioning culverts are also at risk of catastrophic failure when the road fill fails during a high flow event. Within the project area, at least 70 cubic yards of erosion has occurred from roads directly connected to streams and 800 cubic yards of sediment could be discharged to streams were all damaged culverts to catastrophically fail. While this extreme scenario is unlikely, it provides a useful upper limit for the potential effect. By returning 40 at-risk culverts to their designed operating condition, this project will help stabilize ongoing road erosion and reduce the risk of future sediment inputs from culvert failures into the Upper South Fork Stanislaus River Watershed.

Flood attenuation: This project will restore and protect the flood attenuation capacity of seven meadows totaling 78 acres. Functioning meadows allow high stream flows to transfer from the channel to the floodplain where surface water is temporarily stored. Degraded meadows that have lost connectivity between the channel and the floodplain no longer have this capability and allow high flows to travel rapidly downstream. Leland Gully and Upper Three Meadows had poor floodplain connectivity (<50%) and project implementation will benefit these ecosystems by increasing flood attenuation capacity in 24 acres of meadow. Bluff and Middle Three Meadows have retained 50-75% floodplain connectivity; project implementation will maintain and potentially improve stream channel connectivity to 28 acres of meadow floodplains. The project will also protect flood attenuation capacity of 26 acres in Coyote, Bluff, Bloomer Lake, and Groundhog Meadows where floodplain connectivity is currently acceptable, but is at risk of degradation. The secondary benefits of increased flood attenuation capacity in the watershed include decreased channel erosion during high flows that will benefit downstream ecosystems and decreased damage to infrastructure, such as culvert washouts and road surface erosion.

Reduce Net emissions: This project is expected to increase carbon storage in 49 acres of meadow by raising the water table at Leland Gully, Upper Three and Middle Three Meadows. The current carbon storage and exact extent of increase cannot be determined with currently available data, but research on similar meadows indicates that restored meadows store on average 40 tons per acre more than degraded meadows. This could mean an increase of 1960 tonnes of carbon. In addition, carbon storage capability would be protected in 29 acres of meadow by preventing drying of Coyote, Bloomer Lake, Bluff, and Groundhog Meadows. Project implementation could prevent the loss of 1160 tonnes of carbon storage that would occur if these meadows became degraded. While the timing of future without-project loss of carbon storage cannot be predicted, in total this project would protect or increase carbon sequestration on the order of 3120 tonnes of carbon. As CO_2 emissions increase as a result of human activities, carbon sequestration is essential in stabilizing atmospheric levels of CO_2 and mitigating impacts of climate change.

Sustainability Benefits:

Provide a long-term solution in place of a short-term one: Once vegetative recovery has occurred (typically 1-3 years following implementation), meadow restorations in this project are expected to be self-maintaining. The deep root structure of the wet/moist riparian vegetation provides for high bank stability which can withstand high flows. Evidence of this self-maintaining nature has been observed through monitoring efforts at Lower Three Meadows on the Stanislaus National Forest where a restoration implemented 37 years ago still shows natural functioning. Compared to other projects that could yield similar benefits, this project will be longer lasting and will incur virtually no additional operation or maintenance costs after successful implementation.

Improve Water Supply Reliability: This project will improve water supply reliability by increasing water storage in the watershed. Functioning meadows have high water table elevation that allows the meadow to act like a sponge, storing water to be released slowly. In degraded meadows with gullies, the water table is lowered and water quickly drains from the meadow. Water storage has been diminished in Leland Gully, Middle Three Meadows, and Upper Three Meadows (49 acres) as gully formation has caused water tables have dropped. Water storage is threatened in Coyote, Bloomer Lake, Bluff, and Groundhog meadows (29 acres) where headcuts will diminish water storage in the future. By restoring water table elevations through stream channel reconstruction, project implementation will result in increased water storage in the 49 acres of meadow that are already degraded. By preventing further expansion of headcuts, the project will protect water storage capacity in 29 acres of meadow that are currently threatened. The exact amount of water to be stored and the timing of release will depend on factors such as evapotranspiration rates that cannot be accurately quantified with present data. However, it is very likely that implementation of this project will lead to increased late season flows when water has increased value both for downstream ecosystems and for municipal and hydropower users. Water stored in the project meadows is also likely to help sustain minimum flows through periods of extended drought.

Project Benefits Timeline Description

Implementation of this project began in August 2010 and if funded will continue through September 2017. Meadow restoration must take place during a narrow time window when stream flows are low and heavy precipitation is not expected. For this reason our phased approach of implementing restorations over a period of several seasons is an effective measure to ensure project success. Leland gully was implemented in 2010, providing benefits over 7 acres of meadow. In 2015, implementation would be completed at Coyote meadow providing benefits in an additional 11 acres of meadow. In 2016, an additional 18 acres of meadow would be restored at Bloomer Lake, Bluff, and Groundhog meadows. In 2017, 42 acres of degraded meadow would be restored in Upper and Middle Three Meadows. As discussed above, the without-project degradation rate of Coyote, Bloomer Lake, Bluff, and Groundhog meadows is not predictable with available data. The protective benefits of implementation would be realized soon after implementation in these meadows, but the comparison of with and without-project benefits cannot be placed on an accurate timeline. In all project meadows, full benefit levels will likely take 1-3 years to be reached as vegetative recovery occurs. Once this occurs, however, these restorations are expected to be self-sustaining with no anticipated end to operational life and no expected operation or maintenance costs. Benefits from culvert maintenance would be realized immediately upon implementation in 2013 and can be expected to have an operational life of up to 5-7 years before further maintenance may be required.

Potential Adverse Effects from the Project

Fall and early winter rainfall, as well as spring snowmelt, may cause sediment inputs to streams during the first year or two following implementation as meadows would not yet have full vegetative cover. Sediment inputs are expected to be minor and short term, as seeding, planting, and mulching would all be considered in project design to minimize bare ground. However, sediment inputs are expected to be reduced in the long term at all treatment sites because headcuts would no longer continue to advance, the trail at Coyote Meadow would be re-located, and vegetative cover would improve in the degraded meadows.

Costs

Total costs for this project are summarized in Table 19. The total cost is $684,636 in 2012 dollars and includes all costs of implementation of restoration of seven meadows and maintenance of 40 road culverts. In addition to costs detailed in the project budget, this total cost includes planning and environmental analysis costs expended before the allowable match date. Costs will be spread out over an implementation period from June 2005 through November 2017.

Table 19 – Annual Costs of Project

(All costs should be in 2012 Dollars)

Project: Stanislaus National Forest Upper South Fork Stanislaus River Watershed Restoration and Water Quality Enhancement Project (T-S IRWM Project No. 9)

	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)
2005	$0	$6,500	$0	$0	$0	$0	$0	$6,500	1.17	$7,605
2006	$0	$13,000	$0	$0	$0	$0	$0	$13,000	1.13	$14,690
2009	$5,147	$0	$0	$0	$0	$0	$0	$5,147	1.03	$5,301
2010	$15,157	$0	$0	$0	$0	$0	$0	$15,157	1.02	$15,460
2011	$0	$0	$0	$0	$0	$0	$0	$0	1.01	$0
2012	$314,425	$0	$0	$0	$0	$0	$0	$314,425	1.000	$314,425
2013	$55,654	$0	$0	$0	$0	$0	$0	$55,654	0.943	$52,482
2014	$27,154	$0	$0	$0	$0	$0	$0	$27,154	0.890	$24,167
2015	$82,654	$0	$0	$0	$0	$0	$0	$82,654	0.840	$69,429
2016	$101,154	$0	$0	$0	$0	$0	$0	$101,154	0.792	$80,114
2017	$135,157	$0	$0	$0	$0	$0	$0	$135,157	0.747	$100,962
Total Present Value of Discounted Costs (Sum of column (j)) Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries										**$684,636**

Comments: Adjusted Grant Total Costs include costs for planning and NEPA documentation at Leland Gully that occurred before allowable match date.

Tuolumne County Resource Conservation District Small Parcel Storm Water Pollution Prevention and Landowner Stewardship Program (T-S IRWM Project No. 16)

Project Summary

This project is designed to achieve immediate and lasting reductions in nutrient, sediment and pathogen pollution to surface and ground waters in the Tuolumne and Stanislaus River watersheds through implementation of Best Management Practices (BMP's) on small acreage livestock facilities. The proposed project utilizes an incentives based approach to achieve the cultural change needed for livestock facilities to voluntarily adopt management measures that improve the healthy functioning of watershed. This project will focus initially on landowners within the upper Phoenix Lake sub-watershed of the Upper Tuolumne River Watershed, but will be available County-wide in both the Stanislaus and Tuolumne watersheds, inclusive of many DAC census places and tracts.

The project will include:

1. Establishment of a local library of resources and reference materials from other successful similar programs from throughout the United States;
2. An Education and Outreach program that will include locally relevant materials that will be used for ongoing technical assistance to landowners;
3. Five Public Workshops that will include topics such as managing mud, manure, and runoff; design and installation of BMP's; water quality and livestock owner responsibility; reducing erosion; pasture and paddock management; selecting appropriate plants; and keeping pastures green;
4. Technical assistance to landowners where a TCRCD Technical Advisor would visit sites to assess and prioritize needed improvements with property owners;
5. A cost share assistance program for small parcel owners that do not qualify for NRCS programs; and,
6. Implementation and Construction of appropriate BMP's at a minimum of five priority sites.

Without Project and With Project Comparison

Conservatively estimated there are approximately 15,000 properties that have the potential to commercially or privately board livestock in the project region, none of which have been reached with technical assistance to ensure their practices and facility infrastructure are protective of water quality. Many are not even aware that they need assistance, as they are allowing erosion and manure to runoff their properties into local waterways, but are not aware that it is a problem. By offering this program to the livestock community, they increase their awareness about the impacts their property has in the watershed, and are assisted through the process of planning and implementing solutions. Without the project, the knowledge base and related behaviors will remain the same and as such, local small parcel landowners will continue to manage their properties with minimal awareness of the impacts top surface water quality. As detailed in Table 9 in Attachment 7 Technical Justification with the implementation of the proposed project there is a potential to reduce 547.5 lbs of Total Kjeldahl Nitrogen (TKN) per year or 8,212 lbs TKN entering the environment over 15 years, 127.5 lbs of total phosphorus per year or 1915 lbs of total phosphorus entering the environment over 15 years, and 11,870,348 Total Coliform colonies per horse per year or 178,055,213 Total Coliform colonies per horse entering the environment over 15 years.

Period of Analysis

The period of analysis covers the installation of BMP practices through the expected life span of the practices. Life span of the practices has been defined by the Natural Resource Conservation Service standards which will be utilized by the TCRCD when providing technical assistance and when constructing demonstration projects on priority sites. The life spans of some of the more common practices range from 10 to 20 years as shown below.

Code	Practice	Units	Lifespan
317	Composting Facility	no	15
382	Fence	ft	20
386	Field Border	ac	10
393	Filter Strip	ac	10
561	Heavy Use Area Protection	ac	10
468	Lined Waterway or Outlet	ft	15
558	Roof Runoff Structure	no	15
570	Stormwater Runoff Control	no	15
606	Subsurface Drain	ft	20
607	Surface Drain, Field Ditch	ft	15
608	Surface Drain, Main or Lateral	ft	15

Non-Monetized Benefit Analysis

The method of analysis that had been chosen by the TCRCD to analyze the benefits and cost of the proposed project is Non-Monetized Benefit Analysis in Section D2 of the Department of Water Resources (DWR) Proposal Solicitation Package. This method was chosen because the proposed project does not have any benefits that can be monetized prior to project implementation. While the costs of outreach, education, technical assistance and installation of particular BMP's can be estimated, predicting the short and long term economic benefits of these activities is speculative at best. For example, we can say that installation of one acre of vegetated filter strip on a 5-acre horse facility may cost approximately $1,720. But trying to assign a short or long term monetary value to the actual benefit of the stormwater catchment and dispersal functions of the filter strip is speculative. Similarly, because we are attempting to change landowner behaviors, the educational values are more social than economic, even though there may be secondary economic benefits resulting from those behavioral changes. Removing large amounts of sediment from domestic surface water supplies could result in decreased maintenance costs of water treatment facilities (fewer filter changes over 20-50 years?), but at the scale of our project, we are unlikely to have any measurable effect on the costs of treatment facility operations and maintenance.

Table 12 – Non-monetized Benefits Checklist Tuolumne County Resource Conservation District Small Parcel Storm Water Pollution Prevention and Landowner Stewardship Program (T-S IRWM Project No. 16)		
No.	**Question**	**Enter "Yes", "No" or "Neg"**
	Community/Social Benefits **Will the proposal**	
1	**Provide education or technology benefits?**	Yes
2	**Provide social recreation or access benefits?**	No
3	**Help avoid, reduce or resolve various public water resources conflicts?**	Yes
4	**Promote social health and safety?**	Yes
5	**Have other social benefits?**	Yes
	Environmental Stewardship Benefits: **Will the proposal**	
6	**Benefit wildlife or habitat in ways that were not quantified in Attachment 7?**	Yes
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?**	Yes
	Sustainability Benefits: **Will the proposal**	
10	**Improve the overall, long-term management of California groundwater resources?**	Yes
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?**	No
14	**Improve water supply reliability in ways not quantified in Attachment 7?**	Yes
15	**Other (If the above listed categories do not apply, provide non-monetized benefit description)?**	No

Community/Social Benefits

Provide education or technology benefits?

The project proposed by the TCRCD includes six actions that combined will obtain the physical benefits described in Attachment 7 Technical Justification. The first four actions that will be implemented will provide education to small acreage landowners in the Stanislaus and Tuolumne River watersheds. These actions include; establishment of a local library of resources and reference materials, an education and outreach program, public workshops, and technical assistance to landowners. A local water quality database will also be established, providing technological benefits.

Help avoid, reduce or resolve various public water resources conflicts?
TCRCD will utilize the Community-Based Social Marketing methods, detailed in Attachment 7 Technical Justification to increase awareness and over the long-term achieve behavioral changes that will benefit water quality. Research shows that people will choose the behavior that has the fewest barriers and the most benefits. The TCRCD hopes to understand and influence all of the factors in behavioral choices so that managing livestock facilities in a way that is protective of water quality *is* "what makes sense" to landowners.

Promote social health and safety?
Through the proposed project, the TCRCD hopes to educate small acreage landowners on positive ways to protect water quality through BMPs. A link will be made between water quality improvements and public health concerns as a part of the Community-Based Social Marketing approach. Additionally, a key challenge on livestock facility sites is "dust in summer, mud in winter". When we reduce this source of sediment pollution from livestock impact areas and dirt roads through implementation of BMPs, we also decrease the dust problem, a localized air quality concern in livestock facility neighborhoods during the dry season.

Have other social benefits?
The primary justification for the project is surface water quality enhancement and protection. The benefits achieved by the small acreage landowners who participate in the program will be seen by the local community and the IRWM region as a whole. Improvements to water quality, wildlife habitat, flood control, and ground water resources will be beneficial to everyone living in the Stanislaus and Tuolumne River watersheds and to the greater San Joaquin River watershed. By creating a culture of water quality protection, as described above, the benefits will spread throughout each watershed. Working with the project team, and our stakeholders (which include watershed working groups), this benefit will be quickly disseminated. The watersheds in the project region that host livestock facilities also include irrigated agriculture, timber harvesting and/or grazing land uses. Those land uses have been under increasing pressure, including new regulations, to improve water quality. This program will help spread the message in the communities that non-point source pollution is everyone's responsibility, not just those industries. Finally, by using the best available scientific approach to achieving these changes (Community-Based Social Marketing), we are additionally creating a cultural change in the community that will deliver benefits beyond the immediate program participants and into the future, both in our project region and beyond.

Environmental Stewardship Benefits

Benefit wildlife or habitat in ways that were not quantified in Attachment 7?
Benefits related to improvement of surface water quality include habitat improvement for regionally important listed and special status species. The riparian habitats adjacent to the project demonstration sites where BMPs will be implemented will benefit from the practices that will help reduce sediment, nutrients and bacteriological pathogens from storm water flows into the Tuolumne and Stanislaus Rivers.

Provide other environmental stewardship benefits, other than those claimed in Sections D1, D3, or D4?
This project is designed to be a source reduction and pollution prevention program. For example we will both reduce the sources of and the transport of sediment off livestock facility sites. While we cannot reduce the volume of manure, which is the source of nutrient and pathogen pollution targeted, we will

reduce the volume of manure exposed to the elements and vulnerable to mobilization. We will also reduce the transport of those pollutants off site. These reductions will be achieved via proper storage and management, and drainage improvements on livestock facility sites. This strategy will be applied within all site assessment, planning and BMP recommendations, as well as promoted in trainings to create a pollution prevention culture among all livestock facility participants, and in turn, the larger community of livestock owners and boarders. The TCRCD demonstration sites and educational outreach will improve local flood management through installation of site-specific stormwater control and treatment improvements. Localized installation of BMP's such as filter strips, french drains and others on small acreage parcels have been proven to directly reduce stormwater flows into adjacent waterways and provide runoff treatment and infiltration areas.

Sustainability Benefits

Improve the overall, long-term management of California groundwater resources?
While the primary justification for the project is surface water quality enhancement and protection, nitrate contamination can also compromise shallow groundwater aquifers in the project area. The project will protect groundwater by reducing nitrate leaching by reducing the exposure of manure to rainfall.

Provide a long-term solution in place of a short-term one?
The proposed project utilizes an incentives based approach to achieve the cultural change needed for livestock facilities to voluntarily adopt management measures that improve the healthy functioning of watershed. This is the initial step in what the TCRCD envisions as an on-going self-sustaining program related to land stewardship for small acreage landowners. In order to achieve the desired long-term change in behavior that will benefit water quality the TCRCD will utilize the Community-Based Social Marketing methods detailed in Attachment 7 Technical Justification.

Additionally, the project is designed to contribute to the lasting and long-term attainment of water quality objectives as follows:

- Through the creation of a self-sustaining network, resources are developed in the community to continue to promote the adoption and installation of BMPs that are protective of water quality.

- Each implementation site agreement will contain language that commits the landowner to maintaining the improvements or practices into the future, as well as allowing access to their site by future program participants and interested livestock owners.

- Each of the implementation site land owners and technical training participants will leave the program with the knowledge and ability to guide water quality protective improvements to their property into the future.

- NRCS and RCD staff are available and well equipped past the end of the grant term to assist owners, who will know how to access their services better after the grant project.

Improve water supply reliability in ways not quantified in Attachment 7?
Secondary benefits of implementing the proposed project include those related to water supply treatment operation and maintenance. With decreased concentrations of sediments in surface water sources, there may be potential decreased costs of ongoing maintenance and filter replacement for the local domestic water supply infrastructure associated with Phoenix Lake. At the scale of our project, however, it is unlikely that these cost savings would be significant, or even measurable.

Costs

The total cost to implement the proposed project is approximately $340,000 of which grant funding requested under Proposition 84 is approximately $250,000. In addition to the cost detailed in the project budget the TCRCD Board members and the TCRCD Stream Team water quality monitoring volunteers will provide an additional $90,000 in in-kind services.

Potential Adverse Effects

The only potential adverse effects that have been identified are short term and less than significant impacts related to the construction of BMPs on project sites, impacts include dust, noise, etc.

Table 19 – Annual Costs of Project

(All costs should be in 2012 Dollars)

Project: Tuolumne County Resource Conservation District Small Parcel Storm Water Pollution Prevention and Landowner Stewardship Program (T-S IRWM Project No. 16)

	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)**
2009	$8,800.00							$8,800.00	1.03	$9,064.00
2010	$8,800.00							$8,800.00	1.02	$8,976.00
2011	$7,800.00							$7,800.00	1.01	$7,878.00
2012	$10,500.00							$10,500.00	1.000	$10,500.00
2013	$14,700.00							$14,700.00	0.943	$13,862.10
2014	$40,900.00							$40,900.00	0.890	$36,401.00
2015	$71,380.00							$71,380.00	0.840	$59,959.20
2016	$86,085.00							$86,085.00	0.792	$68,179.32
2017	$102,805.00							$102,805.00	0.747	$76,795.34
								Total Present Value of Discounted Costs (Sum of column (j))		**$291,614.96**
								Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries		

Comments: Operation and maintenance of the demonstration project will be the responsibility of the landowners and as such are not included in this table.

Amador Tuolumne Community Action Agency Home-Level Water Conservation for the DAC (T-S IRWM Project No. 17)

Project Summary

The Amador Tuolumne Community Action Agency (ATCAA) proposes a project that directly addresses the DAC on a case-by-case basis. Our goal is to stabilize or lower water rates by conducting water conservation measures in homes to reduce consumption, in conjunction with our current home weatherization efforts. The existing ATCAA Low Income Home Energy Assistance Program is completely financed by grants from Departments of Energy (DOE) & Health and Human Services (HHS), and specifically addresses energy conservation in homes in an effort to help low income households to become self sufficient. This proposed Home-Level Water Conservation Program would be an extension of that existing program, and would extend the energy conservation efforts to include water conservation in the same homes. ATCAA will perform outreach and accept applications from residents who live within the Tuolumne River and Stanislaus River watersheds in Tuolumne and Calaveras Counties. ATCAA has a state approved process for prioritizing work based on total household income and if members of the household are frail elderly, medically needy, experiencing severe financial hardship or when the household includes children under the age of 5. ATCAA would apply this same process and thereby help those members of the DAC who have the most need. ATCAA would 1) leverage our existing grants and infrastructure in order to conduct water conservation measures in as many homes as possible, 2) maximize and quantify the amount of water and ratepayer dollars saved and 3) provide the DAC with assistance that is unavailable elsewhere.

Without Project and With Project Comparison

Without this project the indoor water consumption would be 550 acre feet in the 192 households over the expected project life. The potential savings of 182 acre feet would not be realized without project implementation. Additionally, without the proposed project it would be more difficult for these DAC households to implement water conservation measures. This analysis is detailed in Attachment 7 Technical Justification.

Period of Analysis

The useful life of the installed measure is estimated to be 12 years and as such is being used as the period of analysis.

Table 11 – Statement of Cost-Effectiveness **Project name: Amador Tuolumne Community Action Agency Home-Level Water Conservation for the DAC (T-S IRWM Project No. 17)**	
Question 1	**Types of benefits provided:**
	Water Supply Benefit: This project improves water supply by reducing demand. The proposed project will accomplish this benefit by replacing inefficient appliances with Energy Star appliances and low flow fixtures. **Secondary Benefits of Water Quality:** **Social Benefits:**

	For the lowest income households within this region purchasing an adequate supply of water to meet their daily needs can be a financial hardship. ATCAA has found that members of the DAC, because of their lower incomes, are less likely to spend money on water conservation measures, even if it could result in a future savings. This is compounded in times of drought when these communities are disproportionately burdened by enforced conservation measures. The benefit of implementing this project will be that households which otherwise could not afford to make these upgrades will now have access to their benefits. **Power Cost Savings Benefit:** As part of the proposed project, appliances and low flow fixtures will be installed. This will improve the energy efficiency of the home-level infrastructure by reducing the amount of water that needs to be heated, and saving the corresponding energy.
Question 2	**Have alternative methods of providing the same types and amounts of physical benefits as the proposed project been identified?**
	Yes, in the past water districts have attempted to compel end users to conserve water through metering and charging higher rates for the heaviest users. In addition districts have also attempted outreach and education. Despite these efforts, annual emergency conservation measures have been required as the frequency and severity of droughts increase. The Tuolumne-Stanislaus region has never had a bona fide home-level water conservation program.
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.**
	ATCAA has an established program infrastructure for implementing conservation measures in DAC households. By building upon this existing infrastructure water conservation for DAC's becomes an achievable and cost effective alternative. If other agencies in the T-S IRWM region tried to take on this project it would require a much larger budget to include planning and development costs. ATCAA's current infrastructure allows them to implement this program with relatively low start up costs.
Comments:	

Costs

Grant funding requested under Proposition 84 for implementation of the "Home-Level Water Conservation for the DAC" project is $200,000. ATCAA will be requesting a funding match waiver because 100% of the beneficiaries of this project will be members of the DAC.

Potential Adverse Effects

No adverse physical effects are anticipated

Table 19 – Annual Costs of Project

(All costs should be in 2012 Dollars)

Project: Amador Tuolumne Community Action Agency Home-Level Water Conservation for the DAC (T-S IRWM Project No. 17)

	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							0	1.000	0
2013	$12,862							$12,862	0.943	$12,128
2014	$51,446							$51,446	0.890	$45,787
2015	$51,446							$51,446	0.840	$43,215
2016	$51,446							$51,446	0.792	$40,745
2017	$38,585							$38,585	0.747	$28,823
								Total Present Value of Discounted Costs (Sum of column (j)) Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries		**$170,698**

Comments:

Tuolumne Utilities District Phoenix Lake Preservation and Restoration-Phase 2 (T-S IRWM Project No. 18)

Project Summary

Phoenix Lake is an 88-acre water storage reservoir located approximately 3 miles east of the City of Sonora in Tuolumne County, California. Phoenix Lake water rights and facilities, as well as portions of the lake, are owned by the Tuolumne Utilities District (TUD). The TUD uses the lake as a primary drinking water source for the communities of Sonora, Jamestown, Scenic View and Mono Village.

The Phoenix Lake Preservation and Restoration-Phase 2 project is designed to improve the water quality and restore storage capacity in Phoenix Lake and the Phoenix Lake watershed (see Figure 1-1). A very comprehensive and diverse plan has been developed for the restoration and preservation of Phoenix Lake and the surrounding watershed. This project will finalize the 30% design completed in the Plan, complete all necessary environmental reviews and obtain the required permits to implement the Plan.

The goal of this project is to continue the previous work completed in Phase 1 of the Phoenix Lake Preservation and Restoration project. The Plan, or Phase 1, has developed a roadmap for the TUD to restore and preserve the lake and improve the water quality in the surrounding watershed. Phase 2 of the PLPRP will do the following:

- Develop complete engineering plans for the lake improvements including; dredging plans, sediment forebay design, and wetland enhancement design.
- Complete the necessary environmental review (CEQA and NEPA).
- Obtain the required regulatory permits and compliance for Phase 3, lake improvement implementation.
- Purchase the required land for the sediment forebay.

Without Project and With Project Comparison

Historical and current data shows that the storage capacity of the lake has decreased substantially due to sedimentation. A comparison of bathymetric surveys from 2002 and 2010 suggests that on average approximately 4,600 cubic yards (cy) of sediment enters the lake annually. This sediment delivery estimate is more than three times the rate reported in previous studies. While the allowable storage capacity of the lake is approximately 900 acre-feet (ac-ft), the current capacity is only 600 ac-ft. Reduced lake capacity affects the water quality at Phoenix Lake, which is marginal at times and is declining due to nutrient inputs, sedimentation and exotic invasive aquatic vegetation.

The annual loss of storage capacity is approximately 2.8 ac-ft which equates to the lost water supply for 9 homes on an annual basis.

If the project is not completed the lake will continue to fill with sediment, decreasing the storage capacity, while promoting the proliferation of aquatic vegetation. These factors contribute to declining water quality conditions.

By comparing bathymetric surveys from 2002 and 2010 the data suggests that on average approximately 4,600 cubic yards (cy) of sediment enters the lake annually. This sediment delivery estimate is more than three times the rate reported in previous studies. While the allowable storage capacity of the lake is approximately 900 acre-feet (ac-ft), the current capacity is only 600 ac-ft. Reduced lake capacity affects

the water quality at Phoenix Lake, which is marginal at times and is declining due to nutrient inputs, sedimentation and exotic invasive aquatic vegetation.

The annual loss of storage capacity is approximately 2.8 ac-ft which equates to the water supply for 9 homes on an annual basis. The Lake Plan proposes to remove more than 400,000 cy of sediment from the lake. Wetland enhancements include floodplain and channel reconstruction to provide habitat diversity and manage sedimentation patterns.

The proposed sediment forebay will trap coarse sediment entering the lake. When implemented, the Lake Plan will restore storage capacity in the reservoir while preserving recreational, aesthetic and wetland values at the lake. Assuming an average annual deposition rate of 4,600 cy, removing more than 400,000 cy of sediment would extend the life of the reservoir by more than 85 years.

Period of Analysis

The analysis will be based on a project's life cycle specified by the applicant which shall include the construction period and operational life.

Table 12 – Non-monetized Benefits Checklist

Tuolumne Utilities District Phoenix Lake Preservation and Restoration-Phase 2 (T-S IRWM Project No. 18)

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
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?**	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?**	No
	Sustainability Benefits: **Will the proposal**	
10	**Improve the overall, long-term management of California groundwater resources?**	No
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?**	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)?**	No

No. 3: Help avoid, reduce or resolve various public water resources conflicts?
The environmental process that will be completed in the Phoenix Lake Preservation and Restoration-Phase 2 will include a comprehensive environmental document(s) adhering to the CEQA process. The CEQA process is an open forum promoting input from all advisory agencies as well as adjacent property owners, the Phoenix Lake Task Force and the general public. This is an excellent forum that allows the public an opportunity to aid in the direction and scope of this important water quality and water supply project. Phase 2 will determine how Phoenix Lake is managed and operated for the long-term. The preliminary improvement plans are very comprehensive and diverse connecting water quality improvements, storage capacity restoration, wetland habitat improvements, and public access and fire management concerns. The environmental review process will afford each interest group, regulatory agency, state and local government, adjacent property owner and the general public an opportunity to comment on the proposed lake improvement plans.

No. 12: Provide a long-term solution in place of a short term one?
In 2010, the TUD received a grant from the Sierra Nevada Conservancy (SNC) to perform a comprehensive study of Phoenix Lake and its watershed, with emphasis on the environmental factors that influence water quality, storage capacity and wildlife habitat. The TUD hired consultant Horizon Water and Environment (Horizon) to assist with the study. This Phoenix Lake Preservation and Restoration Plan (PLPRP or Plan) is the culmination of a 2-year investigation that identified stressors on Phoenix Lake and developed strategies to restore and preserve the lake's functions and values.

The Plan provides TUD with a roadmap for restoring and preserving the functions and values of Phoenix Lake. Critical functions and values of the lake include water supply, water quality, wildlife habitat, recreation, and aesthetics. Additional objectives of the PLPRP include investigating opportunities for public access; outreach to local landowners and residents on Best Management Practices (BMPs) to protect the lake; and developing pre-fire management strategies.

The Lake Plan includes sediment removal activities, restoring and enhancing wetlands, creating beach and island habitats, and constructing a sediment forebay. The Lake Plan proposes to remove more than 400,000 cy of sediment from the lake. Wetland enhancements include floodplain and channel reconstruction to provide habitat diversity and manage sedimentation patterns. The proposed sediment forebay will trap coarse sediment entering the lake.

When implemented, the Lake Plan will restore storage capacity in the reservoir while preserving recreational, aesthetic and wetland values at the lake. Assuming an average annual deposition rate of 4,600 cy, removing more than 400,000 cy of sediment would extend the life of the reservoir by more than 85 years. Sediment management activities in wetland areas would further increase the life of the reservoir by trapping sediment in locations that can be regularly maintained with conventional equipment.

Costs

Grant funding requested under Proposition 84 for implementation of the Phoenix Lake Preservation and Restoration-Phase 2 is $1,700,000.

Phoenix Lake is an 88-acre water storage reservoir located approximately 3 miles east of the City of Sonora in Tuolumne County, California. Phoenix Lake water rights and facilities, as well as portions of the lake, are owned by the Tuolumne Utilities District (TUD). The TUD uses the lake as a primary drinking water source for the communities of Sonora, Jamestown, Scenic View and Mono Village.

Since 83% of the service area is in a Census Tract DAC the match provided will be 17% of the standard 25% match required. This equates to a match amount of $72,250. The funding source for the match will be in-kind services from TUD labor. The burdened rate of an Associate Engineer performing project management and design tasks is currently $77/hour. Approximately 938 hours of in-kind services will be used for the required funding match.

In July of 2012 the Phoenix Lake Preservation and Restoration Plan (Phase 1) was completed. The Plan provides TUD with a roadmap for restoring and preserving the functions and values of Phoenix Lake. Critical functions and values of the lake include water supply, water quality, wildlife habitat, recreation, and aesthetics.

Included in the completion of the Plan are 30% conceptual improvement plans. These plans address sediment removal (dredging), lake restoration, sediment forebay, and wetland habitat improvements.

The cost estimate for this project includes the following tasks:

- Project/Grant Administration
- Land Purchase
- Design/Environmental Documentation/Permitting

For a detailed breakdown of the costs of the various tasks please refer to Attachment 4 - Budget. The majority of the expenses will be focused on Design/Environmental Documentation/Permitting.

Potential Adverse Effects

There are no adverse physical effects associated with the Phoenix Lake Preservation and Restoration-Phase 2.

Table 19 – Annual Costs of Project

(All costs should be in 2012 Dollars)

Project: Tuolumne Utilities District Phoenix Lake Preservation and Restoration-Phase 2 (T-S IRWM Project No. 18)

	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							$0	1.000	$0
2013	$20,000							$20,000	0.943	$18,860
2014	$350,000							$350,000	0.890	$311,500
2015	$452,250							$452,250	0.840	$379,890
2016	$450,000							$450,000	0.792	$356,400
2017	$500,000							$500,000	0.747	$373,500
								Total Present Value of Discounted Costs (Sum of column (j))		**$1,440,150**
								Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries		

Comments:

Tuolumne River Trust Tuolumne-Stanislaus Watershed Outreach and Stewardship (T-S IRWM Project No 22)

Project Summary

Through this project we will implement a public outreach and watershed stewardship program to engage the public in wise water use and watershed stewardship. We will do this through a public education campaign that includes the internet and social media as well as presentations, news articles, and events. We will also offer 2-3 watershed stewardship opportunities, such as river cleanups, noxious weed control projects, etc. to directly engage the public in the care of our watersheds.

Without Project and With Project Comparison

Many of the 70,000 residents of the Tuolumne Stanislaus IRWM Region have only the most basic understanding of where their water supply originates, and little knowledge of the complexity of the environmental and watershed issues affecting their water supply. By offering this program, we are providing information to residents about their water supply, how watershed and environmental issues affect it, and what they can do to help use water wisely and efficiently. Without this project, the knowledge base and related behaviors will remain the same, thus little new water savings will be realized and residents will do little to help steward the watershed.

Period of Analysis

The period of analysis shall be the two years of the project, 2014-2015.

Non-Monetized Benefit Analysis

The method of analysis that had been chosen by the Tuolumne River Trust to analyze the benefits and cost of the proposed project is Non-Monetized Benefit Analysis in Section D2 of the Department of Water Resources (DWR) Proposal Solicitation Package. This method was chosen because the proposed project does not have any benefits that can be monetized prior to project implementation.

Table 12 – Non-monetized Benefits Checklist

Tuolumne River Trust Tuolumne-Stanislaus Watershed Outreach and Stewardship (T-S IRWM Project No 22)

No.	Question	Enter "Yes", "No" or "Neg"
	Community/Social Benefits **Will the proposal**	
1	**Provide education or technology benefits?**	Yes
2	**Provide social recreation or access benefits?**	No
3	**Help avoid, reduce or resolve various public water resources conflicts?**	Yes
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?**	Yes

7	**Improve water quality in ways that were not quantified in Attachment 7?**	Yes
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?**	No
	Sustainability Benefits: **Will the proposal**	
10	**Improve the overall, long-term management of California groundwater resources?**	No
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?**	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)?**	No

Community/Social Benefits

Provide education or technology benefits?

The primary objective of this project is to educate the public about water supply, water efficiency, watershed health and restoration. We anticipate that some percentage of those reached through this project will adopt water saving practices and technologies. We also have a stewardship component and believe that through directly involving community members in stewardship of their source watersheds will lead to better overall management and stewardship of the watersheds.

Help avoid, reduce or resolve various public water resources conflicts?

A better educated public and a public that has directly participated in watershed stewardship activities will be better prepared to identify solutions for reducing or resolving water resource conflicts.

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

Through this project we will involve community members directly in the restoration and cleanup of meadows, streams, and forests within their source watersheds. These activities will result in enhanced wildlife habitat.

Improve water quality in ways that were not quantified in Attachment 7?

Through this project, residents will learn about surface water runoff and where water ultimately goes. This outreach message coupled with water saving approaches, in particular savings in landscape irrigation, we would expect to see a reduction in surface water runoff, thus a corresponding reduction in pollutants entering local waterways.

Provide a long-term solution in place of a short-term one?

As the proverb says: "Give a man a fish and you feed him for a day. Teach a man to fish and you feed him for a lifetime." We will conduct an outreach program so that community members are better equipped to make informed decisions about water supply and watershed health over the long-term.

Costs

Grant funding requested under Proposition 84 for implementation of the Tuolumne-Stanislaus Watershed Outreach and Stewardship project is $50,000. An additional $85,757 of funding through private, local, and federal sources has been secured to meet the estimated total cost of $135,757.

Potential Adverse Effects

We do not anticipate any adverse effects due to this project.

Table 19 – Annual Costs of Project

(All costs should be in 2012 Dollars)

Project: Tuolumne River Trust Tuolumne-Stanislaus Watershed Outreach and Stewardship (T-S IRWM Project No 22)

	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)**
2009	$1,398	$0	$0	$0	$0	$0	$0	$1,398	1.030	$1,440
2010	$1,727	$0	$0	$0	$0	$0	$0	$1,727	1.020	$1,762
2011	$16,466	$0	$0	$0	$0	$0	$0	$16,466	1.010	$16,631
2012	$35,724	$0	$0	$0	$0	$0	$0	$35,724	1.000	$35,724
2013	$15,000	$0	$0	$0	$0	$0	$0	$15,000	0.943	$14,145
2014	$40,442	$0	$0	$0	$0	$0	$0	$40,442	0.890	$35,993
2015	$25,000	$0	$0	$0	$0	$0	$0	$25,000	0.840	$21,000
Total Present Value of Discounted Costs (Sum of column (j)) Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries										**$126,695**

Comments: 2015 is the last year of project cost.

Calaveras County Water District Douglas Flat/Vallecito Storage Pond Project (T-S IRWM Project No. 25)

Project Summary

The Calaveras County Water District recently upgraded its Douglas Flat/Vallecito Wastewater Treatment Plant to tertiary treatment with a design flow of 86,500 gallons per day. Since completion of plant upgrades State regulations have changed to require additional storage capacity for the upgraded facility, an additional 26.8 acre feet of storage is now required.

This proposed design phase project will be the first step in increasing the storage capacity of the effluent reservoir near the existing Douglas Flat/Vallecito Wastewater Treatment Plant to allow for full utilization of the entire design capacity of the treatment facility.

The new storage pond would insure that all existing infill and existing septic facilities would be able to tie into the facility. This would have a positive impact on groundwater quality in the area. The original wastewater plant was built in order to mitigate public health concerns. Although the plant has reduced these concerns, further improvement to eliminate septic tanks would benefit water quality.

In addition to the water quality benefits of the proposed project, there is a strong potential for recycled water use, including agricultural if the storage ponds are expanded. There are a number of local vineyards and wineries that would be able to put the reclaimed water to beneficial use. For several years, California has experienced drought conditions, and critical water supply sources, such as the Stanislaus River, have become less dependable. A larger storage pond, along with the permits and Title 22 authorization, will provide additional, reliable and a sustainable supply high of quality tertiary treated water, even in times of drought. This supply will help reduce raw water diversions from the Stanislaus River and allow more water to travel downstream and benefit the river, fish, wildlife, and the Delta.

Without Project and With Project Comparison

Without implementation of this project, which includes development of plans and designs for storage capacity expansion, continued use of spray fields for the disposal of tertiary treated effluent will prevent the possible use of treated water for agriculture. This would continue agriculture's reliance on raw water diversions from the Stanislaus River. With the project the expanded capacity, along with Title 22 permit, will provide additional, reliable and sustainable supply of high quality tertiary treated water, even in times of drought for agriculture and beneficial use.

Without the proposed project the current concentration of onsite septic systems within the service are of the project will continue to be approximately 500 per square mile. If implemented, the expansions planned for as a part of this project will provide increased capacity for existing septic systems in the District's service area to connect, thus protecting groundwater resources.

Period of Analysis

The period of analysis for this project is the expected life span of the recently upgraded wastewater treatment plant which is estimated to be 40 years.

Cost Effectiveness Analysis

The method of analysis that has been chosen by the CCWD to analyze the benefits and cost of the proposed project is Cost Effectiveness Analysis in Section D1 of the Department of Water Resources (DWR) Proposal Solicitation Package. This method was chosen because the proposed project does not have any benefits that can be monetized prior to project implementation. As well as the fact that the project qualifies to use this method of analysis because it will benefit a DAC and is less than $300,000.

Table 11 – Statement of Cost-Effectiveness **Project name: Calaveras County Water District Douglas Flat/Vallecito Storage Pond Project (T-S IRWM Project No. 25)**	
Question 1	**Types of benefits provided:** **Water Supply Benefits:** Implementation of the proposed project, which includes development of plans and designs for storage capacity expansion, will be the first step in increasing the storage capacity of the effluent reservoir near the existing Douglas Flat/Vallecito Wastewater Treatment Plant thereby creating the opportunity for treated effluent to be used for agriculture or other beneficial use. This expanded capacity, along with the permits and Title 22, will provide additional, reliable and sustainable supply of high quality tertiary treated water, even in times of drought. If put to beneficial use, this supply will help reduce raw water diversions from the Stanislaus River. **Water Quality Benefits:** Implementation of this project, which includes development of plans and designs for storage capacity expansion, will serve as an important step toward creating greater storage pond capacity. The recent plant upgrades, in conjunction with the expanded storage capacity, will allow the District to serve all existing septic systems and new infill homes in the Douglas Flat/Vallecito area, thus protecting groundwater resources.
Question 2	**Have alternative methods of providing the same types and amounts of physical benefits as the proposed project been identified?**
	The 2007 Feasibility Study for Vallecito/Douglas Flat Reservoir identified four alternatives. The additional storage requirements eliminated the two smaller pond alternatives, which left two alternatives. The District selected Scenario A - Alternative 2 at $978,500 because it provide an adequate amount of storage and was the less costly of the two remaining alternatives.
	A 2007 feasibility study identified the following four storage alternatives:
	• Scenario A, Alternative 1 - 35 foot reservoir with a 47 acre-foot capacity located outside the approximate boundary of a high-voltage power-line easement: $702,800.
	• Scenario A, Alternative 2 - 45 foot reservoir with an 86 acre-foot capacity located outside the approximate boundary of a high-voltage power-line

	easement: $978,500.
	• Scenario B, Alternative 1 - 30 foot reservoir with a 46 acre-foot capacity located outside the approximate boundary of a high-voltage power-line easement: $748,100.
	• Scenario B, Alternative 2 - 40 foot reservoir with a 89 acre-foot capacity located outside the approximate boundary of a high-voltage power-line easement: $1,011,800
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**.
	The least costly alternative is to do nothing and increase the use of the spray fields. However, this alternative would not take advantage of the beneficial uses of reclaimed water. The ability to provide reclaimed water for agriculture in place of raw water diversions off the Stanislaus River provides a greater than using spray fields.
Comments:	

Costs

The total cost of this phase of the project will be $210,014, funding in the amount of $200,000 is being requested for the proposed storage pond project. Additional administrative and engineering costs will be absorbed by the District. The cost of these efforts will be used as a funding match of $10,014. A partial funding match waiver to cover the remaining 25% required match by DWR is being requested for Disadvantaged Community Assistance, details on the requested waiver are included in Attachment 10.

Potential Adverse Effects

There are no adverse physical effects of this phase of the project as it only includes planning and design for future implementation.

Table 19 – Annual Costs of Project

(All costs should be in 2012 Dollars)

Project: Calaveras County Water District Douglas Flat/Vallecito Storage Pond Project (T-S IRWM Project No. 25)

	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							$0	1.000	$0
2013	$5,000							$5,000	0.943	$4,715
2014	$180,000							$180,000	0.890	$160,200
2015	$15,000							$15,000	0.840	$12,600
								Total Present Value of Discounted Costs (Sum of column (j))		**$177,515**
								Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries		

Comments:

Groveland Community Services District GCSD/BOF (LS#16) Water Quality Protection Project (T-S IRWM Project No. 27)

Project Summary

The Groveland Community Services District, Groveland, CA (GCSD) Sewer Lift Station (#16) adjacent to State Highway 120 at the west end of the Big Oak Flat Community is in serious need of reconstruction. This sewer lift station pumps an average of 10,000 gallons of sewage a day, 365 days per year via a 7,000'+ force main up a very steep grade to a gravity break over and into a 6" gravity sewer line, which goes to the District's Sewer Treatment Plant. This is the single most urgent capital improvement project in all of GCSD's service area. The current lift station was constructed in 1976 and needs to be reconstructed in order to dramatically reduce the potential of a sewage spill into the adjacent Rattlesnake Creek, which is tributary to Lake Don Pedro and the Tuolumne River. The objective of this project is to finish lift station planning and design and reconstruct this infrastructure using state-of-the-art equipment and materials. The lift station components will be compatible with equipment that the District already uses, allowing for parts to be interchangeable and operators to have a familiarity and knowledge of other existing similar equipment. It will also provide system redundancy and back-up pumping capability at the lift station. Should a pump at the reconstructed lift station fail or need to be removed or taken out of service for maintenance reasons, the second pump system would be put into action allowing operations to resume immediately.

The design of this lift station reconstruction will mirror in many ways existing lift station designs which are of high quality. This will allow us to keep reconstruction design costs down as similar lift stations already exist in other parts of the District. This will result in simplified construction drawings and specifications (utilizing existing specifications) for use in bidding of this reconstruction work.

The expected outcome of this project will be to provide a reconstructed lift station for the Big Oak Flat Community (Disadvantaged Community) that is reliable and will serve the needs of the community for many years to come.

The beneficiaries of this project will be: GCSD; the entire Big Oak Flat Community, which is a Disadvantaged Community based on median household income, all end users of Don Pedro Reservoir and the Tuolumne River for swimming, boating and drinking/irrigation water; the flora and fauna that live along the Rattlesnake Creek, etc.

Without Project and With Project Comparison

Without this project, should this sewer lift station fail, the GCSD District Engineer estimates that up to 10,000 gallons of raw sewage could be spilled per day per occurrence. As described above this impact would be devastating to quality of domestic, raw, and environmental water resources, as well as the environment of Rattlesnake Creek, Don Pedro Reservoir, and the Bay Delta.

Without this project this lift station will continue to cost approximately $300 per month to operate and use on average 5,000 KW of power, and these costs are anticipated to increase in the future. By replacing the existing lift station pump, the GCSD District Engineer estimates that the District will save approximately 30% on power costs and usage for this lift station, which equates to approximately 1,500 KW per month. The actual cost savings will be approximately $100 per month.

Period of Analysis

The project life cycle for this project is 40 years. The construction period and operational start period are both anticipated to be FY '13-14.

Benefits and Cost Analysis

The GCSD is requesting a partial Disadvantaged Community funding match waiver and as such is eligible to use the D1 Cost Effectiveness Analysis option for benefits and cost analysis.

Table 11 – Statement of Cost-Effectiveness Project name: Groveland Community Services District GCSD/BOF (LS#16) Water Quality Protection Project (T-S IRWM Project No. 27)	
Question 1	**Types of benefits provided:** **Water Quality:** The water quality protection benefit that this project will provide is significant in that it mitigates the potential of a spill into Rattlesnake Creek and Don Pedro Reservoir, which would drastically degrade water quality. A raw sewage spill would also impact downstream beneficial uses including habitat for special status fish and wildlife species dependant on the Bay Delta ecosystem. In addition to impacting domestic, raw, and environmental water resources the existing extensive recreational opportunities related to Don Pedro Reservoir would be compromised. **Power Cost Savings:** By replacing the existing lift station pump, the GCSD District Engineer estimates that the District will save approximately 30% on power costs for this lift station. The actual cost savings will be approximately $100 per month. **Energy:** By replacing the existing lift station pumps with multiple, more efficient pumps which are installed in series, we will save approximately 30% of power usage, which equates to approximately 1,500 KW per month.
Question 2	**Have alternative methods of providing the same types and amounts of physical benefits as the proposed project been identified?** **If no, why?:** There are no alternative methods to this proposed project that could achieve the same types and amounts of benefits and physical benefits as the proposed project. This proposed project is hugely cost effective, especially as it relates to the huge cost savings and damages avoided by not protecting the water quality of Rattlesnake Creek and Don Pedro Reservoir.
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.**

	This project is not only the most cost effective solution to the current potential water quality disaster, it's total cost of $600,000, could be greatly exceeded by the potential spill cleanup costs that would be incurred by a no action alternative.
Comments:	

Costs

Grant funding requested under Proposition 84 for implementation of the GCSD/BOF (LS #16) Water Quality Protection Project is $600,000. We have completed our preliminary design and planning and nearly completed the permitting process. The cost of these efforts will be used as a funding match of $11,740.00. A partial funding match waiver to cover the remaining 25% required match by DWR is being requested for Disadvantaged Community Assistance, details on the requested waiver are included in Attachment 10.

Potential Adverse Effects

There are no adverse physical effects of implementing this project. The only adverse physical effects will occur in the form of potential sewage spills into Rattlesnake Creek and Don Pedro Reservoir if funding for this project is not secured.

Table 19 – Annual Costs of Project

(All costs should be in 2012 Dollars)

Project: GCSD/Big Oak Flat (LS#16) Water Quality Protection 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	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	$3,600	$5,000			$9,600	1.000	**$9,600**
2013			$1,000	$3,600	$5,000			$9,600	0.943	**$9,053**
2014	$611,740		$1,000	$3,600	$5,000			$621,340	0.890	**$552,993**
2015			$1,000	$2,400	$5,000			$8,400	0.840	**$7,056**
2016			$1,000	$2,400	$5,000			$8,400	0.792	**$6,653**
2017			$1,000	$2,400	$5,000			$8,400	0.747	**$6,275**
2018			$1,000	$2,400	$5,000			$8,400	0.705	**$5,922**
2019			$1,000	$2,400	$5,000			$8,400	0.665	**$5,586**
2020			$1,000	$2,400	$5,000			$8,400	0.627	**$5,267**
2021			$1,000	$2,400	$5,000			$8,400	0.592	**$4,973**
2022			$1,000	$2,400	$5,000			$8,400	0.558	**$4,687**
2023			$1,000	$2,400	$5,000			$8,400	0.527	**$4,427**
2024			$1,000	$2,400	$5,000	$50,000		$58,400	0.497	**$29,025**
2025			$1,000	$2,400	$5,000			$8,400	0.469	**$3,940**
2026			$1,000	$2,400	$5,000			$8,400	0.442	**$3,713**
2027			$1,000	$2,400	$5,000			$8,400	0.417	**$3,503**
2028			$1,000	$2,400	$5,000			$8,400	0.394	**$3,310**
2029			$1,000	$2,400	$5,000			$8,400	0.371	**$3,116**
2030			$1,000	$2,400	$5,000			$8,400	0.350	**$2,940**
2031			$1,000	$2,400	$5,000			$8,400	0.331	**$2,780**

2032			$1,000	$2,400	$5,000			$8,400	0.312	**$2,621**
2033			$1,000	$2,400	$5,000			$8,400	0.294	**$2,470**
2034			$1,000	$2,400	$5,000	$50,000		$58,400	0.278	**$16,235**
2035			$1,000	$2,400	$5,000			$8,400	0.262	**$2,201**
2036			$1,000	$2,400	$5,000			$8,400	0.247	**$2,075**
2037			$1,000	$2,400	$5,000			$8,400	0.233	**$1,957**
2038			$1,000	$2,400	$5,000			$8,400	0.220	**$1,848**
2039			$1,000	$2,400	$5,000			$8,400	0.207	**$1,739**
2040			$1,000	$2,400	$5,000			$8,400	0.196	**$1,646**
2041			$1,000	$2,400	$5,000			$8,400	0.185	**$1,554**
2042			$1,000	$2,400	$5,000			$8,400	0.174	**$1,462**
2043			$1,000	$2,400	$5,000			$8,400	0.164	**$1,378**
2044			$1,000	$2,400	$5,000	$50,000		$58,400	0.155	**$9,052**
2045			$1,000	$2,400	$5,000			$8,400	0.146	**$1,226**
2046			$1,000	$2,400	$5,000			$8,400	0.138	**$1,159**
2047			$1,000	$2,400	$5,000			$8,400	0.130	**$1,092**
2048			$1,000	$2,400	$5,000			$8,400	0.123	**$1,033**
2049			$1,000	$2,400	$5,000			$8,400	0.116	**$974**
2050			$1,000	$2,400	$5,000			$8,400	0.109	**$916**
2051			$1,000	$2,400	$5,000			$8,400	0.103	**$865**
2052			$1,000	$2,400	$5,000			$8,400	0.097	**$815**
2053			$1,000	$2,400	$5,000			$8,400	0.092	**$773**
2054			$1,000	$2,400	$5,000	$50,000		$58,400	0.087	**$5,081**
									Total Present Value of Discounted Costs (Sum of column (j)) Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries	**$734,988**
Comments: The GCSD already operates a lift station at this location and as such does not anticipate any increase in operations and maintenance cost of LS#16 beyond those expended today. Utility costs will decrease after installation of more efficient pumps. Pumps will likely be replaced every 10 years.										

Table 20 – Proposal Benefits and Costs Summary							
Proposal: Tuolumne Stanislaus IRWM Proposition 84 Round 2 Implementation Grant Proposal							
Agency: Tuolumne County Resource 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)**
Wastewater Treatment Facilities Improvement Project	Murphys Sanitary District	$702,642					
Upper South Fork Stanislaus River Watershed Restoration and Water Quality Enhancement Project (9)	USDA Forest Service - Stanislaus National Forest	$684,636					
Small Acreage Land Stewardship Program (16)	Tuolumne County Resource Conservation District	$291,614					
In-Home Water Conservation for the DAC (17)	Amador Tuolumne Community Action Agency	$170,698					
Phoenix Lake Preservation and Restoration (18)	Tuolumne Utilities District	$1,440,150					
Watershed Outreach and Stewardship (22)	Tuolumne River Trust	$126,695					
Douglas Flat/Vallecito Storage Ponds (25)	Calaveras County Water District	$177,515					
Big Oak Flat- Sewer LS #16 Reconstruction (27)	Groveland Community Services District	$734,988					
	TOTAL	$4,328,938					