Attachment 8.1 – Supporting Documents

Economic Analysis – Water Supply Costs and Benefits

Madera Region – IRWM Implementation Grant Application

Table of Contents

Introduction 3

Table 12 7

Table 20 9

Project Narratives

Project A – Grant Administration 13

Table 19 15

Project B - MD19 Parkwood Water Supply and Water Meters 17

Table 15 23

Table 16 25

Table 19 27

Project C - MD8 North Fork/ South Fork Sewer System Improvements 29

Table 15 33

Table 16 35

Table 19 37

Project D - Brockman Flood Control Basin 39

Table 15 47

Table 17 49

Table 18 51

Table 19 53

Project E - CSA14 Chuk-Chanse Sewer System Improvements 55

Table 11 61

Table 15 63

Table 19 65

Project F - MD33 Fairmead Sewer Collection, Treatment and Disposal System Plans 67

Table 15 71

Table 16 73

Table 19 75

Electronic Attachments

Project D- Brockman Flood Control Basin

- 8.2Da – 100-Year Special Flood Hazard Area
- 8.2Db – Depths of Flood Waters
- 8.4Dc – F-RAM Analysis

Madera County Special Districts Budgets

- 8.3B – MD19 Parkwood
- 8.3C – MD8 North Fork
- 8.3E – CSA14 Chuk-Chanse
- 8.3F – MD33 Fairmead

Attachment 8.1, Introduction

Page Left Intentionally Blank

Introduction

The proposed projects are claiming the following water supply benefits:

- Project B – MD19 Parkwood Water Supply and Water Meters – Quantitative and Qualitative Benefits, Cost Avoidance
- Project C – : MD8 North Fork/ South Fork Sewer System Improvements - Quantitative and Qualitative Benefits
- Project D – Brockman Flood Control Basin - Quantitative and Quantitative Benefits, Flood Damage Reduction
- Project E – CSA14 Chuk-Chanse Sewer System Improvements and Water Meters - Quantitative and Qualitative Benefits
- Project F – MD33 Fairmead Sewer Collection, Treatment and Disposal System Plans - Quantitative and Qualitative Benefits

Non-monetized benefits for the Proposal are summarized in the following Table 12.

Detailed descriptions of the benefit analyses and calculations for each project appear on the following pages. The Proposal financial costs and benefits are summarized in the following Table 20.

Page Left Intentionally Blank

Table 12 – Non-monetized Benefits Checklist		
No.	**Question**	**Enter "Yes", "No" or "Neg"**
	Community/Social Benefits **Will the proposal**	
1	**Provide education or technology benefits?**	**No**
2	**Provide social recreation or access benefits?**	**No**
3	**Help avoid, reduce or resolve various public water resources conflicts?**	**Yes**
	Projects B and E: Water Meters are being installed as part of this project to encourage the public to be part of the water conservation program in the State of California.	
	Projects B and E: Water Meters are being install to satisfy the State Mandate to be metered by 2020.8:10	
	Projects C and F: Resolve water resource conflicts by eliminating a primary cause of groundwater contamination by replacing septic tanks with a connection to the local WWTP.	
4	**Promote social health and safety?**	**Yes**
	Project B: Additional water well will provide water supply reliability and required water supply capacity	
	Projects C and F: Reduce public exposure to contaminated groundwater resulting from failed septic tanks.	
	Project D: Reduces risk to property damage from flooding of the Madera Ranchos South drainage.	
5	**Have other social benefits?**	**Yes**
	Projects B, E and F: parkwood, Chuk-Chanse and Fairmead are all DACs, and all project benefits would accrue to their respective residents.	
	Project C: South Fork is a DAC and is nearly 100% Native American population; the water quality benefits of the project accrue nearly exclusively to this group.	
	Project F: Establish foundation for Disadvantaged Community to collaboratively solve community issues	
	Environmental Stewardship Benefits: **Will the proposal**	
6	**Benefit wildlife or habitat in ways that were not quantified in Attachment 7?**	**Yes**
	- Increase the available seasonal habitat/water pool surface acreage used by migratory birds along with local birds and other wildlife.	
7	**Improve water quality in ways that were not quantified in Attachment 7?**	**Yes**
	- Improvement in groundwater quality by mixing higher quality surface water through recharge in the basin.	
8	**Reduce net emissions in ways that were not quantified in Attachment 7?**	**Yes**
	- Reduce the rate of increase in energy use for groundwater pumping by helping to slow the rate of decline for the groundwater level, in turn reducing GHG emissions from power plants.	
9	**Provide other environmental stewardship benefits, other than those claimed in Sections D1, D3, or D4?**	**No**
	Sustainability Benefits: **Will the proposal**	
10	**Improve the overall, long-term management of California groundwater resources?**	**Yes**
	Projects B and E: Water Meters are being install to reduce 20 percent of the ground water used currently in each District.	
	Project C: Reduce extraction of non-renewable groundwater by providing recycled wastewater for irrigation in lieu of groundwater. Project C: Sprayfield expansion will increase groundwater recharge in the sprayfield area.	
	Project D: Promote aquifer storage or recharge.	
	Project D: Reduce extraction of non-renewable groundwater.	

	Project F: Construction of a WWTP will allow recycling of wastewater effluent to adjacent ag users, reducing reliance on limited groundwater resources.	
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**
	Projects B and E: Water meters are being installed that will be a long term solution 20 years to reduce 20 percent of the water currently used in each District.	
	Projects C and F: WWTP provides long-term replacement of failing septic tanks, which must be considered as only short-term solutions at best.	
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)?**	N/A

Table 20 – Proposal Benefits and Costs Summary

Proposal: Madera Region IRWM Implementation Grant

Agency: County of Madera

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)
Project A, Grant Admin	County of Madera	$133,120					
Project B, MD19 Parkwood Water Supply and Water Meters	County of Madera	$1,916,926	$116,943	$0	$116,943		a) Additional water well will provide water supply reliability and required water supply capacity b) Water Meters are being install to reduce 20 percent of the ground water used currently for the Parkwood District. c) Water meters are being installed that will be a long term solution 20 years to reduce 20 percent of the water currently used by Parkwood 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		
Project C, MD8 North Fork/ South Fork Sewer System Improvements	County of Madera	$2,582,545	$317,711	$0	$317,711		a) Resolve water resource conflicts by eliminating a primary cause of groundwater contamination by replacing septic tanks with a connection to the local WWTP. b) Reduce public exposure to contaminated groundwater resulting from failed septic tanks. c) South Fork is a DAC and is nearly 100% Native American population; the water quality benefits of the project accrue nearly exclusively to this group. d) Reduce extraction of non-renewable groundwater by providing recycled wastewater for irrigation in lieu of groundwater. e) Sprayfield expansion will increase groundwater recharge in the sprayfield area. f) WWTP provides long-term replacement of failing septic tanks, which must be considered as only short-term solutions at best.
Project D, Brockman Blood Control Basin	County of Madera	$1,112,586	$88,585	$1,398,605	$1,487,190		a) Reduces risk to property damage from flooding of the Madera Ranchos South drainage. b) Increase the available seasonal habitat/water pool surface acreage used by migratory birds along with local birds and other wildlife. c) Improvement in groundwater quality by mixing higher quality surface water through recharge in the basin. d) Reduce the rate of increase in energy use for groundwater pumping by helping to slow the rate of decline for the groundwater level, in turn reducing GHG emissions from power plants.

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		
Project F. CSA14 Chuk-Chanse Sewer System Improvements and Water Meters	County of Madera	$305,583	$7,615	$0	$7,615	a) Water meters will be installed in this DAC, allowing the community to meet the 2020 requirement for meter intallation. Meters will be self-reading, allowing for collection of meter data without staff time spent on meter reading. b) A 500 LF section of the community's 12-inch sanitary sewer collector will be replaced, eliminating excessive I&I and removing a source of groundwater contamination by elimination badly cracked VCP sewer line that crosses a natural drainage. c) A 300 LF trench drain will be constructed along the west edge of the existing WWTP percolation/evaporation pond, mitigating leakage from the pond which now travels laterally on top of a shallow hardpan lens and surfaces in the neighboring nut orchard, creating standing water with algae blooms throughout the spring months	
Project F. MD33 Fairmead Wastewater Collection, Treatment and Disposal Plans	County of Madera	$718,790	$105,822	$0	$105,822	$0	a) Promote social health and safety - By eliminating the potential health hazard and potential pollution problems related to septic tank system disposal in the community, the proposed project will help secure groundwater supplies for beneficial uses. b) Have other social benefits that targets resources to improve critical water supply and quality issues affecting an environmental justice severely disadvantaged community. c) Improve water supply reliability by providing more flexible management of water resources. d) Have other social benefits that targets resources to improve critical water supply and quality issues affecting an environmental justice severely disadvantaged community. e) Improve water supply reliability by providing more flexible management of water resources.

(1) From Table 19, or RWMG method
(2) From Table 15 or RWMG method
(3) From Table 18 or RWMG method

Page Intentionally Left Blank

Attachment 8.1, Project A – Grant Administration

Project A includes all grant administration activities for the overall proposal. It includes periodic meetings, progress payment requests and other on-going administrative activities involved in managing the overall grant.

No monetized or non-monetized benefits accrue to this project.

Project costs are summarized in the following Table 19.

Page Left Intentionally Blank

Table 19 – Annual Costs of Project

(All costs should be in 2012 Dollars)

Project: Project A, Grant Administration

	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	**$ -**
2013			$ 15,250.00					$ 15,250.00	0.943	**$ 14,380.75**
2014			$ 68,625.00					$ 68,625.00	0.890	**$ 61,076.25**
2015			$ 68,625.00					$ 68,625.00	0.840	**$ 57,645.00**
Total Present Value of Discounted Costs (Sum of column (j))										**$ 133,102.00**

Comments:

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

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

Page Intentionally Left Blank

Attachment 8.1, Project B – MD19 Parkwood Water Supply and Water Meters

Page Left Intentionally Blank

Project B – MD19 Parkwood Water Supply and Water Meters

Monetized Benefits Analysis

Installation of Water Meters to Meet Statutory Requirement: MD19 Parkwood's 633 service connections are currently unmetered and pay a flat monthly rate for water. The current annual water use averages 383,378 gpd. January water production averages 7 million gallons, while summer water projection (June, July, August) typically ranges from 17 million to 20 million gallons.

The large difference between summer and winter use is all assignable to outdoor irrigation. Similar systems have experienced 20% to 25% drops in annual water use through installation of water meters and imposition of progressive, revenue-neutral water rates. Parkwood can expect similar results.

With meters installed, a savings of 20 percent would result in a reduction in water production per average day of about 76,675 gpd, which sums to 27,986,375 gallons or 86 acre-feet per year, all of which is water left in the aquifer and directly reducing groundwater overdraft. This reduction in pumped water saves electrical power costs of $100 per acre foot pumped as described in Table 15. The Total Present Value of Discounted Benefits is $ 116,942.

The no-project alternative is not considered feasible, in the face of the 2020 requirement to install meters. Penalties and fines for non-compliance could be substantial.

The proposed project is to install self-reading electronic meters. Including all necessary boxes, materials, labor, the central receiving computer with software, the project cost will be approximately $588,050.

The alternative to the project would be non-self-reading (mechanical) meters. These meters are slightly less expensive to purchase, representing a $43,170 savings. Also, the mechanical meters would not require the handheld meter reading equipment with software, representing an additional savings of $20,000, for a total gross savings of $63,170. However, the mechanical meters would require monthly reading. Since Madera County does not have any staff on site at Parkwood, a special trip to read the meters would be required each month. Including travel time, it is estimated that reading the meters would require 48 man hours per month, at a full-burdened cost of $65/man-hour, or a total of $3,120. The annualized cost would be $37,440. The life of the meters is considered to be 20 years. The Present Value of the 20-year cost of reading the meters, at 4%, is $509,083. The self-reading meters do not require this manpower. Thus, the Present Value cost of the alternative is $1,033,963, or $445,913 greater than the cost of the recommended self-reading meters.

This cost effective solution of installation of self-reading meters is beyond the reach of MD-19 A & B very limited capital program budget, which is funded only by the user charges from 605 residential and 28 commercial connections in this DAC.

Additional Water Supply to Meet Statutory Requirement: MD19 Parkwood currently serves 605 residential and 28 commercial water connections. This community, designated a Disadvantage Community, is located south of Avenue 13 between Hwy 145 and Raymond Thomas Road in Madera, California. The District is subject to Enforcement Letter 03-11-11E-007 from the California Department of Public Health. It has been in violation of Section 65445(a), Title 22CCR. This section of the Code states that at all times a public water system's water source(s) shall have the capacity to meet the system's maximum day demand (MDD). At one time the Parkwood system had three wells on line and was more than capable of meeting this 680 gpm requirement. However, the only remaining well in Parkwood has a current pumping capacity of 400 gpm (down from 470 gpm a year ago).

The remaining well has to pump for approximately 16 hours a day to produce 383,378 gpd to supply the average daily demand of Parkwood. At 100% duty cycle, the well could produce 17.8 million gallons in a month. There are several months on record where the actual delivery of water in the District has been as much as 20 million gallons. This one remaining well falls far short of being an adequate or reliable source of water to the District.

The new well proposed under this project will be designed to produce at least 680 gpm to insure that if the remaining well No. 3 does in fact fail in the next 3 to 5 years as anticipated by the County Engineer, the District would continue to be in compliance with Section 65445(a).

The reality faced by the District is that each of the three existing wells was constructed along with the Parkwood development in the early 1970's so all are 40 or more years old and approaching the end of their anticipated service lives. One of the wells failed in 2005. The second failed in 2011, both due to sanding issues brought about by erosion of the well casing due to age and corrosion. The remaining third well has lost pumping capacity since 2011, to the current production rate of 400 gpm, again due to sanding issues with similar cause. In the professional opinion of the County Engineer, Kheng Vang, it appears likely that the third well will fail within the next three years.

If this project is not funded and a new well has not been constructed when the current sole source of water for Parkwood fails, the District will incur substantial costs providing a combination of non-potable water via water trucks to pressurize the water system, and bottled water for cooking and consumption, for the period of time required to design, permit and construct a new well on an emergency basis. The following Table A quantifies the costs that would be faced by the District under such circumstances, all of which would be over and above the cost of design and construction of the new well as proposed by this Project:

Table A – Emergency Costs Due to Failed Parkwood Well

Item	Description	Cost per year/connection
1	5 gallons of drinking water per week @ $1.50/gallon	$390
2	Cost for laundering clothing at a commercial Laundromat (2 loads per day @1.00 each)	$730
3	Non-Potable water for toilet flushing (12 flushes/day @ 2.5 gal/flush average), Non potable water cost assumed to be $0.10/gallon	$1,095
4	Non-Potable water for Bath/Shower (50 gal/day)	$1,825
	Per Connection Total:	$4,040
	District Total:	$2,444,200

These Avoided Costs are placed in year 2015, to reflect the County Engineer's expectation that the existing well will fail within the next three years. Therefore the Total Present Value of Discounted Avoided Project Costs is $2,053,128. These costs are completely avoidable if the new well is constructed and on line before the failure of the existing well.

The no-project alternative is not considered feasible, with the continual decline of the current sole source well and the emanate failure of the well in the next three to five years.

An alternative to the Project would be to have the City of Madera annex the Parkwood community in to the City. Parkwood is currently bounded on three sides by the City of Madera. Before the first well failed in 2005, the County of Madera approached the City of Madera to discuss annexation of MD19, Parkwood, in to the City. The City stated that water meters on all service connections in the District would be a condition of annexation. This was not feasible for the DAC of Parkwood.

In 2005 a subdivision east of Raymond Thomas Road was being built within the City. The City and County again discussed the possibility of annexation of Parkwood. Again, the City stated that water meters on all service connections in the District would be a condition of annexation.

After the second well in Parkwood failed in 2011 the County approached the City a third time regarding annexation of Parkwood. With the failure of the second well, Parkwood was now in violation of Section 65445(a), Title 22CCR, that states, at all times a public water system's water source(s) shall have the capacity to meet the system's maximum day demand (MDD). With this violation on the record, the City added the additional condition that a new source well would be required, together with water meters, before annexation of Parkwood could occur.

During the writing of this Grant Application, the County for the fourth time approached the City to discuss the possibility of annexation. The County was again told that a new well and water meters on each service connection would be the conditions for consideration of annexation.

Annexation to the City of Madera is not feasible until the requirements of the City are met.

With the continual decline and looming failure of the source wells for Parkwood, and the inability of the District to fund the required improvements for annexation to the City, the Avoided Project as described above is a real and present possibility.

Project Benefits and Cost Summary

From Attachment 8.1B, Table 15, the Total Present Value of Discounted Benefits is **$ 116,942**.

From Attachment 8.1B, Table 16, the Total Present Value of Discounted Avoided Project Costs is **$2,053,128**.

For Attachment 8.1B, Table 19, the Total Project costs have been calculated including the proposed capital cost of the project, which will be expended over the three-calendar-year duration of the Grant Funding Project in Table 19. The first year 2013, was allocated 10 % of the Grant Funds for a total of $199,933.25. The next two years, 2014 and 2015, were allocated 45 % each of Grant Funds for a total of $899,699.62 each.

The incremental change in O & M costs for maintenance includes $100 per year after the project is constructed. This covers the minor costs to perform required maintenance on the 633 Water Meters that will be installed. This maintenance allocation will be required for the Life of the Project thru 2052. Also included are $3,000 lump sums in 2019 and every 5 years thereafter to perform required maintenance on the new well pump and motor and standby generator that will be installed.

The incremental change in replacement costs was determined to be the cost of replacing meters as they wear out. This is budgeted as 25% of the total cost of replacing all meters, in four parts, beginning with $120,000 in year 2025, 10 years after the project will be completed. An additional $ 120,000 was budgeted every five years for three additional groups of replacement meters, with that project being completed in 2040.

Also provided under the category of replacement was $40,000 in 2034, 20 years after the project will be completed, for the replacement of the new well pump and motor.

The Total Present Value of Discounted Costs as shown in Attachment 8B, Table 19 is **$1,916,925.70**.

Table 15 – Annual Benefit

(All benefits should be in 2012 dollars)

Project:Project B, MD -19 Parkwood Water System Improvements

(a) Year	(b) Type of Benefit	(c) Measure of Benefit (Units)	(d) Without Project	(e) With Project	(f) Change Resulting from Project (e) – (d)	(g) Unit $ Value (1)	(h) Annual $ Value (1)	(i) Discount Factor (1)	(j) Discounted Benefits (1) (h) x (i)
2012	b	acre feet/year	0	0	0	$ -	$ -	1.000	**$ -**
2013	b	acre feet/year	0	0	0	$ -	$ -	0.943	**$ -**
2014	b	acre feet/year	0	0	0	$ -	$ -	0.943	**$ -**
2015	b	acre feet/year	0	86	86	$ 100.00	$ 8,600.00	0.840	**$ 7,224.00**
2016	b	acre feet/year	0	86	86	$ 100.00	$ 8,600.00	0.840	**$ 7,224.00**
2017	b	acre feet/year	0	86	86	$ 100.00	$ 8,600.00	0.747	**$ 6,424.20**
2018	b	acre feet/year	0	86	86	$ 100.00	$ 8,600.00	0.747	**$ 6,424.20**
2019	b	acre feet/year	0	86	86	$ 100.00	$ 8,600.00	0.665	**$ 5,719.00**
2020	b	acre feet/year	0	86	86	$ 100.00	$ 8,600.00	0.665	**$ 5,719.00**
2021	b	acre feet/year	0	86	86	$ 100.00	$ 8,600.00	0.592	**$ 5,091.20**
2022	b	acre feet/year	0	86	86	$ 100.00	$ 8,600.00	0.592	**$ 5,091.20**
2023	b	acre feet/year	0	86	86	$ 100.00	$ 8,600.00	0.527	**$ 4,532.20**
2024	b	acre feet/year	0	86	86	$ 100.00	$ 8,600.00	0.527	**$ 4,532.20**
2025	b	acre feet/year	0	86	86	$ 100.00	$ 8,600.00	0.469	**$ 4,033.40**
2026	b	acre feet/year	0	86	86	$ 100.00	$ 8,600.00	0.469	**$ 4,033.40**
2027	b	acre feet/year	0	86	86	$ 100.00	$ 8,600.00	0.417	**$ 3,586.20**
2028	b	acre feet/year	0	86	86	$ 100.00	$ 8,600.00	0.417	**$ 3,586.20**
2029	b	acre feet/year	0	86	86	$ 100.00	$ 8,600.00	0.371	**$ 3,190.60**
2030	b	acre feet/year	0	86	86	$ 100.00	$ 8,600.00	0.371	**$ 3,190.60**
2031	b	acre feet/year	0	86	86	$ 100.00	$ 8,600.00	0.331	**$ 2,846.60**
2032	b	acre feet/year	0	86	86	$ 100.00	$ 8,600.00	0.331	**$ 2,846.60**
2033	b	acre feet/year	0	86	86	$ 100.00	$ 8,600.00	0.294	**$ 2,528.40**
2034	b	acre feet/year	0	86	86	$ 100.00	$ 8,600.00	0.294	**$ 2,528.40**
2035	b	acre feet/year	0	86	86	$ 100.00	$ 8,600.00	0.262	**$ 2,253.20**
2036	b	acre feet/year	0	86	86	$ 100.00	$ 8,600.00	0.262	**$ 2,253.20**
2037	b	acre feet/year	0	86	86	$ 100.00	$ 8,600.00	0.233	**$ 2,003.80**
2038	b	acre feet/year	0	86	86	$ 100.00	$ 8,600.00	0.233	**$ 2,003.80**
2039	b	acre feet/year	0	86	86	$ 100.00	$ 8,600.00	0.207	**$ 1,780.20**
2040	b	acre feet/year	0	86	86	$ 100.00	$ 8,600.00	0.207	**$ 1,780.20**
2041	b	acre feet/year	0	86	86	$ 100.00	$ 8,600.00	0.185	**$ 1,591.00**
2042	b	acre feet/year	0	86	86	$ 100.00	$ 8,600.00	0.185	**$ 1,591.00**
2043	b	acre feet/year	0	86	86	$ 100.00	$ 8,600.00	0.164	**$ 1,410.40**
2044	b	acre feet/year	0	86	86	$ 100.00	$ 8,600.00	0.164	**$ 1,410.40**
2045	b	acre feet/year	0	86	86	$ 100.00	$ 8,600.00	0.146	**$ 1,255.60**
2046	b	acre feet/year	0	86	86	$ 100.00	$ 8,600.00	0.146	**$ 1,255.60**
2047	b	acre feet/year	0	86	86	$ 100.00	$ 8,600.00	0.130	**$ 1,118.00**
2048	b	acre feet/year	0	86	86	$ 100.00	$ 8,600.00	0.130	**$ 1,118.00**
2049	b	acre feet/year	0	86	86	$ 100.00	$ 8,600.00	0.116	**$ 997.60**
2050	b	acre feet/year	0	86	86	$ 100.00	$ 8,600.00	0.116	**$ 997.60**
2051	b	acre feet/year	0	86	86	$ 100.00	$ 8,600.00	0.103	**$ 885.80**
2052	b	acre feet/year	0	86	86	$ 100.00	$ 8,600.00	0.103	**$ 885.80**
								Total Present Value of Discounted Benefits Based on Unit Value	**$ 116,942.80**

Comments:Savings in pumping cost per year $ 100.00 per acre foot of water pumped.

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

Page Intentionally Left Blank

Table 16 – Annual Costs of Avoided Projects

(All avoided costs should be in 2012 dollars)

Project: Project B: MD 19 A&B Parkwood Water Supply and Water Meters

	Costs				Discounting Calculations	
(a)	(b)	(c)	(d)	(e)	(f)	(g)
Year	Construct New Well to Supply minimum 680 gpm, to meet MDD water supply requirements Avoided Project Description: Avoided cost to supply water service to 605 residential customers and 28 commercial customer in the event of failure of their only source of water				Discount Factor	Discounted Costs (e) x (f)
	Avoided Capital Costs	Avoided Replacement Costs	Avoided Operations and Maintenance Costs	Total Cost Avoided for Individual Alternatives (b) + (c) + (d)		
2012				$ -	1.000	$ -
2013				$ -	0.943	$ -
2014				$ -	0.890	$ -
2015			$ 2,444,200.00	$ 2,444,200.00	0.840	$ 2,053,128
2016				$ -	0.792	$ -
2017				$ -	0.747	$ -
2018				$ -	0.705	$ -
2019				$ -	0.665	$ -
2020				$ -	0.627	$ -
2021				$ -	0.592	$ -
2022				$ -	0.558	$ -
2023				$ -	0.527	$ -
2024				$ -	0.497	$ -
2025				$ -	0.469	$ -
2026				$ -	0.442	$ -
2027				$ -	0.417	$ -
2028				$ -	0.394	$ -
2029				$ -	0.371	$ -
2030				$ -	0.350	$ -
2031				$ -	0.331	$ -
2032				$ -	0.312	$ -
2033				$ -	0.294	$ -
2034				$ -	0.278	$ -
2035				$ -	0.262	$ -
2036				$ -	0.247	$ -
2037				$ -	0.233	$ -
2038				$ -	0.220	$ -
2039				$ -	0.207	$ -
2040				$ -	0.196	$ -
2041				$ -	0.185	$ -
2042				$ -	0.174	$ -
2043				$ -	0.164	$ -
2044				$ -	0.155	$ -
2045				$ -	0.146	$ -
2046				$ -	0.138	$ -
2047				$ -	0.130	$ -
2048				$ -	0.123	$ -
2049				$ -	0.116	$ -
2050				$ -	0.109	$ -
2051				$ -	0.103	$ -
2052				$ -	0.097	$ -
					Total Present Value of Discounted Costs (Sum of Column (g))	**$ 2,053,128**
					(%) Avoided Cost Claimed by Project	**100%**
					Total Present Value of Discounted Avoided Project Costs Claimed by Alternative Project (Total Present Value of Discounted Costs x % Avoided Cost Claimed by Project)	**$ 2,053,128**

Comments: Cost avoided is the cost of supplying bottled water for domestic drinking and cooking indoor use for 12 months, in the likely case that the existing well fails within the next three to five years. Non-potable water would be supplied via water trucks and pumping into the distribution system. Failure would result in no water supply to the existing residents and businesses, which would require the County to supply emergency water while a new well is designed and constructed. Constructing the new well in advance of failure of the existing well will result in avoidance of these emergency costs.

Page Intentionally Left Blank

Table 19 – Annual Costs of Project

(All costs should be in 2012 Dollars)

Project: Parkwood MD-19 A & B

	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	$ -
2013	$ 199,933.25							$ 199,933.25	0.943	$ 188,537.05
2014	$ 899,699.62							$ 899,699.62	0.890	$ 800,732.66
2015	$ 899,699.62			$ -	$ 100.00	$ -		$ 899,799.62	0.840	$ 755,831.68
2016				$ -	$ 100.00	$ -		$ 100.00	0.792	$ 79.20
2017				$ -	$ 100.00	$ -		$ 100.00	0.747	$ 74.70
2018				$ -	$ 100.00	$ -		$ 100.00	0.705	$ 70.50
2019				$ -	$ 3,100.00	$ -		$ 3,100.00	0.665	$ 2,061.50
2020				$ -	$ 100.00	$ -		$ 100.00	0.627	$ 62.70
2021				$ -	$ 100.00	$ -		$ 100.00	0.592	$ 59.20
2022				$ -	$ 100.00	$ -		$ 100.00	0.558	$ 55.80
2023				$ -	$ 100.00	$ -		$ 100.00	0.527	$ 52.70
2024				$ -	$ 3,100.00	$ -		$ 3,100.00	0.497	$ 1,540.70
2025				$ -	$ 100.00	$ 120,000.00		$ 120,100.00	0.469	$ 56,326.90
2026				$ -	$ 100.00	$ -		$ 100.00	0.442	$ 44.20
2027				$ -	$ 100.00	$ -		$ 100.00	0.417	$ 41.70
2028				$ -	$ 100.00	$ -		$ 100.00	0.394	$ 39.40
2029				$ -	$ 3,100.00	$ -		$ 3,100.00	0.371	$ 1,150.10
2030				$ -	$ 100.00	$ 120,000.00		$ 120,100.00	0.350	$ 42,035.00
2031				$ -	$ 100.00	$ -		$ 100.00	0.331	$ 33.10
2032				$ -	$ 100.00	$ -		$ 100.00	0.312	$ 31.20
2033				$ -	$ 100.00	$ -		$ 100.00	0.294	$ 29.40
2034				$ -	$ 3,100.00	$ -		$ 3,100.00	0.278	$ 861.80
2035				$ -	$ 100.00	$ 160,000.00		$ 160,100.00	0.262	$ 41,946.20
2036				$ -	$ 100.00	$ -		$ 100.00	0.247	$ 24.70
2037				$ -	$ 100.00	$ -		$ 100.00	0.233	$ 23.30
2038				$ -	$ 100.00	$ -		$ 100.00	0.220	$ 22.00
2039				$ -	$ 3,100.00	$ -		$ 3,100.00	0.207	$ 641.70
2040				$ -	$ 100.00	$ 120,000.00		$ 120,100.00	0.196	$ 23,539.60
2041				$ -	$ 100.00	$ -		$ 100.00	0.185	$ 18.50
2042				$ -	$ 100.00	$ -		$ 100.00	0.174	$ 17.40
2043				$ -	$ 100.00	$ -		$ 100.00	0.164	$ 16.40
2044				$ -	$ 3,100.00	$ -		$ 3,100.00	0.155	$ 480.50
2045				$ -	$ 100.00	$ -		$ 100.00	0.146	$ 14.60
2046				$ -	$ 100.00	$ -		$ 100.00	0.138	$ 13.80
2047				$ -	$ 100.00	$ -		$ 100.00	0.130	$ 13.00
2048				$ -	$ 100.00	$ -		$ 100.00	0.123	$ 12.30
2049				$ -	$ 3,100.00	$ -		$ 3,100.00	0.116	$ 359.60
2050				$ -	$ 100.00	$ -		$ 100.00	0.109	$ 10.90
2051				$ -	$ 100.00	$ -		$ 100.00	0.103	$ 10.30
2052				$ -	$ 100.00	$ -		$ 100.00	0.097	$ 9.70
									Total Present Value of Discounted Costs (Sum of column (j))	$ 1,916,925.70

Comments: $100 per year for maintenance on water meters; $3,000 every 5 years for maintenance on the New Well Pump and Motor; $ 120,000 to replace 25 % of the Water Meters in the system after the first 10 years and to Replace 25 % of the Water Meters every 5 years till complete in 2040; $ 40,000 to replace the New Well Pump and Motor in 2035 after 20 years .

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

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

Page Intentionally Left Blank

Attachment 8.1, Project C – MD8 North Fork/ South Fork Sewer System Improvements

Page Left Intentionally Blank

Project C – MD8 North Fork/ South Fork Sewer System Improvements

Brief Description of Project and Implementing Agencies

County Maintenance District 8A, North Fork, is located in North Fork near Road 228 and Road 225. The district will provide sewer and water service to approximately 200 homes, apartments and businesses when final build out is complete. About 155 are currently served by the water and/or sewer systems.

The unincorporated community of South Fork lies within the boundaries of MD-8. South Fork currently relies on individual septic tanks for wastewater disposal, with the exception of a single private wastewater system. The North Fork Mill Housing Facility's private wastewater system serves a residential neighborhood of approximately 24 residential structures. The residential neighborhood is known as the North Fork Mill Housing Facility. The North Fork Mill Housing Facility private wastewater system is subject to Waste Discharge Requirements Order No. 90-051, and Cleanup and Abatement Order No. 99-729, as issued by the Regional Water Quality Control Board (RWQCB). It has a long history of chronic noncompliance with RWQCB regulations, dating from 1986.

The County desires to plan, design and construct a wastewater collection and conveyance system for the South Fork community to allow many of the existing septic tanks and the failing North Fork Mill Housing Facility private wastewater system to be taken out of service. The system is expected to consist of a gravity wastewater collection system, a wastewater pump station, and a sewer force main. The gravity wastewater collection system would convey wastewater from the properties served to the pump station, where it would be pumped via the force main to another gravity wastewater collection system and then discharge to the existing MD-8 wastewater treatment system.

Project Costs

The project budget is **$2,395,348**, including $1,678,822 in construction implementation and $716,528 in anticipated costs for design, administration, permitting, etc. Refer to Table 7 for additional details.

Annual Project Physical Benefits

Septic system flows treated were analyzed and anticipated to annually treat between 15,875 and 20,375 gallons per day (gpd) over the study period of 20 years (2013-2032). Refer to Tables 9 or 15 for additional details.

Annual Benefits

In addition to requested grant funds covering project costs ($2,347,848), the project is expected to generate additional income of $9,900 annually and $23,650 every ten years (listed in 2012 dollar values). This income is generated by user fees. The 2012 values were adjusted using an

annual discount factor for inflation, giving a total present value of benefits of **$125,505.60** above the requested grant funds. Refer to Table 15 for additional details.

Annual Costs of Avoided Projects

Over the 20-year study period, avoided capital costs are anticipated to total $4,350,000. In addition, replacement costs avoided are projected at $1,935,000 and maintenance costs at $882,000. These avoided costs are projected to be incurred by the following sources and anticipated scenarios:

- Private entities to improve, replace and repair the existing septic systems to meet new State standards.
- Performing remedial cleanup efforts due to sewage overflows. Based on previous violations there were instances of sewage seeping into groundwater and a nearby creek.
- Groundwater contamination to any nearby wells, which may require additional treatment at the surface or may require drilling new wells.
- Groundwater contamination/pollution of the nearby creeks which may potentially impact the existing ecology. Therefore, the private entities may incur additional cost to restore the ecology.

Adjusting using the annual discount factor gives a total present value of avoided costs of $4,451,823. The composite percentage claimed by the project is 75%, giving a total present value of avoided cost claimed by project of **$3,324,474**. Refer to Table 16 for additional details.

Cost / Benefit Summary

PV of Annual Fiscal Benefits (Not Including Requested Grant Funds)	$ 125,505.60
PV of Avoided Costs	$ 3,324,474.00
Project Costs	- $ 2,395,348.00
Total Benefit	**$ 1,079,631.60**

Table 15 – Annual Benefit

(All benefits should be in 2012 dollars)

Project: Project C, MD 8 North Fork/ South Fork Sewer System Improvements

(a) Year	(b) Type of Benefit	(c) Measure of Benefit (Units)	(d) Without Project	(e) With Project	(f) Change Resulting from Project (e) – (d)	(g) Unit $ Value (1)	(h) Annual $ Value (1)	(i) Discount Factor (1)	(j) Discounted Benefits (1) (h) x (i)
2012	a	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	1.000	**$ 9,900.00**
2012	b	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	1.000	**$ 9,900.00**
2013	a	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.943	**$ 9,335.70**
2013	b	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.943	**$ 9,335.70**
2014	a	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.890	**$ 8,811.00**
2014	b	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.890	**$ 8,811.00**
2015	a	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.840	**$ 8,316.00**
2015	b	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.840	**$ 8,316.00**
2016	a	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.792	**$ 7,840.80**
2016	b	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.792	**$ 7,840.80**
2017	a	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.747	**$ 7,395.30**
2017	b	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.747	**$ 7,395.30**
2018	a	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.705	**$ 6,979.50**
2018	b	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.705	**$ 6,979.50**
2019	a	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.665	**$ 6,583.50**
2019	b	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.665	**$ 6,583.50**
2020	a	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.627	**$ 6,207.30**
2020	b	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.627	**$ 6,207.30**
2021	a	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.592	**$ 5,860.80**
2021	b	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.592	**$ 5,860.80**
2022	a	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.558	**$ 5,524.20**
2022	b	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.558	**$ 5,524.20**
2023	a	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.527	**$ 5,217.30**
2023	b	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.527	**$ 5,217.30**
2024	a	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.497	**$ 4,920.30**
2024	b	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.497	**$ 4,920.30**
2025	a	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.469	**$ 4,643.10**
2025	b	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.469	**$ 4,643.10**
2026	a	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.442	**$ 4,375.80**
2026	b	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.442	**$ 4,375.80**
2027	a	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.417	**$ 4,128.30**
2027	b	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.417	**$ 4,128.30**
2028	a	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.394	**$ 3,900.60**
2028	b	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.394	**$ 3,900.60**
2029	a	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.371	**$ 3,672.90**
2029	b	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.371	**$ 3,672.90**
2030	a	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.350	**$ 3,465.00**
2030	b	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.350	**$ 3,465.00**
2031	a	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.331	**$ 3,276.90**
2031	b	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.331	**$ 3,276.90**
2032	a	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.312	**$ 3,088.80**
2032	b	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.312	**$ 3,088.80**
2033	a	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.294	**$ 2,910.60**
2033	b	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.294	**$ 2,910.60**
2034	a	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.278	**$ 2,752.20**
2034	b	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.278	**$ 2,752.20**
2035	a	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.262	**$ 2,593.80**
2035	b	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.262	**$ 2,593.80**
2036	a	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.247	**$ 2,445.30**
2036	b	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.247	**$ 2,445.30**
2037	a	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.233	**$ 2,306.70**
2037	b	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.233	**$ 2,306.70**
2038	a	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.220	**$ 2,178.00**
2038	b	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.220	**$ 2,178.00**
2039	a	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.207	**$ 2,049.30**
2039	b	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.207	**$ 2,049.30**
2040	a	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.196	**$ 1,940.40**
2040	b	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.196	**$ 1,940.40**
2041	a	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.185	**$ 1,831.50**
2041	b	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.185	**$ 1,831.50**
2042	a	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.174	**$ 1,722.60**
2042	b	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.174	**$ 1,722.60**
2043	a	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.164	**$ 1,623.60**
2043	b	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.164	**$ 1,623.60**
2044	a	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.155	**$ 1,534.50**
2044	b	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.155	**$ 1,534.50**
2045	a	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.146	**$ 1,445.40**
2045	b	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.146	**$ 1,445.40**
2046	a	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.138	**$ 1,366.20**
2046	b	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.138	**$ 1,366.20**
2047	a	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.130	**$ 1,287.00**
2047	b	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.130	**$ 1,287.00**
2048	a	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.123	**$ 1,217.70**
2048	b	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.123	**$ 1,217.70**
2049	a	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.116	**$ 1,148.40**
2049	b	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.116	**$ 1,148.40**
2050	a	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.109	**$ 1,079.10**
2050	b	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.109	**$ 1,079.10**
2051	a	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.103	**$ 1,019.70**
2051	b	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.103	**$ 1,019.70**
2052	a	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.097	**$ 960.30**
2052	b	gpd	0	15,875	15875	$ 0.62	$ 9,900.00	0.097	**$ 960.30**
								Total Present Value of Discounted Benefits Based on Unit Value	**$ 317,710.80**

Comments:

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

Page Left Intentionally Blank

Table 16 – Annual Costs of Avoided Projects

(All avoided costs should be in 2012 dollars)

Project: Project C, MD 8 North Fork/ South Fork Sewer System Improvements

	Costs				Discounting Calculations	
(a)	(b)	(c)	(d)	(e)	(f)	(g)
Year	Alternative (b): Remedial Cost for Cleanup of Sewage Overflows Avoided Project Description: Remedial cost in the event of sewage overflows.				Discount Factor	Discounted Costs (e) x (f)
	Avoided Capital Costs	Avoided Replacement Costs	Avoided Operations and Maintenance Costs	Total Cost Avoided for Individual Alternatives (b) + (c) + (d)		
2012	$ 100,000.00			$ 100,000.00	1.000	$ 100,000.00
2013	$ 100,000.00			$ 100,000.00	0.943	$ 94,300.00
2014	$ 100,000.00			$ 100,000.00	0.890	$ 89,000.00
2015	$ 100,000.00			$ 100,000.00	0.840	$ 84,000.00
2016	$ 100,000.00			$ 100,000.00	0.792	$ 79,200.00
2017	$ 100,000.00			$ 100,000.00	0.747	$ 74,700.00
2018	$ 100,000.00			$ 100,000.00	0.705	$ 70,500.00
2019	$ 100,000.00			$ 100,000.00	0.665	$ 66,500.00
2020	$ 100,000.00			$ 100,000.00	0.627	$ 62,700.00
2021	$ 100,000.00			$ 100,000.00	0.592	$ 59,200.00
2022	$ 100,000.00			$ 100,000.00	0.558	$ 55,800.00
2023	$ 100,000.00			$ 100,000.00	0.527	$ 52,700.00
2024	$ 100,000.00			$ 100,000.00	0.497	$ 49,700.00
2025	$ 100,000.00			$ 100,000.00	0.469	$ 46,900.00
2026	$ 100,000.00			$ 100,000.00	0.442	$ 44,200.00
2027	$ 100,000.00			$ 100,000.00	0.417	$ 41,700.00
2028	$ 100,000.00			$ 100,000.00	0.394	$ 39,400.00
2029	$ 100,000.00			$ 100,000.00	0.371	$ 37,100.00
2030	$ 100,000.00			$ 100,000.00	0.350	$ 35,000.00
2031	$ 100,000.00			$ 100,000.00	0.331	$ 33,100.00
2032	$ 100,000.00			$ 100,000.00	0.312	$ 31,200.00
2033	$ 100,000.00			$ 100,000.00	0.294	$ 29,400.00
2034	$ 100,000.00			$ 100,000.00	0.278	$ 27,800.00
2035	$ 100,000.00			$ 100,000.00	0.262	$ 26,200.00
2036	$ 100,000.00			$ 100,000.00	0.247	$ 24,700.00
2037	$ 100,000.00			$ 100,000.00	0.233	$ 23,300.00
2038	$ 100,000.00			$ 100,000.00	0.220	$ 22,000.00
2039	$ 100,000.00			$ 100,000.00	0.207	$ 20,700.00
2040	$ 100,000.00			$ 100,000.00	0.196	$ 19,600.00
2041	$ 100,000.00			$ 100,000.00	0.185	$ 18,500.00
2042	$ 100,000.00			$ 100,000.00	0.174	$ 17,400.00
2043	$ 100,000.00			$ 100,000.00	0.164	$ 16,400.00
2044	$ 100,000.00			$ 100,000.00	0.155	$ 15,500.00
2045	$ 100,000.00			$ 100,000.00	0.146	$ 14,600.00
2046	$ 100,000.00			$ 100,000.00	0.138	$ 13,800.00
2047	$ 100,000.00			$ 100,000.00	0.130	$ 13,000.00
2048	$ 100,000.00			$ 100,000.00	0.123	$ 12,300.00
2049	$ 100,000.00			$ 100,000.00	0.116	$ 11,600.00
2050	$ 100,000.00			$ 100,000.00	0.109	$ 10,900.00
2051	$ 100,000.00			$ 100,000.00	0.103	$ 10,300.00
2052	$ 100,000.00			$ 100,000.00	0.097	$ 9,700.00
					Total Present Value of Discounted Costs (Sum of Column (g))	$ 1,604,600.00
					(%) Avoided Cost Claimed by Project	100%
					Total Present Value of Discounted Avoided Project Costs Claimed by Alternative Project (Total Present Value of Discounted Costs x % Avoided Cost Claimed by Project)	$ 1,604,600.00

Comments: District has previous violations where sewage overflows have gotten to the nearby Willow Creek. There is an ongoing potential for sewage overflows every year. Cleanup cost is based on 15,875 gpd, and includes potential restoration of habitat and ecology. Does not include potential RWQCB fines, which have not been imposed due to past violations.

Page Intentionally Left Blank

Table 19 – Annual Costs of Project

(All costs should be in 2012 Dollars)

Project: C. North Fork/ South Fork Sewer System Improvements

	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	$ -
2013								$ -	0.943	$ -
2014	$ 1,197,674.00							$ 1,197,674.00	0.890	$ 1,065,929.86
2015	$ 1,197,674.00		$ 605.00	$ 3,500.00	$ 7,700.00	$ 7,500.00	$ 650.00	$ 1,217,629.00	0.840	$ 1,022,808.36
2016			$ 1,210.00	$ 7,000.00	$ 15,400.00	$ 15,000.00	$ 1,300.00	$ 39,910.00	0.792	$ 31,608.72
2017			$ 1,210.00	$ 7,000.00	$ 15,400.00	$ 15,000.00	$ 1,300.00	$ 39,910.00	0.747	$ 29,812.77
2018			$ 1,210.00	$ 7,000.00	$ 15,400.00	$ 15,000.00	$ 1,300.00	$ 39,910.00	0.705	$ 28,136.55
2019			$ 1,210.00	$ 7,000.00	$ 15,400.00	$ 15,000.00	$ 1,300.00	$ 39,910.00	0.665	$ 26,540.15
2020			$ 1,210.00	$ 7,000.00	$ 15,400.00	$ 15,000.00	$ 1,300.00	$ 39,910.00	0.627	$ 25,023.57
2021			$ 1,210.00	$ 7,000.00	$ 15,400.00	$ 15,000.00	$ 1,300.00	$ 39,910.00	0.592	$ 23,626.72
2022			$ 1,210.00	$ 7,000.00	$ 15,400.00	$ 15,000.00	$ 1,300.00	$ 39,910.00	0.558	$ 22,269.78
2023			$ 1,210.00	$ 7,000.00	$ 15,400.00	$ 15,000.00	$ 1,300.00	$ 39,910.00	0.527	$ 21,032.57
2024			$ 1,210.00	$ 7,000.00	$ 15,400.00	$ 15,000.00	$ 1,300.00	$ 39,910.00	0.497	$ 19,835.27
2025			$ 1,210.00	$ 7,000.00	$ 15,400.00	$ 15,000.00	$ 1,300.00	$ 39,910.00	0.469	$ 18,717.79
2026			$ 1,210.00	$ 7,000.00	$ 15,400.00	$ 15,000.00	$ 1,300.00	$ 39,910.00	0.442	$ 17,640.22
2027			$ 1,210.00	$ 7,000.00	$ 15,400.00	$ 15,000.00	$ 1,300.00	$ 39,910.00	0.417	$ 16,642.47
2028			$ 1,210.00	$ 7,000.00	$ 15,400.00	$ 15,000.00	$ 1,300.00	$ 39,910.00	0.394	$ 15,724.54
2029			$ 1,210.00	$ 7,000.00	$ 15,400.00	$ 15,000.00	$ 1,300.00	$ 39,910.00	0.371	$ 14,806.61
2030			$ 1,210.00	$ 7,000.00	$ 15,400.00	$ 15,000.00	$ 1,300.00	$ 39,910.00	0.350	$ 13,968.50
2031			$ 1,210.00	$ 7,000.00	$ 15,400.00	$ 15,000.00	$ 1,300.00	$ 39,910.00	0.331	$ 13,210.21
2032			$ 1,210.00	$ 7,000.00	$ 15,400.00	$ 15,000.00	$ 1,300.00	$ 39,910.00	0.312	$ 12,451.92
2033			$ 1,210.00	$ 7,000.00	$ 15,400.00	$ 15,000.00	$ 1,300.00	$ 39,910.00	0.294	$ 11,733.54
2034			$ 1,210.00	$ 7,000.00	$ 15,400.00	$ 15,000.00	$ 1,300.00	$ 39,910.00	0.278	$ 11,094.98
2035			$ 1,210.00	$ 7,000.00	$ 15,400.00	$ 15,000.00	$ 1,300.00	$ 39,910.00	0.262	$ 10,456.42
2036			$ 1,210.00	$ 7,000.00	$ 15,400.00	$ 15,000.00	$ 1,300.00	$ 39,910.00	0.247	$ 9,857.77
2037			$ 1,210.00	$ 7,000.00	$ 15,400.00	$ 15,000.00	$ 1,300.00	$ 39,910.00	0.233	$ 9,299.03
2038			$ 1,210.00	$ 7,000.00	$ 15,400.00	$ 15,000.00	$ 1,300.00	$ 39,910.00	0.220	$ 8,780.20
2039			$ 1,210.00	$ 7,000.00	$ 15,400.00	$ 15,000.00	$ 1,300.00	$ 39,910.00	0.207	$ 8,261.37
2040			$ 1,210.00	$ 7,000.00	$ 15,400.00	$ 15,000.00	$ 1,300.00	$ 39,910.00	0.196	$ 7,822.36
2041			$ 1,210.00	$ 7,000.00	$ 15,400.00	$ 15,000.00	$ 1,300.00	$ 39,910.00	0.185	$ 7,383.35
2042			$ 1,210.00	$ 7,000.00	$ 15,400.00	$ 15,000.00	$ 1,300.00	$ 39,910.00	0.174	$ 6,944.34
2043			$ 1,210.00	$ 7,000.00	$ 15,400.00	$ 15,000.00	$ 1,300.00	$ 39,910.00	0.164	$ 6,545.24
2044			$ 1,210.00	$ 7,000.00	$ 15,400.00	$ 15,000.00	$ 1,300.00	$ 39,910.00	0.155	$ 6,186.05
2045			$ 1,210.00	$ 7,000.00	$ 15,400.00	$ 15,000.00	$ 1,300.00	$ 39,910.00	0.146	$ 5,826.86
2046			$ 1,210.00	$ 7,000.00	$ 15,400.00	$ 15,000.00	$ 1,300.00	$ 39,910.00	0.138	$ 5,507.58
2047			$ 1,210.00	$ 7,000.00	$ 15,400.00	$ 15,000.00	$ 1,300.00	$ 39,910.00	0.130	$ 5,188.30
2048			$ 1,210.00	$ 7,000.00	$ 15,400.00	$ 15,000.00	$ 1,300.00	$ 39,910.00	0.123	$ 4,908.93
2049			$ 1,210.00	$ 7,000.00	$ 15,400.00	$ 15,000.00	$ 1,300.00	$ 39,910.00	0.116	$ 4,629.56
2050			$ 1,210.00	$ 7,000.00	$ 15,400.00	$ 15,000.00	$ 1,300.00	$ 39,910.00	0.109	$ 4,350.19
2051			$ 1,210.00	$ 7,000.00	$ 15,400.00	$ 15,000.00	$ 1,300.00	$ 39,910.00	0.103	$ 4,110.73
2052			$ 1,210.00	$ 7,000.00	$ 15,400.00	$ 15,000.00	$ 1,300.00	$ 39,910.00	0.097	$ 3,871.27
									Total Present Value of Discounted Costs (Sum of column (j))	$ 2,582,544.65

Comments: Based on current budget for sewer expenses for MD-08A 2012-2013, and projected incremental increases due to project.

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

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

Page Left Intentionally Blank

Attachment 8.1, Project D – Brockman Flood Control Basin

Page Left Intentionally Blank

Project D – Brockman Flood Control Basin

Brief Description of Project and Implementing Agencies

The Madera County Brockman Flood Control Basin project includes the donation of a 5-acre site to construct an initial 5-acre flood control basin and diversion structure along with a turnout structure on the MID Lateral 6.2 canal to import surface water supplies for additional groundwater recharge.

This area of the County currently relies exclusively on groundwater. Using Section 215 surface water supplies, the proposed pipeline will be able to deliver, on average, 75 AF/year to the project area. The County remains in discussions with the landowner regarding donation or acquisition of additional acreage. While not a part of this grant application or benefit analysis, at future build out of a basin covering the entire 13 acre site, on average 425 AF/year could be recharged. If additional Class II water were to be purchased (at a current cost of $80/AF, twice the cost of Section 215 floodwater) the capacity for ground water recharge would increase significantly due to the possibility of recharging water in the basin over the entire irrigation delivery season.

During the winter months, the Brockman Flood Control Basin will perform its main function and capture flood flows in excess of 140 cfs, for up to a total volume of 30 acre-feet, to reduce the potential flooding from a 24-hr 100-yr storm event to less than that of a 24-hr 10-yr storm event. The estimated flood damage reduction values are significant. (See Attachment 7.1D, Technical Justification.)

Project Costs

The project budget is **$1,014,990**, including $445,100 in construction implementation and $569,890 in anticipated costs for design, administration, permitting, etc. Refer to Attachment 5.1D, Project Budgets, Table 7 for additional details.

Annual Project Physical Benefits

The Brockman Flood Control Basin Project will offer both monetized and non-monetized benefits. The non-monetized benefits will be analyzed first.

Non-Monetized Benefits

Water quality benefits and some other Project benefits are difficult to quantify in economic terms, but they are discussed qualitatively below. Refer to Attachment 8.1, Table 12 for a full listing of non-monetized benefits. More detailed explanation of each non-monetized benefit is set forth in Attachment 7.1D, Technical Justification.

Non-Quantifiable Water Quality Benefits

Groundwater in the project area of Southeast Madera County is characterized by a mix on contaminants observed at varying depths. These include Heterotrophic Plate Count (or HPC, a type of iron bacteria that causes blue slime to form in the well), iron, manganese and arsenic. While groundwater conditions vary dramatically over relatively small distances, the water is also generally less saline at shallower depths. Water below approximately 550 to 600 feet below ground surface is too brackish to use as potable water. Because of overdraft, the layer of fresh water overlying the brackish water becomes more thin each year. Groundwater levels in the project area have declined an average of 5 feet per year for the past 20 years, according to DWR's annual water well level surveys. The proposed project will help improve groundwater quality by: 1) Helping to slow the average annual decline in groundwater levels in an area that shows a decline in groundwater quality with depth, and 2) Importing cleaner surface water that will mix with and improve the quality of the groundwater.

The proposed Brockman Flood Control project is important because of degrading groundwater quality in southeastern Madera County. Currently the adjacent Madera Ranchos community is a mixture of private wells and a County operated Maintenance District (MD 10A), providing potable water supply for approximately 900 water connection that use the local groundwater. However, this normally reliable supply has been found to be in jeopardy. The groundwater elevations in the area have been declining for years.

Of the first three municipal wells drilled for this community only one remains active (an additional three wells have been drilled in the past 15 years). The oldest well, "Fernwood," from 1951, is inactive and was shut down due to elevated levels of iron and manganese present when pumped. The next oldest well, "Sparta," completed in 1961, is inactive and was shut down because of high nitrate concentrations. Lastly, "Old Fender," drilled in 1984, is still operational. The well in recent years has significantly dropped in production from 500 gpm in 2006 to 150 gpm in 2012 due to the decline in groundwater elevation.

If the project is implemented, it will help to slow the decline of existing groundwater levels and could delay the need for installing treatment facilities or finding a new water supply for MD-10A connections and other private wells in the community.

Importing high quality San Joaquin River Section 215 water when available, will be diverted for the project. This water originates in the Sierra Nevada Mountains and has excellent quality for irrigation or municipal use. See **Table 8-1** on the following page.

Table 8-1 – Chemical Constituents in the San Joaquin River

Constituent	Concentration	Units
Ammonia	ND	mg/L
Calcium	3.3	mg/L
Specific Conductivity	50	µmhos/cm
Copper	ND	µg/L
Hardness	11	mg/L
Magnesium	0.62	mg/L
Nitrate	ND	mg/L
Phosphate	ND	mg/L
pH	7.4	
Temperature	21.2	ºC

Source: "Report of Waste Discharge, Friant Ranch WWTF," Provost & Pritchard Consulting Group, December 2012

As previously stated, certain areas in and near the project have groundwater quality problems. The imported surface water will percolate and mix with the groundwater, thus improving its overall quality.

Non-Quantifiable Economic Benefits

Some economic benefits will be realized from the reduce rate at which groundwater levels will decline. The proposed project will reduce the rate at which the cost of groundwater pumping increases as the water table drops each year. The project would also mitigate the need to modify well pumps or install new wells since well yields will increase with a higher static water levels. Also, there will be less need to deepen wells or lower pump bowls since the historical groundwater level decline will be partially arrested.

These benefits are difficult to quantify accurately so they are not included in the economic analysis. Since these benefits are not included, the economic benefit claimed is considered conservative.

Monetized Benefits Analysis

The proposed project will use water from two sources: San Joaquin floodwater (Section 215 water), and flood water captured during winter storm events. The amount of Section 215 water and flood water captured is described in Attachment 7.1D and totals up to 90 ac-ft annually.

The value of captured flood water is about $100/AF, based on the equivalent cost of purchasing and conveying Class II CVP water from Madera Irrigation District. This annual average benefits is equal to $1,500 for 15 AF at $100/AF. The value of the imported Section 215 is equivalent to the difference in cost of purchasing Class II CVP water from Madera Irrigation District at $100/AF versus the cost of purchasing the Section 215 water for $40/AF. This annual average benefit is equal to $4,500 for 75 AF at $60/AF. The total present value of Discounted Benefits is equal to **$88,585** dollars over a 50-yr project time span. Refer to Table 15 for additional details.

Flood Damage Reduction Benefit

Without the project an estimated 80 homes and structures within the 100-yr floodplain of the Madera Ranchos South Drainage with be damaged. Included Electronic Attachment 8.2D a, is a Figure illustrating the existing 100-yr flood plain (560 cfs peak flow). The legend identifies the impacted lots as well as those which have received a Flood Certificate and no longer are considered for potential damage.

Following the Modeling Inputs listed in the Flood Rapid Assessment Model (F-RAM), from the 2008 guide book, Attachment 8.2D b, is a Figure created to estimate average flood depth at each of the 80 impacted structures to determine an input value for the F-RAM program. This figure combines the FEMA Zone AE (flood plain with base flood elevation) data with the USGS topographical map to create as figure similar to the HEC-FIA model that combines hydraulic and hydrological data for a flood event (depth and extent) with a digital elevation model (DEM).

Instead of using census data, a current aerial photograph was reviewed and the location of each house structure was determined for the affected parcels. **Table 8-2** is the complied output consistent to the results that would have occurred using HEC-FIA, resulting in a 100-yr interval event average depth of approximately 3.0 feet. Additionally, F-RAM requires the user to also input the average flood depth for the other event intervals. Analyzing the FEMA Madera County Flood Insurance Study profile for Madera Ranchos South, the 500-yr event is approximately 3 inches greater, the 50-yr event is approximately 3 inches less, and the 10-yr event nine inches less, respectively, than the depth of the 100-yr event.

Table 8-2 Estimated Average Depth

Average Flood Depth above Ground Level (ft)	Number of Homes/Structures
0.5 +/-	12
1.0 +/-	10
2.0 +/-	29
3.0 +/-	14
4.0 +/-	12
5.0 +/-	3
Avg. Flood Depth	**3.0 +/-**

For the "With Project" scenario, the diverted 30 AF of storm water runoff results in the 10-yr, 50-yr, and 100-yr events all being analyzed at less than the current 10-yr rainfall event, resulting in no flood damage to existing structures. The full peak of the 500-yr event cannot be captured and reduced, so the 50-yr "Without Project" damages input is used for the 500-yr event to estimate the difference.

The resulting output from the F-RAM analysis (Electronic Attachment 8.2D c) has been entered into Table 17 to determine the Expected Annual Damages, Without and With Project. The

Present Value of Future Benefits is **$1,398,605** due to the estimated Flood Reduction Benefits expected for the next 50 year. See Table 18 for additional detail.

Annual Costs of Project

Over the 50-year study period, administrative costs are anticipated to total $500 each year. In addition, operational costs are projected at $800 each year and maintenance costs at $2,200 annually. The average annual purchasing cost of Section 215 water is projected at $3,000. These avoided costs are projected to be incurred by the following sources and anticipated scenarios:

- Administrative costs (analyze meter data and manage Section 215 water when available) are minimal.
- Operational costs include staff salaries for monitoring the site and collecting meter data.
- Maintenance costs are anticipated for discing the bottom of the basin and for weed control around the perimeter of the fencing.
- Other costs include purchasing the average annual 75 AF of Section 215 water for imported surface water recharge.

Adjusting using the annual discount factor gives a total present value of project costs at **$1,112,586**. This includes the initial construction/grant cost of $1,014,990. Refer to Table 19 for additional details.

Cost / Benefit Summary

Below is a summary of total project costs and benefits:

PV of Annual Fiscal Benefits (Not Including Requested Grant Funds)	$ 88,585.00
PV of Flood Damage Reduction Benefits	$ 1,398,605.00
Total Benefit	**$ 1,487,190.00**
PV Project Costs	- $ 1,112,586.00

This provides an overall benefit cost ratio of **1.34**.

Page Left Intentionally Blank

Table 15 – Annual Benefit

(All benefits should be in 2012 dollars)

Project: D, Brockman Flood Control Basin

(a) Year	(b) Type of Benefit	(c) Measure of Benefit (Units)	(d) Without Project	(e) With Project	(f) Change Resulting from Project (e) – (d)	(g) Unit $ Value (1)	(h) Annual $ Value (1) (f) x (g)	(i) Discount Factor (1)	(j) Discounted Benefits (1) (h) x (i)
2012	Recharge - Stormwater	Acre-Feet	0	0	0	100	0	1.000	**0**
	Recharge - 215 Water	Acre-Feet	0	0	0	60	0	1.000	**0**
2013	Groundwater Recharge	Acre-Feet	0	0	0	100	0	0.943	**0**
	Recharge - 215 Water	Acre-Feet	0	0	0	60	0	0.943	**0**
2014	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.890	**1335**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.890	**4005**
2015	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.840	**1259**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.840	**3778**
2016	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.792	**1188**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.792	**3564**
2017	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.747	**1121**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.747	**3363**
2018	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.705	**1057**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.705	**3172**
2019	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.665	**998**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.665	**2993**
2020	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.627	**941**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.627	**2823**
2021	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.592	**888**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.592	**2664**
2022	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.558	**838**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.558	**2513**
2023	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.527	**790**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.527	**2371**
2024	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.497	**745**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.497	**2236**
2025	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.469	**703**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.469	**2110**
2026	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.442	**663**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.442	**1990**
2027	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.417	**626**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.417	**1878**
2028	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.394	**590**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.394	**1771**
2029	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.371	**557**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.371	**1671**
2030	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.350	**526**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.350	**1577**
2031	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.331	**496**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.331	**1487**
2032	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.312	**468**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.312	**1403**
2033	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.294	**441**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.294	**1324**
2034	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.278	**416**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.278	**1249**
2035	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.262	**393**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.262	**1178**
2036	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.247	**370**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.247	**1111**
2037	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.233	**349**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.233	**1048**
2038	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.220	**330**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.220	**989**
2039	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.207	**311**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.207	**933**
2040	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.196	**293**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.196	**880**
2041	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.185	**277**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.185	**831**
2042	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.174	**261**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.174	**783**
2043	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.164	**246**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.164	**739**
2044	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.155	**232**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.155	**697**
2045	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.146	**219**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.146	**658**
2046	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.138	**207**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.138	**621**
2047	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.130	**195**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.130	**585**
2048	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.123	**184**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.123	**552**
2049	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.116	**174**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.116	**521**
2050	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.109	**164**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.109	**492**
2051	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.103	**155**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.103	**464**
2052	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.097	**146**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.097	**437**
2053	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.092	**138**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.092	**413**
2054	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.087	**130**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.087	**389**
2055	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.082	**122**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.082	**367**
2056	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.077	**116**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.077	**347**
2057	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.073	**109**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.073	**327**
2058	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.069	**103**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.069	**308**
2059	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.065	**97**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.065	**291**
2060	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.061	**91**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.061	**274**
2061	Groundwater Recharge	Acre-Feet	0	15	15	100	1500	0.058	**86**
	Recharge - 215 Water	Acre-Feet	0	75	75	60	4500	0.058	**259**
								Total Present Value of Discounted Benefits Based on Unit Value	**$ 88,585**

Comments:

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

Page Left Intentionally Blank

Table 17 – Example Calculation of Expected Annual Damage											
(All benefits should be in 2012 dollars)											
Project: D, Brockman Flood Control Basin											
Hydrologic Event	Event Exceedance Probability	Event Damage if Flood Structures Fail	Probability Structural Failure		Expected Event Damage		Interval Probability	Average Damage in Interval		Average Damage in Interval times Interval Probability	
			Without Project	With Project	Without Project	With Project		Without Project	With Project	Without Project	With Project
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(i)	(j)	(k)	(l)	(m)
					(c) x (d)	(c) x (e)	from (b)	from (f)	from (g)	(i) x (j)	(i) x (k)
10-year	0.1	$0	1	0	$0	$0	0.1	$0	$0	$0	$0
50-Year	0.02	$1,366,293	1	0	$1,366,293	$0	0.02	$1,366,293	$0	$27,326	$0
100-Year	0.01	$5,204,925	1	0	$5,204,925	$0	0.01	$5,204,925	$0	$52,049	$0
500-Year	0.002	$6,050,725	1	0.226	$6,050,725	$1,366,293	0.002	$6,050,725	$1,366,293	$12,101	$2,733
Expected Annual Damages, Without and With Project										$91,477	$2,733

Notes:
(f) Equal to F-RAM Calculated Without Project EAD (Total Potential Damages)
(g) Equal to F-RAM Calculated With Project EAD (Total Potential Damages)

Page Left Intentionally Blank

Table 18 – Present Value of Expected Annual Damage Reduction Benefits Project: D, Brockman Flood Control Basin			
(a)	Expected Annual Damage Without Project (1)		**$91,476.56**
(b)	Expected Annual Damage With Project (1)		**$2,732.59**
(c)	Expected Annual Benefit	(a) – (b)	**$88,743.97**
(d)	Present Value Coefficient (2)		**15.76**
(e)	**Present Value of Future Benefits** **Transfer to Table 20, column (e).**	**(c) x (d)**	**$1,398,605.03**

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

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

Page Left Intentionally Blank

Table 19 – Annual Costs of Project

(All costs should be in 2012 Dollars)

Project: Parkwood MD-19 A & B

	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	$ -
2013	$ 199,933.25							$ 199,933.25	0.943	$ 188,537.05
2014	$ 899,699.62							$ 899,699.62	0.890	$ 800,732.66
2015	$ 899,699.62			$ -	$ 100.00	$ -		$ 899,799.62	0.840	$ 755,831.68
2016				$ -	$ 100.00	$ -		$ 100.00	0.792	$ 79.20
2017				$ -	$ 100.00	$ -		$ 100.00	0.747	$ 74.70
2018				$ -	$ 100.00	$ -		$ 100.00	0.705	$ 70.50
2019				$ -	$ 3,100.00	$ -		$ 3,100.00	0.665	$ 2,061.50
2020				$ -	$ 100.00	$ -		$ 100.00	0.627	$ 62.70
2021				$ -	$ 100.00	$ -		$ 100.00	0.592	$ 59.20
2022				$ -	$ 100.00	$ -		$ 100.00	0.558	$ 55.80
2023				$ -	$ 100.00	$ -		$ 100.00	0.527	$ 52.70
2024				$ -	$ 3,100.00	$ -		$ 3,100.00	0.497	$ 1,540.70
2025				$ -	$ 100.00	$ 120,000.00		$ 120,100.00	0.469	$ 56,326.90
2026				$ -	$ 100.00	$ -		$ 100.00	0.442	$ 44.20
2027				$ -	$ 100.00	$ -		$ 100.00	0.417	$ 41.70
2028				$ -	$ 100.00	$ -		$ 100.00	0.394	$ 39.40
2029				$ -	$ 3,100.00	$ -		$ 3,100.00	0.371	$ 1,150.10
2030				$ -	$ 100.00	$ 120,000.00		$ 120,100.00	0.350	$ 42,035.00
2031				$ -	$ 100.00	$ -		$ 100.00	0.331	$ 33.10
2032				$ -	$ 100.00	$ -		$ 100.00	0.312	$ 31.20
2033				$ -	$ 100.00	$ -		$ 100.00	0.294	$ 29.40
2034				$ -	$ 3,100.00	$ -		$ 3,100.00	0.278	$ 861.80
2035				$ -	$ 100.00	$ 160,000.00		$ 160,100.00	0.262	$ 41,946.20
2036				$ -	$ 100.00	$ -		$ 100.00	0.247	$ 24.70
2037				$ -	$ 100.00	$ -		$ 100.00	0.233	$ 23.30
2038				$ -	$ 100.00	$ -		$ 100.00	0.220	$ 22.00
2039				$ -	$ 3,100.00	$ -		$ 3,100.00	0.207	$ 641.70
2040				$ -	$ 100.00	$ 120,000.00		$ 120,100.00	0.196	$ 23,539.60
2041				$ -	$ 100.00	$ -		$ 100.00	0.185	$ 18.50
2042				$ -	$ 100.00	$ -		$ 100.00	0.174	$ 17.40
2043				$ -	$ 100.00	$ -		$ 100.00	0.164	$ 16.40
2044				$ -	$ 3,100.00	$ -		$ 3,100.00	0.155	$ 480.50
2045				$ -	$ 100.00	$ -		$ 100.00	0.146	$ 14.60
2046				$ -	$ 100.00	$ -		$ 100.00	0.138	$ 13.80
2047				$ -	$ 100.00	$ -		$ 100.00	0.130	$ 13.00
2048				$ -	$ 100.00	$ -		$ 100.00	0.123	$ 12.30
2049				$ -	$ 3,100.00	$ -		$ 3,100.00	0.116	$ 359.60
2050				$ -	$ 100.00	$ -		$ 100.00	0.109	$ 10.90
2051				$ -	$ 100.00	$ -		$ 100.00	0.103	$ 10.30
2052				$ -	$ 100.00	$ -		$ 100.00	0.097	$ 9.70
									Total Present Value of Discounted Costs (Sum of column (j))	$ 1,916,925.70

Comments: $100 per year for maintenance on water meters; $3,000 every 5 years for maintenance on the New Well Pump and Motor; $ 120,000 to replace 25 % of the Water Meters in the system after the first 10 years and to Replace 25 % of the Water Meters every 5 years till complete in 2040; $ 40,000 to replace the New Well Pump and Motor in 2035 after 20 years .

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

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

Page Left Intentionally Blank

Attachment 8.1, Project E – CSA14 Chuk-Chanse Sewer System Improvements

Page Left Intentionally Blank

Project E – CSA14 Chuk-Chanse Sewer System Improvements

Cost Effectiveness Analysis

Elimination of Groundwater Contamination by Sewer System Improvements: SA-14 Chuk-Chanse operates a small facultative-lagoon wastewater treatment system located about one mile west of the community. The WWTP currently has two long-neglected maintenance issues.

The first is severe cracking in a 500-foot section of the original 12-inch vitrified clay pipe (VCP) collector sewer. Because this section is located directly within a local drainage, the cracking results in excess I&I into the collection line, which then has to be pumped into the lagoon. Also, the infiltrated water causes the volume of the inflow to exceed the design disposal rate of the lagoons, which creates pond capacity issues especially in very wet seasons. The cracks are also causing groundwater contamination during the dry months, as they allow raw wastewater to exfiltrate from the sewer collector and into the surrounding drainage. Allowing this to continue represents a serious threat to the groundwater quality of the community and therefore the no-project alternative is not a viable long-term option. This contamination has not yet drawn an enforcement action from the RWQCB, such discharges onto drainage areas are not permissible and repair is required.

The alternative solution would be installation of a cured-in-place liner such as an InsituForm. This alternative would require only two manholes. It would require approximately the same amount of bypass pumping as the proposed alternative. Cost of the InsituForm CIP liner would be approximately $95,000, making this alternative substantially more expensive than the recommended project. Therefore the recommended project is the most cost-effective solution.

The second issue is flooding of a neighboring orchard during the spring and early summer months, caused by seepage beneath the western levee of the lagoons. Investigation by Madera County Special Districts Staff Joe Beck and Marty Duvall in 2005 revealed that rather than simply percolating into the ground, the seepage travels laterally to the west into a neighboring nut orchard, on top of an impervious hardpan layer that is about five feet below the ground surface. The water migrates to the surface, leaving standing puddles that bloom with algae in the spring and early summer months. Allowing this to continue represents a serious threat to the surface water and groundwater quality of the community and therefore the no-project alternative is not a viable long-term option. While this seepage has not yet drawn enforcement action from the RWQCB, such discharges onto neighboring properties are not permissible and repair is required.

The proposed trench drain would eliminate lateral transport of seeping wastewater effluent from the WWTP percolation/evaporation basin to the neighboring property by creating a break in the hardpan, allowing the seeped effluent to percolate as intended rather than flowing laterally across the top of the hardpan. This solution can be implemented as part of this overall project at a construction cost of approximately $45,000.

The alternative to the trench drain would be lining the pond, which would completely eliminate seepage, but would have the dis-benefit of completely eliminating percolation from the pond, reducing the overall effluent disposal capacity. This is a serious drawback to the alternative. However, the cost of the alternative is decisive. Lining the 300'x75x pond would cost approximately $250,000 including engineering and administration. That job would be substantially more difficult since the pond itself is perennially full of water and there are no convenient options to dispose of the water and drain the pond. For that reason, this alternative is not considered feasible. Even if it were feasible, the cost is some $205,000 greater than the cost of the proposed trench drain, making the proposed solution the more cost-effective alternative.

The Project recommends a two-part repair to address these separate contamination issues:

1. Replacement of the 500 LF of cracked VCP sewer by constructing a parallel 12-inch PVC SDR35 sewer, connected to the original collector line at each end of the PVC using 45-degree connections with a standard 48-inch manhole at each angle point. Since the collector sewer travels through open ground, the parallel construction can be accomplished by simple conventional construction methods and is by far the most cost effective alternative. Total construction cost of the alternative is expected to be $41,000.

2. Construction of 300 LF of trench drain along the toe of the west end of the lagoon levee. See Attachment 8.1, Project E for details. The trench drain will allow seepage water to penetrate the hardpan and percolate into the deeper ground layers, eliminating the lateral travel and the puddling in the neighbor's orchard. Total construction cost of the alternative is expected to be $45,000.

Each of these repairs is simple, cost effective, and beyond the reach of CSA14's very limited capital program budget, which is funded only by the user charges from 31 connections and 1 commercial connection in this DAC.

Installation of Water Meters to Meet Statutory Requirement: CSA14 Chuk-Chanse is a Disadvantaged Community which has 31 water service connections and 1 commercial service connection, all of which are currently unmetered. The customers pay a flat quarterly rate for water. The current annual water use averages 25,000 gpd. January water production averages 500,000 gallons, while summer water projection (June, July, August) typically is 1,000,000 gallons per month. The water is supplied by a single well that produces 31 gpm and pumps to a 48,000 gallon storage tank and is then boosted to a hydro pneumatic tank to provide pressure to the system.

At 100% duty cycle, the well could produce 1.34 million gallons of water in a 30-day month. Since summer water production is only 75% of that amount, the water system is not production-constrained. However, the single well has no backup, and any failure of that well is an immediate and critical problem.

The large difference between summer and winter use is all assignable to outdoor irrigation. Similar systems have experienced 20% to 25% drops in annual water use through installation of water meters and imposition of progressive, revenue-neutral water rates. Chuk-Chanse can expect similar results.

With meters installed, a savings of 20 percent would result in a reduction in water production per average day of about 5,000 gpd, which sums to 1,825,000 gallons or 5.60 acre-feet per year, all of which is water left in the aquifer and would directly reduce groundwater overdraft in the severely over drafted region. This reduction in pumped water saves electrical power costs of $100 per acre foot pumped as described in Table 15. The Total Present Value of Discounted Benefits is **$ 7,615**.

The no-project alternative is not considered feasible, in the face of the 2020 requirement to install meters. Penalties and fines for non-compliance could be substantial.

The proposed project is to install self-reading electronic meters. Including all necessary boxes, materials, labor, the central receiving computer with software, the project cost will be approximately $55,000.

The alternative to the project would be non-self-reading (mechanical) meters. These meters are slightly less expensive to purchase, representing a $3,100 savings. Also, the mechanical meters would not require the handheld meter reading equipment with software, representing an additional savings of $20,000, for a total gross savings of $23,100. However, the mechanical meters would require monthly reading. Since Madera County does not have any staff on site at Chuck-Chanse, a special trip to read the meters would be required each month. Including travel time, it is estimated that reading the meters would require 6 man hours per month, at a full-burdened cost of $65/man-hour, or a total of $390. The annualized cost would be $4,680. The life of the meters is considered to be 20 years. The Present Value of the 20-year cost of reading the meters, at 4%, is $63,603. The self-reading meters do not require this manpower. Thus, the Present Value cost of the alternative is $95,503, or $40,503 greater than the cost of the recommended self-reading meters.

This cost effective solution of installation of self-reading meters is beyond the reach of CSA14's very limited capital program budget, which is funded only by the user charges from 31 connections and 1 commercial connection in this DAC.

Project Benefits and Cost Summary

From Attachment 8.1E, Table 15, the Total Present Value of Discounted Benefits is **$ 7,615**.
The Total Project costs have been prorated over the three year duration of the Project as shown on the Project Schedule, Attachment 5E. These are shown in Table 19. The first year, 2013, was allocated 10 % of the Grant Funds ($33,982.) The next two years, 2014 and 2015, were allocated 45 % ($152,921) each.

The incremental change in maintenance costs was determined to be $100 per year for required maintenance on the 32 Water Meters. This maintenance allocation will be required for the life of the Project, thru 2052.

The incremental change in replacement costs was determined to be the cost of replacing meters as they wear out. This is budgeted as 25% of the total cost of replacing all meters, in four parts, beginning with $6,000 in year 2025, 10 years after the project will be completed. An additional $ 6,000 was budgeted every five years for three additional groups of replacement meters, with that project being completed in 2040.

The Total Present Value of Discounted Costs is **$ 305,582.56**.

Table 11 – Statement of Cost-Effectiveness Project E: CSA14 Chuk-Chanse Sewer System Improvements	
Question 1	Types of benefits provided:
	1. Water meters will be installed in this DAC, allowing the community to meet the 2020 requirement for meter intallation. Meters will be self-reading, allowing for collection of meter data without staff time spent on meter reading.
	2. A 500 LF section of the community's 12-inch sanitary sewer collector will be replaced, eliminating excessive I&I and removing a source of groundwater contamination by elimination badly cracked VCP sewer line that crosses a natural drainage.
	3. A 300 LF trench drain will be constructed along the west edge of the existing WWTP percolation/evaporation pond, mitigating leakage from the pond which now travels laterally on top of a shallow hardpan lens and surfaces in the neighboring nut orchard, creating standing water with algae blooms throughout the spring months.
Question 2	Have alternative methods of providing the same types and amounts of physical benefits as the proposed project been identified?
	1. Yes
	2. Yes
	3. Yes
	If no, why?
	If yes, list the methods (including the proposed project) and estimated costs.
	1. The no-project alternative is not considered feasible, in the face of the 2020 requirement to install meters. Penalties and fines for non-compliance could be substantial. The proposed project is to install self-reading electronic meters. Including all necessary boxes, materials, labor, the central receiving computer with software, the project cost will be approximately $55,000. The alternative to the project would be non-self-reading (mechanical) meters. These meters are slightly less expensive to purchase, representing a $3,100 savings. Also, the mechanical meters would not require the handheld meter reading equipment with software, representing an additional savings of $20,000, for a total gross savings of $23,100. However, the mechanical meters would require monthly reading. Since there is no Madera County staff on site at Chuck-Chanse, a special trip to read the meters would be required each month. Including travel time, it is estimated that reading the meters would require 6 man hours per month, at a full-burdened cost of $65/man-hour, or a total of $390. The annualized cost would be $4,680. The life of the meters is considered to be 20 years. The Present Value of the 20-year cost of reading the meters, at 4%, is $63,603. The self-reading meters do not require this manpower. Thus, the Present Value cost of the alternative is $95,503, or $40,503 greater than the cost of the recommended self-reading meters.

	2. The proposed trench drain would eliminate lateral transport of seeping wastewater effluent from the WWTP percolation/evaporation basin to the neighboring property by creating a break in the hardpan, allowing the seeped effluent to percolate as intended rather than flowing laterally across the top of the hardpan. This solution can be implemented as part of this overall project at a construction cost of approximately $45,000. The alternative to the trench drain would be lining the pond, which would completely eliminate seepage, but would have the dis-benefit of completely eliminating percolation from the pond, reducing the overall effluent disposal capacity. This is a serious drawback to the alternative. However, the cost of the alternative is decisive. Lining the 300'x75x pond would cost approximately $250,000 including engineering and administration. That job would be substantially more difficult since the pond itself is perennially full of water and there are no convenient options to dispose of the water and drain the pond. For that reason, this alternative is not considered feasible. Even if it were feasible, the cost is some $205,000 greater than the cost of the proposed trench drain, making the proposed solution the more cost-effective alternative.
	3. The County has identified an approximately 500 LF section of the sewer collector which is significantly cracked and allowing excessive I&I during wet conditions. During dry conditions, that same cracking is allowing exfiltration of raw sewage from the pipeline into the surrounding ground, where it is free to percolate to the groundwater table. Allowing this to continue respresents a serious threat to the groundwater quality of the community and therefore the no-project alternative is not a viable long-term option. The project proposes reconstruction of the cracked section of pipeline using a parallel 12-inch PVC SDR 35 pipe. This will allow construction of the new line with minimal disruption to current service, minimizing the need to provide bypass pumping during cosntruction. Four manholes would be required to accomodate the angle points. Since the pipeline route is through open field, no trench resurfacing or traffic control would be required. Total construction cost of the alternative is expected to be $41,000. The alternative solution would be installation of a cured-in-place liner such as an InsituForm. This alternative would require only two manholes. It would require approximately the same amount of bypass pumping as the proposed alternative. Cost of the InsituForm CIP liner would be approximately $95,000, making this alternative substantially more expensive than the recommended project. Therefore the recommended project is the most cost-effective solution.
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.
	In each case, the proposed alternative is the most cost-effective alternative to solve the problem at hand.
Comments:	

Table 15 – Annual Benefit

(All benefits should be in 2012 dollars)

Project: Project E, CSA14 Chuk-Chanse Water System Improvements

(a) Year	(b) Type of Benefit	(c) Measure of Benefit (Units)	(d) Without Project	(e) With Project	(f) Change Resulting from Project (e) – (d)	(g) Unit $ Value (1)	(h) Annual $ Value (1)	(i) Discount Factor (1)	(j) Discounted Benefits (1) (h) x (i)
2012	b	acre feet/year	0	0	0	$ -	$ -	1.000	**$ -**
2013	b	acre feet/year	0	0	0	$ -	$ -	0.943	**$ -**
2014	b	acre feet/year	0	0	0	$ -	$ -	0.943	**$ -**
2015	b	acre feet/year	0	5.6	5.6	$ 100.00	$ 560.00	0.840	**$ 470.40**
2016	b	acre feet/year	0	5.6	5.6	$ 100.00	$ 560.00	0.840	**$ 470.40**
2017	b	acre feet/year	0	5.6	5.6	$ 100.00	$ 560.00	0.747	**$ 418.32**
2018	b	acre feet/year	0	5.6	5.6	$ 100.00	$ 560.00	0.747	**$ 418.32**
2019	b	acre feet/year	0	5.6	5.6	$ 100.00	$ 560.00	0.665	**$ 372.40**
2020	b	acre feet/year	0	5.6	5.6	$ 100.00	$ 560.00	0.665	**$ 372.40**
2021	b	acre feet/year	0	5.6	5.6	$ 100.00	$ 560.00	0.592	**$ 331.52**
2022	b	acre feet/year	0	5.6	5.6	$ 100.00	$ 560.00	0.592	**$ 331.52**
2023	b	acre feet/year	0	5.6	5.6	$ 100.00	$ 560.00	0.527	**$ 295.12**
2024	b	acre feet/year	0	5.6	5.6	$ 100.00	$ 560.00	0.527	**$ 295.12**
2025	b	acre feet/year	0	5.6	5.6	$ 100.00	$ 560.00	0.469	**$ 262.64**
2026	b	acre feet/year	0	5.6	5.6	$ 100.00	$ 560.00	0.469	**$ 262.64**
2027	b	acre feet/year	0	5.6	5.6	$ 100.00	$ 560.00	0.417	**$ 233.52**
2028	b	acre feet/year	0	5.6	5.6	$ 100.00	$ 560.00	0.417	**$ 233.52**
2029	b	acre feet/year	0	5.6	5.6	$ 100.00	$ 560.00	0.371	**$ 207.76**
2030	b	acre feet/year	0	5.6	5.6	$ 100.00	$ 560.00	0.371	**$ 207.76**
2031	b	acre feet/year	0	5.6	5.6	$ 100.00	$ 560.00	0.331	**$ 185.36**
2032	b	acre feet/year	0	5.6	5.6	$ 100.00	$ 560.00	0.331	**$ 185.36**
2033	b	acre feet/year	0	5.6	5.6	$ 100.00	$ 560.00	0.294	**$ 164.64**
2034	b	acre feet/year	0	5.6	5.6	$ 100.00	$ 560.00	0.294	**$ 164.64**
2035	b	acre feet/year	0	5.6	5.6	$ 100.00	$ 560.00	0.262	**$ 146.72**
2036	b	acre feet/year	0	5.6	5.6	$ 100.00	$ 560.00	0.262	**$ 146.72**
2037	b	acre feet/year	0	5.6	5.6	$ 100.00	$ 560.00	0.233	**$ 130.48**
2038	b	acre feet/year	0	5.6	5.6	$ 100.00	$ 560.00	0.233	**$ 130.48**
2039	b	acre feet/year	0	5.6	5.6	$ 100.00	$ 560.00	0.207	**$ 115.92**
2040	b	acre feet/year	0	5.6	5.6	$ 100.00	$ 560.00	0.207	**$ 115.92**
2041	b	acre feet/year	0	5.6	5.6	$ 100.00	$ 560.00	0.185	**$ 103.60**
2042	b	acre feet/year	0	5.6	5.6	$ 100.00	$ 560.00	0.185	**$ 103.60**
2043	b	acre feet/year	0	5.6	5.6	$ 100.00	$ 560.00	0.164	**$ 91.84**
2044	b	acre feet/year	0	5.6	5.6	$ 100.00	$ 560.00	0.164	**$ 91.84**
2045	b	acre feet/year	0	5.6	5.6	$ 100.00	$ 560.00	0.146	**$ 81.76**
2046	b	acre feet/year	0	5.6	5.6	$ 100.00	$ 560.00	0.146	**$ 81.76**
2047	b	acre feet/year	0	5.6	5.6	$ 100.00	$ 560.00	0.130	**$ 72.80**
2048	b	acre feet/year	0	5.6	5.6	$ 100.00	$ 560.00	0.130	**$ 72.80**
2049	b	acre feet/year	0	5.6	5.6	$ 100.00	$ 560.00	0.116	**$ 64.96**
2050	b	acre feet/year	0	5.6	5.6	$ 100.00	$ 560.00	0.116	**$ 64.96**
2051	b	acre feet/year	0	5.6	5.6	$ 100.00	$ 560.00	0.103	**$ 57.68**
2052	b	acre feet/year	0	5.6	5.6	$ 100.00	$ 560.00	0.103	**$ 57.68**
								Total Present Value of Discounted Benefits Based on Unit Value	**$ 7,614.88**

Comments:Savings in pumping cost per year $ 100.00 per acre foot of water pumped.

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

Page Left Intentionally Blank

Table 19 – Annual Costs of Project

(All costs should be in 2012 Dollars)

Project: Chuk-Chanse SA-14

	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	$ -
2013	$ 33,982.50		$ -	$ -	$ -	$ -	$ -	$ 33,982.50	0.943	$ 32,045.50
2014	$ 152,921.25		$ -	$ -	$ -	$ -	$ -	$ 152,921.25	0.890	$ 136,099.91
2015	$ 152,921.25		$ -	$ -	$ 100.00	$ -	$ -	$ 153,021.25	0.840	$ 128,537.85
2016			$ -	$ -	$ 100.00	$ -	$ -	$ 100.00	0.792	$ 79.20
2017			$ -	$ -	$ 100.00	$ -	$ -	$ 100.00	0.747	$ 74.70
2018			$ -	$ -	$ 100.00	$ -	$ -	$ 100.00	0.705	$ 70.50
2019			$ -	$ -	$ 100.00	$ -	$ -	$ 100.00	0.665	$ 66.50
2020			$ -	$ -	$ 100.00	$ -	$ -	$ 100.00	0.627	$ 62.70
2021			$ -	$ -	$ 100.00	$ -	$ -	$ 100.00	0.592	$ 59.20
2022			$ -	$ -	$ 100.00	$ -	$ -	$ 100.00	0.558	$ 55.80
2023			$ -	$ -	$ 100.00	$ -	$ -	$ 100.00	0.527	$ 52.70
2024			$ -	$ -	$ 100.00	$ -	$ -	$ 100.00	0.497	$ 49.70
2025			$ -	$ -	$ 100.00	$ 6,000.00	$ -	$ 6,100.00	0.469	$ 2,860.90
2026			$ -	$ -	$ 100.00	$ -	$ -	$ 100.00	0.442	$ 44.20
2027			$ -	$ -	$ 100.00	$ -	$ -	$ 100.00	0.417	$ 41.70
2028			$ -	$ -	$ 100.00	$ -	$ -	$ 100.00	0.394	$ 39.40
2029			$ -	$ -	$ 100.00	$ -	$ -	$ 100.00	0.371	$ 37.10
2030			$ -	$ -	$ 100.00	$ 6,000.00	$ -	$ 6,100.00	0.350	$ 2,135.00
2031			$ -	$ -	$ 100.00	$ -	$ -	$ 100.00	0.331	$ 33.10
2032			$ -	$ -	$ 100.00	$ -	$ -	$ 100.00	0.312	$ 31.20
2033			$ -	$ -	$ 100.00	$ -	$ -	$ 100.00	0.294	$ 29.40
2034			$ -	$ -	$ 100.00	$ -	$ -	$ 100.00	0.278	$ 27.80
2035			$ -	$ -	$ 100.00	$ 6,000.00	$ -	$ 6,100.00	0.262	$ 1,598.20
2036			$ -	$ -	$ 100.00	$ -	$ -	$ 100.00	0.247	$ 24.70
2037			$ -	$ -	$ 100.00	$ -	$ -	$ 100.00	0.233	$ 23.30
2038			$ -	$ -	$ 100.00	$ -	$ -	$ 100.00	0.220	$ 22.00
2039			$ -	$ -	$ 100.00	$ -	$ -	$ 100.00	0.207	$ 20.70
2040			$ -	$ -	$ 100.00	$ 6,000.00	$ -	$ 6,100.00	0.196	$ 1,195.60
2041			$ -	$ -	$ 100.00	$ -	$ -	$ 100.00	0.185	$ 18.50
2042			$ -	$ -	$ 100.00	$ -	$ -	$ 100.00	0.174	$ 17.40
2043			$ -	$ -	$ 100.00	$ -	$ -	$ 100.00	0.164	$ 16.40
2044			$ -	$ -	$ 100.00	$ -	$ -	$ 100.00	0.155	$ 15.50
2045			$ -	$ -	$ 100.00	$ -	$ -	$ 100.00	0.146	$ 14.60
2046			$ -	$ -	$ 100.00	$ -	$ -	$ 100.00	0.138	$ 13.80
2047			$ -	$ -	$ 100.00	$ -	$ -	$ 100.00	0.130	$ 13.00
2048			$ -	$ -	$ 100.00	$ -	$ -	$ 100.00	0.123	$ 12.30
2049			$ -	$ -	$ 100.00	$ -	$ -	$ 100.00	0.116	$ 11.60
2050			$ -	$ -	$ 100.00	$ -	$ -	$ 100.00	0.109	$ 10.90
2051			$ -	$ -	$ 100.00	$ -	$ -	$ 100.00	0.103	$ 10.30
2052			$ -	$ -	$ 100.00	$ -	$ -	$ 100.00	0.097	$ 9.70
								Total Present Value of Discounted Costs (Sum of column (j)		$ 305,582.56

Comments: $ 100 per year for Maintenance on Water Meters; $ 6,000 to Replace 25 % of the Water Meters after the first 10 years and $ 6,000 to replace 25 % of theWater Meters every 5 Years until complete in 2040.

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

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

Page Left Intentionally Blank

Attachment 8.1, Project F – MD33 Fairmead Sewer Collection, Treatment and Disposal System Plans

Page Left Intentionally Blank

Project F – MD33 Fairmead Sewer Collection, Treatment and Disposal System Plans

Project Overview

This project proposes to carry out the planning and engineering work necessary to complete plans, specifications and cost estimate for a complete wastewater collection, treatment and disposal system for the Disadvantaged Community of Fairmead (County Maintenance District MD33). While no construction would be carried out under this grant, the plans and specifications produced would leave Fairmead in position to competitively apply for construction grant funding from agencies including USDA Rural Utility Service and the CDPH State Revolving Fund. Once constructed, there would be both quantitative and qualitative water supply benefits from the project, which are detailed below.

Project Qualitative Water Supply Benefits

The proposed project, once carried through to construction completion, will replace existing private individual septic tanks (many of which are failing and leaking) with a community-wide sewer disposal system to serve the Disadvantaged Community of Fairmead.

The qualitative benefits of the project accrue from a reduction in the risk of polluting the local aquifer with nitrates and coliforms from the eventual failure of septic systems. These benefits will be demonstrable only when the project is carried through to construction.

Annual Benefits

Although there are benefits anticipated as a result of the proposed project, these benefits are difficult to quantify for the planning, pre-design, and design project. Benefits are therefore based on the three following anticipated reductions: 1) a reduction in the cost to treat for nitrate; 2) a proportional reduction in the cost of water pumping and well replacement; and 3) a reduction in the cost of forgoing the need to replace and/or maintain private septic systems.

1) The reduction in the cost to treat for nitrates is based on the present system-wide nitrate treatment cost of $16,032 (from year 2012 through year 2020), the projected nitrate treatment cost of $16,513 (from year 2021 through year 2032), and the projected nitrate treatment cost of $17,338 (from year 2033 though year 2043).

It is estimated that the elimination of leaking or failing septic tanks in the community of Fairmead would translate into an annual nitrate treatment cost reduction of $3,206 (for years 2012 through 2020), an annual nitrate treatment cost reduction of $3,302 (for years 2021 through 2032), and an annual nitrate treatment cost reduction of $3,468 (for years 2033 through 2043); thereafter, the annual nitrate treatment cost reduction is expected to be incremental, as the cost of nitrate treatment is expected to gradually increase with inflation.

2) A proportional reduction in the cost of water pumping and well replacement cost is also anticipated as an ancillary benefit of this project, because of the elimination of the need to pump water that is then wasted without recapture in nitrate treatment. The current estimated cost of water pumping for the community of Fairmead, including maintenance and projected well replacement cost negative amortization, are $21,024 through year 2024, $22,075 from year 2025 through year 2036, and $23,179 from year 2037 through year 2043. Thereafter, costs are expected to be incremental, as water pumping and well maintenance costs are expected to increase with inflation.

With the completion of this project, the projected cost savings in water pumping and consequential well replacement cost reductions are estimated to be $4,205, per year, through the year 2024; with annual cost savings of $4,415 from year 2025 through year 2036; and with annual cost savings of $4,636 from year 2037 through year 2043; thereafter, cost savings are expected to be incremental.

3) It is estimated that the elimination of individual septic tanks and the community of Fairmead's eventual connection to its own wastewater treatment facility or other viable wastewater disposal alternative would eliminate this disadvantaged community's septic tank pumping and maintenance expense. With present yearly pumping and maintenance expenses averaging $350 per household, the community's total septic expenses are estimated at $58,450 per year; as septic maintenance and replacement cost increase, these costs are expected to increase to $62,293 (starting in year 2021), to $67,802 (starting in year 2028), to $70,641 (starting in year 2035). These community-wide expenses would be eliminated if the community could develop and implement a wastewater treatment facility or would connect to an alternative wastewater treatment system.

Water Supply Benefits: Decrease Groundwater Overdraft Effects

This area of the Central Valley is experiencing a severe groundwater overdraft. Groundwater is subsiding at a rate which reaches five feet per year. This project would alleviate a portion of this over draft by making available 15-20 AF of treated effluent for agricultural irrigation. This will result in an estimated reduction of 15-20 AF of water being pumped from the ground.

Energy

Offsetting groundwater pumping will decrease the energy required by pumping.

Table 15 – Annual Benefit

(All benefits should be in 2012 dollars)

Project: Project F, MD33 Fairmead Sewer Collection, Treatment and Disposal System Plans

(a) Year	(b) Type of Benefit	(c) Measure of Benefit (Units)	(d) Without Project	(e) With Project	(f) Change Resulting from Project (e) – (d)	(g) Unit $ Value (1)	(h) Annual $ Value (1) (f) x (g)	(i) Discount Factor (1)	(j) Discounted Benefits (1) (h) x (i)
2012	Water Sales	AF	0	46.77	46.77	150	7015.5	1.000	**$7,015.50**
2013	Water Sales	AF	0	46.77	46.77	150	7015.5	0.943	**$6,615.62**
2014	Water Sales	AF	0	46.77	46.77	150	7015.5	0.890	**$6,243.80**
2015	Water Sales	AF	0	46.77	46.77	150	7015.5	0.840	**$5,893.02**
2016	Water Sales	AF	0	46.77	46.77	150	7015.5	0.792	**$5,556.28**
2017	Water Sales	AF	0	46.77	46.77	150	7015.5	0.747	**$5,240.58**
2018	Water Sales	AF	0	46.77	46.77	150	7015.5	0.705	**$4,945.93**
2019	Water Sales	AF	0	46.77	46.77	150	7015.5	0.665	**$4,665.31**
2020	Water Sales	AF	0	46.77	46.77	150	7015.5	0.627	**$4,398.72**
2021	Water Sales	AF	0	46.77	46.77	150	7015.5	0.592	**$4,153.18**
2022	Water Sales	AF	0	46.77	46.77	150	7015.5	0.558	**$3,914.65**
2023	Water Sales	AF	0	46.77	46.77	150	7015.5	0.527	**$3,697.17**
2024	Water Sales	AF	0	46.77	46.77	150	7015.5	0.497	**$3,486.70**
2025	Water Sales	AF	0	46.77	46.77	150	7015.5	0.469	**$3,290.27**
2026	Water Sales	AF	0	46.77	46.77	150	7015.5	0.442	**$3,100.85**
2027	Water Sales	AF	0	46.77	46.77	150	7015.5	0.417	**$2,925.46**
2028	Water Sales	AF	0	46.77	46.77	150	7015.5	0.394	**$2,764.11**
2029	Water Sales	AF	0	46.77	46.77	150	7015.5	0.371	**$2,602.75**
2030	Water Sales	AF	0	46.77	46.77	150	7015.5	0.350	**$2,455.43**
2031	Water Sales	AF	0	46.77	46.77	150	7015.5	0.331	**$2,322.13**
2032	Water Sales	AF	0	46.77	46.77	150	7015.5	0.312	**$2,188.84**
2033	Water Sales	AF	0	46.77	46.77	150	7015.5	0.294	**$2,062.56**
2034	Water Sales	AF	0	46.77	46.77	150	7015.5	0.278	**$1,950.31**
2035	Water Sales	AF	0	46.77	46.77	150	7015.5	0.262	**$1,838.06**
2036	Water Sales	AF	0	46.77	46.77	150	7015.5	0.247	**$1,732.83**
2037	Water Sales	AF	0	46.77	46.77	150	7015.5	0.233	**$1,634.61**
2038	Water Sales	AF	0	46.77	46.77	150	7015.5	0.220	**$1,543.41**
2039	Water Sales	AF	0	46.77	46.77	150	7015.5	0.207	**$1,452.21**
2040	Water Sales	AF	0	46.77	46.77	150	7015.5	0.196	**$1,375.04**
2041	Water Sales	AF	0	46.77	46.77	150	7015.5	0.185	**$1,297.87**
2042	Water Sales	AF	0	46.77	46.77	150	7015.5	0.174	**$1,220.70**
2043	Water Sales	AF	0	46.77	46.77	150	7015.5	0.164	**$1,150.54**
Last Year of Project Life	Water Sales	AF	0	46.77	46.77	150	7015.5	0.155	**$1,087.40**
								Total Present Value of Discounted Benefits Based on Unit Value (Sum of the values in Column (j) for all Benefits shown in table)	**$105,821.80**

Comments: Assumes an average of 25 AF of recycled water is sold at $150/AF each year

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

Page Left Intentionally Blank

Table 16 – Annual Costs of Avoided Projects

(All avoided costs should be in 2012 dollars)

Project: Project F, MD33 Fairmead Wastewater Collection, Treatment and Disposal System Plans

	Costs				Discounting Calculations	
(a)	(b)	(c)	(d)	(e)	(f)	(g)
Year	Alternative: Ongoing Repair and Maintenance Costs for Failing Septic Tanks Avoided Project Description:				Discount Factor	Discounted Costs (e) x (f)
	Avoided Capital Costs	Avoided Replacement Costs	Avoided Operations and Maintenance Costs	Total Cost Avoided for Individual Alternatives (b) + (c) + (d)		
2012	3206	4205	58450	65861	1.000	**$65,861.00**
2013	3206	4205	58450	65861	0.943	**$62,106.92**
2014	3206	4205	58450	65861	0.890	**$58,616.29**
2015	3206	4205	58450	65861	0.840	**$55,323.24**
2016	3206	4205	58450	65861	0.792	**$52,161.91**
2017	3206	4205	58450	65861	0.747	**$49,198.17**
2018	3206	4205	58450	65861	0.705	**$46,432.01**
2019	3206	4205	58450	65861	0.665	**$43,797.57**
2020	3302	4205	58450	65957	0.627	**$41,355.04**
2021	3302	4205	62293	69800	0.592	**$41,321.60**
2022	3302	4205	62293	69800	0.558	**$38,948.40**
2023	3302	4205	62293	69800	0.527	**$36,784.60**
2024	3302	4415	62293	70010	0.497	**$34,794.97**
2025	3302	4415	62293	70010	0.469	**$32,834.69**
2026	3302	4415	62293	70010	0.442	**$30,944.42**
2027	3302	4415	62293	70010	0.417	**$29,194.17**
2028	3302	4415	67802	75519	0.394	**$29,754.49**
2029	3302	4415	67802	75519	0.371	**$28,017.55**
2030	3302	4415	67802	75519	0.350	**$26,431.65**
2031	3302	4415	67802	75519	0.331	**$24,996.79**
2032	3302	4415	67802	75519	0.312	**$23,561.93**
2033	3468	4415	67802	75685	0.294	**$22,251.39**
2034	3468	4415	67802	75685	0.278	**$21,040.43**
2035	3468	4415	67802	75685	0.262	**$19,829.47**
2036	3468	4636	70641	78745	0.247	**$19,450.02**
2037	3468	4636	70641	78745	0.233	**$18,347.59**
2038	3468	4636	70641	78745	0.220	**$17,323.90**
2039	3468	4636	70641	78745	0.207	**$16,300.22**
2040	3468	4636	70641	78745	0.196	**$15,434.02**
2041	3468	4636	70641	78745	0.185	**$14,567.83**
2042	3468	4636	70641	78745	0.174	**$13,701.63**
2043	3468	4636	70641	78745	0.164	**$12,914.18**
Last Year of Project Life	3468	4636	70641	78745	0.155	**$12,205.48**
					Total Present Value of Discounted Costs (Sum of Column (g))	**$1,055,803.53**
					(%) Avoided Cost Claimed by Project	**21**
					Total Present Value of Discounted Avoided Project Costs Claimed by Alternative Project (Total Present Value of Discounted Costs x % Avoided Cost Claimed by Project)	**$221,718.74**

Comments: See narrative, Attachment 8.1F, for explanation of how these avoided costs are derived. The existing septic systems require regular maintenance and repair, which would be completely eliminated by construction of the planned Project. The start date of the avoided costs assumes that construction of the Project improvements would be completed approximately three years after completion of the Plans and Specifications pursuant to this Project.

Page Left Intentionally Blank

Table 19 – Annual Costs of Project

(All costs should be in 2012 Dollars)

Project: Fairmead Wastewater Planning, Pre-design and Design 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	$0	$0	$0	$0	$0	$0	$0	$0	1.000	**$0**
2013	$0	$0	$0	$0	$0	$0	$0	$0	0.943	**$0**
2014	$415,000	$0	$0	$0	$0	$0	$0	$415,000	0.890	**$369,350**
2015	$416,000	$0	$0	$0	$0	$0	$0	$416,000	0.840	**$349,440**
Last Year of Project Life	$0	$0	$0	$0	$0	$0	$0	$0	0.155	**$0**
Total Present Value of Discounted Costs (Sum of column (j)) Transfer to Table 20, column (c), Proposal Benefits and Costs Summaries										**$718,790**

Comments: Project complete in 2015

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

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

Page Left Intentionally Blank