11 ATTACHMENT 8 – BENEFITS AND COST ANALYSIS

For the "AttachmentName" in the naming convention of BMS, use "BenCost" for this attachment.

Attachment 8 is mandatory. This attachment allows applicants to claim monetized and non-monetized benefits based on the physical benefit descriptions as documented in Attachment 7. Describe and quantify the benefits and costs of each project (if there are multiple projects) in the proposal. The content provided in this attachment will be evaluated in a collective manner to see how all project benefits (combined) compare against the costs of all projects in the proposal. There is no page limitation for Attachment 8; however, applicants are encouraged to be specific, clear, and concise.

See Exhibit D for detailed guidance (termed as DWR Method of Analysis) on the preparation of this attachment. Alternatively, applicants can submit benefit analysis performed according to alternative analysis methodologies (RWMG Method) in lieu of DWR Method. Whether the applicant chooses to use DWR Method or the RWMG Method, the analysis will be evaluated and scored using same scoring criterion.

Primary benefit of a project(s) applying for SWFM Grant funds must be flood damage reduction (FDR).

DWR Method

- *All applicants must complete the Section D1 benefit analysis option. For additional benefits, applicants may complete Section D2 or D3 benefit analysis option, whichever is appropriate for the type of project or benefit(s) type being claimed. A process is provided in Figure 1 to guide applicants in selecting analysis methods.*
- *All projects must yield multiple benefits to be eligible for grant funding. When analyzing each benefit of a project, applicants may complete the project benefit analysis option(s) that is appropriate for each type of project or benefit being claimed. Three benefit analysis options are available for a project. Following is a brief description of these options. More detail is provided in Exhibit D.*
    - *Section D1 - Flood Damage Reduction Benefit Analysis. All SWFM projects must provide FDR benefits, meaning all applicants must complete a "Flood Damage Reduction Benefit Analysis". This analysis includes a determination of the expected annual damages with and without the project to be completed.*
    - *Section D2 - Non-Monetized Benefit Analysis. For projects with secondary benefits that cannot be monetized, a Non-Monetized Benefit Analysis should be completed. This analysis requires a description (where possible) of applicable social, environmental stewardship, and sustainability benefits that may result from the implementation of a project.*
    - *Section D3 - Monetized Benefits Analysis. For projects with secondary benefits that can be quantified in dollar terms, it is recommended that a Monetized Benefits Evaluation be completed.*

11.1 Section D1 – Flood Damage Reduction Benefits Analysis

The 2013 Hannah Ranch Flood Control & Habitat Conservation Project is the development of approximately 380 acres of land Kaweah Delta WCD already owns into a new flood control basin complex. The Project would include an improved diversion from the Lower Kaweah River (300 CFS) so that flooding from large storm events on Dry Creek watershed could be reduced in Visalia and Farmersville area. Also the Project would include a new diversion from the Friant-Kern Canal so that the basin complex can receive wet year surplus water and floodwaters from Millerton Reservoir. A new outlet structure to the Lower Kaweah River on the west side of the property will allow for controlled gravity releases back to the river when there is demand for the supplies and available channel capacity for its conveyance. The Project's operations was evaluated through a spreadsheet model using hydrographs for flood events from the Dry Creek watershed and the results of that analysis is summarized below.

The flood analysis spreadsheet model for the Lower Kaweah Flood Corridor did not involve the evaluation of costs, but rather focused on estimating flood flows, flood volumes, approximate flood depths and associated areas for different recurrence interval storms at various locations along the Lower Kaweah Flood Corridor. This spreadsheet model estimated that no flood damage would occur in the City of Visalia for 10 year storms either on Packwood Creek or Mill Creek. Also, 100 year flood statistics were developed using the spreadsheet but the flood damage reduction was not included in the benefits claimed for the Project. The reason for this is that Terminus Dam currently provides protection from Kaweah River flooding up to approximately 75 year events as is noted in the ACOE's 2005 Terminus Dam Water Control Manual. Kaweah River runoff for storms beyond this recurrence interval will overwhelm Terminus Dam and significantly diminish the impact of the Project on the flooding in Visalia. However the values are left in the tables above for reference.

DWR's Flood Rapid Assessment Model (F-RAM) was used to estimate the financial flood damage reduction benefits for the project. The F-RAM spreadsheet model required 1) the number of flood buildings for each flood event and their classification (residential, commercial or industrial), 2) the lengths of roads submerged in the flooded area, 3) the average depth of flooding for each flood event, and 4) a percentage of the ratio of depreciated value to replacement value. Tulare County GIS information was used to evaluate the number of structures inside the estimated pre and post project flooded areas for various recurrence interval storms. This information set was also used to estimate the number of miles of road that would be impacted by floodwaters.

Table 11-1: Hannah Ranch Project Summary Benefit Table

Pre-Project

Recurrence Interval (Year)	Dry Crk Peak (CFS)	Mill Crk Peak (CFS)	Beyond Capacity (HRS)	Mill Crk Flood (AF)	Packwood Crk Peak (CFS)	Beyond Capacity (HRS)	Packwood Crk Flood (AF)	Total Flood (AF)	Flooded Area (Acres)
100	16,100	605	29	806	605	31	948	1,754	3,508
75	14,200	510	27	607	510	29	744	1,350	2,701
50	12,301	415	25	395	415	26	529	924	1,848
25	8,594	230	0	0	230	26	79	79	158
10	5,444	123	0	0	123	0	0	0	0

Post-Project

Recurrence Interval (Year)	Dry Crk Peak (CFS)	Mill Crk Peak (CFS)	Beyond Capacity (HRS)	Mill Crk Flood (AF)	Packwood Crk Peak (CFS)	Beyond Capacity (HRS)	Packwood Crk Flood (AF)	Total Flood (AF)	Percent Reduction	Flooded Area (Acres)
100	16,100	555	28	573	555	29	689	1,262	28.1%	2,524
75	14,200	460	27	408	460	29	521	929	31.2%	1,859
50	12,301	365	24	211	365	26	313	525	43.2%	1,049
25	8,594	192	0	0	230	0	0	0	100.0%	0
10	5,444	101	0	0	101	0	0	0	--	0

Flood Damage Reduction Benefits

Recurrence Interval (Year)	Mill Crk Pre Proj (AF)	Mill Crk Post Proj (AF)	Mill Crk Benefits (AF)	Beyond Capacity (HRS)	Packwood Pre Proj (AF)	Packwood Post proj (AF)	Packwood Benefits (AF)	Beyond Capacity (HRS)	Total Volume (AF)	Total Area (Acres)
100	806	573	233	-1	948	689	259	-2	492	984
75	607	408	198	0	744	521	223	0	421	842
50	395	211	184	-1	529	313	215	0	399	798
25	0	0	0	0	79	0	79	-26	79	158
10	0	0	0	0	0	0	0	0	0	0

Note: Values in red designate flows in excess of channel capacity

As was described in the previous section, all buildings impacted by floodwater were described as urban residential, single story with no basement. Further, all roads impacted by floodwaters were described as minor roads. These values could have been refined to account for the number of commercial and industrial buildings in the flood areas as well as the different type of roads, but given the simplifying assumptions that were needed in estimating the flooded areas, the refinement didn't seem warranted. The hope was that these changes would ensure conservative estimates of flood damage reduction.

Table 11-2: Estimated No. of Structures and Roads Impacted by Mill Creek Flooding

Recurrence Interval (Years)	Mill Creek Flooding					
	Pre-Project Area (Acres)	Post Project Area (Acres)	Pre-Project Buildings	Post-Project Buildings	Pre-Project Roads (miles)	Post-Project Roads (miles)
10	0	0	0	0	0	0
25	0	0	0	0	0	0
50	788	423	1,249	757	22.9	14.9
75	1,201	815	2,177	1,290	32.5	23.4
100	--	--	--	--	--	--

Table 11-3: Estimated No. of Structures and Roads Impacted by Packwood Creek Flooding

Recurrence Interval (Years)	Packwood Creek Flooding					
	Pre-Project Area (Acres)	Post-Project Area (Acres)	Pre-Project Buildings	Post-Project Buildings	Pre-Project Roads (miles)	Post-Project Roads (miles)
10	0	0	0	0	0	0
25	158	0	327	0	1.8	0.0
50	1,058	626	2,199	1,176	22.9	12.9
75	1,488	1,042	3,151	2,129	33.4	22.2
100	--	--	--	--	--	--

From the estimated pre and post Project flood areas and number of flooded buildings, the Project appears to have significant benefits in the 50 and 75 year storms.

Also the following F-RAM model variables were set in the input tab:

- The ratio of depreciated value to replacement value was set to 85%.
- The flood warning time was set as 5 hours because of the estimated time for flood flows to travel from McKays Point to the City of Visalia.

The community of Visalia was depicted as having no flood experience and the probability of levee failure was set to 1 (intending to represent levee overtopping).

The F-RAM spreadsheet model was used to estimate flood event damage associated with 10, 25, 50, 75 and 100 year event storms for scenarios without and with the Project. These estimated damages were then summarized in Table 11-6 (DWR's Table 11) to estimate the Expected Annual Damage without and with the Project. As can be seen in Table 11-6 the expected event damage with and without the Project has been set to be equal so that no flood reduction benefits are shown for the 100-year event.

All flood damages for Packwood and Mill Creeks are associated with channel overtopping, but since these channels are below ground the failures were not viewed as levee failures. So in Table 11-6, Column (d) shows values of 1 for each flood event where there was flooding because floodwaters rose out of the channel and inundated properties. The 10 year event shows a 0 in Colum (d) because there was no flooding associated with this event in either the pre or post Project simulation. Column (e) reflects the ratio between the without project damage estimate in Column (f) and the with project damage estimate in Column (g).

The expected annual damage without and with Project values developed in Table 11 are then used in Table 11-7 (DWR's Table 12). These values are used to develop the Project's expected annual benefit and bring those benefits into present value.

It is expected that the Basin will have a life of 50 years. The concrete structures are expected to last this life span; however, the gate equipment is expected to be replaced on a 20 year cycle. This is based on a combination of KDWCD's experience, manufacturer's information, and life expectancies listed in Design and Operation of Farm Irrigation Systems, ASAE Monograph No. 3, 1981 (pg. 58).

11.2 Section D2 – Non-Monetized Benefit Analysis

The non-monetized benefits for the Project are the reduction of Regional conflict over water resources through conservation, the habitat development and conservation aspects and environmental stewardship benefits, and the benefits of greater capability to generate on-peak hydroelectric power through the Kaweah River Power Authority facilities at Terminus Dam. Each of these benefits was viewed as being extremely difficult to place a meaningful value on other than the development cost of the project. It is hoped that the descriptions of these benefits (both in Attachment 7 & 8) will help the reviewer understand the potential for these secondary benefits.

Table 11-4: F-RAM Calculation of Expected Annual Damage without Project

Calculation of Without Project EAD

	Event 1	Event 2	Event 3	Event 4	Event 5
Average Recurrence Interval (ARI)	10	25	50	75	100
AEP	0.100	0.040	0.020	0.013	0.010
Actual Damage to Residential Buildings ($)	$ -	$ 6,654,416	$ 70,166,445	$ 108,424,251	$ 144,789,517
Potential Damage to Residential Buildings ($)	$ -	$ 7,057,466	$ 74,416,339	$ 114,991,374	$ 153,559,238
Actual Damage to Commercial/Industrial Buildings ($)	$ -	$ -	$ -	$ -	$ -
Potential Damage to Commercial/Industrial Buildings ($)	$ -	$ -	$ -	$ -	$ -
Damage to Agriculture ($)	$ -	$ -	$ -	$ -	$ -
Damage to Roads ($)	$ -	$ 55,420	$ 1,373,807	$ 1,977,477	$ 2,620,557
Actual Indirect Costs	$ -	$ 1,677,459	$ 17,885,063	$ 27,600,432	$ 36,197,379
Potential Indirect Costs	$ -	$ 1,778,222	$ 18,947,537	$ 29,242,213	$ 38,389,810
Special Cases	$ -	$ -	$ -	$ -	$ -
Total Actual Damages	$ -	$ 8,387,296	$ 89,425,315	$ 138,002,161	$ 183,607,453
Total Potential Damages	$ -	$ 8,891,108	$ 94,737,683	$ 146,211,063	$ 194,569,605

Table 11-5: F-RAM Calculation of Expected Annual Damage with Project

Calculation of With Project EAD

	Event 1	Event 2	Event 3	Event 4	Event 5
Average Recurrence Interval (ARI)	10	25	50	75	100
AEP	0.100	0.040	0.020	0.013	0.010
Actual Damage to Residential Buildings ($)	$ -	$ -	$ 39,336,351	$ 69,576,298	$ 144,789,517
Potential Damage to Residential Buildings ($)	$ -	$ -	$ 41,718,905	$ 73,790,448	$ 153,559,238
Actual Damage to Commercial/Industrial Buildings ($)	$ -	$ -	$ -	$ -	$ -
Potential Damage to Commercial/Industrial Buildings ($)	$ -	$ -	$ -	$ -	$ -
Damage to Agriculture ($)	$ -	$ -	$ -	$ -	$ -
Damage to Roads ($)	$ -	$ -	$ 833,432	$ 1,367,710	$ 2,620,557
Actual Indirect Costs	$ -	$ -	$ 10,042,446	$ 17,736,002	$ 36,852,518
Potential Indirect Costs	$ -	$ -	$ 10,638,084	$ 18,789,540	$ 39,044,949
Special Cases	$ -	$ -	$ -	$ -	$ -
Total Actual Damages	$ -	$ -	$ 50,212,228	$ 88,680,010	$ 184,262,592
Total Potential Damages	$ -	$ -	$ 53,190,421	$ 93,947,698	$ 195,224,744

Table 11-6: Calculation of Expected Annual Damage (Table 11)

Table 11 – Calculation of Expected Annual Damage											
Hydrologic Event	Event Exceedance Probability	Event Damage if Flood Structures Fail	Probability Structural Failure		Expected Event Damage		Interval Probability	Average Damage in Interval		Average Damage in Interval times Interval Probability	
			Without 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	0.100	$0	0	0	$0	$0					
25-Year	0.040	$8,387,296	1	0	$8,387,296	$0	0.06	$4,193,648	$0	$251,619	$0
50-Year	0.020	$89,425,315	1	0.561	$89,425,315	$50,212,228	0.02	$48,906,306	$25,106,114	$978,126	$502,122
75-Year	0.013	$138,002,161	1	0.643	$138,002,161	$88,680,010	0.007	$113,713,738	$69,446,119	$795,996	$486,123
100-Year	0.010	$183,607,453	1	1	$183,607,453	$183,607,453	0.003	$160,804,807	$136,143,732	$482,414	$408,431
Expected Annual Damages, Without and With Project										$2,508,155.58	$1,396,676.31

Table 11-7: Present Value of Expected Annual Damage Benefits (Table 12)

Table 12 – Present Value of Expected Annual Damage Benefits Project: Hanna Ranch Flood Control & Habitat Conservation Project			
(a)	Expected Annual Damage Without Project (1)		**$2,508,155.58**
(b)	Expected Annual Damage With Project (1)		**$1,396,676.31**
(c)	Expected Annual Benefit	(a) – (b)	**$1,111,479.27**
(d)	Present Value Coefficient (2)		**15.76**
(e)	**Present Value of Future Benefits** **Transfer to Table 17, column (d).**	**(c) x (d)**	**$17,516,913.29**

(1) This program assumes no land use changes in the floodplain. So, EAD will be constant over analysis period.
(2) 6% discount rate; 50-year analysis period (could vary depending upon lifecycle of project).

Table 11-8: Non-monetized Benefits Checklist (Table 13)

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

	Sustainability Benefits: **Will the proposal**	
10	**Improve the overall, long-term management of California groundwater resources?**	Neg
	Examples are not limited to, but may include: - Reduce extraction of non-renewable groundwater? - Promote aquifer storage or recharge?	
11	**Reduce demand for net diversions for the regions from the Delta?**	Neg
12	**Provide a long-term solution in place of a short-term one?**	Yes
	Examples are not limited to, but may include: - Replace a temporary water supply with a more permanent supply? - Replace a temporary water quality solution with a more permanent solution? - Replace temporary flood control management with a more permanent solution? - Replace temporary habitat with a more permanent solution?	
13	**Reduce water consumption on a permanent basis?**	No
14	**Promote energy savings or replace fossil fuel based energy sources with renewable energy and resources?**	Neg
	Examples are not limited to, but may include: - Reduce net energy use on a permanent basis? - Increase renewable energy production? - Include new buildings or modify buildings to include certified LEED features? - Provide a net increase in recycling or reuse of materials? - Replace unsustainable land or water management practices with recognized sustainable practices?	
15	**Improve water supply reliability in ways not quantified in Attachment 7?**	Yes
	Examples are not limited to, but may include: - Provide a more flexible mix of water sources? - Reduce likelihood of catastrophic supply outages? - Reduce supply uncertainty? - Reduce supply variability?	
16	**Other (If the above listed categories do not apply, provide non-monetized benefit description)?**	

11.2.1 Reducing Conflict

Surface Water Storage. It has been postulated that future climate variability may bring about more rain flood periods and less storable snow melt for the San Joaquin Valley's watersheds. Larger rain events will require more groundwater banking capacity to capture such water that previously remained in foothill reservoirs (Lakes Millerton and Kaweah). This Project adds regulation basin capacity for the District and the Region and should thus aid in mitigating for adverse impacts due to climate variability.

San Joaquin River Restoration. The additional surface water supplies made available to KDWCD would also partially address water supply shortages due to San Joaquin River Restoration impacts and heightened competition for finite water supplies within the San Joaquin Valley given urban growth. This will help to address water supply reductions from the San Joaquin River Restoration settlement, and curtailment of Delta pumping due to Delta Smelt issues. Also, this reduction in demand will aid all CVP water users south of the Delta by decreasing competition for surface water during times with available flood and surplus water from the Kaweah and St. Johns River.

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

11.2.2 Health and Safety

Visalia's one hospital as well as several other government building and one of three high schools are all within the flood areas (see Attachment 7 for greater detail on these facilities). The additional flood protection from this Project would promote social health and safety by reducing impediments to emergency services during flood events.

11.2.3 Habitat Development and Conservation

11.2.3.1 Acreage

The areas of the Project that will be developed for endangered species habitat are either along the south bank of the Kaweah River (a kind of habitat corridor along the river) or near the top of the levees that bound project basins. The width of the area along the Kaweah River is approximately 100 feet and its length is approximately 5,700 feet producing an area of 13.1 acres. The planted habitat area on the upper banks of basin levees will be approximately 20 feet wide on the 36,820 feet of levee producing and area of 16.9 acres. This habitat will be developed and maintained by KDWCD as part of the Habitat Conservation Plan.

11.2.3.2 Species

The habitat area along the south bank of the Kaweah River would be planted with regionally significant phreatophytes such as willows, cottonwoods and potentially sycamores. The upper levees of the basin cells would be re-developed into Oak Savannah habitat as this property located within the historic Kaweah River Delta. In the mid 1800's the Kaweah River Delta supported the largest stand of valley oak (*Quercus lobata*) riparian forest in the world (McClaron 1983). The vast majority of this habitat type has since been eliminated as a result of conversion to agriculture. The habitat development along the upper rim of the new basin levees includes the restoration of Valley Oak Savannah and wild rose. Also this project is consistent with the Tulare Lake Basin Plan through the implementation of watershed management activities by local agencies.

Anticipated endangered species that will benefit from the conserved habitat include brush rabbit, western pond turtle, and Swainsons hawk. Also the Project will support a nearby Heron rookery and several local raptor species.

11.2.4 Increased Peak Power Generation

Kaweah River Power Authority (KRPA) developed and operates a hydroelectric turbine at Terminus Dam that produces electricity to support the green energy needs of California. The additional offstream surface water storage developed through the Project creates the potential for KRPA to produce greater amounts of on-peak hydroelectric energy through Terminus Dam while reregulating surface water supplies through the Project basins so that water right holders are kept whole and do not loose available resources through the effort. Kaweah Delta WCD with Tulare ID are partners in KRPA.

11.3 Section D3 – Monetized Benefit Analysis

The monetized benefit analysis was used to account for the benefits from conserved flood water that is repurposed and used for an irrigation supply. This was assumed to happen only with floodwater, but in reality the increased reregulation capability will likely lead to greater conservation over time than the amounts estimated in this evaluation indicate. The average annual amount of storage was shown as 227.4 AF, but the value of the supply was set at $20/AF in 2012 dollars because alternative supplies could vary from free river system water, to Friant Division CVP Class 2 surface water at $35/AF, to pumped groundwater at $40-60/AF. Using the discount numbers from 2012 to 2063 the total present value of discounted benefits was $56,611 (see Table 14 in Appendix ?).

Also, there were no avoided projects that were identified and so Table 15 was not filled out.

11.4 Section D4 – Project Benefits and Cost Summary

Table 16 was filled out and estimated a total present value of discounted costs of $9,531,576. This table reflects an initial project financial outlay between 2012 and 2014. Basin and structure operations costs of $29,600/year begin in 2013. The nine overshot gates associated with Hannah Dam are anticipated to have a 20 year life, so $619,000 was budgeted in 2032 and 2052 for the replacement of those gates as well as other miscellaneous repairs to the facility (see Table 16 in **Attachment 8, Appendix B**).

Table 11-9: Proposal Benefits and Costs Summary (Table 17)

Table 17 – Proposal Benefits and Costs Summary Proposal: 2013 Hannah Ranch Flood Control & Habitat Conservation Project Proposal Agency: Kaweah Delta Water Conservation District (KDWCD)						
Project	Project Proponent	Total Present Value Project Costs (1)	Total Present Value Project Benefits			From Section D2 – Briefly describe the main Non-monetized benefits
			From Section D2 – Flood Damage Reduction (2)	From Section D3 – Monetized (3)	Total	
(a)	(b)	(c)	(d)	(e)	(f) = (d) + (e)	(g)
Hannah Ranch Flood Control & Habitat Conservation Project	KDWCD	$9,531,576	$17,516,913	$56,611	$17,573,524	Habitat Development, Power Generation, Public Safety
					0	
					0	
					0	
					0	
					0	

(1) From Table 16 or RWMG method
(2) From Table 12 or RWMG method
(3) From Table 14 or RWMG method

When the total present value of Project costs are compared to the total present value of Project benefits the cost to benefit ratio becomes approximately 2.66. This value corresponds to the average cost to benefit ratio developed between the actual and potential flood damage reduction benefits in the Project's F-RAM spreadsheet model. This ratio is high because the District has owned the property for the Project for several years. The cost to benefit ratio looks like the Project is an effective means of leveraging available financial resources to obtain an excellent return through the desired benefits.

ATTACHMENT 8 – COST AND BENEFIT ANALYSIS

APPENDIX A

F-RAM Model Spreadsheets

DWR Levee Mitigation Prioritization Tool

To Read Instructions: Read Instructions

To Enter Project Information: Enter Project Information

To Enter Special Cases: Enter Special Cases

View Cost-Benefit Analysis: Cost-Benefit Analysis

View Stage Damage Graph: Stage v Damage Curve

View AAD Graph (Actual): Loss Probability Curve

Instructions

Return to Menu

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

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

Model Map

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

Project Name: 2013 Hannah Ranch Flood Control & Habitat Conservation Project Proposal

Cost of Project: $ 6,219,712

Description: KDWCD is proposing to build flood relief basins on property known as Hannah Ranch east of the City of Visalia. The goal for the proposed basins is to decrease the amount of flooding in the City during larger storm events.

		Without Project						With Project					
Number of Events Modeled	5	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6
Average Return Interval (ARI)		10	25	50	75	100		10	25	50	75	100	
Annual Probability of Exceedance		0.100	0.040	0.020	0.013	0.010	#DIV/0!	0.100	0.040	0.020	0.013	0.010	#DIV/0!
Probability of Levee Failure		0.00	1.00	1.00	1.00	1.00		0.00	0.00	1.00	1.00	1.00	
Water Surface Elevation - channel (f)		0.00	0.25	0.50	0.75	1.00		0.00	0.25	0.50	0.75	1.00	
Flood Warning Time (hours)		5	5	5	5	5		5	5	5	5	5	
Flood Experience		N	N	N	N	N		N	N	N	N	N	
Period of Inundation (days)		0.00	1.08	2.13	2.33	2.50		0.00	0.00	2.08	2.33	2.38	
HEC-FIA DATA INPUTS		N											
Residential Structural Damages ($)													
Residential Contents Damages ($)													
Residential Debris & Cleanup ($)													
Commercial Structural Damages ($)													
Commercial Contents Damages ($)													
Commercial Debris & Cleanup ($)													
Industrial Structural Damages ($)													
Industrial Contents Damages ($)													
Industrial Debris & Cleanup ($)													
Agricultural Structural Damages ($)													
Agricultural Contents Damages ($)													
Agricultural Debris & Cleanup ($)													
Residential Properties													
Ratio Depreciated Value to Replacement Value		85%	85%	85%	85%	85%		85%	85%	85%	85%	85%	
Average Flood depth above ground level (f)		0.50	0.50	0.50	0.50	0.50		0.50	0.50	0.50	0.50	0.50	
Rural - Res: Homesteads													
Rural - Other: Barns, sheds													
Urban Res: Single story (no base)		0	327	3448	5328	7115		0	0	1933	3419	7115	
Urban Res: Single story (basement)													
Urban Res: Two plus story (no base)													
Urban Res: Two plus story (basement)													
Mobile home													

Commercial Properties												
Ratio Depreciated Value to Replacement Value												
Average Flood depth above ground level (f)												
low value	building area inundated (sq.f.)											
medium value	building area inundated (sq.f.)											
high value	building area inundated (sq.f.)											
Industrial Properties												
Ratio Depreciated Value to Replacement Value												
Average Flood depth above ground level (f)												
low value	building area inundated (sq.f.)											
medium value	building area inundated (sq.f.)											
high value	building area inundated (sq.f.)											
Agricultural Production												
Corn	ac.											
Rice	ac.											
Walnuts	ac.											
Almonds	ac.											
Cotton	ac.											
Tomatoes	ac.											
Wine Grapes	ac.											
Alfalfa	ac.											
Pasture	ac.											
Safflower	ac.											
Sugar Beets	ac.											
Beans	ac.											
Other	ac.											
Roads												
length of arterial roads inundated (miles)												
length of major roads inundated (miles)												
length of minor roads inundated (miles)		0.00	1.85	45.79	65.92	87.35		0.00	0.00	27.78	45.59	87.35
length of unsealed roads inundated (miles)												

Extrapolate Y-intercept N

Summary of Cost-Benefit Analysis

Return to Menu

Project Name: **2013 Hannah Ranch Flood Control & Habitat Conservation Project Proposal**

Description: KDWCD is proposing to build flood relief basins on property known as Hannah Ranch east of the City of Visalia. The goal for the proposed basins is to decrease the amount of flooding in the City during larger storm events.

Proposed project capital cost:	$ 6,219,712	[Note: construction costs which are assumed to occur in one year.]
Change in annual O&M costs:	$ 29,600	[Note: the change in annual O&M costs compared to without project conditic
PV of future O&M costs:	$ 466,551	(at 6% discount rate over 50 years)
PV of future costs	$ 6,686,263	[Note: the sum of capital costs plus the PV of O&M costs.]

Benefits

	Actual	Potential	
EAD without project	$ 4,359,927	$ 4,619,847	[Note: for stormwater projects use "Potential" damage which ignores sto
EAD with project	$ 3,262,627	$ 3,456,566	
Annual Benefit:	$ 1,097,300	$ 1,163,281	
PV of Future Benefits:	$ 17,295,497	$ 18,335,479	(at 6% discount rate over 50 years)

Cost-Benefit Analysis

	Actual	Potential	
Net Present Value (NPV)	$ 10,609,234	$ 11,649,216	(at 6% discount rate over 50 years)
Benefit:Cost Ratio	2.587	2.742	

NPV Sensitivity to Discount Rate:

	Actual	Potential
4%	$ 17,352,699	$ 18,770,113
5%	$ 13,812,523	$ 15,017,066
6%	$ 11,075,785	$ 12,115,767
7%	$ 8,923,853	$ 9,834,439
8%	$ 7,204,096	$ 8,011,273

Model Assumptions

Residential

Foundation heights

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

Estimate Replacement Value (assumed proxy for depreciated value)

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

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

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

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

Other

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

Commercial / Industrial Buildings

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

Calculation of Other Direct Damages

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

NPV Calculation

Discount Rate	6%
Time Horizon	50 years

Roads

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

Agricultural Damages

	Weighted, Average Annual Damages ($/acre)	Establishment Costs ($/acre)	Land Cleanup & rehabilitation ($/acre)	Total <5 d) ($/acre)	Total (>=5 d) ($/acre)
Corn	$48	$0	$246	$293	$293
Rice	$227	$0	$243	$471	$471
Walnuts	$585	$5,284	$243	$828	$6,112
Almonds	$1,618	$3,514	$243	$1,862	$5,376
Cotton	$301	$0	$246	$547	$547
Tomatoes	$1,015	$0	$235	$1,250	$1,250
Wine Grapes	$3,241	$3,240	$235	$3,476	$6,716
Alfalfa	$250	$246	$243	$493	$739
Pasture	($15)	$82	$272	$257	$339
Safflower	$164	$0	$241	$405	$405
Sugar Beets	$313	$0	$262	$575	$575
Beans	$111	$0	$246	$356	$356
Other	$0	0	$246	$246	$246

Source: Comp Study

Establishment Costs are 50% costs of total establishment costs

Calculation of Actual to Potential Damages Ratio

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

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

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

NOT USED

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

Residential Buildings

	Without Project						With Project					
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6
ARI:	10	25	50	75	100	0	10	25	50	75	100	0
Probability of Levee Failure	0.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	1.00	1.00	1.00	0.00
Flood depth above ground level (ft)	0.50	0.50	0.50	0.50	0.50	0.00	0.50	0.50	0.50	0.50	0.50	0.00
Buildings Inundated (no.)												
Rural - Res: Homesteads	0	0	0	0	0	0	0	0	0	0	0	0
Rural - Other: Barns, sheds	0	0	0	0	0	0	0	0	0	0	0	0
Urban Res: Single story (no base)	0	327	3448	5328	7115	0	0	0	1933	3419	7115	0
Urban Res: Two plus story (no base)	0	0	0	0	0	0	0	0	0	0	0	0
Mobile home	0	0	0	0	0	0	0	0	0	0	0	0
Structural Damages												
Rural - Res: Homesteads	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Rural - Other: Barns, sheds	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Urban Res: Single story (no base)	$ -	$ 2,099,217	$ 22,134,867	$ 34,203,762	$ 45,675,632	$ -	$ -	$ -	$ 12,409,135	$ 21,948,698	$ 45,675,632	$ -
Urban Res: Two plus story (no base)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Mobile home	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Structual Damages HEC-FIA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Structural Damages	$ -	$ 2,099,217	$ 22,134,867	$ 34,203,762	$ 45,675,632	$ -	$ -	$ -	$ 12,409,135	$ 21,948,698	$ 45,675,632	$ -
Content Damages												
Rural - Res: Homesteads	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Rural - Other: Barns, sheds	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Urban Res: Single story (no base)	$ -	$ 2,015,249	$ 21,249,472	$ 32,835,612	$ 43,848,607	$ -	$ -	$ -	$ 11,912,770	$ 21,070,750	$ 43,848,607	$ -
Urban Res: Two plus story (no base)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Mobile home	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Contents Damage HEC-FIA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Actual:Potential Ratio	0.8	0.8	0.8	0.8	0.8	0.9	0.8	0.8	0.8	0.8	0.8	0.9
Total Contents Damages: Actual	$ -	$ 1,612,199	$ 16,999,578	$ 26,268,489	$ 35,078,885	$ -	$ -	$ -	$ 9,530,216	$ 16,856,600	$ 35,078,885	$ -
Total Contents Damages: Potential	$ -	$ 2,015,249	$ 21,249,472	$ 32,835,612	$ 43,848,607	$ -	$ -	$ -	$ 11,912,770	$ 21,070,750	$ 43,848,607	$ -
Clean-Up/ Other Costs												
External	$ -	$ 1,635,000	$ 17,240,000	$ 26,640,000	$ 35,575,000	$ -	$ -	$ -	$ 9,665,000	$ 17,095,000	$ 35,575,000	$ -
Cleanup	$ -	$ 1,308,000	$ 13,792,000	$ 21,312,000	$ 28,460,000	$ -	$ -	$ -	$ 7,732,000	$ 13,676,000	$ 28,460,000	$ -
Other Costs HEC-FIA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Other Costs: Potential	$ -	$ 2,943,000	$ 31,032,000	$ 47,952,000	$ 64,035,000	$ -	$ -	$ -	$ 17,397,000	$ 30,771,000	$ 64,035,000	$ -
Sum Actual Damages	**$ -**	**$ 6,654,416**	**$ 70,166,445**	**$ 108,424,251**	**$ 144,789,517**	**$ -**	**$ -**	**$ -**	**$ 39,336,351**	**$ 69,576,298**	**$ 144,789,517**	**$ -**
Sum Potential Damages	**$ -**	**$ 7,057,466**	**$ 74,416,339**	**$ 114,991,374**	**$ 153,559,238**	**$ -**	**$ -**	**$ -**	**$ 41,718,905**	**$ 73,790,448**	**$ 153,559,238**	**$ -**
Total Actual Damage with levee failure ($):	**$ -**	**$ 6,654,416**	**$ 70,166,445**	**$ 108,424,251**	**$ 144,789,517**	**$ -**	**$ -**	**$ -**	**$ 39,336,351**	**$ 69,576,298**	**$ 144,789,517**	**$ -**
Total Potential Damage with levee failure ($):	**$ -**	**$ 7,057,466**	**$ 74,416,339**	**$ 114,991,374**	**$ 153,559,238**	**$ -**	**$ -**	**$ -**	**$ 41,718,905**	**$ 73,790,448**	**$ 153,559,238**	**$ -**
Indirect Actual Damage	$ -	$ 1,663,604	$ 17,541,611	$ 27,106,063	$ 36,197,379	$ -	$ -	$ -	$ 9,834,088	$ 17,394,074	$ 36,197,379	$ -
Indirect Potential Damage	$ -	$ 1,764,367	$ 18,604,085	$ 28,747,843	$ 38,389,810	$ -	$ -	$ -	$ 10,429,726	$ 18,447,612	$ 38,389,810	$ -

Commercial & Industrial Buildings

	Without Project						With Project					
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6
ARI:	10	25	50	75	100	0	10	25	50	75	100	0
Probability of Levee Failure	0.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	1.00	1.00	1.00	0.00
Commercial												
'Flood depth above ground level (ft)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
low building size	0	0	0	0	0	0	0	0	0	0	0	0
medium building size	0	0	0	0	0	0	0	0	0	0	0	0
high building size	0	0	0	0	0	0	0	0	0	0	0	0
Industrial												
'Flood depth above ground level (ft)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
low building size	0	0	0	0	0	0	0	0	0	0	0	0
medium building size	0	0	0	0	0	0	0	0	0	0	0	0
high building size	0	0	0	0	0	0	0	0	0	0	0	0
Structural Damages												
Commercial												
low	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
medium	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
high	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Commercial HEC-FIA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Industrial												
low	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
medium	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
high	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Industrial HEC-FIA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Structural Damages	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Contents Damages												
Commercial												
low	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
medium	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
high	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Commercial HEC-FIA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Industrial												
low	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
medium	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
high	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Industrial HEC-FIA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Actual:Potential Ratio	0.8	0.8	0.8	0.8	0.8	0.9	0.8	0.8	0.8	0.8	0.8	0.9
Total Contents Damages: Actual	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Contents Damages: Potential	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Clean-up/ Other Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Clean-Up/ Other Costs: HEC-FIA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Sum Actual Damages	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Sum Potential Damages	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Total Damage with levee failure ($):	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Total Damage with levee failure ($):	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Indirect Actual Damages	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Indirect Potentail Damages	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Agricultural Damages

		Without Project						With Project					
		Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6
ARI:		10	25	50	75	100	0	10	25	50	75	100	0
Probability of Levee Failure		0.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	1.00	1.00	1.00	0.00
Length of Inundation <5d Y/N		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Agricultural Land Inundated													
Corn	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Rice	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Walnuts	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Almonds	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Cotton	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Tomatoes	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Wine Grape	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Alfalfa	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Pasture	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Safflower	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Sugar Beets	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Beans	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Other	ac.	0	0	0	0	0	0	0	0	0	0	0	0
Potential Damages													
Corn		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Rice		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Walnuts		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Almonds		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cotton		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tomatoes		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Wine Grapes		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Alfalfa		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pasture		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Safflower		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Sugar Beets		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Beans		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Potential Damages		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Damage with levee failure ($):		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Roads

	Without Project						With Project					
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6
ARI	10	25	50	75	100	0	10	25	50	75	100	0
Probability of Levee failure	0.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	1.00	1.00	1.00	0.00
Roads Inundated												
length of arterial roads inundated (miles)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
length of major roads inundated (miles)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
length of minor roads inundated (miles)	0.00	1.85	45.79	65.92	87.35	0.00	0.00	0.00	27.78	45.59	87.35	0.00
length of unsealed roads inundated (miles)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Potential Damages												
length of arterial roads inundated (miles)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
length of major roads inundated (miles)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
length of minor roads inundated (miles)	$ -	$ 55,420	$ 1,373,807	$ 1,977,477	$ 2,620,557	$ -	$ -	$ -	$ 833,432	$ 1,367,710	$ 2,620,557	$ -
length of unsealed roads inundated (miles)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Damages:	*$ -*	*$ 55,420*	*$ 1,373,807*	*$ 1,977,477*	*$ 2,620,557*	*$ -*	*$ -*	*$ -*	*$ 833,432*	*$ 1,367,710*	*$ 2,620,557*	*$ -*
Total Damage with levee failure ($):	$ -	$ 55,420	$ 1,373,807	$ 1,977,477	$ 2,620,557	$ -	$ -	$ -	$ 833,432	$ 1,367,710	$ 2,620,557	$ -

Special Cases - Dollar Damages Incurred

Return to Menu

	Without Project						With Project					
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6
ARI	10	25	50	75	100	0	10	25	50	75	100	0
Probability of Levee failure	0.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	1.00	1.00	1.00	0.00
Description / Site ID												
Total Damages:	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Damage with levee failure ($):	0	0	0	0	0	0	0	0	0	0	0	0

Calculation of Without Project EAD

	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Y Intercept
Average Recurrence Interval (ARI)	10	25	50	75	100	0	
AEP	0.100	0.040	0.020	0.013	0.010	#DIV/0!	0
Actual Damage to Residential Buildings ($)	$ -	$ 6,654,416	$ 70,166,445	$ 108,424,251	$ 144,789,517	$ -	
Potential Damage to Residential Buildings ($)	$ -	$ 7,057,466	$ 74,416,339	$ 114,991,374	$ 153,559,238	$ -	
Actual Damage to Commercial/Industrial Buildings ($)	$ -	$ -	$ -	$ -	$ -	$ -	
Potential Damage to Commercial/Industrial Buildings ($)	$ -	$ -	$ -	$ -	$ -	$ -	
Damage to Agriculture ($)	$ -	$ -	$ -	$ -	$ -	$ -	
Damage to Roads ($)	$ -	$ 55,420	$ 1,373,807	$ 1,977,477	$ 2,620,557	$ -	
Actual Indirect Costs	$ -	$ 1,677,459	$ 17,885,063	$ 27,600,432	$ 36,197,379	$ -	
Potential Indirect Costs	$ -	$ 1,778,222	$ 18,947,537	$ 29,242,213	$ 38,389,810	$ -	
Special Cases	$ -	$ -	$ -	$ -	$ -	$ -	
Total Actual Damages	$ -	$ 8,387,296	$ 89,425,315	$ 138,002,161	$ 183,607,453	$ -	$ 183,607,453
Total Potential Damages	$ -	$ 8,891,108	$ 94,737,683	$ 146,211,063	$ 194,569,605	$ -	$ 194,569,605
EAD (Actual)	$ 4,359,927						
EAD (Potential)	$ 4,619,847						

Potential Damages

Without Project

Water Surface Elevation - channel (f)	0	0.25	0.5	0.75	1	1	
ARI	10	25	50	75	100	0	
Probability of Exceedence (AEP)	0.100	0.040	0.020	0.013	0.010	#DIV/0!	
Damages incurred	$ -	$ 8,891,108	$ 94,737,683	$ 146,211,063	$ 194,569,605	$ -	$ 194,569,605

With Project

	0	0.25	0.5	0.75	1	1	
	10	25	50	75	100	0	
	0.100	0.040	0.020	0.013	0.010	#DIV/0!	
	$ -	$ -	$ 53,190,421	$ 93,947,698	$ 195,224,744	$ -	$ 195,224,744

Actual Damages

Without Project

Water Surface Elevation - channel (f)	0	0.25	0.5	0.75	1	0	
ARI	10	25	50	75	100	0	
Probability of Exceedence (AEP)	0.100	0.040	0.020	0.013	0.010	#DIV/0!	
Damages incurred	$ -	$ 8,387,296	$ 89,425,315	$ 138,002,161	$ 183,607,453	$ -	$ 183,607,453

With Project

	0	0.25	0.5	0.75	1	0	
	10	25	50	75	100	0	
	0.100	0.040	0.020	0.013	0.010	#DIV/0!	
	$ -	$ -	$ 50,212,228	$ 88,680,010	$ 184,262,592	$ -	$ 184,262,592

Without Project

Water Surface Elevation - channel (f)	10	25	50	75	100	0
Probability of Exceedence (AEP)	0.100	0.040	0.020	0.013	0.010	0.010
Potential	$ -	$ 8,891,108	$ 94,737,683	$ 146,211,063	$ 194,569,605	$ 194,569,605
Actual	$ -	$ 8,387,296	$ 89,425,315	$ 138,002,161	$ 183,607,453	$ 183,607,453

With Project

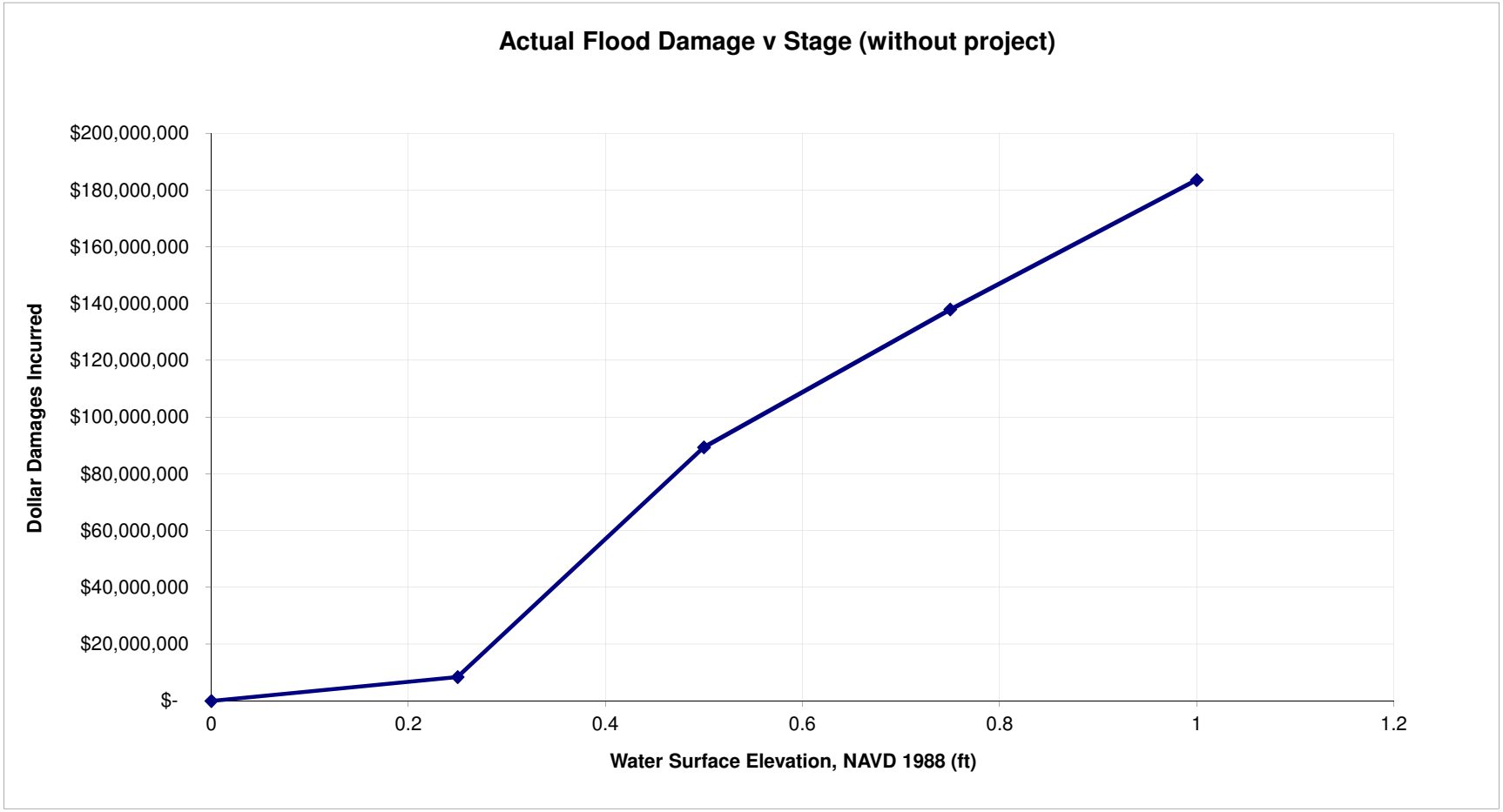
Water Surface Elevation - channel (f)	10	25	50	75	100	0
Probability of Exceedence (AEP)	0.100	0.040	0.020	0.013	0.010	0.010
Potential	$ -	$ -	$ 53,190,421	$ 93,947,698	$ 195,224,744	$ 195,224,744
Actual	$ -	$ -	$ 50,212,228	$ 88,680,010	$ 184,262,592	$ 184,262,592

Calculation of With Project EAD

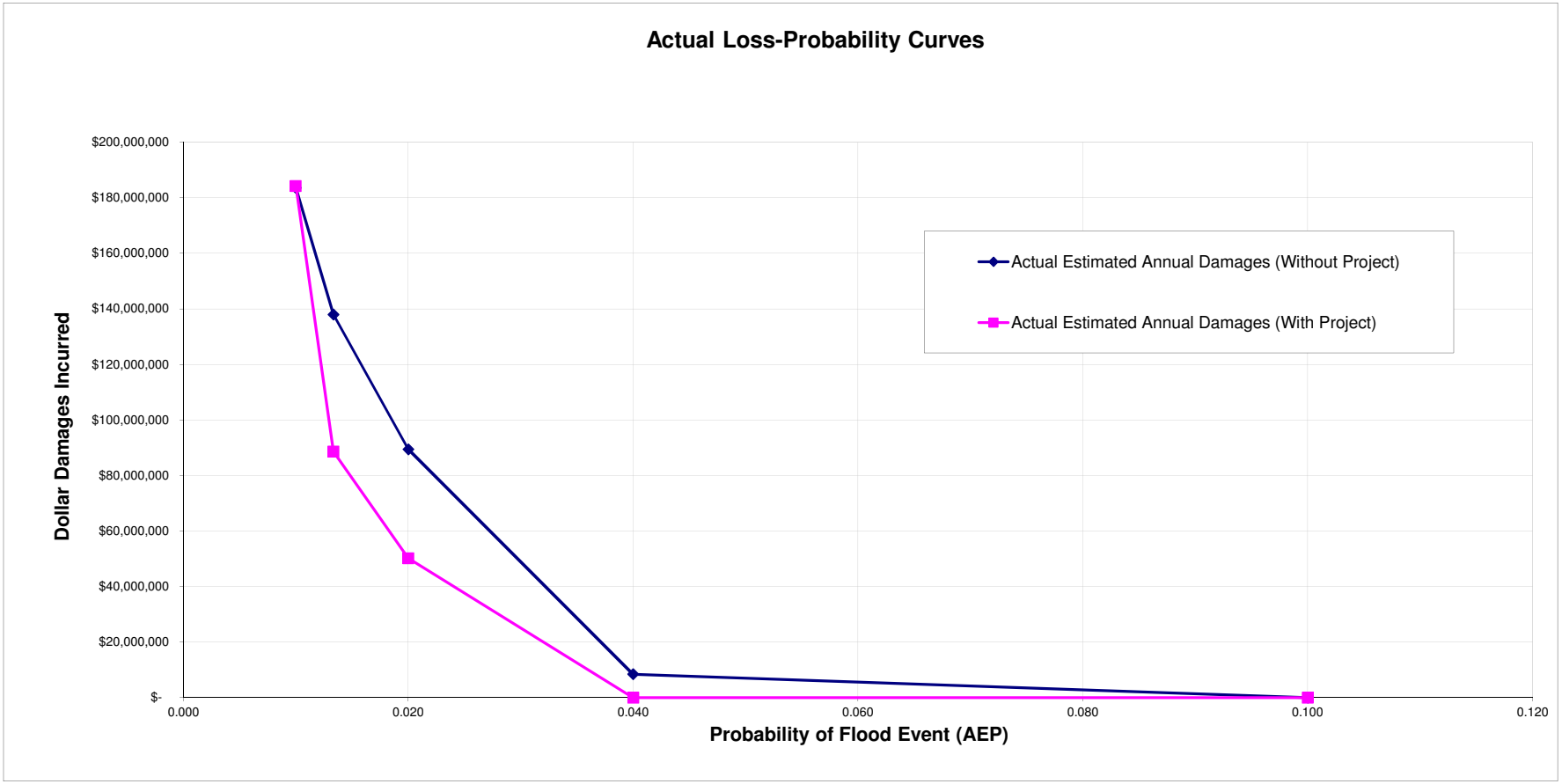
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	
Average Recurrence Interval (ARI)	10	25	50	75	100	0	
AEP	0.100	0.040	0.020	0.013	0.010	#DIV/0!	0
Actual Damage to Residential Buildings ($)	$ -	$ -	$ 39,336,351	$ 69,576,298	$ 144,789,517	$ -	
Potential Damage to Residential Buildings ($)	$ -	$ -	$ 41,718,905	$ 73,790,448	$ 153,559,238	$ -	
Actual Damage to Commercial/Industrial Buildings ($)	$ -	$ -	$ -	$ -	$ -	$ -	
Potential Damage to Commercial/Industrial Buildings ($)	$ -	$ -	$ -	$ -	$ -	$ -	
Damage to Agriculture ($)	$ -	$ -	$ -	$ -	$ -	$ -	
Damage to Roads ($)	$ -	$ -	$ 833,432	$ 1,367,710	$ 2,620,557	$ -	
Actual Indirect Costs	$ -	$ -	$ 10,042,446	$ 17,736,002	$ 36,852,518	$ -	
Potential Indirect Costs	$ -	$ -	$ 10,638,084	$ 18,789,540	$ 39,044,949	$ -	
Special Cases	$ -	$ -	$ -	$ -	$ -	$ -	
Total Actual Damages	$ -	$ -	$ 50,212,228	$ 88,680,010	$ 184,262,592	$ -	$ 184,262,592
Total Potential Damages	$ -	$ -	$ 53,190,421	$ 93,947,698	$ 195,224,744	$ -	$ 195,224,744

EAD (Actual)	$ 3,262,627
EAD (Potential)	$ 3,456,566

Return to Menu



Return to Menu



ATTACHMENT 8 – COST AND BENEFIT ANALYSIS

APPENDIX B

Prop 1E SWFM Economic Analysis Tables

Table 6 – Summary Budget Proposal Title: 2013 Hannah Ranch Flood Control & Habitat Conservation Project Proposal						
Individual Project Title		Requested Grant Amount	Cost Share: Non-State Fund Source* (Funding Match)	Cost Share: Other State Fund Source*	Total Cost	% Funding Match (col. b/col. d)
(a)		Grand Total (Sum rows (a) through (h) for each column in Table 5)	Grand Total (Sum rows (a) through (h) for each column in Table 5)	Grand Total (Sum rows (a) through (h) for each column in Table 5)	Grand Total (Sum rows (a) through (h) for each column in Table 5)	
(b)	Hannah Ranch Flood Control & Habitat Conservation Project	$3,109,856	$3,109,856		$6,219,712	**50.0%**
(c)						
(d)						
(e)						
(f)						
(g)						
(h)						
(i)	Grand Total (Sum rows (a) through (h) for each column)	$3,109,856	$3,109,856		$6,219,712	**50.0%**

Table 7 – Annual Project Physical Benefits			
Project Name: 2013 Hannah Ranch Flood Control & Habitat Conservation Project Proposal			
Type of Benefit Claimed: Conserved Flood Water			
Measure of Benefit Claimed (Name of Units): Acre-Feet			
Additional Information About this Measure:			
(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2012	0	0	0
2013	0	45.48	-45.48
2014	0	90.96	-90.96
2015	0	136.44	-136.44
2016	0	170.55	-170.55
2017	0	193.29	-193.29
2018	0	216.03	-216.03
2019	0	227.4	-227.4
2020	0	227.4	-227.4
2021	0	227.4	-227.4
2022	0	227.4	-227.4
2023	0	227.4	-227.4
2024	0	227.4	-227.4
2025	0	227.4	-227.4
2026	0	227.4	-227.4
2027	0	227.4	-227.4
2028	0	227.4	-227.4
2029	0	227.4	-227.4
2030	0	227.4	-227.4
2031	0	227.4	-227.4
2032	0	227.4	-227.4
2033	0	227.4	-227.4
2034	0	227.4	-227.4
2035	0	227.4	-227.4
2036	0	227.4	-227.4
2037	0	227.4	-227.4
2038	0	227.4	-227.4
2039	0	227.4	-227.4
2040	0	227.4	-227.4
2041	0	227.4	-227.4
2042	0	227.4	-227.4
2043	0	227.4	-227.4
2044	0	227.4	-227.4
2045	0	227.4	-227.4

(a)	(b)	(c)	(d)
	Physical Benefits		
Year	Without Project	With Project	Change Resulting from Project (b) – (c)
2046	0	227.4	-227.4
2047	0	227.4	-227.4
2048	0	227.4	-227.4
2049	0	227.4	-227.4
2050	0	227.4	-227.4
2051	0	227.4	-227.4
2052	0	227.4	-227.4
2053	0	227.4	-227.4
2054	0	227.4	-227.4
2055	0	227.4	-227.4
2056	0	227.4	-227.4
2057	0	227.4	-227.4
2058	0	227.4	-227.4
2059	0	227.4	-227.4
2060	0	227.4	-227.4
2061	0	227.4	-227.4
2062	0	227.4	-227.4
2063	0	227.4	-227.4
Comments:			

Table 11 – Calculation of Expected Annual Damage											
Hydrologic Event	Event Exceedance Probability	Event Damage if Flood Structures Fail	Probability Structural Failure		Expected Event Damage		Interval Probability	Average Damage in Interval		Average Damage in Interval times Interval Probability	
			Without 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	0.100	$0	0	0	$0	$0					
25-Year	0.040	$8,387,296	1	0	$8,387,296	$0	0.06	$4,193,648	$0	$251,619	$0
50-Year	0.020	$89,425,315	1	0.561	$89,425,315	$50,212,228	0.02	$48,906,306	$25,106,114	$978,126	$502,122
75-Year	0.013	$138,002,161	1	0.643	$138,002,161	$88,680,010	0.007	$113,713,738	$69,446,119	$795,996	$486,123
100-Year	0.010	$183,607,453	1	1	$183,607,453	$183,607,453	0.003	$160,804,807	$136,143,732	$482,414	$408,431
Expected Annual Damages, Without and With Project										$2,508,155.58	$1,396,676.31

Table 12 – Present Value of Expected Annual Damage Benefits Project: Hanna Ranch Flood Control & Habitat Conservation Project			
(a)	Expected Annual Damage Without Project [1]		**$2,508,155.58**
(b)	Expected Annual Damage With Project [1]		**$1,396,676.31**
(c)	Expected Annual Benefit	(a) – (b)	**$1,111,479.27**
(d)	Present Value Coefficient [2]		**15.76**
(e)	**Present Value of Future Benefits** **Transfer to Table 17, column (d).**	**(c) x (d)**	**$17,516,913.29**

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

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

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

12	**Provide a long-term solution in place of a short-term one?**	Yes
	Examples are not limited to, but may include: - Replace a temporary water supply with a more permanent supply? - Replace a temporary water quality solution with a more permanent solution? - Replace temporary flood control management with a more permanent solution? - Replace temporary habitat with a more permanent solution?	
13	**Reduce water consumption on a permanent basis?**	No
14	**Promote energy savings or replace fossil fuel based energy sources with renewable energy and resources?**	Neg
	Examples are not limited to, but may include: - Reduce net energy use on a permanent basis? - Increase renewable energy production? - Include new buildings or modify buildings to include certified LEED features? - Provide a net increase in recycling or reuse of materials? - Replace unsustainable land or water management practices with recognized sustainable practices?	
15	**Improve water supply reliability in ways not quantified in Attachment 7?**	Yes
	Examples are not limited to, but may include: - Provide a more flexible mix of water sources? - Reduce likelihood of catastrophic supply outages? - Reduce supply uncertainty? - Reduce supply variability?	
16	**Other (If the above listed categories do not apply, provide non-monetized benefit description)?**	

Table 14 – Annual Benefit

(All benefits should be in 2012 dollars)

Project: 2013 Hannah Ranch Flood Control & Habitat Conservation Project Proposal

(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
Year	**Type of Benefit**	**Measure of Benefit (Units)**	**Without Project**	**With Project**	**Change Resulting from Project (e) – (d)**	**Unit $ Value (1)**	**Annual $ Value (1) (f) x (g)**	**Discount Factor (1)**	**Discounted Benefits (1) (h) x (i)**
2012	Conserved Flood Water	Acre-Feet	0	0	0	$20	$0	1.000	**$0**
Year	**Type of Benefit**	**Measure of Benefit (Units)**	**Without Project**	**With Project**	**Change Resulting from Project (e) – (d)**	**Unit $ Value (1)**	**Annual $ Value (1) (f) x (g)**	**Discount Factor (1)**	**Discounted Benefits (1) (h) x (i)**
2013	Conserved Flood Water	Acre-Feet	0	45.48	45.48	$20	$910	0.943	**$858**
Year	**Type of Benefit**	**Measure of Benefit (Units)**	**Without Project**	**With Project**	**Change Resulting from Project (e) – (d)**	**Unit $ Value (1)**	**Annual $ Value (1) (f) x (g)**	**Discount Factor (1)**	**Discounted Benefits (1) (h) x (i)**
2014	Conserved Flood Water	Acre-Feet	0	90.96	90.96	$20	$1,819	0.890	**$1,619**
Year	**Type of Benefit**	**Measure of Benefit (Units)**	**Without Project**	**With Project**	**Change Resulting from Project (e) – (d)**	**Unit $ Value (1)**	**Annual $ Value (1) (f) x (g)**	**Discount Factor (1)**	**Discounted Benefits (1) (h) x (i)**
2015	Conserved Flood Water	Acre-Feet	0	136.44	136.44	$20	$2,729	0.840	**$2,292**
Year	**Type of Benefit**	**Measure of Benefit (Units)**	**Without Project**	**With Project**	**Change Resulting from Project**	**Unit $ Value (1)**	**Annual $ Value (1) (f) x (g)**	**Discount Factor (1)**	**Discounted Benefits (1)**
2016	Conserved Flood Water	Acre-Feet	0	170.55	170.55	$20	$3,411	0.792	**$2,702**
Year	**Type of Benefit**	**Measure of Benefit (Units)**	**Without Project**	**With Project**	**Change Resulting from Project (e) – (d)**	**Unit $ Value (1)**	**Annual $ Value (1) (f) x (g)**	**Discount Factor (1)**	**Discounted Benefits (1) (h) x (i)**
2017	Conserved Flood Water	Acre-Feet	0	193.29	193.29	$20	$3,866	0.747	**$2,888**
Year	**Type of Benefit**	**Measure of Benefit (Units)**	**Without Project**	**With Project**	**Change Resulting from Project (e) – (d)**	**Unit $ Value (1)**	**Annual $ Value (1) (f) x (g)**	**Discount Factor (1)**	**Discounted Benefits (1) (h) x (i)**
2018	Conserved Flood Water	Acre-Feet	0	216.03	216.03	$20	$4,321	0.705	**$3,046**
Year	**Type of Benefit**	**Measure of Benefit (Units)**	**Without Project**	**With Project**	**Change Resulting from Project (e) – (d)**	**Unit $ Value (1)**	**Annual $ Value (1) (f) x (g)**	**Discount Factor (1)**	**Discounted Benefits (1) (h) x (i)**
2019	Conserved Flood Water	Acre-Feet	0	227.4	227.4	$20	$4,548	0.665	**$3,024**
Year	**Type of Benefit**	**Measure of Benefit (Units)**	**Without Project**	**With Project**	**Change Resulting from Project (e) – (d)**	**Unit $ Value (1)**	**Annual $ Value (1) (f) x (g)**	**Discount Factor (1)**	**Discounted Benefits (1) (h) x (i)**
2020	Conserved Flood Water	Acre-Feet	0	227.4	227.4	$20	$4,548	0.627	**$2,852**
Year	**Type of Benefit**	**Measure of Benefit (Units)**	**Without Project**	**With Project**	**Change Resulting from Project (e) – (d)**	**Unit $ Value (1)**	**Annual $ Value (1) (f) x (g)**	**Discount Factor (1)**	**Discounted Benefits (1) (h) x (i)**
2021	Conserved Flood Water	Acre-Feet	0	227.4	227.4	$20	$4,548	0.592	**$2,692**
Year	**Type of Benefit**	**Measure of Benefit (Units)**	**Without Project**	**With Project**	**Change Resulting from Project (e) – (d)**	**Unit $ Value (1)**	**Annual $ Value (1) (f) x (g)**	**Discount Factor (1)**	**Discounted Benefits (1) (h) x (i)**
2022	Conserved Flood Water	Acre-Feet	0	227.4	227.4	$20	$4,548	0.558	**$2,538**
Year	**Type of Benefit**	**Measure of Benefit (Units)**	**Without Project**	**With Project**	**Change Resulting from Project (e) – (d)**	**Unit $ Value (1)**	**Annual $ Value (1) (f) x (g)**	**Discount Factor (1)**	**Discounted Benefits (1) (h) x (i)**
2023	Conserved Flood Water	Acre-Feet	0	227.4	227.4	$20	$4,548	0.527	**$2,397**
Year	**Type of Benefit**	**Measure of Benefit (Units)**	**Without Project**	**With Project**	**Change Resulting from Project (e) – (d)**	**Unit $ Value (1)**	**Annual $ Value (1) (f) x (g)**	**Discount Factor (1)**	**Discounted Benefits (1) (h) x (i)**
2024	Conserved Flood Water	Acre-Feet	0	227.4	227.4	$20	$4,548	0.497	**$2,260**
Year	**Type of Benefit**	**Measure of Benefit (Units)**	**Without Project**	**With Project**	**Change Resulting from Project (e) – (d)**	**Unit $ Value (1)**	**Annual $ Value (1) (f) x (g)**	**Discount Factor (1)**	**Discounted Benefits (1) (h) x (i)**

2025	Conserved Flood Water	Acre-Feet	0	227.4	227.4	$20	$4,548	0.469	**$2,133**
Year	**Type of Benefit**	**Measure of Benefit (Units)**	**Without Project**	**With Project**	**Change Resulting from Project (e) – (d)**	**Unit $ Value (1)**	**Annual $ Value (1) (f) x (g)**	**Discount Factor (1)**	**Discounted Benefits (1) (h) x (i)**
2026	Conserved Flood Water	Acre-Feet	0	227.4	227.4	$20	$4,548	0.442	**$2,010**
Year	**Type of Benefit**	**Measure of Benefit (Units)**	**Without Project**	**With Project**	**Change Resulting from Project (e) – (d)**	**Unit $ Value (1)**	**Annual $ Value (1) (f) x (g)**	**Discount Factor (1)**	**Discounted Benefits (1) (h) x (i)**
2027	Conserved Flood Water	Acre-Feet	0	227.4	227.4	$20	$4,548	0.417	**$1,897**
Year	**Type of Benefit**	**Measure of Benefit (Units)**	**Without Project**	**With Project**	**Change Resulting from Project (e) – (d)**	**Unit $ Value (1)**	**Annual $ Value (1) (f) x (g)**	**Discount Factor (1)**	**Discounted Benefits (1) (h) x (i)**
2028	Conserved Flood Water	Acre-Feet	0	227.4	227.4	$20	$4,548	0.394	**$1,792**
Year	**Type of Benefit**	**Measure of Benefit (Units)**	**Without Project**	**With Project**	**Change Resulting from Project (e) – (d)**	**Unit $ Value (1)**	**Annual $ Value (1) (f) x (g)**	**Discount Factor (1)**	**Discounted Benefits (1) (h) x (i)**
2029	Conserved Flood Water	Acre-Feet	0	227.4	227.4	$20	$4,548	0.371	**$1,687**
Year	**Type of Benefit**	**Measure of Benefit (Units)**	**Without Project**	**With Project**	**Change Resulting from Project (e) – (d)**	**Unit $ Value (1)**	**Annual $ Value (1) (f) x (g)**	**Discount Factor (1)**	**Discounted Benefits (1) (h) x (i)**
2030	Conserved Flood Water	Acre-Feet	0	227.4	227.4	$20	$4,548	0.350	**$1,592**
Year	**Type of Benefit**	**Measure of Benefit (Units)**	**Without Project**	**With Project**	**Change Resulting from Project (e) – (d)**	**Unit $ Value (1)**	**Annual $ Value (1) (f) x (g)**	**Discount Factor (1)**	**Discounted Benefits (1) (h) x (i)**
2031	Conserved Flood Water	Acre-Feet	0	227.4	227.4	$20	$4,548	0.331	**$1,505**
Year	**Type of Benefit**	**Measure of Benefit (Units)**	**Without Project**	**With Project**	**Change Resulting from Project (e) – (d)**	**Unit $ Value (1)**	**Annual $ Value (1) (f) x (g)**	**Discount Factor (1)**	**Discounted Benefits (1) (h) x (i)**
2032	Conserved Flood Water	Acre-Feet	0	227.4	227.4	$20	$4,548	0.312	**$1,419**
Year	**Type of Benefit**	**Measure of Benefit (Units)**	**Without Project**	**With Project**	**Change Resulting from Project (e) – (d)**	**Unit $ Value (1)**	**Annual $ Value (1) (f) x (g)**	**Discount Factor (1)**	**Discounted Benefits (1) (h) x (i)**
2033	Conserved Flood Water	Acre-Feet	0	227.4	227.4	$20	$4,548	0.294	**$1,337**
Year	**Type of Benefit**	**Measure of Benefit (Units)**	**Without Project**	**With Project**	**Change Resulting from Project (e) – (d)**	**Unit $ Value (1)**	**Annual $ Value (1) (f) x (g)**	**Discount Factor (1)**	**Discounted Benefits (1) (h) x (i)**
2034	Conserved Flood Water	Acre-Feet	0	227.4	227.4	$20	$4,548	0.278	**$1,264**
Year	**Type of Benefit**	**Measure of Benefit (Units)**	**Without Project**	**With Project**	**Change Resulting from Project (e) – (d)**	**Unit $ Value (1)**	**Annual $ Value (1) (f) x (g)**	**Discount Factor (1)**	**Discounted Benefits (1) (h) x (i)**
2035	Conserved Flood Water	Acre-Feet	0	227.4	227.4	$20	$4,548	0.262	**$1,192**
Year	**Type of Benefit**	**Measure of Benefit (Units)**	**Without Project**	**With Project**	**Change Resulting from Project (e) – (d)**	**Unit $ Value (1)**	**Annual $ Value (1) (f) x (g)**	**Discount Factor (1)**	**Discounted Benefits (1) (h) x (i)**
2036	Conserved Flood Water	Acre-Feet	0	227.4	227.4	$20	$4,548	0.247	**$1,123**
Year	**Type of Benefit**	**Measure of Benefit (Units)**	**Without Project**	**With Project**	**Change Resulting from Project (e) – (d)**	**Unit $ Value (1)**	**Annual $ Value (1) (f) x (g)**	**Discount Factor (1)**	**Discounted Benefits (1) (h) x (i)**
2037	Conserved Flood Water	Acre-Feet	0	227.4	227.4	$20	$4,548	0.233	**$1,060**
Year	**Type of Benefit**	**Measure of Benefit (Units)**	**Without Project**	**With Project**	**Change Resulting from Project (e) – (d)**	**Unit $ Value (1)**	**Annual $ Value (1) (f) x (g)**	**Discount Factor (1)**	**Discounted Benefits (1) (h) x (i)**
2038	Conserved Flood Water	Acre-Feet	0	227.4	227.4	$20	$4,548	0.220	**$1,001**
Year	**Type of Benefit**	**Measure of Benefit (Units)**	**Without Project**	**With Project**	**Change Resulting from Project (e) – (d)**	**Unit $ Value (1)**	**Annual $ Value (1) (f) x (g)**	**Discount Factor (1)**	**Discounted Benefits (1) (h) x (i)**
2039	Conserved Flood Water	Acre-Feet	0	227.4	227.4	$20	$4,548	0.207	**$941**

Year	Type of Benefit	Measure of Benefit (Units)	Without Project	With Project	Change Resulting from Project (e) – (d)	Unit $ Value [1]	Annual $ Value [1] (f) x (g)	Discount Factor [1]	Discounted Benefits [1] (h) x (i)
2040	Conserved Flood Water	Acre-Feet	0	227.4	227.4	$20	$4,548	0.196	**$891**
Year	Type of Benefit	Measure of Benefit (Units)	Without Project	With Project	Change Resulting from Project (e) – (d)	Unit $ Value [1]	Annual $ Value [1] (f) x (g)	Discount Factor [1]	Discounted Benefits [1] (h) x (i)
2041	Conserved Flood Water	Acre-Feet	0	227.4	227.4	$20	$4,548	0.185	**$841**
Year	Type of Benefit	Measure of Benefit (Units)	Without Project	With Project	Change Resulting from Project (e) – (d)	Unit $ Value [1]	Annual $ Value [1] (f) x (g)	Discount Factor [1]	Discounted Benefits [1] (h) x (i)
2042	Conserved Flood Water	Acre-Feet	0	227.4	227.4	$20	$4,548	0.174	**$791**
Year	Type of Benefit	Measure of Benefit (Units)	Without Project	With Project	Change Resulting from Project (e) – (d)	Unit $ Value [1]	Annual $ Value [1] (f) x (g)	Discount Factor [1]	Discounted Benefits [1] (h) x (i)
2043	Conserved Flood Water	Acre-Feet	0	227.4	227.4	$20	$4,548	0.164	**$746**
Year	Type of Benefit	Measure of Benefit (Units)	Without Project	With Project	Change Resulting from Project (e) – (d)	Unit $ Value [1]	Annual $ Value [1] (f) x (g)	Discount Factor [1]	Discounted Benefits [1] (h) x (i)
2044	Conserved Flood Water	Acre-Feet	0	227.4	227.4	$20	$4,548	0.155	**$705**
Year	Type of Benefit	Measure of Benefit (Units)	Without Project	With Project	Change Resulting from Project (e) – (d)	Unit $ Value [1]	Annual $ Value [1] (f) x (g)	Discount Factor [1]	Discounted Benefits [1] (h) x (i)
2045	Conserved Flood Water	Acre-Feet	0	227.4	227.4	$20	$4,548	0.146	**$664**
Year	Type of Benefit	Measure of Benefit (Units)	Without Project	With Project	Change Resulting from Project (e) – (d)	Unit $ Value [1]	Annual $ Value [1] (f) x (g)	Discount Factor [1]	Discounted Benefits [1] (h) x (i)
2046	Conserved Flood Water	Acre-Feet	0	227.4	227.4	$20	$4,548	0.138	**$628**
Year	Type of Benefit	Measure of Benefit (Units)	Without Project	With Project	Change Resulting from Project (e) – (d)	Unit $ Value [1]	Annual $ Value [1] (f) x (g)	Discount Factor [1]	Discounted Benefits [1] (h) x (i)
2047	Conserved Flood Water	Acre-Feet	0	227.4	227.4	$20	$4,548	0.130	**$591**
Year	Type of Benefit	Measure of Benefit (Units)	Without Project	With Project	Change Resulting from Project (e) – (d)	Unit $ Value [1]	Annual $ Value [1] (f) x (g)	Discount Factor [1]	Discounted Benefits [1] (h) x (i)
2048	Conserved Flood Water	Acre-Feet	0	227.4	227.4	$20	$4,548	0.123	**$559**
Year	Type of Benefit	Measure of Benefit (Units)	Without Project	With Project	Change Resulting from Project (e) – (d)	Unit $ Value [1]	Annual $ Value [1] (f) x (g)	Discount Factor [1]	Discounted Benefits [1] (h) x (i)
2049	Conserved Flood Water	Acre-Feet	0	227.4	227.4	$20	$4,548	0.116	**$528**
Year	Type of Benefit	Measure of Benefit (Units)	Without Project	With Project	Change Resulting from Project (e) – (d)	Unit $ Value [1]	Annual $ Value [1] (f) x (g)	Discount Factor [1]	Discounted Benefits [1] (h) x (i)
2050	Conserved Flood Water	Acre-Feet	0	227.4	227.4	$20	$4,548	0.109	**$496**
Year	Type of Benefit	Measure of Benefit (Units)	Without Project	With Project	Change Resulting from Project (e) – (d)	Unit $ Value [1]	Annual $ Value [1] (f) x (g)	Discount Factor [1]	Discounted Benefits [1] (h) x (i)
2051	Conserved Flood Water	Acre-Feet	0	227.4	227.4	$20	$4,548	0.103	**$468**
Year	Type of Benefit	Measure of Benefit (Units)	Without Project	With Project	Change Resulting from Project (e) – (d)	Unit $ Value [1]	Annual $ Value [1] (f) x (g)	Discount Factor [1]	Discounted Benefits [1] (h) x (i)
2052	Conserved Flood Water	Acre-Feet	0	227.4	227.4	$20	$4,548	0.097	**$441**
Year	Type of Benefit	Measure of Benefit (Units)	Without Project	With Project	Change Resulting from Project (e) – (d)	Unit $ Value [1]	Annual $ Value [1] (f) x (g)	Discount Factor [1]	Discounted Benefits [1] (h) x (i)
2053	Conserved Flood Water	Acre-Feet	0	227.4	227.4	$20	$4,548	0.092	**$418**

Year	Type of Benefit	Measure of Benefit (Units)	Without Project	With Project	Change Resulting from Project (e) – (d)	Unit $ Value (1)	Annual $ Value (1) (f) x (g)	Discount Factor (1)	Discounted Benefits (1) (h) x (i)
2054	Conserved Flood Water	Acre-Feet	0	227.4	227.4	$20	$4,548	0.087	**$396**
Year	**Type of Benefit**	**Measure of Benefit (Units)**	**Without Project**	**With Project**	**Change Resulting from Project (e) – (d)**	**Unit $ Value (1)**	**Annual $ Value (1) (f) x (g)**	**Discount Factor (1)**	**Discounted Benefits (1) (h) x (i)**
2055	Conserved Flood Water	Acre-Feet	0	227.4	227.4	$20	$4,548	0.082	**$373**
Year	**Type of Benefit**	**Measure of Benefit (Units)**	**Without Project**	**With Project**	**Change Resulting from Project (e) – (d)**	**Unit $ Value (1)**	**Annual $ Value (1) (f) x (g)**	**Discount Factor (1)**	**Discounted Benefits (1) (h) x (i)**
2056	Conserved Flood Water	Acre-Feet	0	227.4	227.4	$20	$4,548	0.077	**$350**
Year	**Type of Benefit**	**Measure of Benefit (Units)**	**Without Project**	**With Project**	**Change Resulting from Project (e) – (d)**	**Unit $ Value (1)**	**Annual $ Value (1) (f) x (g)**	**Discount Factor (1)**	**Discounted Benefits (1) (h) x (i)**
2057	Conserved Flood Water	Acre-Feet	0	227.4	227.4	$20	$4,548	0.073	**$332**
Year	**Type of Benefit**	**Measure of Benefit (Units)**	**Without Project**	**With Project**	**Change Resulting from Project (e) – (d)**	**Unit $ Value (1)**	**Annual $ Value (1) (f) x (g)**	**Discount Factor (1)**	**Discounted Benefits (1) (h) x (i)**
2058	Conserved Flood Water	Acre-Feet	0	227.4	227.4	$20	$4,548	0.069	**$314**
Year	**Type of Benefit**	**Measure of Benefit (Units)**	**Without Project**	**With Project**	**Change Resulting from Project (e) – (d)**	**Unit $ Value (1)**	**Annual $ Value (1) (f) x (g)**	**Discount Factor (1)**	**Discounted Benefits (1) (h) x (i)**
2059	Conserved Flood Water	Acre-Feet	0	227.4	227.4	$20	$4,548	0.065	**$296**
Year	**Type of Benefit**	**Measure of Benefit (Units)**	**Without Project**	**With Project**	**Change Resulting from Project (e) – (d)**	**Unit $ Value (1)**	**Annual $ Value (1) (f) x (g)**	**Discount Factor (1)**	**Discounted Benefits (1) (h) x (i)**
2060	Conserved Flood Water	Acre-Feet	0	227.4	227.4	$20	$4,548	0.061	**$277**
Year	**Type of Benefit**	**Measure of Benefit (Units)**	**Without Project**	**With Project**	**Change Resulting from Project (e) – (d)**	**Unit $ Value (1)**	**Annual $ Value (1) (f) x (g)**	**Discount Factor (1)**	**Discounted Benefits (1) (h) x (i)**
2061	Conserved Flood Water	Acre-Feet	0	227.4	227.4	$20	$4,548	0.058	**$264**
Year	**Type of Benefit**	**Measure of Benefit (Units)**	**Without Project**	**With Project**	**Change Resulting from Project (e) – (d)**	**Unit $ Value (1)**	**Annual $ Value (1) (f) x (g)**	**Discount Factor (1)**	**Discounted Benefits (1) (h) x (i)**
2062	Conserved Flood Water	Acre-Feet	0	227.4	227.4	$20	$4,548	0.055	**$250**
Last Year of Project Life	**Type of Benefit**	**Measure of Benefit (Units)**	**Without Project**	**With Project**	**Change Resulting from Project (e) – (d)**	**Unit $ Value (1)**	**Annual $ Value (1) (f) x (g)**	**Discount Factor (1)**	**Discounted Benefits (1) (h) x (i)**
2063	Conserved Flood Water	Acre-Feet	0	227.4	227.4	$20	$4,548	0.052	**$236**
								Total Present Value of Discounted Benefits Based on Unit Value	**$62,978**
Comments:									

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

Table 15– Annual Costs of Avoided Projects

(All avoided costs should be in 2012 dollars)

Project: 2013 Hannah Ranch Flood Cotnrol & Habitat Conservation Project Proposal

	Costs				Discounting Calculations	
(a)	(b)	(c)	(d)	(e)	(f)	(g)
Year	Alternative (Avoided Project Name): _____ Avoided Project Description:				Discount Factor	Discounted Costs (e) x (f)
	Avoided Capital Costs	Avoided Replacement Costs	Avoided Operations and Maintenance Costs	Total Cost Avoided for Individual Alternatives (b) + (c) + (d)		
2012					1.000	
2013					0.943	
2014					0.899	
2015					0.839	
...					...	
Last Year of Project Life					...	
				Total Present Value of Discounted Costs (Sum of Column (g))		
				(%) Avoided Cost Claimed by Project		
				Total Present Value of Discounted Avoided Project Costs Claimed by alternative Project (Total Present Value of Discounted Costs x % Avoided Cost Claimed by Project)		
Comments:						

Not Applicable

Table 16 – Annual Costs of Project

(All costs should be in 2012 Dollars)

Project: 2013 Hannah Ranch Flood Control & Habitat Conservation Project Proposal

	Initial Costs Grand Total Cost from Table 6 (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	$2,073,237							$2,073,237	1.000	**$2,073,237**
2013	$2,073,237			$3,000	$26,600			$2,102,837	0.943	**$1,982,976**
2014	$2,073,237			$3,000	$26,600			$2,102,837	0.890	**$1,871,525**
2015				$3,000	$26,600			$29,600	0.840	**$24,864**
2016				$3,000	$26,600			$29,600	0.792	**$23,443**
2017				$3,000	$26,600			$29,600	0.747	**$22,111**
2018				$3,000	$26,600			$29,600	0.705	**$20,868**
2019				$3,000	$26,600			$29,600	0.665	**$19,684**
2020				$3,000	$26,600			$29,600	0.627	**$18,559**
2021				$3,000	$26,600			$29,600	0.592	**$17,523**
2022				$3,000	$26,600			$29,600	0.558	**$16,517**
2023				$3,000	$26,600			$29,600	0.527	**$15,599**
2024				$3,000	$26,600			$29,600	0.497	**$14,711**
2025				$3,000	$26,600			$29,600	0.469	**$13,882**
2026				$3,000	$26,600			$29,600	0.442	**$13,083**
2027				$3,000	$26,600			$29,600	0.417	**$12,343**
2028				$3,000	$26,600			$29,600	0.394	**$11,662**
2029				$3,000	$26,600			$29,600	0.371	**$10,982**
2030				$3,000	$26,600			$29,600	0.350	**$10,360**
2031				$3,000	$26,600			$29,600	0.331	**$9,798**
2032				$3,000	$26,600	$619,000		$648,600	0.312	**$202,363**
2033				$3,000	$26,600			$29,600	0.294	**$8,702**
2034				$3,000	$26,600			$29,600	0.278	**$8,229**
2035				$3,000	$26,600			$29,600	0.262	**$7,755**
2036				$3,000	$26,600			$29,600	0.247	**$7,311**
2037				$3,000	$26,600			$29,600	0.233	**$6,897**
2038				$3,000	$26,600			$29,600	0.220	**$6,512**
2039				$3,000	$26,600			$29,600	0.207	**$6,127**
2040				$3,000	$26,600			$29,600	0.196	**$5,802**
2041				$3,000	$26,600			$29,600	0.185	**$5,476**
2042				$3,000	$26,600			$29,600	0.174	**$5,150**
2043				$3,000	$26,600			$29,600	0.164	**$4,854**
2044				$3,000	$26,600			$29,600	0.155	**$4,588**
2045				$3,000	$26,600			$29,600	0.146	**$4,322**
2046				$3,000	$26,600			$29,600	0.138	**$4,085**
2047				$3,000	$26,600			$29,600	0.130	**$3,848**
2048				$3,000	$26,600			$29,600	0.123	**$3,641**
2049				$3,000	$26,600			$29,600	0.116	**$3,434**
2050				$3,000	$26,600			$29,600	0.109	**$3,226**
2051				$3,000	$26,600			$29,600	0.103	**$3,049**
2052				$3,000	$26,600	$619,000		$648,600	0.097	**$62,914**
2053				$3,000	$26,600			$29,600	0.092	**$2,723**
2054				$3,000	$26,600			$29,600	0.087	**$2,575**
2055				$3,000	$26,600			$29,600	0.082	**$2,427**
2056				$3,000	$26,600			$29,600	0.077	**$2,279**
2057				$3,000	$26,600			$29,600	0.073	**$2,161**
2058				$3,000	$26,600			$29,600	0.069	**$2,042**
2059				$3,000	$26,600			$29,600	0.065	**$1,924**
2060				$3,000	$26,600			$29,600	0.061	**$1,806**
2061				$3,000	$26,600			$29,600	0.058	**$1,717**
2062				$3,000	$26,600			$29,600	0.055	**$1,628**
2063				$3,000	$26,600			$29,600	0.052	**$1,539**
Total Present Value of Discounted Costs (Sum of Column (j)) Transfer to Table 17, column (c), Proposal Benefits and Costs Summaries										**$6,594,836**

Comments:

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

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

Table 17 – Proposal Benefits and Costs Summary

Proposal: 2013 Hannah Ranch Flood Control & Habitat Conservation Project Proposal

Agency: Kaweah Delta Water Conservation District (KDWCD)

Project	Project Proponent	Total Present Value Project Costs (1)	Total Present Value Project Benefits			From Section D2 – Briefly describe the main Non-monetized benefits
			From Section D2 – Flood Damage Reduction (2)	From Section D3 – Monetized (3)	Total	
(a)	(b)	(c)	(d)	(e)	(f) = (d) + (e)	(g)
Hannah Ranch Flood Control & Habitat Conservation Project	KDWCD	$6,594,836	$17,516,913	$62,978	$17,579,891	Habitat Development, Power Generation, Public Safety
					0	
					0	
					0	
					0	
					0	

(1) From Table 16 or RWMG method
(2) From Table 12 or RWMG method
(3) From Table 14 or RWMG method