Attachment 9.3 – Supporting Documents

Flood Damage Reduction Costs and Benefits

Project C - Cottonwood Creek, Berenda Creek, and Dry Creek Arundo Eradication and Sand Removal

Madera Region – IRWM Implementation Grant Application

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Attachment 9.3, Photos of Arundo in Cottonwood Creek near Road 25

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12/15/2010

12/15/2010

Attachment 9.3, USDA Secretarial Disaster Declaration Letter

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Madera County Department of Agriculture
Weights and Measures

Robert J. Rolan, Agricultural Commissioner
Sealer of Weights and Measures

Jay Seslowe, Assistant Agricultural
Commissioner/Sealer

April 24, 2006

Henry R. Renteria, Director
Governor's Office of Emergency Services
Individual Assistance Section
3650 Schiever Avenue,
Mather CA 95655-4203.

Re: Request for USDA Secretarial Disaster Declaration for Damage to 2006 Cherry Crop in Madera County, California

Dear Director Renteria,

A survey of Madera County cherry growers has confirmed production losses in excess of 41% in this year's cherry crop. The damage, estimated at $564,000, is attributed to freezing temperatures that occurred on February 16, 2006. All of the county's 225 acres of bearing cherries suffered some degree of loss.

In addition, flooding on April 5, 2006, and heavy periods of rain throughout the months of March and April, 2006 have resulted in production losses to almonds, alfalfa hay, peaches, plums, prunes, apples, and barley. To date, the total estimated crop loss in Madera County is $23,050,000.

I respectfully request that Madera County be considered for a USDA Secretarial Disaster Declaration based upon the attached *County Agricultural Commissioner Disaster Report*.

Thank you for your consideration of this request.

Sincerely,

Robert J. Rolan
Madera County Agricultural Commissioner/
Sealer of Weights and Measures

c: Madera County Board of Supervisors
Joe Grillo, Farm Services Agency, Madera
Julia Berry, Madera County Farm Bureau

332 Madera Avenue • Madera, CA 93637-5499 • Phone (559) 675-7876 • Fax (559) 674-4071

CALIFORNIA COUNTY AGRICULTURAL COMMISSIONER DISASTER REPORT

1. County:	2. Date of Disaster:	3. Type and Brief Description of Disaster:
Madera	February , March, April 2006	Feb 16 freeze; March & April rains; April 5 flooding

4. Crops Damaged: (List crops in order of importance, including hay & pasture.)	5. 5-Yr. Avg. Yield: (From Annual Crop Report)	6. 5-Yr. Avg. Price: (From Annual Crop Report)	7. Acres Planted	8. Acres Damaged	9. Acres Not Planted	10. Est. Yield:	11. Est. Dollar Loss:
Almonds	0.91 tn/ac	$2637/tn	80,500	13,000	0	0.56	$11,998,000
Alfalfa hay	7.33 tn/ac	$107/tn	40,000	36,000	0	5.83	$5,778,000
Peaches	14.07 tn/ac	$292/tn	1,600	1,600	0	10.55	$1,643,000
Plums	8.60 tn/ac	$555/tn	800	500	0	4.30	$1,193,000
Prunes	2.63 tn/ac	$894/tn	1,500	1,300	0	1.71	$1,070,000
Apples	9.79 tn/ac	$297/tn	1,300	300	0	.97	$785,000
Cherries	2.86 tn/ac	$2090/tn	400	225	0	1.66	$564,000
Barley	confidential	confidential	500	300	0	confidential	$19,000
Raisin Grapes	2.67 tn/AC	$1110/TN	32,100	2008 #s, for years from 2004-2008.			
Wine Grape	10.06 tN/AC	$229/TN	42,500				
Table Grape	7.87 TN/AC	$1293/TN	4,800				
						TOTAL	$23,050,000

12. County's Total Crop Acres: 658,880

13. Total Farms in County: *(Use most recent U.S. Farm Census number.)*	Number
	1,780

14. Farms with Production Losses of:	Number
100%	
90 to 99%	1
80 to 89%	
70 to 79%	
60 to 69%	
50 to 59%	6
40 to 49%	53
30 to 39%	14
20 to 29%	4
Less than 20%	102

15. Livestock and Poultry Losses of:	Number Destroyed/Damaged	3-Year Avg. Price *(From Annual Crop Report)*	Dollar Loss
Cattle *(Excluding milk cows)*			
Milk Cows			
Milk Production			
Sheep			
Hogs			
Poultry			
Aquaculture			
Apiary			
Other			

16. Farms with Physical Losses of:	Number
Major	
Minor	

17. Farm Facilities Damaged:	Number			Dollar Loss
	Destroyed	Major	Minor	
Dwellings & Service Buildings				
Structures				
Machinery & Equipment				
Land Damages *(Acres)*				
Other				

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Attachment 9.3, City of Madera Storm Drainage Master Plan Table 2.1

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City of Madera

Final Report

Storm Drainage Master Plan

October 1997

MONTGOMERY WATSON

interest, such as a structure, outlet or spillway. Duration may be expressed in any time unit such as minutes, hours, or days.

Frequency or Probability. This element is the frequency of occurrence of events with the specified precipitation depth and duration. It is expressed in terms of the return period. In order to provide a reasonable level of flood protection, the statistical concept of return period or recurrence interval is utilized which aids in assigning a probabilistic meaning to a precipitation event. The percent probability of a storm occurring in a give year is equal to the inverse of the return period (e.g. a 2-year storm give a 50% probability for a give year). The longer the return period (the lower the probability) the larger the storm.

Rainfall Frequency

Given a long history of maximum rainfall intensities for varying durations, a reasonable statistical interpretation can be made of the data to determine estimates of rainfall intensities or depths as a function of storm duration and of return frequency. Design storms for Madera were based on Depth-Duration-Frequency (DDF) statistics computed using short-duration data from Merced and Fresno, and long-term data at Madera.

Table 2-1
Rainfall Frequency Data for Madera

	2-year		5-year		10-year		100-year	
Duration	in	in/hr	in	in/hr	in	in/hr	in	in/hr
5-min	0.18	2.16	0.24	2.88	.29	3.48	.41	4.92
10-min	0.22	1.32	0.30	1.80	.37	2.22	.53	3.18
15-min	0.27	1.08	0.35	1.40	0.42	1.68	0.61	2.44
30-min	0.33	0.66	0.44	0.88	0.52	1.04	0.44	1.54
1-hr	0.42	0.42	0.57	0.57	0.69	0.69	0.98	0.98
2-hr	0.54	0.27	0.72	0.36	0.87	0.44	1.20	0.60
3-hr	0.62	0.21	0.82	0.27	1.00	0.33	1.40	0.47
6-hr	**0.80**	**0.13**	1.05	0.18	**1.20**	**0.20**	**1.90**	**0.32**
12-hr	1.01	0.08	1.30	0.11	1.60	0.13	2.20	0.18
1-day	1.20	0.05	1.70	0.07	2.00	0.08	2.95	0.12
5-day	1.87	0.016	2.58	0.022	3.02	0.025	4.26	0.036
10-day	2.30	0.010	3.20	0.013	3.70	0.015	**5.25**	**0.022**

2

Attachment 9.3, Historical Storm Event Analysis and MID Daily Precipitation Data

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Results of Historical Storm Event Analysis Based on MID Weather Station Data
Period: 1990-2009

Frequency of Event		Rain Year (July 1 - June 30)	Event Dates	Total Rain per Event / inches
2 Year		2008-2009	Feb 6-Feb15	2.22
10 Year		2005-2006	Dec. 26 -Jan 3	3.63
2 Year		2005-2006	Mar. 26-Apr. 5	2.25
2 Year		2004-2005	Oct. 18 -Oct 27	2.69
5 Year		2004-2005	Dec. 27-Jan 1	3.40
2 Year		2004-2005	Feb. 11 -Feb. 22	2.17
2 Year		2004-2005	Mar. 19-Mar. 28	2.42
2 Year		1999-2000	Jan. 17-Jan.26	2.98
2 Year		1999-2000	Feb. 10-Feb.17	2.61
2 Year		1999-2000	Feb. 21-Feb.29	2.38
2 year		1997-1998	Jan.-Jan.19	2.16
2 Year		1997-1998	Jan. 27-Feb. 4	2.62
2 year		1997-1998	Feb. 6-Feb. 15	2.40
2 year		1997-1998	Mar. 24-Apr. 1	2.90
2 Year		1996-1997	Nov. 18-Nov.23	2.53
2 Year		1996-1997	Dec. 5-Dec.13	2.54
2 Year		1996-1997	Dec.30-Jan.5	2.80
2 Year		1996-1997	Jan.20-Jan.26	2.41
2 Year		1995-1996	Jan.31-Feb. 6	2.45
2 Year		1994-1995	Jan.3-Jan.12	2.50
2 Year		1994-1995	Jan. 21-Jan.28	2.37
10 Year		1994-1995	Mar. 3-Mar.12	3.84
2 Year		1992-1993	Dec. 7-Dec.12	2.44
10 Year		1992-1993	Jan7-Jan16	4.57
2 year		1992-1993	Mar.24-Mar. 28	2.21
5 Year		1991-1992	Feb.8-Feb17	3.48
10 Year		1990-1991	Mar. 18-Mar.26	5.08

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Rainfall Season

2008-2009

	July	August	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June
1					0.02							
2					0.13		0.09		0.19		0.36	
3				0.04	0	0.06			0.01			
4					0.14				0.13			
5												0.18
6							0.03	0.24				
7								0.87				
8								0.26		0.04		
9					0.11		0.04	0.01				
10								0.03		0.01		
11					0.02			0.27				
12												
13								0.54				
14												
15						0.4		0.1				
16						0.05		0.26				
17						0.02		0.16				
18												
19						0.02						
20												
21					0.02							
22						0.4	0.09	0.03	0.2			
23						0.07	0.21	0.29	0.1			
24							0.65	0.1				
25						0.11						
26					0.59	0.15	0.04	0.01				
27					0.07							
28					0.02						0.01	
29												
30												
31				0.4								
Totals	0	0	0	0.04	1.12	1.28	1.15	3.17	0.63	0.05	0.37	0.18
Yearly												

8.97

Rainfall Season

2005-2006

	July	August	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June
1							0.48			0.26		
2						0.34	2.03					
3							0.29		0.31	0.40		
4									0.27	0.23		
5										0.30		
6									0.18	0.06		
7									0.08			
8						0.10			0.30	0.01		
9					0.01	0.03						
10									0.04			
11							0.02		0.58	0.22		
12							0.02		0.08			
13												
14							0.36		0.03			
15				0.01			0.17		0.24	0.29		
16		0.02				0.04						
17									0.03	0.24		
18						0.34	0.09	0.10	0.25			
19						0.25	0.21	0.32				
20								0.05				
21			0.01						0.31			
22						0.02					1.24	
23						0.21						
24						0.15				0.06		
25				0.01	tr							
26						0.68			0.25	0.09		
27			0.01				0.02	0.08				
28				0.08				0.14	0.73			
29					0.02	0.15			0.17			
30									0.01			
31							0.05					
Totals	0.00	0.02	0.02	0.10	0.03	2.31	3.74	0.69	3.86	2.16	1.24	0.00
Yearly		0.02	0.04	0.14	0.17	2.48	6.22	6.91	10.77	12.93	14.17	14.17

Rainfall Season

2004-2005

	July	August	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June
1							0.10		0.01			
2									0.08			
3							0.53					
4					0.18		0.10		0.29	0.02		
5							0.10				0.15	
6											1.26	
7						0.32	0.40	0.03				
8					0.05	0.48	0.01	0.02		0.08		
9					0.03	0.05	0.30			0.15	0.17	
10							0.17				0.06	
11					0.05		0.39	0.01				
12					0.52		0.15	0.17				
13					0.06							
14												
15								0.22				
16								1.27			0.07	
17				0.28				0.03			0.04	
18				0.18				0.41				
19				0.12			0.01		0.16			
20				0.83			0.01	0.02	0.76			
21				0.33				0.05	0.24			
22								0.15	0.46			
23									0.38	0.01		
24				0.02					0.27			
25				0.20			0.02					
26				tr			0.06					
27				1.01		0.10	0.46					
28					0.04	0.90	0.09	0.59	0.15	0.30		
29						0.13	0.10		0.03	0.03		
30						0.09			0.03			
31						1.35						
Totals	0.00	0.00	0.00	2.97	0.93	3.42	3.00	2.97	2.86	0.59	1.75	0.00
Yearly				2.97	3.90	7.32	10.32	13.29	16.15	16.74	18.49	18.49

1998 — 1999 RAINFALL SEASON

	JUL	AUG	SEP.	OCT	NOV	DEC.	JAN	FEB	MAR	APR	MAY	JUN.
1						.28		.02				
2											.04	.04
3												
4						.29			.02			
5			.03									
6						.16				.24		
7					.07			.03		.06		
8					.04		.01	.25		.31		
9			.09						.05	.35		
10			.04					.64	.02			
11					.15							
12										.32		
13												
14						.14						
15							.02	.03				
16							.23		.02			
17					.04			.04				
18												
19							.12	.05				
20						.03	.26		.18			
21						.25	.29	.24				
22												
23									.01			
24							.18					
25				.24			.40	.07	.06			
26							.25					
27			.02				.02					
28												
29					.06							
30												
31							.32		.22			

1997 – 1998 RAINFALL SEASON

	July	Aug	Sept	Oct	Nov	Dec.	Jan	Feb	Mar	Apr.	May	Jun.
1						.34				.37		
2							.05	.34		.02		T
3			.04				.20	.63		.23	.01	
4							.19	.86		.38	.17	
5						.17	.32				.17	
6						.27		.05	.48		.25	
7						.16	.07	.30		.21		.74
8						.42		.34				.01
9						.05	.05	.12				
10							.38					
11				.03	1.21		.09	.23				
12							.14			.07	.18	
13					.06		.48	.35	T	.10	.27	
14					.08			.49	.53	.66		
15						.18	.56	.52				
16					.32		.24					
17								.24				
18						.02						
19							.27					
20								.53				
21												
22								.30				
23												
24								.28	.25	.15		
25									1.42			
26			.11		.18				.19			
27					.36		.08					
28									.39			
29							.23		.26		.14	
30							.38					
31									.02			

1996 - 1997 RAINFALL SEASON

	JULY	AUG.	SEPT.	OCT	NOV.	DEC.	JAN.	FEB	MAR	APR.	MAY	JUNE
1						.01	.28					
2							.31					
3							.81					
4												
5						.36	.22					
6						.14						
7												
8								.08				
9												
10						1.19						
11						.77						
12						.01						
13						.07	.48					
14												
15							.46					
16							.12					
17								T.	.01			
18					1.10							
19												
20					.07		.19					
21					.01	.66	.47					
22					1.05	.10	.17					
23					.30		.24					
24												
25							.42					
26				.31			.10					
27						.17	.82	.01				
28								.05				
29				.07	.13							
30				1.38		1.08						
31				.23		.10						

1995 – 1996 – RAINFALL SEASON

	JULY	AUG	SEPT.	OCT.	NOV	DEC.	JAN	FEB.	MAR.	APR.	MAY	JUNE
1								.66	.05			
2										.43		
3												
4								.60	.17			
5								65	.08			
6								.10	.08			
7												
8												
9												
10							.04					
11						.16						
12						.38			.24			
13						.49			.97			
14						.77						
15												
16						.06		.17		.12	.55	
17	.02						.60			.15		
18										.15		
19						.02	.25	.18				
20								.28				
21							.20	.16				
22							.18	.44				
23												
24						.13						
25							.25	.27				
26								.02				.02
27												.25
28							.12	.13	.19			
29								.08	.20			
30						.38						
31						.02	.14					

1994 – 1995 – RAINFALL SEASON

	July	Aug	Sept.	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun.
1									.04		.05	
2					.10						.73	
3							.30		.23			
4				.50			.25		.23			
5				.93			.88		.46			
6							.01		.04		.12	
7						.02	.14				.03	
8					.12			.14				
9							.08		.20			
10					.56		.38		1.43			
11							.25		1.22			
12						.08	.21		.03			
13					.04	.42	.07				.25	
14							.03	.60	.02	.23	.03	
15						.12	.11				.19	.07
16					.12		.13			.12		.46
17					.06		.23			.02		
18					.11					.05		
19						.01			.02	.01		
20										.01		19.17
21							.09		.61	.09		
22							.02		.40			
23							.34		.33			
24			.04				.46		.19			
25					.28	.45	1.07					
26					.25		.14					
27							.16					
28					.03	.18	.15			.03		
29			.08			.04				.19		
30										.32		
31												

1992 – 1993 – Rainfall Season

	July	Aug	Sept	Oct	Nov	Dec.	Jan	Feb	Mar	Apr	May	June
1										.10		.34
2							.73					
3												
4												
5								.03				.32
6												
7						.97	.74					.02
8						.70	.49	.24				
9						.02	.35	.62				
10							.37	.04				
11						.48	.09	.01				
12	.04					.27						
13							.73					
14							1.10		.20			
15							.32					
16							.38					
17							.06		.26			
18						.16	.33		.10	.15		
19								.54				
20								.18				
21				.30			.02	.17				
22				.03			.10					
23								.33				
24								.04	.52			
25									.58		.38	
26								.02	.51			
27								.18	.27			
28									.33			
29						.16						
30				.81		.12						
31				.18								

1991 – 1992 – Rainfall Season

	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr.	May	June
1												
2							.02		.05			
3							.03					
4							.10					
5							.55					
6							.50	.04	.58			
7							.12	.23				
8						.20	.31	.04				
9												
10								.35				
11								.34				
12								.35				
13								.78				
14												
15								.72	.08			
16								.37	.17			
17								.53				
18					.14	.11						
19						.08						
20								.14				
21									.56			
22												
23									.28			
24												
25												
26				.13								
27				.15								
28				.43		.21						
29						.12						
30						.33			.02			
31									.33			

1990 – 1991 Rainfall Season

	July	Aug	Sept.	Oct	Nov.	Dec.	Jan	Feb	Mar	Apr.	May	Jun.
1					.01				.37			
2									.47			
3								.18	.14			
4							.11		.52			
5								.21	.12			
6												
7												
8												
9												
10												
11									.14			
12						.01						
13						.01	.01		.31			
14							.01		.02		.02	
15									.08			
16						.38						
17												
18									1.10			
19						.15			1.14			
20					.06	.16			.37	.10		
21									.22	.04		
22			.03									
23												
24			.05						.16			
25									.53			
26					.41				.62			
27									.94			
28								.58				
29												
30												
31												

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Attachment 9.3, Maps of Delineated Flood Areas along Cottonwood, Berenda, and Dry Creeks

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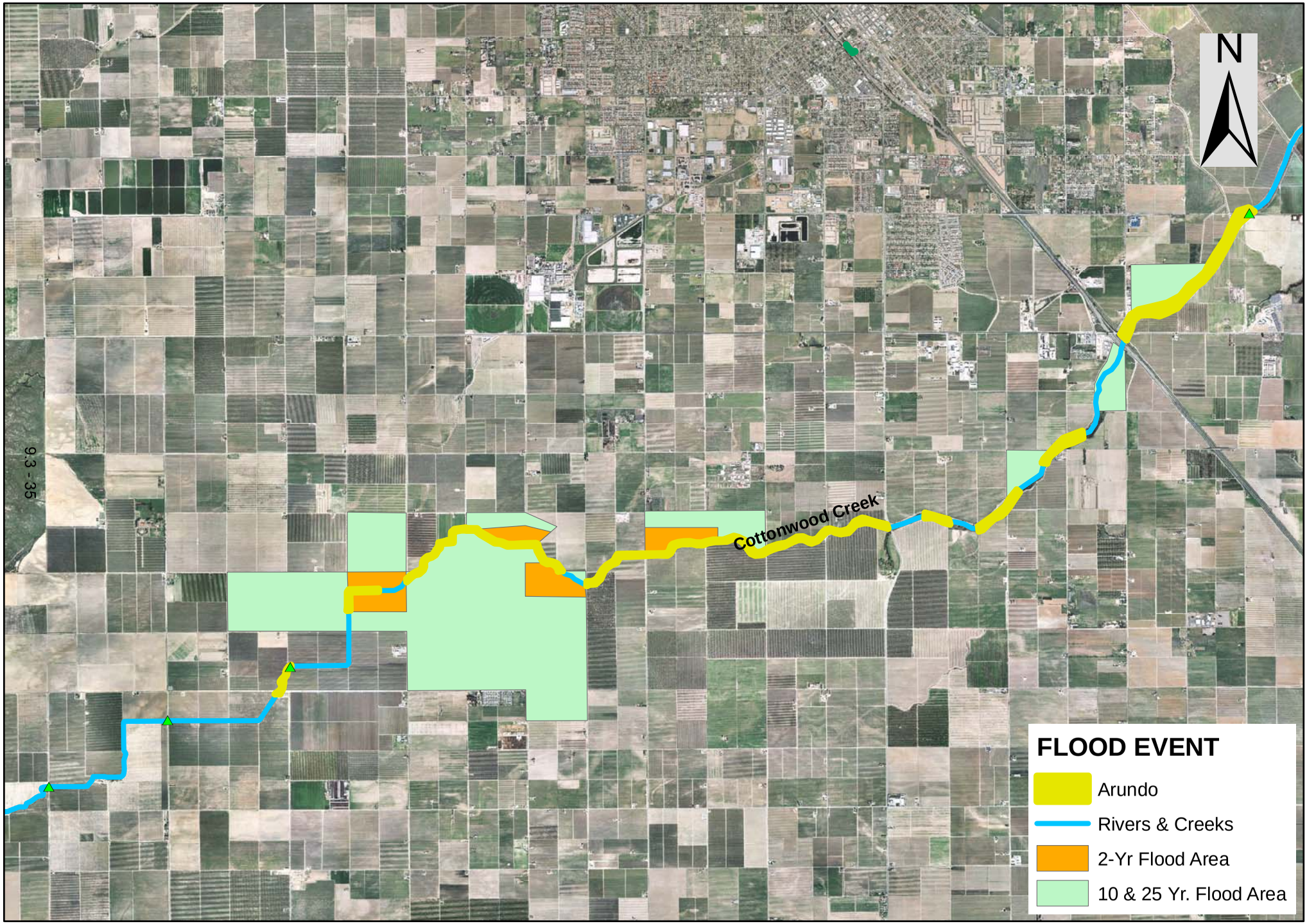
COTTONWOOD CREEK FLOOD MAP



0 0.4 0.8 1.6 2.4 3.2 4 4.8 Miles

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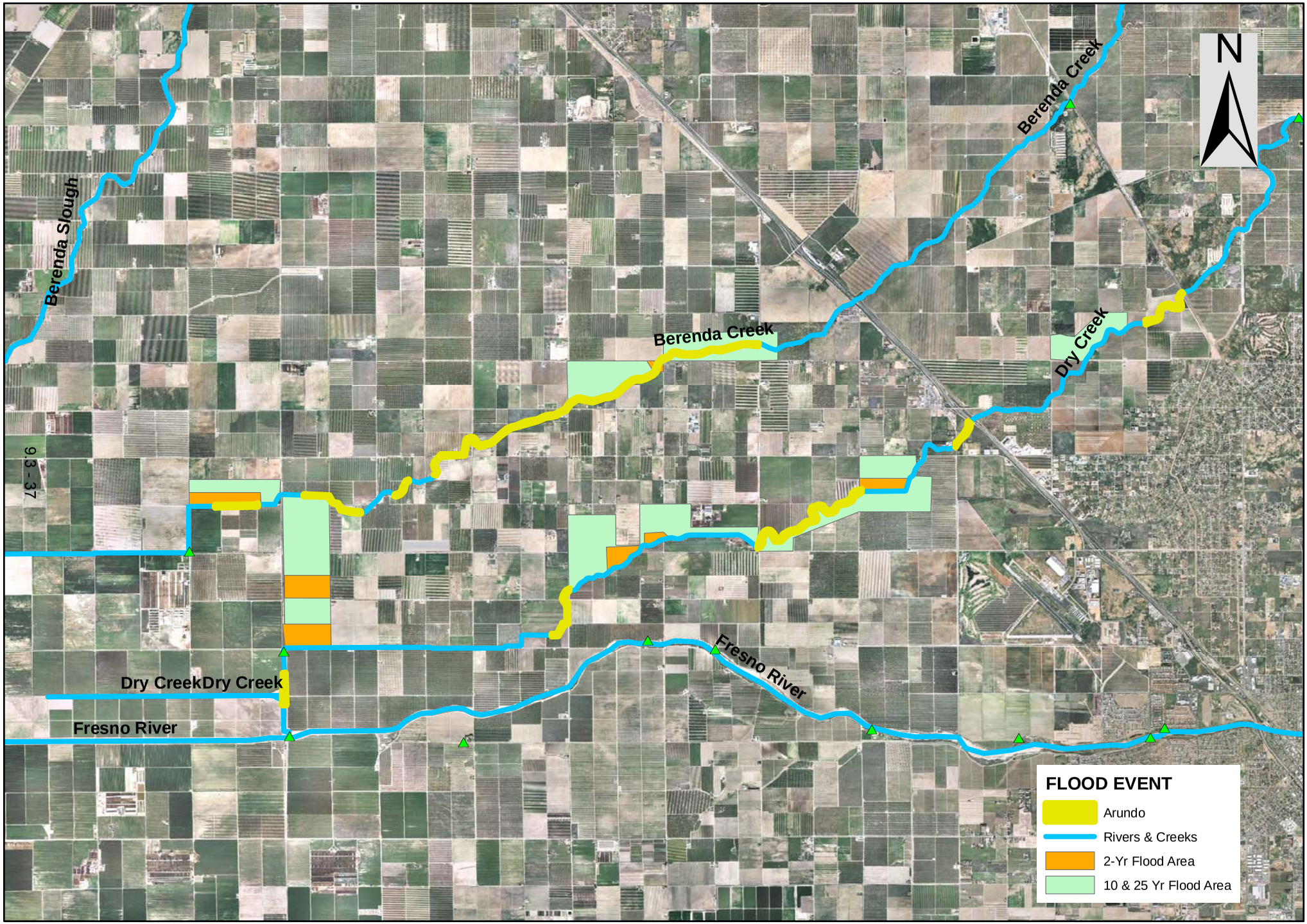
BERENDA & DRY CREEK FLOOD MAP



Miles

0 0.5 1 2 3 4 5 6

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Attachment 9.3, Results of FRAM Analysis

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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

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

Return to Menu

Project Name: Madera Cottonwood Creek, Berenda Creek, and Dry Creek Arundo Eradication and Sediment Removal

Cost of Project: $ 2,508,000

Description: Eradication of arundo and removal of Sediments to reduce flood damage along the creeks.

Number of Events Modeled: 3

	Without Project						With Project					
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6
Average Return Interval (ARI)	2	10	25				2	10	25			
Annual Probability of Exceedance	0.500	0.100	0.040				0.500	0.100	0.040			
Probability of Levee Failure	0.10	0.75	1.00				0.00	0.50	1.00			
Water Surface Elevation - channel (f)												
Flood Warning Time (hours)												
Flood Experience	Y	Y	Y				Y	Y	Y			
Period of Inundation (days)	4	4	6				4	4	6			
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												
Average Flood depth above ground level (f)												
Rural - Res: Homesteads												
Rural - Other: Barns, sheds												
Urban Res: Single story (no base)												
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.	350	2200	2200				0	2200	2200			
Cotton — ac.												
Tomatoes — ac.												
Wine Grapes — ac.	350	2200	2200				0	2200	2200			
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)												
length of unsealed roads inundated (miles)												

Extrapolate Y-intercept: N

Summary of Cost-Benefit Analysis

Return to Menu

Project Name:	**Madera Cottonwood Creek, Berenda Creek, and Dry Creek Arundo Eradication a**
Description	Eradication of arundo and removal of Sediments to reduce flood damage along the creeks.
Proposed project cost:	$ 2,508,000
Change in annual O&M costs:	$ 41,495
PV of future O&M costs:	$ 654,038 (at 6% discount rate over 50 years)
PV of Future Costs	$ 3,162,038

Benefits

	Actual	Potential	
EAD without project	$ 3,924,956	$ 3,924,956	
EAD with project	$ 3,212,422	$ 3,212,422	
Annual Benefit:	$ 712,534	$ 712,534	
PV of Future Benefits:	$ 11,230,862	$ 11,230,862	(at 6% discount rate over 50 years)

Cost-Benefit Analysis

	Actual	Potential	
Net Present Value (NPV)	$ 8,068,824	$ 8,068,824	(at 6% discount rate over 50 years)
Benefit:Cost Ratio	3.552	3.552	

NPV Sensitivity to Discount Rate:

	Actual	Potential
4%	$ 12,798,788	$ 12,798,788
5%	$ 10,499,968	$ 10,499,968
6%	$ 8,722,862	$ 8,722,862
7%	$ 7,325,501	$ 7,325,501
8%	$ 6,208,774	$ 6,208,774

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)	Constructio n 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 Fran

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:	0%
Percentage of comm/ind. direct damages applied as indirect:	0%
HEC-FIA only: Percentage all building direct damages applied as indirect	0%
Percentage of roads direct damages applied as indirect:	0%

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	0	0	0	0	0	0	0	0	0	0	0	0
Recent Flood Expe	Y / N	Y	Y	Y	0	0	0	Y	Y	Y	0	0	0
Actual : Potential Ratio		0.8	0.8	0.8	0.9	0.9	0.9	0.8	0.8	0.8	0.9	0.9	0.9

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

Occ_Name	Cat_Name	Occ_Description	Parameter	Depth (ft) above First Finished Floor (FFE)																		
1ST-NB	RES	one story, no basement	Stage	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1ST-NB	RES		S	0	2.5	13.4	23.3	32.1	40.1	47.1	53.2	58.6	63.2	67.2	70.5	73.2	75.4	77.2	78.5	79.5	80.2	80.7
1ST-NB	RES		C	0	2.4	8.1	13.3	17.9	22	25.7	28.8	31.5	33.8	35.7	37.2	38.4	39.2	39.7	40	40	40	40
2ST-NB	RES	two or more stories, no basement	Stage	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
2ST-NB	RES		S	0	3	9.3	15.2	20.9	26.3	31.4	36.2	40.7	44.9	48.8	52.4	55.7	58.7	61.4	63.8	65.9	67.7	69.2
2ST-NB	RES		C	0	1	5	8.7	12.2	15.5	18.5	21.3	23.9	26.3	28.4	30.3	32	33.4	34.7	35.6	36.4	36.9	37.2
FARM	FAR	Farm Homesteads	Stage	-10	-3	-2	-1	0	1	2	3	4	5	6	7	8	10	13	15	19	21	25
FARM	FAR		S	0	0	0	0	4	9	13	18	22	27	31	35	38	49	49	49	49	49	49
FARM	FAR		C	0	0	0	0	0	6	30	54	69	75	78	80	80	80	100	100	100	100	100
MOBILE	MOB	Mobile homes	Stage	-10	-3	-2	-1	0	1	2	3	4	5	6	7	8	10	13	15	19	21	25
MOBILE	MOB		S	0	0	0	0	8	44	63	73	78	80	81	82	82	82	82	82	82	82	82
MOBILE	MOB		C	0	0	0	0	0	27	49	64	70	76	78	79	81	83	83	83	83	83	83
PUBLIC	PUB	Public buildings	Stage	-10	-3	-2	-1	0	1	2	3	4	5	6	7	8	10	13	15	19	21	25
PUBLIC	PUB		S	0	0	0	0	8	22	30	35	39	41	44	46	48	49	49	49	49	49	49
PUBLIC	PUB		C	0	0	0	0	0	17.5	25	30	34	37	39	40.5	41.5	42	42	42	42	42	42
INDUSTRY	IND	Industrial Buildings	Stage	-10	-3	-2	-1	0	1	2	3	4	5	6	7	8	10	13	15	19	21	25
INDUSTRY	IND		S	0	0	0	0	4	9	13	18	22	27	31	35	38	49	49	49	49	49	49
INDUSTRY	IND		C	0	0	0	0	0	72	75	76.5	78	81	84	87	90	96	102	108	114	120	120
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:	2	10	25	0	0	0	2	10	25	0	0	0
Probability of Levee Failure	0.10	0.75	1.00	0.00	0.00	0.00	0.00	0.50	1.00	0.00	0.00	0.00
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
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	0	0	0	0	0	0	0	0	0	0	0
Urban Res: Two plus story (no base)	0	0	0	0	0	0	0	0	0	0	0	0
Mobile home	0	0	0	0	0	0	0	0	0	0	0	0
Structural Damages												
Rural - Res: Homesteads	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Rural - Other: Barns, sheds	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Urban Res: Single story (no base)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Urban Res: Two plus story (no base)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Mobile home	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Structual Damages HEC-FIA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Structural Damages	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Content Damages												
Rural - Res: Homesteads	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Rural - Other: Barns, sheds	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Urban Res: Single story (no base)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Urban Res: Two plus story (no base)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Mobile home	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Contents Damage HEC-FIA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Actual:Potential Ratio	0.8	0.8	0.8	0.9	0.9	0.9	0.8	0.8	0.8	0.9	0.9	0.9
Total Contents Damages: Actual	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Contents Damages: Potential	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Clean-Up/ Other Costs												
External	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cleanup	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other Costs HEC-FIA	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Other Costs: Potential	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Sum Actual Damages	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Sum Potential Damages	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Total Actual Damage with levee failure ($):	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Total Potential Damage with levee failure ($):	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Indirect Actual Damage	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Indirect Potential Damage	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

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:	2	10	25	0	0	0	2	10	25	0	0	0
Probability of Levee Failure	0.10	0.75	1.00	0.00	0.00	0.00	0.00	0.50	1.00	0.00	0.00	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	0.9	0.9	0.9	0.8	0.8	0.8	0.9	0.9	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:	2	10	25	0	0	0	2	10	25	0	0	0
Probability of Levee Failure	0.10	0.75	1.00	0.00	0.00	0.00	0.00	0.50	1.00	0.00	0.00	0.00
Length of Inundation <5d Y/N	Y	Y	N	Y	Y	Y	Y	Y	N	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.	350	2200	2200	0	0	0	0	2200	2200	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.	350	2200	2200	0	0	0	0	2200	2200	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	$ 651,565	$ 4,095,554	$ 11,826,435	$ -	$ -	$ -	$ -	$ 4,095,554	$ 11,826,435	$ -	$ -	$ -
Cotton	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Tomatoes	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Wine Grapes	$ 1,216,501	$ 7,646,580	$ 14,774,662	$ -	$ -	$ -	$ -	$ 7,646,580	$ 14,774,662	$ -	$ -	$ -
Alfalfa	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pasture	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Safflower	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Sugar Beets	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Beans	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Other	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Potential Damages	$ 1,868,067	$ 11,742,134	$ 26,601,097	$ -	$ -	$ -	$ -	$ 11,742,134	$ 26,601,097	$ -	$ -	$ -
Total Damage with levee failure ($):	$ 186,807	$ 8,806,600	$ 26,601,097	$ -	$ -	$ -	$ -	$ 5,871,067	$ 26,601,097	$ -	$ -	$ -

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	2	10	25	0	0	0	2	10	25	0	0	0
Probability of Levee failure	0.10	0.75	1.00	0.00	0.00	0.00	0.00	0.50	1.00	0.00	0.00	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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
length of unsealed roads inundated (miles)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Potential Damages												
length of arterial roads inundated (miles)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
length of major roads inundated (miles)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
length of minor roads inundated (miles)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
length of unsealed roads inundated (miles)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Damages:	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Damage with levee failure ($):	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

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	2	10	25	0	0	0	2	10	25	0	0	0
Probability of Levee failure	0.10	0.75	1.00	0.00	0.00	0.00	0.00	0.50	1.00	0.00	0.00	0.00
Description / Site ID												
Total Damages:	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Damage with levee failure ($):	0	0	0	0	0	0	0	0	0	0	0	0

Calculation of Without Project EAD

	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	Y Intercept
Average Recurrence Interval (ARI)	2	10	25	0	0	0	
AEP	0.500	0.100	0.040	0.000	0.000	0.000	0
Actual Damage to Residential Buildings ($)	$ -	$ -	$ -	$ -	$ -	$ -	
Potential Damage to Residential Buildings ($)	$ -	$ -	$ -	$ -	$ -	$ -	
Actual Damage to Commercial/Industrial Buildings ($)	$ -	$ -	$ -	$ -	$ -	$ -	
Potential Damage to Commercial/Industrial Buildings ($)	$ -	$ -	$ -	$ -	$ -	$ -	
Damage to Agriculture ($)	$ 186,807	$ 8,806,600	$ 26,601,097	$ -	$ -	$ -	
Damage to Roads ($)	$ -	$ -	$ -	$ -	$ -	$ -	
Actual Indirect Costs	$ -	$ -	$ -	$ -	$ -	$ -	
Potential Indirect Costs	$ -	$ -	$ -	$ -	$ -	$ -	
Special Cases	$ -	$ -	$ -	$ -	$ -	$ -	
Total Actual Damages	$ 186,807	$ 8,806,600	$ 26,601,097	$ -	$ -	$ -	$ 26,601,097
Total Potential Damages	$ 186,807	$ 8,806,600	$ 26,601,097	$ -	$ -	$ -	$ 26,601,097
EAD (Actual)	$ 3,924,956						
EAD (Potential)	$ 3,924,956						

Potential Damages Without Project

Water Surface Elevation - channel (f)	0	0	0	0	0	0	
ARI	2	10	25	0	0	0	
Probability of Exceedence (AEP)	0.500	0.100	0.040	#DIV/0!	#DIV/0!	#DIV/0!	
Damages incurred	$ 186,807	$ 8,806,600	$ 26,601,097	$ -	$ -	$ -	$ 26,601,097

Actual Damages Without Project

Water Surface Elevation - channel (f)	0	0	0	0	0	0	
ARI	2	10	25	0	0	0	
Probability of Exceedence (AEP)	0.500	0.100	0.040	#DIV/0!	#DIV/0!	#DIV/0!	
Damages incurred	$ 186,807	$ 8,806,600	$ 26,601,097	$ -	$ -	$ -	$ 26,601,097

Without Project

Water Surface Elevation - channel (f)	2	10	25	0	0	0
Probability of Exceedence (AEP)	0.500	0.100	0.040	0.040	0.040	0.040
Potential	$ 186,807	$ 8,806,600	$ 26,601,097	$ 26,601,097	$ 26,601,097	$ 26,601,097
Actual	$ 186,807	$ 8,806,600	$ 26,601,097	$ 26,601,097	$ 26,601,097	$ 26,601,097

With Project

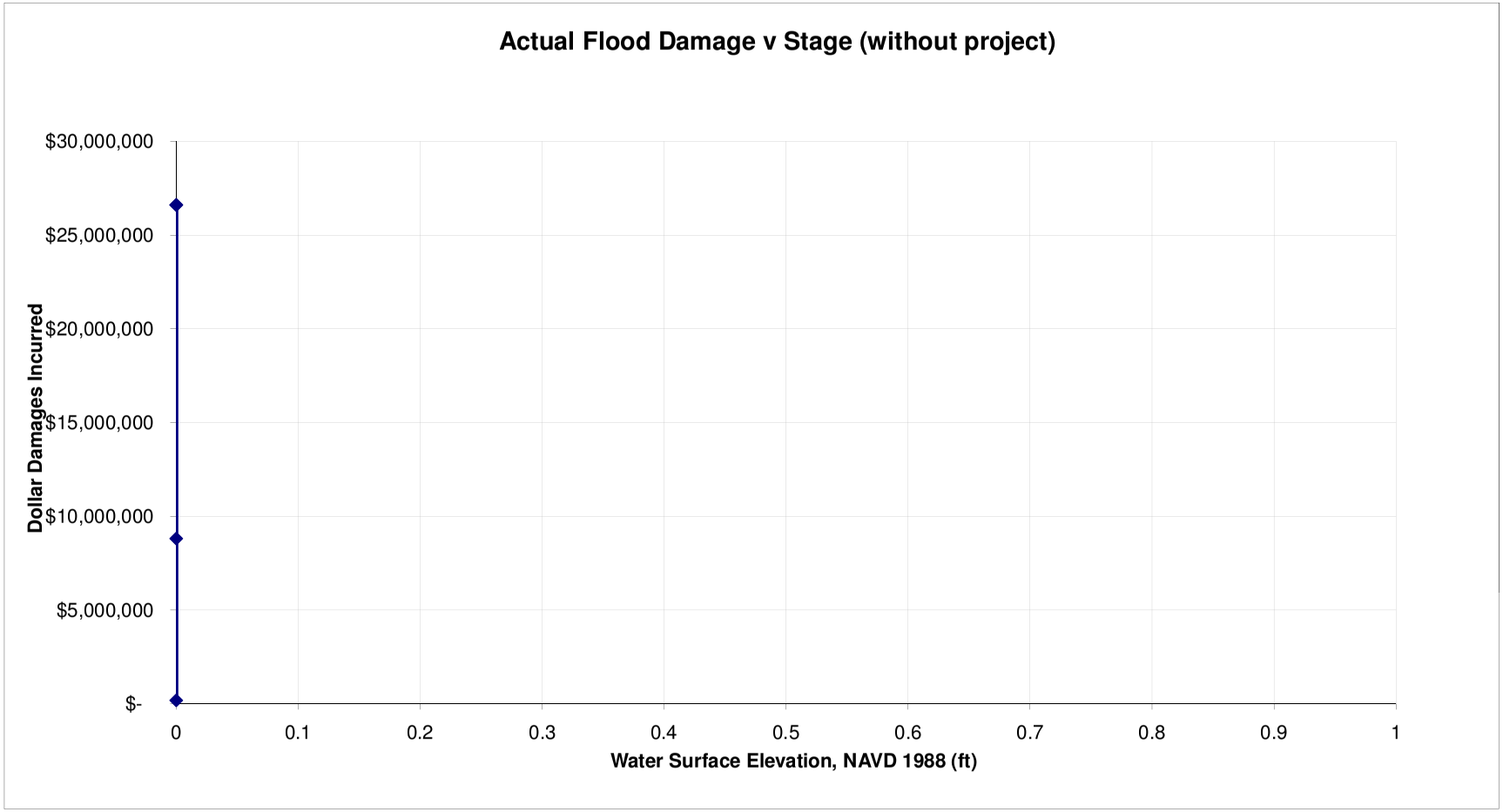
Water Surface Elevation - channel (f)	2	10	25	0	0	0
Probability of Exceedence (AEP)	0.500	0.100	0.040	0.040	0.040	0.040
Potential	$ -	$ 5,871,067	$ 26,601,097	$ 26,601,097	$ 26,601,097	$ 26,601,097
Actual	$ -	$ 5,871,067	$ 26,601,097	$ 26,601,097	$ 26,601,097	$ 26,601,097

Calculation of With Project EAD

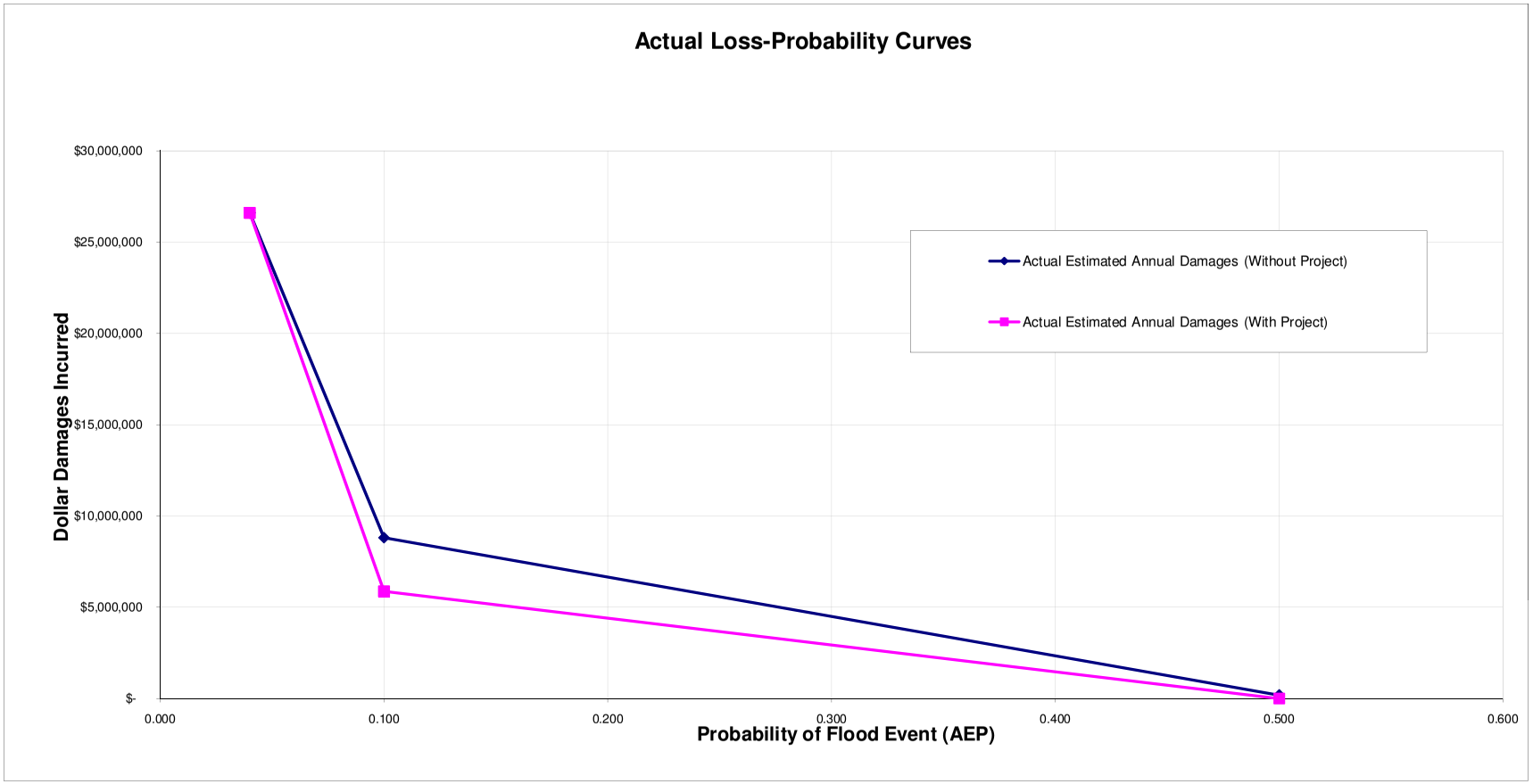
	Event 1	Event 2	Event 3	Event 4	Event 5	Event 6	
Average Recurrence Interval (ARI)	2	10	25	0	0	0	
AEP	0.500	0.100	0.040	0.000	0.000	0.000	0
Actual Damage to Residential Buildings ($)	$ -	$ -	$ -	$ -	$ -	$ -	
Potential Damage to Residential Buildings ($)	$ -	$ -	$ -	$ -	$ -	$ -	
Actual Damage to Commercial/Industrial Buildings ($)	$ -	$ -	$ -	$ -	$ -	$ -	
Potential Damage to Commercial/Industrial Buildings ($)	$ -	$ -	$ -	$ -	$ -	$ -	
Damage to Agriculture ($)	$ -	$ 5,871,067	$ 26,601,097	$ -	$ -	$ -	
Damage to Roads ($)	$ -	$ -	$ -	$ -	$ -	$ -	
Actual Indirect Costs	$ -	$ -	$ -	$ -	$ -	$ -	
Potential Indirect Costs	$ -	$ -	$ -	$ -	$ -	$ -	
Special Cases	$ -	$ -	$ -	$ -	$ -	$ -	
Total Actual Damages	$ -	$ 5,871,067	$ 26,601,097	$ -	$ -	$ -	$ 26,601,097
Total Potential Damages	$ -	$ 5,871,067	$ 26,601,097	$ -	$ -	$ -	$ 26,601,097

EAD (Actual)	$ 3,212,422
EAD (Potential)	$ 3,212,422

Return to Menu



Return to Menu



Attachment 9.3, Flood Damage Photos

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SYSTEMS FLOOD DAMAGE

Location: C.W.C. west of Sherman Thomas weir

Description of Damage: North Bank, Break 30' wide picture #1

Location: Same as above picture taken from

Description of Damage: opposite bank Picture #2

Location: C.W.C. South Bank at Ave. 10

Description of Damage: Break in south Bank 53' wide Picture #3

Location: Same as above, different angle

Description of Damage: Picture #4

SYSTEMS FLOOD DAMAGE

Location: C.W.C. west of Hargrove weir

Description of Damage: Weakened bank, needs dirt Picture #5

Location: East of Galeener weir on C.W.C.

Description of Damage: North Bank, Breaks and Erosion Picture #6

SYSTEMS FLOOD DAMAGE

Location: Galeener Ditch, just west of Galeener weir on C.W.C.

Description of Damage: Large wash out both sides of ditch Picture #15

Location: Galeener Ditch just west of Galeener Weir on C.W.C.

Description of Damage: Large wash out both sides of ditch. Pict. #16

SYSTEMS FLOOD DAMAGE

Location: Galeenen Ditch west of Galeenen were C.W.C

Description of Damage: Large Washouts both sides of Ditch Picture #17

Location: Ave. 10 at C.W.C. Bridge east of Rd. 24

Description of Damage: Roadside erosion Picture #18

Attachment 9.3, MID Repair Log Book

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...ECO RANCH) PHASE III	SEC. 8 DITCH		1/6/92	17-91
Stockton Ditch	ave 14½		1/10/92	1-92
75" RCP	(Lilly ST EAST)		2/3/92	2-92
Hospital Ditch	Rd 28½	(PR Xing)	2/21/92	3-92
...ersey Hughes Ditch	Ave 11	(Rd Xing)	2/24/92	4-92
...s Madera Canal M.P. 31.80	Bevuda Creek	(T.O. M.B)	2/27/92	5-92
...RAL 24.2 AVE 17	Drain		3/4/92	6-92
...s Ditch. @ head	replace Xing		3/4/92	7-92
...ein Mad ave #145	ave 8		5/5/92	8-92
Hughes Ditch	w/ Rd 26½		5/7/92	9-92
Lat 24.2-13.2	Rd 20		5/13/92	10-92
	Rd 400		5/19/92	11-92
Main #1	ave 15		5/3/92	12-92
Schmitz Ditch	Rd 26	repair	8/21/92	13-92
...ek Channel Clearance	Project	MCFCA	9/9/92	14-92
Lat 32.2-13.2	AVE 18½	repair	9/10/92	15-92
DRY CREEK	ROAD 24	T.O.	10/8/92	16-92
LAT 32.2	AVE 25	T.O. 2	10/13/92	17-92
...kon LAT. 32.2-9.9	ROAD AVE 20½ (1B)	T.O. & M.B	11/4/92	18-92
SCHUBERT DITCH	AVE 7½ Rd. 23½	EX. GATE	11/30/92	19-92
BUTTE DITCH	AVE 12 Rd. 24½	PIPELINE	12/1/92	20-92

DRY CREEK. M 2 D. & MCFCA.	Rd 17½ - Rd 16	Channel Clearance	12/21/92	22-92
Hospital Lateral	TO DESMOND DITCH.	P.L.	1/2/93	1-93
Madera Irrigation Dist.	Main No. 2 (LEE Simpson)	Rd 28 M.B	1/5/93	2-93
Madera Rancho's	Lat 6.2	Install C.M.P w/gate	1/15/93	3-93
* Flood Damage repairs			1/14/93	4-93
Roger Galleano	Hughes Ditch	repair P.L	3/15/93	5-93
Jerry Venturi	Stockton Ditch -	Remove T.O. 1	3/18/93	6-93
Alan Cosyns.	Lat. 24.2-17.0	T.O & M.B	3/19/93	7-93
M 2 D.	Madera Lake Rodent Control		3/24/93	8-93
Insurance ?	Ripperdon DITCH.	accident on Structure	3/31/93	9-93
Morgan Johnson	Cottonwood Creek	ave 9½ & Rd 22½	4/14/93	10-93
City of Madera	China Garden	Park	5/3/93	11-93
Madera Irrig. DIST.	6.2-18.4	Ave 7 (Manuel Delgado)	5/4/93	12-93
Madera Irrig. DIST	Ripperdon	ave 8½ (David Chavez)	5/4/93	13-93
Jerry Houlding	Hospital Lat.	Ave 13	5/11/93	14-93
~~Hildreth~~	~~Cat walk~~	~~@ head~~	~~7/13/93~~	~~15-93~~
Cal Trans	Hwy 41		8/9/93	15-93
Madera, Irrig. DIST.	Cottonwood Ck. Lat. 5.0	(E. Bursey	8/16/93	16-93
Madera, Irrig. Dist.	Hughes	check structure (Vic. Prosperi	8/19/93	17-93
Dave Davis	6.2-14.5-.01	repair Vent	8/24/93	18-93
Madera Irrig. Dist.	Dry Creek	Channel Clearance	9/8/93	19-93
[illegible]	[illegible]		[illegible]	[illegible]

9.3.69

	Creek Flood Repair - Rd 24 - Ave 10½ (Loera/Miller)		11-9-93	22-93
	Improvement Ditch Lateral	- TO MB.	12-7-93	23-93
LEARING	DRY CREEK		12-14-93	24-93
	Lat 24.2 - 21.1W	M.B.		25-93
	Colony Extension	Line Repair		26-93
	Main No 1	Fence Gates @ Lilly		27-93
	Colony Extension	Meter Box		28-93
	LAKE MADERA	FENCE		1-94
	Survey Posts @ Reservoir.			2-94
)	Dixieland Ditch	MB		3-94
	18.4	T.O. & MB		4-94
	Mordecai	T.O. & MB		5-94
	Kilday	Rd Xing @ Parks Dairy		6-94-4
	HUGHES #10	Hubend Gates		7-94-2
cher	Dixieland #78 & 60	MB & X CONNECT		8-94-2
	Hargrove Ditch	Rd XING		9-94-2
	Cody Lateral	Riser & 14" Valve		10-94-4
	Hargrove #5	INSTALL MB. Correct Metering Prob.		11-94-5
	Jensen-Schroder #4	INSTALL MB Replace gate		12-94-5
	" "	Pressure gate		13-94 4
MID	Damage to well,	Air conditioner		14-94-4
	LAT 6.2	Repair Break		15-94-5
3	MAIN 1 - 3.0.	Remove Meter Box (Chatoian)		16-94-4

Madera Water Dist.	Dry Creek	Rd Gates	17-94-2
PG&E	15.9 Spill	Repair Damage	18-94-4
MID	6.2	Automation	19-94-5
MID	Tire Disposal	Various	20-94-5
MID	Replace Hughes X Ing	Rd 24½ Ave 11-11½	21-94-1
Channel Clearing	Berenda Creek		22-94-2
Pipe line Repair	6.2 #1-7	Replace Line	23-94-1
Julio Pistoresi	9.9W #5	Repair pipline	24-94-4
Ken Headrick	Improvement Ditch LAT.	T.O. & MB.	25-94-2
COUNTY OF MADERA	MID YARD	Relocate facilities for Ave 12 WIDENING	26-94-4
DAVE BERRY	LAT 24.2	Remove Illegal Drain North of Lincoln school	27-94-4
MID	PAD FOR NEW FUEL TANK AND EXCESSARIES		1-95-3
MID	Flood CONTROL	DEBRIS REMOVAL	2-95-1
MID	FLOOD DAMAGE	DITCH REPAIRS	3-95-1
MID	Graffiti		4-95-5
MADERA COUNTY	Rd XINGS, Rd 24, 24½ 25, 26 & 26½	AVE 12 WIDENING	5-95-
Improvement Dist 4	LAT 32.2	T.O & MB	6-95-4
MID / CITY	MAIN No 1	Pipeline - Lake to Lilly	7-95-2
MID	Flood (Mar)		8-95-1
Logoluso farms	16.9	Repair Damage	9-95-4
Water Conservation Plan	M.I.D.	Costs	10-95-5
ISLAND TRACT PUMP PLANT MAR. 95 FLOOD DAMAGE		REPAIR RIVER CHANNEL	11-95-4

...ms.	LAT 32.2 T.O.	Install Meter.	12-95-4
	BIG CREEK FLOOD REPAIR		13-95-1
	Channel Clearing Willow Creek		14-95-1
	Cottonwood Creek	TO & MB	15-95-4
	Dry Creek	T.O. & Gate	16-95-4
...ing	Cottonwood Creek		17-95-2
...ID	Deberm Pond @ Town & County Park		18-95-4
	Franchi Weir	Flood Damage Repair	19-95-4
	LAT 32.2 Spill to Berenda Creek		1-96-3 ~~2-96~~
	LAT 9.2 Spill to LAT 6.2 @ 15.9		2-96-3
	WATER CONSERVATION PLAN COSTS		3-96-5
	Valley Engineers.	Techite Pipe	4-96-5
	Cottonwood Creek Lat #1 Repair		5-96-4
	LAT 18.4 T.O & MB.		6-96-2
...	MID / STATE / CITY.		7-96-5
	Rd XING Millview		8-96-2
	Fresno River Riparian		9-96-5
	MADERA CANAL SCADA		10-96-5
	Kelly. Reinstall gate & MB Dry Creek Lat T.O. 2		11-96-5
	LEACH - BERENDA DRAIN TO# 3A		12-96-2
	CWD PIPE		13-96-4
Tune	Complete Service Installation		14-96-2

MID	Lat 24.2-13.2	Deniz Repair	15-96-4
MID	Lat 24.2-19.6	Cosyns MB	16-96-3
Reisz	32.2-13.2 TO.17	Reset MB	17-96-4
TAMURA	Kenney Ditch	T.O. 6 New MB	18-96-4
Kent & Sons	Airport Drain	Rd 23. Ave 16	19-96-4

MID (FEMA)	Airport Ditch	Flood Repair	1-97-1
MID FEMA	Main No Rd 23	Flood Repair	2-97-1
	Sec 8 Ave 10	Flood Repair	3-97-1
	Dry AICO	Flood Repair	4-97-1
	Gravelly Ford	Sell & Deliver Pipe	5-97-4
S. Thomas	Cottonwood Creek - Flood Repair,		6-97-1
Arkay	Cottonwood Creek.	FLOOD REPAIR	7-97-1
	Improvement	Flood Repair	8-97-1
MID FEMA	Flood Control. Trash	Everywhere	9-97-1
Jerkovuk	Cottonwood Creek	Flood Repair	10-97-1
MID FEMA	Butin	Flood Repair	11-97-1
MID FEMA	Dry Creek (Lasgoity) East Rd 16	Flood Repair	12-97-1
MID FEMA	Dry Creek (Deniz) East Rd 19	Flood Repair	13-97-1
MID FEMA	Dry Creek (Pistoresi) East Rd 21	Flood Repair	14-97-1
MID FEMA	Berenda Creek (Sam Sherman) N. Ave 18	Flood Repair	15-97-1
MID ?	Fresno River (Deniz) Rd 21½	Flood Repair	16-97-1
MID FEMA	Berenda Creek (Teach Fuller) Ave 17½	Flood Repair	17-97-1
MID FEMA	Berenda Creek (Streck) Rd 16	Flood Repair	18-97-1

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