



Ventura County
Watershed Protection District

Ventura River Levee (VR-1)

Ventura County, California

Preliminary Economic Analysis Report

March 2015



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Irvine, California 92614

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Prepared for:

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Prepared by:

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1. INTRODUCTION

The Ventura River Levee System (VR-1) is located in the City of San Buenaventura, Ventura County, California. The levee was designed and constructed by the U.S. Army Corps of Engineers (USACE) in 1948, and is currently maintained by Ventura County Watershed Protection District (VCWPD). The system protects a large area of residential, commercial, industrial and public facilities. Recent field investigations, along with hydrology and hydraulic analyses, have found several critical issues that have led to FEMA listing the status of the levee system as to be de-accredited. These critical issues also increase the risk of flooding that would cause significant economic impacts in the local economy as well as to the region as a whole.

This report documents the methods, assumptions and conclusions for a benefit-cost ratio that has been estimated for the Ventura River Levee System (VR-1) to support the proposed construction for rehabilitating the levee system. This analysis is being completed in order to incorporate the findings into the grant application for the California Department of Water Resources, Local Levee Assistance Program.

1.1 Project Scope

This economic analysis was designed to use FEMA's HAZUS-MH programming to generate all inputs and outputs for this study. This study is considered a Level 1 analysis by FEMA, which is defined as utilizing all the software's internal data to estimate flood damages. As described by FEMA, results from Level 1 studies are intended to "be appropriate as initial loss estimates to determine where detailed analyses are warranted."

1.2 Methodology

The following is a discussion of the steps and procedures completed for the economic analysis of the flood damages utilizing FEMA's HAZUS-MH programming.

- Define the study region.
- Define the flood hazard.
- Incorporate topography files.
- Generate the stream network and define reaches.
- Run the hydrologic analysis.
- Delineate the floodplains.
- Run the damage models for the five analysis periods (10-, 25-, 50-, 100-, and 500-year events) for the without project condition (existing levee).

The above steps were completed entirely within the HAZUS-MH program, the remaining steps of the analysis utilized the outputs from the HAZUS models, but were completed using spreadsheets to calculate expected annual damages (EAD) for the with and without projects as well as the total annual project costs.

- Calculate EAD for the without project scenario based on HAZUS outputs.
- Estimate with project EAD assuming 100-year level of protection with an improved levee in place.

- Calculate annualized project costs.
- Calculate a Benefit-Cost Ratio from the items above.

1.3 General Assumptions

All the results and information in this analysis are based on the following general project assumptions:

- Federal interest rate of 3.375%
- Assumes 50-year period of analysis.

2. HAZUS-MH FLOOD DAMAGE MODEL

2.1 Study Area

The HAZUS-MH program requires the delineation of a study area for estimation of demographic and structure inventories values. For this analysis, the USACE Levee Protected Area was utilized to determine which census blocks are in the floodplain. Figure 1 shows the protected area used, as well as the census blocks that intersect this area.

In total there are 151 census blocks that intersect the protected area. The census block files contain 2010 census data for population and structure estimates. Within these census blocks the estimated population is 14,109 living within an estimated 4,679 individual households. The total structure inventory counts and values for each structure category from the FEMA Census data are provided in Table 1.

Table 1 – Structure Counts and Values in Study Area

Structure Category	Structure Count	Structure Value	Content Value	Total Value
Residential	3,399	\$860,000	\$430,000	\$1,290,000
Commercial	101	\$283,000	\$292,000	\$575,000
Industrial	19	\$105,000	\$76,000	\$181,000
Public	5	\$28,000	\$83,000	\$111,000
Total	3,524	\$1,276,000	\$881,000	\$2,157,000
Note: All values are in \$1,000's				

2.2 Topography

The HAZUS program has a built in tool that directs the user to the U.S. Geologic Survey (USGS) web page to directly download the Digital Elevation Model (DEM) for the predetermined study area extent. The DEMs provided by the USGS are taken from the National Elevation Dataset (NED), which is a standardized dataset with consistent datum, elevation units and projections across the county. This tool was used to download and input the DEM file from the USGS web page for this specific study region.

2.3 Floodplain Modeling

After providing the DEM for the study region, HAZUS is capable of developing a stream network for the study area. From this stream network, the local channel, in this case the Ventura River, can be selected for use in the hydrologic modeling.

After selecting the location of the stream to be analyzed, the hydrologic modeling can be run. HAZUS has built in information that the program utilizes to develop the information for the inundation areas. The program typically models five flood events that include the 10-, 25-, 50-, 100-, and 500-year flood events. Figure 2 shows the resulting floodplain inundation areas for each of these five events.

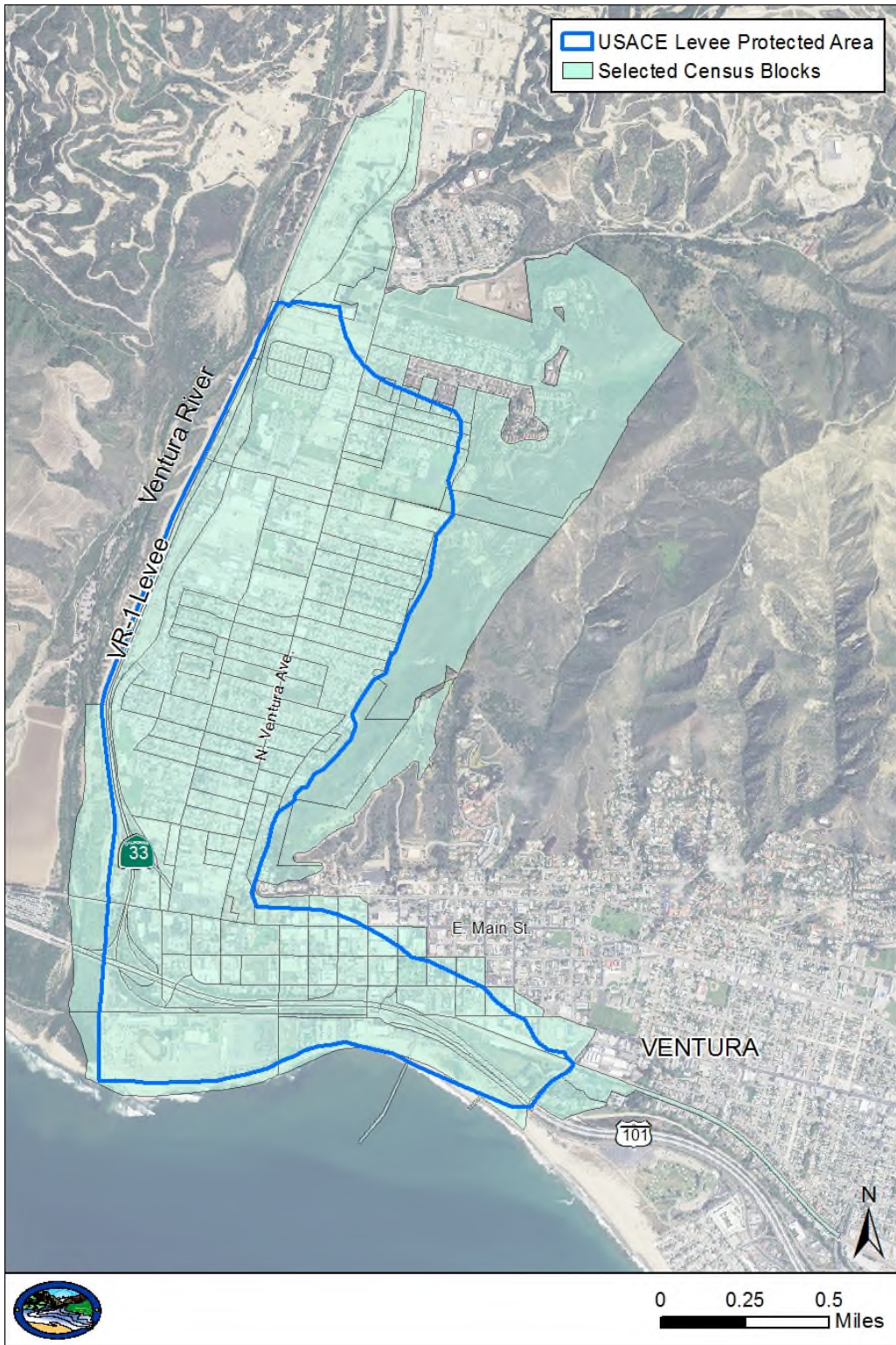


Figure 1 – VR-1 Protected Area and Census Blocks

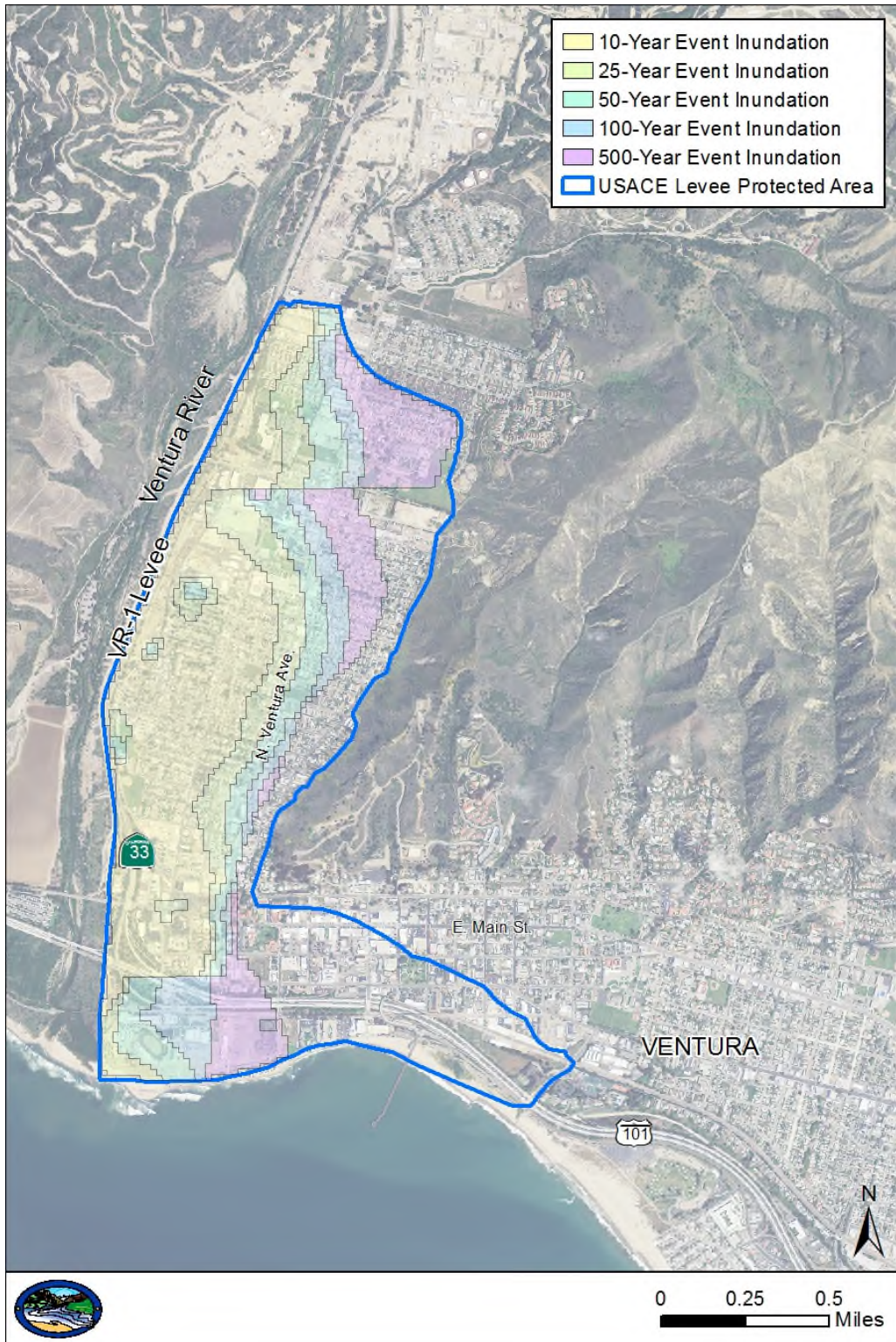


Figure 2 – VR-1 HAZUS Modeled Flood Events

2.4 Estimated Damages

Estimated flood damages are calculated after the flood depths have been developed. HAZUS has various categories that can be used to estimate damages. However, for this analysis only structures and content damages have been calculated for use in the benefit-cost analysis. The estimated damages for each of the flood events modeled, and for each damage category are provided in Table 2.

Table 2 – Estimated Damages in the Study Area

Flood Event	Structure Damages	Content Damages	Total Damages
10-year	\$9,630	\$11,745	\$21,375
25-year	\$18,546	\$23,997	\$42,543
50-year	\$28,998	\$37,496	\$66,494
100-year	\$40,247	\$60,630	\$90,777
500-year	\$73,753	\$86,278	\$160,031
Note: All values are in \$1,000's			

3. BENEFIT COST RATIO CALCULATION

3.1 Project Benefits

For this analysis, the benefits to the project have been estimated as the Present Value of Future Benefits (PVFB), which is derived from the expected annual damages (EAD) of the without project minus the EAD from the with project.

HAZUS does not provide PVFB calculations internally. Instead, the without project EAD is calculated externally utilizing a simplified EAD calculation table, provided by DWR for previous grant work, along with the total damages referenced in the discussions above.

In order to estimate the with project EAD, the analysis assumes that with construction complete the levee would contain all flows up to the 100-year event. Therefore calculation of the with project EAD only assumes damages occurring after the 100-year event. The estimated EAD for both the with and without project conditions are provided in Attachment 1.

To calculate the total PVFB the current discount rate of 3.375% and the project life span must be incorporated. The project life span is currently assumed to be 50-years. Table 3 shows the calculation of the PVFB for the upstream reach which utilizes the EAD from the without project condition and the EAD from the with project condition to generate one PVFB for the project.

Table 3 – Present Value of Future Benefits Calculation

Present Value of Expected Annual Damage Benefits			
(a)	Expected Annual Damage Without Project		\$4,797,497
(b)	Expected Annual Damage With Project		\$640,124
(c)	Expected Annual Benefit	(a) – (b)	\$4,157,373
(d)	Present Value Coefficient		23.99
(e)	Present Value of Future Benefits	(c) x (d)	\$99,751,595

3.2 Project Costs

The construction costs for this project have been taken from the *Ventura River Levee Evaluation and Rehabilitation,zz Alternatives Report (2012)*. This report provided the recommendation of pursuing one of the alternatives analyzed. From this recommendation, the total costs for Alternative 1 have been used to estimate the annualized costs. Attachment 2 contains the spreadsheet cost estimate for the proposed construction activities.

Annual O&M costs were taken from a detailed O&M report compiled by the County, that contains the amount spent by the county per year from 1998 to 2015. The average cost spent on O&M over the seventeen years from 1998 to 2014 has been used as the annual O&M costs for this study. Attachment 2 also contains the yearly O&M cost table provided by the County.

The total project implementation costs and annual operations & maintenance costs have been annualized over the 50-year project life to develop the total present value of discounted costs (PVDC). Table 4 shows the total costs used to develop the PVDC, and Attachment 3 shows the PVDC calculation table.

Table 4 – Project Costs

Total Project Costs	Annual O&M Costs	PVDC
\$25,593,400	\$34,542	\$25,507,491

3.3 Benefit Cost Ratio

The previously referenced benefits and costs have been used to generate the benefit to cost ratio. Table 5 provides the calculated benefit cost ratio for this project. This ratio is calculated by dividing the PVFB by the PVDC. The current ratio, as shown in Table 5, is 3.91.

Table 5 – Benefit-Cost Ratio

PVFB	PVDC	Benefit-Cost Ratio
\$99,751,595	\$25,507,491	3.91

3.4 Benefit Cost Results

The benefit cost ratio for this project is greater than 1.0. This means that the proposed plan, as currently designed, would provide greater added benefit to the protected area than the alternative would in turn cost to be constructed. This ratio is based currently based on the best information available at this time, and is likely to change as the project progresses and more detailed technical data becomes available.

ATTACHMENT 1

Estimated Expected Annual Damage Calculations

VR-1 - EXPECTED ANNUAL DAMAGE CALCULATIONS

WITHOUT PROJECT CONDITIONS							
Hydrologic Event	Event Exceedance Probability	Event Damage if Flood Structures Fail	Total Probability Structural Failure	Expected Event Damage	Interval Probability	Average Damage in Interval	Average Damage in Interval times Interval Probability
			Without Project	Without Project		Without Project	Without Project
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
				(c) x (d)	from (b)	from (e)	(f) x (g)
10-Year	0.1	\$21,375,000	1.000	\$21,375,000	-	-	-
25-Year	0.04	\$42,543,000	1.000	\$42,543,000	0.06	\$31,959,000	\$1,917,540
50-year	0.02	\$66,494,000	1.000	\$66,494,000	0.02	\$54,518,500	\$1,090,370
100-year	0.01	\$90,777,000	1.000	\$90,777,000	0.01	\$78,635,500	\$786,355
500-year	0.002	\$160,031,000	1.000	\$160,031,000	0.008	\$125,404,000	\$1,003,232
Expected Annual Damages:							\$4,797,497

Note: All dollar values are in \$1,000's.

WITH PROJECT CONDITIONS							
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	Without Project		Without Project	Without Project
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
				(c) x (d)	from (b)	from (e)	(f) x (g)
10-Year	0.1	\$21,375,000	0.000	\$0	-	-	-
25-Year	0.04	\$42,543,000	0.000	\$0	0.06	\$0	\$0
50-year	0.02	\$66,494,000	0.000	\$0	0.02	\$0	\$0
100-year	0.01	\$90,777,000	0.000	\$0	0.01	\$0	\$0
500-year	0.002	\$160,031,000	1.000	\$160,031,000	0.008	\$80,015,500	\$640,124
Expected Annual Damages:							\$640,124

Note: All dollar values are in \$1,000's.

ATTACHMENT 2

Preferred Alternative Cost Estimate and Yearly O&M Costs

COST ESTIMATE

Project ID: **T 27654**
 Project Title: **VR-1 Eval and Rehab**
 Date: **3/6/12**

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Alternative 1 - Grouted Riprap Protection with Toedown

	Contract Items	Unit	Quantity	Unit Cost	Total Cost
1	Mobilization	LS	1	\$ 760,000	\$760,000
2	Clearing and Grubbing	Acre	22.86	\$ 4,000	\$91,440
3	Riprap Protection w/ Toedown - (Sta.56+00 to 133+00)	LF	7,700	\$ 1,808.73	\$13,927,240
3.1	<i>Grouted Riprap</i>	<i>CY</i>	<i>30,216</i>	<i>\$ 135</i>	<i>\$4,079,160</i>
3.2	<i>Excavation</i>	<i>CY</i>	<i>630,613</i>	<i>\$ 8</i>	<i>\$5,044,904</i>
3.3	<i>Compacted Backfill</i>	<i>CY</i>	<i>600,397</i>	<i>\$ 8</i>	<i>\$4,803,176</i>
4	Removal of Unpermitted Encroachment	LS	1	\$ 20,000	\$ 20,000
5	Sediment Removal	SY	4,600	\$ 3	\$13,800
6	Vegetation Removal	LS	1	\$ 200,000	\$ 200,000
7	Restoration of Displaced Existing Riprap	CY	1,570	\$ 80	\$125,600
8	Floodwall - Ventura River (including removal of ex. Conc. Curb)	LF	561.5	\$ 520	\$291,980
9	Floodwall - Canada de San Joaquin	LF	285.0	\$ 480	\$136,800
10	Restoration of Existing Storm Drain System	LS	1	\$ 39,000	\$39,000
11	Animal Burrow Removal	LS	1	\$ 10,000	\$10,000
12	Levee Embankment Surface Erosion Repair	SY	270	\$ 7.50	\$2,025
13	Removal of Incised Channel near Riverside Toe	LF	850	\$ 30	\$25,500
14	Regrading of Existing Access Ramps	EA	3	\$ 5,000	\$15,000
15	Stop-log Structure Replacement	EA	1	\$ 75,000	\$75,000
16	Repair of Levee Embankment to As-built Condition (including removal of ex. Retaining wall)	LF	310	\$ 140	\$43,400
17	Permit Application for Unpermitted Ex. Features	LS	1	\$ 100,000	\$100,000.00
				Subtotal:	\$15,876,785
				Planning, Engineering, and Design (@ 12%)	\$1,905,214
				Construction Management (@ 12%)	\$1,905,214
				Subtotal:	\$19,687,213
				Contingencies (@ 30%)	\$5,906,164
				Subtotal:	\$25,593,377
				Grand Total:	\$25,593,400

VENTURA RIVER LEVEE (VR-1)
SUMMARY OF ROUTINE OPERATIONS AND MAINTENANCE COSTS
BY ACTIVITY CODE AND YEAR
(January, 1998 to February, 2015)

CODE	ACTIVITY	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	TOTAL
PT92	WORK RELEASE	\$0.00	\$404.10	\$0.00	\$0.00	\$918.10	\$250.38	\$76.24	\$499.58	\$0.00	\$7,968.04	\$5,816.31	\$16,147.62	\$1,110.20	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$33,190.57
PT26	IMPVD CHNL CLNT, TRSH & GRW/CR	\$0.00	\$1,411.53	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$1,411.53
PT43	WEED CONTROL, HAND CREW	\$3,870.59	\$4,666.50	\$0.00	\$2,849.72	\$2,130.52	\$5,082.66	\$2,768.38	\$350.04	\$2,814.15	\$1,579.53	\$1,291.03	\$9,579.17	\$13,821.89	\$6,249.59	\$0.00	\$0.00	\$0.00	\$0.00	\$57,053.77
PT48	WEED CONTROL, FIRE ABATEMENT	\$0.00	\$0.00	\$0.00	\$0.00	\$507.20	\$0.00	\$0.00	\$705.28	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$2,307.90	\$0.00	\$0.00	\$0.00	\$3,520.38
PT41	BRSH & WED CNTRL, SPRY W/BOOM	\$4,373.28	\$6,045.74	\$10,367.57	\$12,259.14	\$6,159.66	\$7,417.62	\$5,481.95	\$7,502.53	\$6,113.18	\$7,660.21	\$7,229.80	\$3,396.50	\$8,061.77	\$4,499.53	\$4,662.28	\$4,227.87	\$4,260.33	\$1,281.09	\$111,000.05
PT42	WEED CONTROL, HAND SPRAY	\$177.86	\$1,437.39	\$1,562.99	\$562.81	\$1,692.51	\$1,087.24	\$1,726.95	\$2,178.63	\$481.12	\$1,459.89	\$1,194.93	\$2,507.41	\$4,198.68	\$3,201.37	\$7,875.07	\$9,300.29	\$5,998.43	\$343.67	\$46,987.24
PS41	BRSH & WED CNTRL, SPRY W/BOOM	\$0.00	\$4,405.00	\$770.64	\$1,519.32	\$3,584.92	\$4,879.57	\$741.13	\$0.00	\$0.00	\$0.00	\$1,462.33	\$1,445.55	\$946.07	\$1,786.26	\$2,433.90	\$0.00	\$0.00	\$0.00	\$23,974.69
PS42	WEED CONTROL, HAND SPRAY	\$0.00	\$120.19	\$0.00	\$0.00	\$385.31	\$302.38	\$360.87	\$0.00	\$0.00	\$0.00	\$0.00	\$1,721.17	\$0.00	\$0.00	\$3,418.41	\$0.00	\$0.00	\$0.00	\$6,308.33
PT80	FLAP GATE MAINT & REPAIR	\$0.00	\$0.00	\$219.39	\$0.00	\$168.95	\$0.00	\$283.65	\$0.00	\$0.00	\$0.00	\$759.78	\$0.00	\$240.98	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$1,672.75
PT83	TRASH RACK CLEANING	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$367.23	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$367.23
PT66	PIPE/GATE CONSTRUCTN/REPAIR	\$0.00	\$710.85	\$0.00	\$252.81	\$0.00	\$640.64	\$45.67	\$0.00	\$96.80	\$0.00	\$504.84	\$629.76	\$3,132.22	\$369.82	\$475.28	\$0.00	\$0.00	\$0.00	\$6,858.69
PT57	MAINT OF MISC ACSS RD STRUCTS	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$25,226.82	\$85,519.10	\$0.00	\$0.00	\$0.00	\$0.00	\$110,745.92
PT89	MISC MAINT	\$258.48	\$2,631.92	\$370.68	\$0.00	\$1,098.15	\$0.00	\$0.00	\$3,374.65	\$0.00	\$3,739.10	\$0.00	\$2,380.49	\$9,407.57	\$3,590.16	\$24,501.88	\$1,753.49	\$0.00	\$0.00	\$53,106.57
PT21	UNIMPVD CHNL CLNOUT, SD/EXCVTR	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$1,446.74	\$0.00	\$0.00	\$0.00	\$448.44	\$8,303.05	\$0.00	\$0.00	\$6,232.72	\$0.00	\$16,430.95
PT02	FLD SUP AND FAC INSPECTION	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$63.38	\$0.00	\$0.00	\$0.00	\$1,535.82	\$0.00	\$0.00	\$535.50	\$0.00	\$0.00	\$0.00	\$2,134.70
PT44	CHANNEL ACTIVITIES, MECHANICAL	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$1,423.35	\$0.00	\$0.00	\$1,838.20	\$0.00	\$0.00	\$0.00	\$0.00	\$3,261.55
PT20	UNIMPVD CHNL CLNOUT, SDMT/CRN	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$8,133.35	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$8,133.35
PT32	EARTHWORK, BY HAND	\$0.00	\$0.00	\$1,611.24	\$0.00	\$0.00	\$0.00	\$302.60	\$0.00	\$0.00	\$0.00	\$0.00	\$3,733.05	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$5,646.89
PT34	EARTHWORK, MECHANICAL	\$0.00	\$4,074.86	\$0.00	\$1,135.50	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$5,210.36
PT60	FENCE REPAIR	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$3,068.70	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$3,068.70
PT61	MISC FENCE MAINTENANCE	\$276.96	\$0.00	\$629.82	\$161.56	\$0.00	\$0.00	\$0.00	\$0.00	\$237.20	\$0.00	\$276.52	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$1,582.06
PT62	FENCE CONSTRUCTION	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$1,213.05	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$1,213.05
PT65	GATE CONSTRUCTION CHAINLINK	\$0.00	\$0.00	\$359.72	\$0.00	\$0.00	\$0.00	\$324.16	\$265.45	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$949.33
PT66	PIPE/GATE CONSTRUCTN/REPAIR	\$0.00	\$710.85	\$0.00	\$252.81	\$0.00	\$640.64	\$45.67	\$0.00	\$96.80	\$0.00	\$504.84	\$629.76	\$3,132.22	\$369.82	\$475.28	\$0.00	\$0.00	\$0.00	\$6,858.69
PT53	REBASING & SHAPING OF ACSS RDS	\$0.00	\$8,069.14	\$0.00	\$0.00	\$25,847.24	\$0.00	\$0.00	\$808.88	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$34,725.26
PT55	ROUTINE GRADING OF ACCSS ROADS	\$0.00	\$721.85	\$0.00	\$0.00	\$2,364.50	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$8,116.24	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$11,202.59
PT56	GRADER OPS ON ACCESS ROADS	\$0.00	\$527.58	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$2,476.22	\$0.00	\$0.00	\$0.00	\$0.00	\$6,924.31	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$9,928.11
PT58	MAINT ACCESS DITCH ROAD	\$0.00	\$6,993.81	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$6,993.81
PT38	BLEEDER PIPE MAINT & REPAIR	\$0.00	\$161.18	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$161.18
PT54	PRE-EMERG. HAND SPRAY	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$233.53	\$0.00	\$233.53
PT32	EARTHWORK, BY HAND	\$0.00	\$0.00	\$1,611.24	\$0.00	\$0.00	\$0.00	\$302.60	\$0.00	\$0.00	\$0.00	\$0.00	\$3,733.05	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$5,646.89
PT69	GRAFFITI REMOVAL STAFF	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$203.04	\$0.00	\$0.00	\$203.04
PT64	GATE REPAIR/CHAINLINK	\$0.00	\$0.00	\$189.21	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$189.21
PT87	CONTRACT O&M WORK	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$2,936.25	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$2,936.25
PT90	STORM PROTECTION	\$0.00	\$0.00	\$0.00	\$274.32	\$0.00	\$0.00	\$0.00	\$1,065.39	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$4,599.17	\$0.00	\$5,938.88
		\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
		\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
		\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
		\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
		\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
	Sub-Total by year	\$8,957.17	\$43,092.49	\$17,692.50	\$19,267.99	\$44,857.06	\$21,881.41	\$12,459.87	\$27,423.38	\$11,285.99	\$22,406.77	\$20,463.73	\$50,508.05	\$87,703.66	\$115,726.90	\$46,685.50	\$15,484.69	\$21,324.18	\$1,624.76	\$588,846.16

ATTACHMENT 3

Present Value of Discounted Costs (PVDC) Calculation

TOTAL PRESENT VALUE OF DISCOUNTED COSTS						
Ventura River Levee (VR-1)						
Time Frame		Total Project Implementation Costs	Operations and Maintenance		Discounting Calculations	
Year	No.		(a)	(b)	Total Costs (a) + (b)	Discount Factor
		(a)	(b)	(c)	(d)	(e)
2015				0	1.000	0
2016	1	25,593,400		25,593,400	0.966	24,729,623
2017	2		34,542	34,542	0.934	32,250
2018	3		34,542	34,542	0.902	31,161
2019	4		34,542	34,542	0.872	30,110
2020	5		34,542	34,542	0.842	29,093
2021	6		34,542	34,542	0.814	28,112
2022	7		34,542	34,542	0.786	27,163
2023	8		34,542	34,542	0.760	26,246
2024	9		34,542	34,542	0.734	25,360
2025	10		34,542	34,542	0.709	24,504
2026	11		34,542	34,542	0.685	23,677
2027	12		34,542	34,542	0.662	22,878
2028	13		34,542	34,542	0.640	22,106
2029	14		34,542	34,542	0.618	21,360
2030	15		34,542	34,542	0.598	20,639
2031	16		34,542	34,542	0.577	19,942
2032	17		34,542	34,542	0.558	19,269
2033	18		34,542	34,542	0.539	18,619
2034	19		34,542	34,542	0.521	17,991
2035	20		34,542	34,542	0.503	17,384
2036	21		34,542	34,542	0.486	16,797
2037	22		34,542	34,542	0.470	16,230
2038	23		34,542	34,542	0.454	15,682
2039	24		34,542	34,542	0.439	15,153
2040	25		34,542	34,542	0.424	14,641
2041	26		34,542	34,542	0.410	14,147
2042	27		34,542	34,542	0.396	13,670
2043	28		34,542	34,542	0.382	13,209
2044	29		34,542	34,542	0.369	12,763
2045	30		34,542	34,542	0.357	12,332
2046	31		34,542	34,542	0.345	11,916
2047	32		34,542	34,542	0.333	11,514
2048	33		34,542	34,542	0.322	11,125
2049	34		34,542	34,542	0.311	10,750
2050	35		34,542	34,542	0.301	10,387
2051	36		34,542	34,542	0.291	10,036
2052	37		34,542	34,542	0.281	9,697
2053	38		34,542	34,542	0.271	9,370
2054	39		34,542	34,542	0.262	9,054
2055	40		34,542	34,542	0.253	8,748
2056	41		34,542	34,542	0.245	8,453
2057	42		34,542	34,542	0.236	8,168
2058	43		34,542	34,542	0.228	7,892
2059	44		34,542	34,542	0.221	7,626
2060	45		34,542	34,542	0.213	7,368
2061	46		34,542	34,542	0.206	7,120
2062	47		34,542	34,542	0.199	6,879
2063	48		34,542	34,542	0.192	6,647
2064	49		34,542	34,542	0.186	6,423
2065	50		34,542	34,542	0.180	6,206
Total Present Value of Discounted Costs (Sum of Column (e))						25,507,491
Comments:						