

**Meeting of the Central Valley Flood Protection Board
September 26, 2014
Staff Report – 33 U.S.C., Section 408 Request
to the U.S. Army Corps of Engineers, Sacramento District
On behalf of Reclamation District 17
Phase III Levee Seepage Repair Project, San Joaquin County**

1.0 – REQUESTED ITEM

Consider approval to send a letter (Attachment A) to the U.S. Army Corps of Engineers (USACE), Sacramento District requesting permission to alter a portion of the Lower San Joaquin River and Tributaries Project (LSRTP) based on Application No. 18980 and pursuant to 33 U.S.C., Section 408.

The letter states that based on the information the Central Valley Flood Protection Board (Board) has received and reviewed to date, that "...the Board supports the proposed RD 17 Phase III Levee Seepage Repair Project and believes the project will not be injurious to the public interest, and will not impair the usefulness of the LSRTP." The letter also states that, "If, upon completion of the proposed project, the USACE formally incorporates the RD 17 levee repair project into the LSRTP, the State of California, acting through the Board, will accept the altered project for operation and maintenance and will hold and save the United States free from damage due to the constructed works."

This is not a flood system improvement project hearing, and no construction permit is being considered for issuance at this time. Board staff is requesting that the attached draft letter be finalized and sent to USACE Sacramento District to initiate the 33 USC Section 408 review process for the proposed repair project.

2.0 – APPLICANT

Reclamation District 17 (RD 17)

3.0 – PROJECT LOCATION

The project is part of RD 17 levee system that is bordered by the south bank of French Camp Slough, the east bank of the San Joaquin River, the north bank of the Weatherbee Lake area, and extends overland east of Weatherbee Lake. The levee

system is continuous, extending approximately 19 miles (see Attachment B_Project Maps).

4.0 – PROJECT DESCRIPTION

The project proposes to implement under-seepage, through-seepage and levee geometry repair/remediation to approximately 5.2 miles of Project levee along the east (right) bank of the San Joaquin River and north bank of Walthall Slough. The project consists primarily of in-place repair/remediation of the existing levees and construction of one setback levee as follows (see Attachment C):

- Seepage Berm = 2,665 feet
- Under-seepage Cutoff Wall = 17,370 feet
- Through-seepage Chimney Drain= 5,400 feet
- Setback Levee = 2,350 feet (Attachment E)

The project does not include any raises to the existing levee. Construction is proposed to begin in 2015 and is expected to be completed in 2016.

5.0 – AUTHORITY OF THE BOARD

- California Code of Regulations, Title 23 (CCR 23), § 6, Need for a Permit
- CCR 23, § 106, Existing Encroachments within an Adopted Plan of Flood Control
- CCR 23, § 116, Borrow and Excavation Activities – Land and Channel
- CCR 23, § 120, Levees
- CCR 23, § 121, Erosion Control
- CCR 23, § 123, Pipelines, Conduits and Utility Lines
- CCR 23, § 124, Abandonment of Pipelines
- CCR 23, § 130, Patrol roads and Access Ramps
- CCR 23, § 131, Vegetation
- Rivers and Harbors Act of 1899, Title 33 United States Code, § 408, hereafter referred to as 33 USC 408

6.0 – PROJECT ANALYSIS

The overall purpose of the RD 17 Levee Seepage Repair Program (LSRP) is to implement levee improvements at various locations along the landside toe of levees to increase the resistance of RD 17's levee system to under-seepage and through-seepage, and ultimately bring the approximately 19-mile levee system into compliance with applicable Federal and State standards for the levees protecting urban areas. The RD 17 LSRP is being implemented in three phases. Phase I repairs were completed in 2009, and Phase II repairs were completed during the summer of 2010.

A summary of project background, project objectives, project design review, hydraulic review, geotechnical review, environmental review is presented below along with project benefits, consistency with the 2012 Central Valley Flood Protection Plan and Delta Plan, System Wide Improvement Framework and adjacent landowners.

6.1 – Project Background

The U.S. Congress authorized the Lower San Joaquin River and Tributaries Project (LSRTP) as part of the Flood Control Act of 1944, and the USACE subsequently commenced work to improve the RD17 levee system. Improvements were completed by the USACE in 1963.

In about 1989 the RD17 levees, including those authorized as part of the LSRTP, were improved as a part of the development of Weston Ranch in the City of Stockton in order to meet the Federal Emergency Management Agency's (FEMA) 100-year flood protection requirements for urban development (44 CFR 65.10). FEMA accredited the levee as meeting these requirements for a 100-year flood event in February 1990.

During the January 1997 floods seepage and boils occurred at numerous locations along the RD17 levees. The USACE, California Department of Water Resources (DWR), CVFPB, and RD17 successfully contained the seepage and boils and prevented the levees from failure. Subsequently after the 1997 event the USACE, CVFPB, and RD17 repaired the seepage and boil areas to pre-flood condition under the Public Law 84-99 Rehabilitation Assistance Program (PL 84-99). The project referred to as *Reconstruction of the California Central Valley Levees San Joaquin Basin #4, Reclamation District #17* consisted of installation of landside drained seepage berms. USACE performed design and construction, and in October 2004 provided an addendum to the Standard Operation and Maintenance Manual for repairs completed as of October 2001.

In 2006 FEMA began a comprehensive update to the area's Flood Insurance Rate Map (FIRM) as part of its Map Modernization Program. Due to seepage concerns FEMA denied full accreditation and instead granted provisional accredited levee (PAL) status. A PAL levee is one that FEMA has previously accredited with providing 100-year level of flood risk reduction (0.01 Annual Exceedance Probability - AEP) but for which FEMA required repairs or improvements.

In 2007, and in response to the PAL status, RD 17 initiated the LSRP and requested State funding through the DWR Early Implementation Program (EIP). In 2010, following completion of the first two phases of planned RD 17 levee improvements, FEMA re-accredited the area protected by the RD 17 levee system for protection of the 100-year flood event.

The landside drained seepage berms constructed as part of the *Reconstruction of the California Central Valley Levees San Joaquin Basin #4, Reclamation District 17* project were identified at Elements Ia, Ie, IIab, IIIb, IVc, Va, VIa, and VIa4 (see Attachment C) and are not considered functional for the Phase III LSRP seepage mitigation design. A large percentage of the existing landside seepage berm material is proposed to be removed and reconstructed as part of the Phase III LSRP improvements.

6.2 Project Objectives

RD 17's objectives for the Phase III LSRP are to (a) increase the levee's resistance to under-seepage and through-seepage; and (b) correct levee geometry where needed to meet USACE design standards.

Levee repairs for Phase III include construction of drained seepage berms, cutoff walls and setback levee to address under seepage, chimney drains and cutoff walls to address through seepage, and modification of levee slopes and crown widths where needed to meet levee design geometry standards.

6.3 – Project Design Review

Board staff has reviewed the following technical documents submitted by RD 17, in preparation of this staff report:

- Design Documentation Report
- 408 Project Summary Report (Attachment H)
- Submittal (plans, specifications, and supporting documents)
- Seepage Evaluation Reports, Reclamation District 17, Mossdale Tract, 100-year Levee Seepage Repair Project, San Joaquin County, California., 2014.
- Deterministic Hydraulic Impact Analysis for the RD 17 Early Implementation Program Level Setback Project, MBK, February 2014
- Review of KSN water surface elevation profile drawing, Memo prepared by MBK, August 29, 2014 (Attachment F)

6.4 – Hydraulic Review

Several hydraulic analyses have been performed for RD17, as part of San Joaquin River system by USACE (1955, 1979, 2002), for or by FEMA (1988, 1990, 2009) and by DWR (2002 and 2013). Attachment F presents a hydraulic memo dated August 29, 2014 prepared by MBK Engineers for RD 17 regarding the design water surface elevation (DWSE) compared with other water surface profiles. RD 17 is proposing to use the highest and most conservative water elevation as the DWSE.

This means using the 100-year DWSE prepared by Gill & Pulver consultants (1990) for FEMA certification from station 0+00 to 693+00 and the 200-year USACE Comprehensive Study DWSE (2002) from station 693+00 to 854+00. At this point in its review, Board staff has two concerns with the selected DWSE as follows: (1) the hydraulic memo (Attachment F) concluded that “the quality of the calibration of FEMA model is questionable” and (2) the apparent freeboard is less than three feet above the selected DWSE in the upstream portion of the levee system. Board staff will continue to work with the applicant to address and resolve these concerns at the current 65 percent level of design.

Hydraulic analysis of the setback levee indicates that no changes to the water surface elevation are expected (Reference: Deterministic Hydraulic Impact Analysis for the RD 17 Early Implementation Program Level Setback Project, MBK, February 2014).

6.5 – Geotechnical Review

The scope of geotechnical analyses included a steady-state seepage analysis to evaluate under-seepage, a steady-state stability analyses to evaluate landside stability, and a rapid drawdown stability analyses to evaluate waterside stability conditions.

To construct the 3h:1v waterside and landside levee slopes some corrections will be required to the existing levee geometry that may result in shifting the levee centerline up to 20 feet landward. The design details are not available in the 65 percent level of design, however a typical slope construction is presented in Attachment D. Board staff's review of the geotechnical analyses to date has concluded that the proposed project is anticipated to comply with CCR 23 standards.

6.6 – Environmental Review

RD 17 as the lead agency has prepared a Draft Environmental Impact Report /Environmental Impact Statement (DEIR/EIS) to comply with the California Environmental Quality Act (CEQA) and the National Environmental Policy Act

(NEPA). The required mandates of CEQA and NEPA will be completed prior to the Board's consideration of approval of a permit as the Non-Federal Sponsor pursuant to CCR 23 and 33 USC 408.

6.7 – Project Benefits

The proposed levee repair project for RD 17 would:

- reduce the risk of flooding due to under-seepage and through-seepage and the associated impacts to human health, safety, and welfare
- reduce the risk of levee failure due to levee instability through levee geometry corrections to meet USACE design standards
- create new sensitive species habitat in the remnant area to be established by the proposed setback levee
- improve the existing, authorized flood management infrastructure
- further protect farmland, agricultural commodities, and agricultural infrastructure for the region

The proposed seepage improvements, geometry corrections, and the setback levee will be constructed with negligible impact to San Joaquin River hydraulics.

6.8 – Consistency with CVFPP

Based on information provided by RD 17 to date, it is the Board staff's opinion that the proposed project will be consistent with implementation of the 2012 Central Valley Flood Protection Plan (CVFPP) and State System-wide Investment Approach (SSIA), as presented in Attachment G.

6.9 – Consistency with Delta Plan

The proposed levee repair project is located in the legal Delta and therefore subject to consistency with the Delta Plan. The Phase III Levee Seepage Repair Project has been determined by RD17 as a covered action in accordance with the Delta Stewardship Council's Delta Plan. The applicant plans to prepare the Certification of Consistency form upon completion of the CEQA process as per Delta Stewardship Council standard procedure.

6. 10 – System Wide Improvement Framework

The applicant is in the process of isolating the RD 17 levee segments from the upstream segments in the project levee system so that the System Wide Improvement Framework (SWIF) only applies to RD 17. The applicant completed the USACE Initial

Eligibility Inspection in August 2014 to enter the non-project, dry land levee portion of the District into the USACE Rehabilitation Program (formerly RIP) which will serve to isolate RD 17 from the upstream Districts. The applicant intends to resubmit the Letter of Intent (LOI) once the RD 17 levee segments are officially categorized into an isolated levee system.

6.11 – Adjacent Landowners

Board staff notified landowners adjacent regarding the proposed project in July 2014, and no objection or protest letters have been received to date.

7.0 – STAFF RECOMMENDATION

Staff recommends that the Board approve the attached draft letter (Attachment A) in substantially the form provided, and authorize the Executive Officer to sign and send it to the U.S. Army Corps of Engineers, Sacramento District.

8.0 – LIST OF ATTACHMENTS

- A. Draft 408 Request Letter to the USACE
- B. Project Maps
 - B1 – Location Map
 - B2 – Vicinity Map
- C. RD 17 Levee Repair Project
- D. Typical Slope Construction
- E. Levee Setback Map
- F. KSN Water Surface Elevation Profile Memo
- G. Consistency with CVFPP Goals
- H. RD 17 Project Summary Report

Technical Review:	Ali Porbaha, Senior Engineer
Document Review:	Eric Butler, PE, Planning Branch Chief
	Len Marino, PE, Chief Engineer
	Leslie Gallagher, Acting Executive Officer

Attachment A

STATE OF CALIFORNIA – CALIFORNIA NATURAL RESOURCES AGENCY

EDMUND G. BROWN JR., GOVERNOR

CENTRAL VALLEY FLOOD PROTECTION BOARD

3310 El Camino Ave., Rm. 151
SACRAMENTO, CA 95821
(916) 574-0609 FAX: (916) 574-0682
PERMITS: (916) 574-2380 FAX: (916) 574-0682



September 26, 2014

Colonel Michael Farrell, Commander
U.S. Army Corps of Engineers
Sacramento District
1325 J Street
Sacramento, California 95814

Subject: Reclamation District 17, Phase III Levee Seepage Repair Project, San Joaquin County, 33 U.S.C. Section 408 Request

Dear Colonel Farrell:

Pursuant to 33 United States Code Section 408 (33 USC 408), and based on the *Policy and Procedural Guidance for the Approval of Modification and Alteration of Corps of Engineers Projects* dated October 23, 2006, and further Clarification Guidance dated November 17, 2008, the Central Valley Flood Protection Board (Board), on behalf of Reclamation District 17 (RD 17), is requesting permission from the U.S. Army Corps of Engineers (USACE), to alter approximately 5.2 miles of State Plan of Flood Control Project levee along the east (right) bank of the San Joaquin River and north (right) bank of Walthall Slough in San Joaquin County. This request is also written to meet the intent of the July 31, 2014 USACE Engineering Circular (EC) 1165-2-216 *Policy and Procedural Guidance for Processing Requests to Alter US Army Corps of Engineers Civil Works Projects Pursuant to 33 USC 408*.

The RD 17 levee system was authorized as part of the Lower San Joaquin River and Tributaries Project (LSRTP) by Congress in the Flood Control Act of 1944, and was completed by the USACE in 1963.

During the January 1997 floods seepage and boils occurred at numerous locations along the RD17 levees. The USACE, California Department of Water Resources (DWR), CVFPB, and RD17 successfully contained the seepage and boils and prevented the levees from failure. Subsequently after the 1997 event the USACE, CVFPB, and RD17 repaired the seepage and boil areas to pre-flood condition under the Public Law 84-99 Rehabilitation Assistance Program (PL 84-99). The project referred to as *Reconstruction of the California Central Valley Levees San Joaquin Basin #4, Reclamation District #17* consisted of installation of landside drained seepage berms. USACE performed design and construction, and in October 2004 provided an addendum to the Standard Operation and Maintenance Manual for repairs completed as of October 2001.

Attachment A

Colonel Michael Farrell, Commander

September 26, 2014

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The proposed repair project consists primarily of in place repair/remediation of the existing levees and construction of one 2,350 foot long setback levee; 2,665 feet of seepage berm, 17,370 feet of under-seepage cutoff wall, and 5,400 feet of through-seepage chimney drain. Levee slopes and crown widths will also be modified where needed to meet levee design geometry standards. The project does not include any raises to the existing levee. Construction is proposed to begin in 2015 and is expected to be completed in 2016.

The Board has reviewed documents submitted by RD 17 including the Design Documentation Report, specifications, plans and drawings, seepage evaluation reports, and hydraulic memo. These documents reflect a sixty five (65) percent level of design and indicate that the proposed repairs would reduce the risk of flooding due to under- and through-seepage and the associated impacts to human health, safety, and welfare; reduce the risk of levee failure due to levee instability through levee geometry corrections to meet USACE design standards; create new sensitive species habitat in the remnant area to be established by the proposed setback levee; improve the existing, authorized flood management infrastructure; and further protect farmland, agricultural commodities, and agricultural infrastructure for the region. The proposed seepage improvements, geometry corrections, and setback levee will be constructed with negligible impact to San Joaquin River hydraulics.

Based on information provided by RD 17 to date, and based on Board staff's opinion that the proposed project will be consistent with implementation of the 2012 Central Valley Flood Protection Plan (CVFPP), the Board supports the proposed RD 17 Phase III Levee Seepage Repair Project and believes the project will not be injurious to the public interest, and will not impair the usefulness of the LS RTP. Supplemental information in the form of a Project Summary Report as required by the October 26, 2006 and November 17, 2008 policies and procedural guidance is enclosed as part of this request.

In accordance with the requirements ii, iii, and iv stated in the July 31, 2014 USACE Engineering Circular 1165-2-216 (see page 9), the applicant has provided the following statements:

- (a) Item ii: To implement the RD17 Phase III Levee Seepage Repair Project, RD17 requested authorization from the U.S. Army Corps of Engineers Regulatory Division under Section 404 of the Clean Water act for the placement of fill in jurisdictional waters of the United States through an official application package submitted on May 27, 2014.
- (b) Item iii: RD17 plans to seek crediting under Section 221 of the Flood Control Act of 1970, and if necessary approval under Section 204(f) of WRDA 19.
- (c) Item iv: RD17 Phase III Levee Seepage Repair Project does not impact any federally owned land and there is no federally owned land within the boundaries of the project. There will be construction on non-federally sponsored land as levee seepage repairs will be conducted on existing easements of the Sacramento-San Joaquin Drainage District (SSJDD) and these easements will be expanded to take into account the expanded footprint of the repaired levee sections.

Attachment A

Colonel Michael Farrell, Commander

September 26, 2014

Page 3

If, upon completion of the proposed project, the USACE formally incorporates the RD 17 levee repair project into the LS RTP, the State of California, acting through the Board, will accept the altered project for operation and maintenance and will hold and save the United States free from damage due to the constructed works.

If you have any questions regarding this request, please contact me at (916) 574-0609, or your staff may contact Mr. Ali Porbaha, Senior Engineer, Planning Branch at (916) 574-2378 or by email at mohammad.porbaha@water.ca.gov.

Sincerely,

Leslie Gallagher
Acting Executive Officer

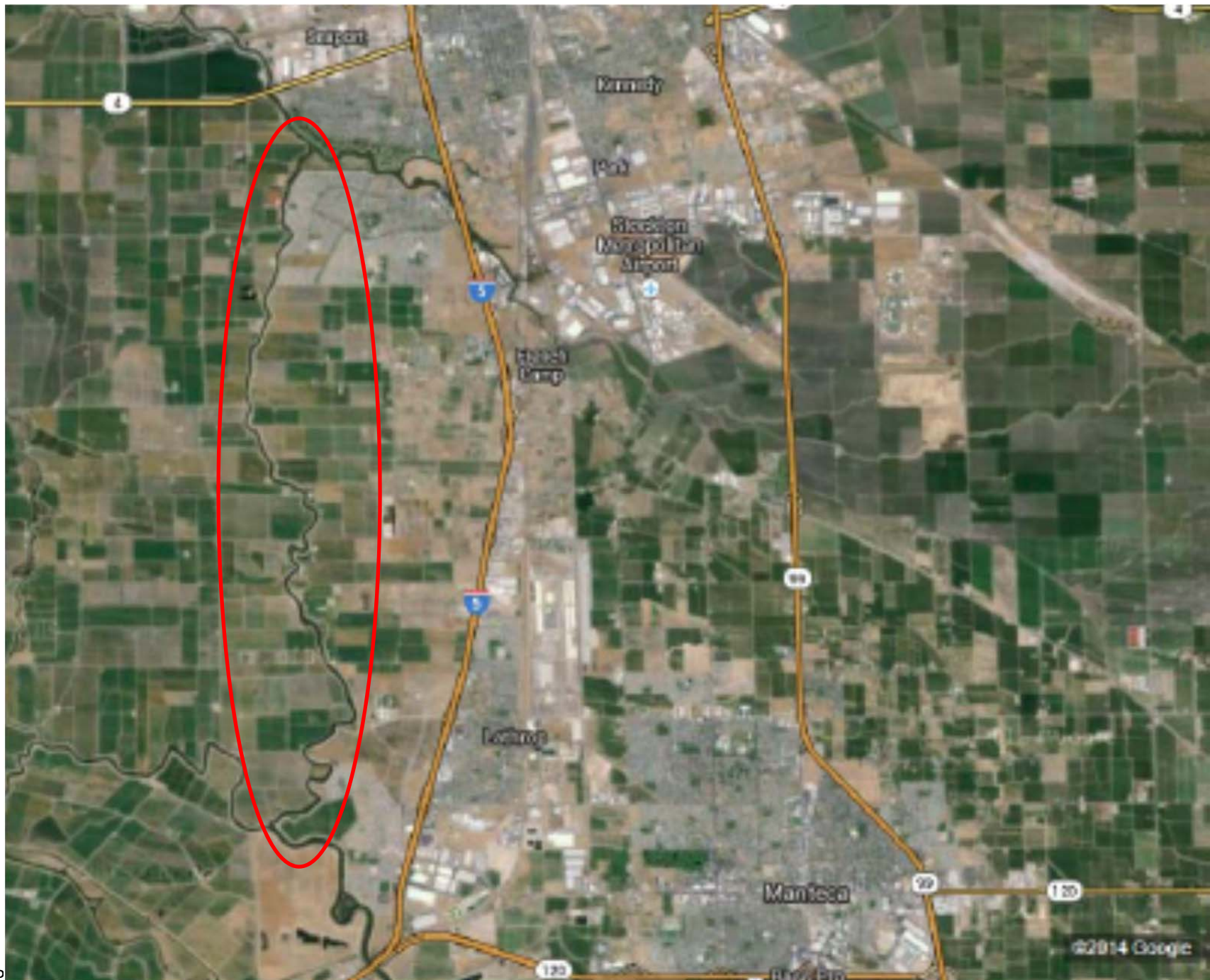
Enclosure: Project Summary Report

cc: Mr. Chris Neudeck
KSN Inc.
711 N. Pershing Ave.
Stockton CA 95203


Mr. Barry O'Regan
KSN Inc.
711 N. Pershing Ave.
Stockton CA 95203

Mr. Jeff Mueller
KSN Inc.
711 N. Pershing Ave.
Stockton CA 95203

Attachment B1_Location Map



Attachment B2_Vicinity Map

Revisions					Design	Scale	Date	
No.	Description	Date	By	Apprvd. By			MAY 2008	
					Drawn JAM	1" = 5000'	Sheet Number	
							1 Of 1	
					Check CHN	Original Drawing Scale 0 1/2" 1" 	Project File No.	
							0856-0020	

LEVEE SEEPAGE REPAIR PROJECT - PHASE III

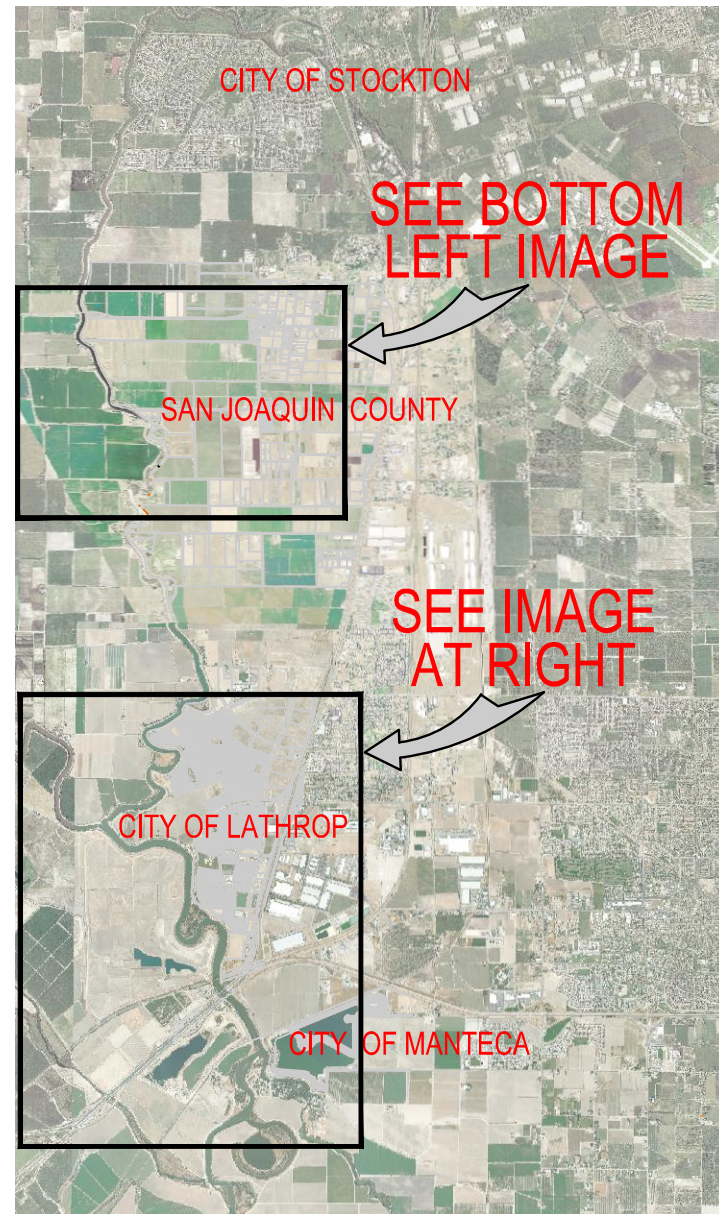
RECLAMATION DISTRICT 17

UPDATED JULY 16, 2014

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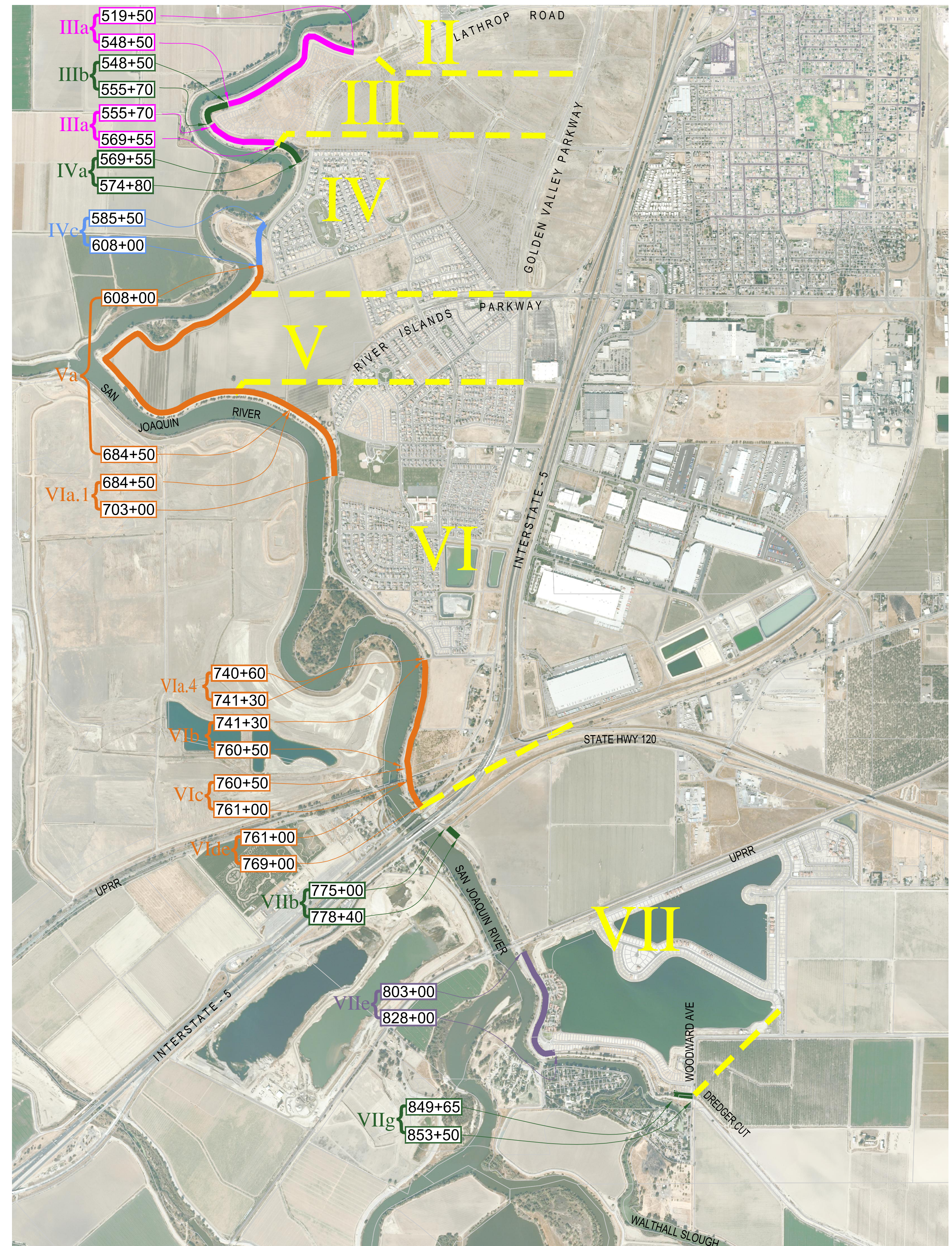
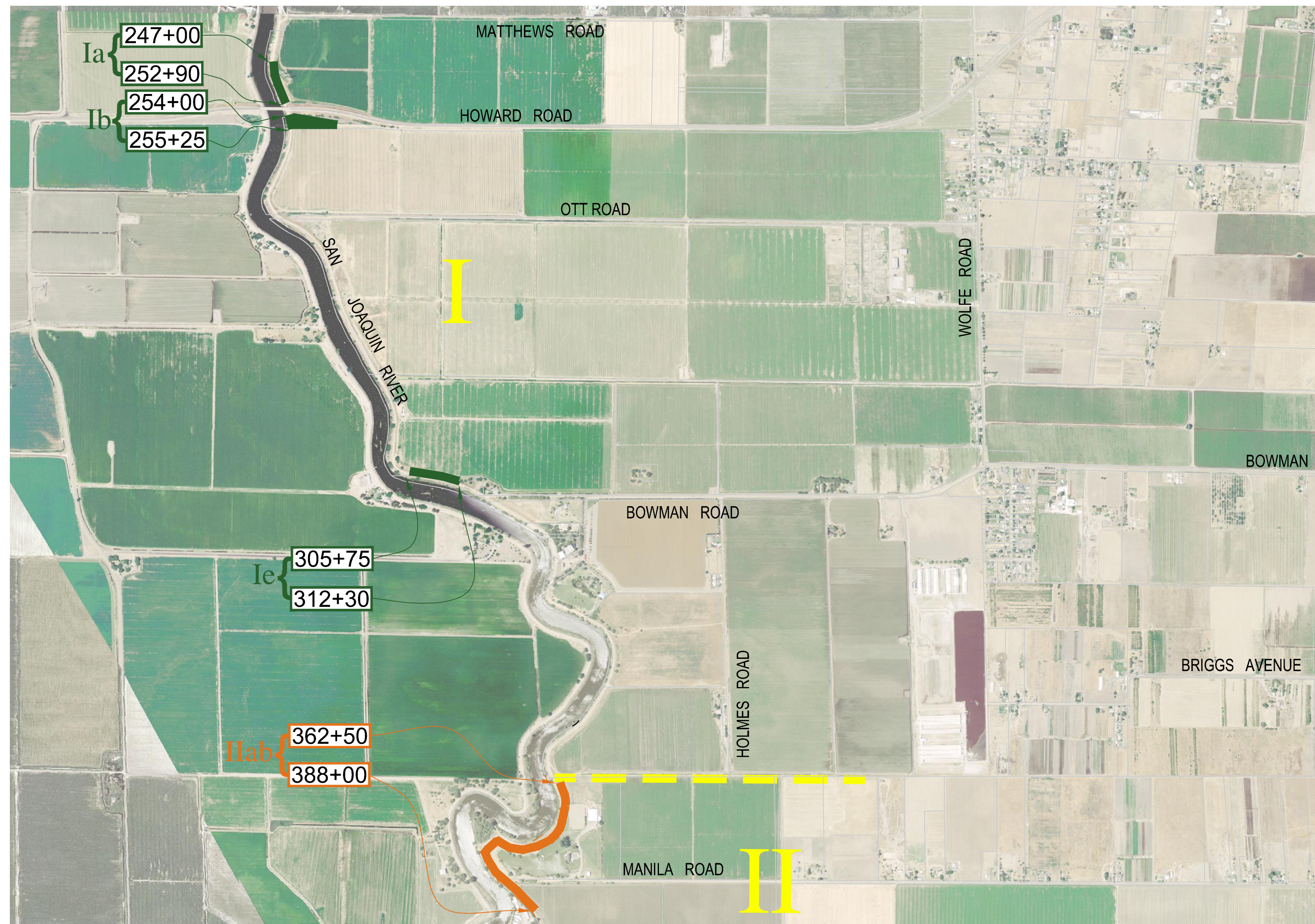
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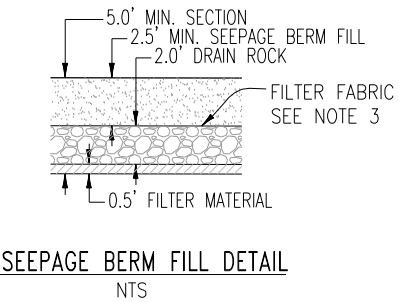
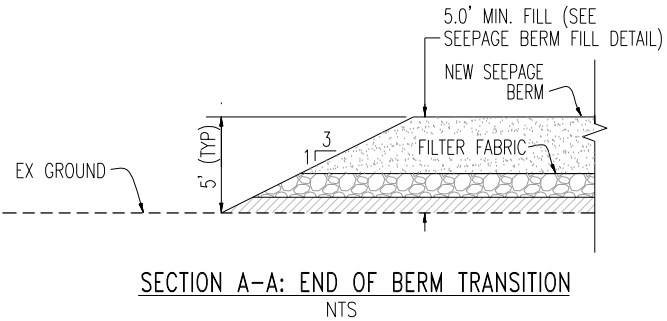
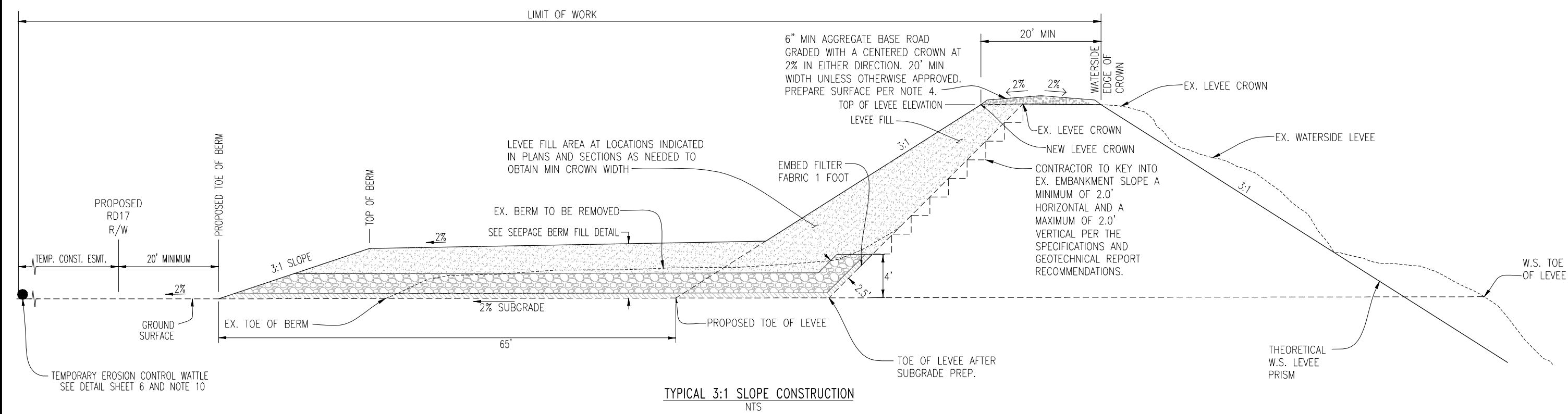
VICINITY MAP

- I** GEOPHYSICAL SEGMENT DESIGNATION
- Ib** ELEMENT NAME - BASED ON OWNERSHIP OR OTHER CRITERIA
- PHASE III - SETBACK LEVEE WITH CUTOFF WALL
 - PHASE III - THROUGH SEEPAGE
 - PHASE III - DSM CUTOFF WALL
 - PHASE III - OPEN CUT CUTOFF WALL
 - PHASE III - SEEPAGE BERM / FILL

LEGEND



Attachment D Typical Slope Construction



- NOTES:
- RD17 RIGHT OF WAY EXTENDS FROM THE SAN JOAQUIN RIVER WATER'S EDGE (AT ORDINARY HIGH WATER) TO THE PROPOSED RD17 RIGHT OF WAY SHOWN ABOVE AND ON THE DETAILED CROSS-SECTIONS WITHIN THIS PLAN SET. TEMPORARY CONSTRUCTION EASEMENTS WILL BE OBTAINED BY RD17 TO COVER THE LIMITS OF WORK AS SHOWN.
 - CONTRACTOR TO CLEAR, AND GRUB WORKING AREAS. SCARIFY AND RECOMPACT EXISTING GROUND PER GEOTECHNICAL ENGINEER'S RECOMMENDATION.
 - ALL FILTER FABRIC SHALL BE MIRAFI FW700 OR APPROVED EQUAL. EDGES SHALL BE SEWN PER SPECIFICATIONS.
 - PG&E SHALL BE NOTIFIED WHEN WORK OCCURS WITHIN 20' OF THE HIGH VOLTAGE OVERHEAD LINES AND CONTRACTOR SHALL NOTIFY PG&E 72 HOURS IN ADVANCE TO ALLOW FOR PG&E INSPECTOR TO BE ONSITE DURING CONSTRUCTION.
 - REMOVE EXISTING SEEPAGE BERM, MATERIAL MAY BE REUSED AS FILL IF SUFFICIENTLY MIXED WITH OTHER MATERIALS PER GEOTECHNICAL ENGINEERS RECOMMENDATION.
 - THE CONTRACTOR SHALL TAKE NOTE OF THE POWER LINES & HIGH VOLTAGE TOWERS WITHIN THE CONSTRUCTION ZONE. EXTREME CAUTION SHALL BE EXERCISED WHILE WORKING AROUND THE LIVE LINES.
 - IF HIGH VOLTAGE TOWERS, POWER POLES, LINES AND GUY WIRES ARE WITHIN THE IMMEDIATE WORK AREA, CONTRACTOR SHALL ADHERE TO ALL SAFETY STANDARDS AND REQUIREMENTS OF THE UTILITY COMPANY.
 - FILL AROUND HIGH VOLTAGE TOWERS & POLES SHALL BE PLACED AND COMPACTED IN A MANNER SO AS TO AVOID ANY ADVERSE IMPACTS TO THE INTEGRITY OF THE EXISTING POLES AND POWER SYSTEM & CONSISTENT WITH THE RECOMMENDATIONS OF THE SOILS REPORT.
 - GRADE SUBGRADE TO UNIFORM 2% SLOPE TO ENSURE CONSISTENT UNIFORM BERM LAYER THICKNESS
 - CONTRACTOR SHALL PLACE WATTLES ALONG THE LIMIT OF THE TEMPORARY CONSTRUCTION EASEMENT PRIOR TO BEGINNING WORK, ALL SUBSEQUENT EROSION CONTROL MEASURES SHALL BE INSTALLED PER THE PROVISIONS OF THE SWPPP.

REGISTERED PROFESSIONAL ENGINEER
CHRISTOPHER H. NEUDECK
No. 43473
EXP. 6/30/2014
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STATE OF CALIFORNIA

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REGISTERED PROFESSIONAL ENGINEER
JOSEF TOOTLE
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GEOTECHNICAL
STATE OF CALIFORNIA

THESE PLANS CONFORM TO THE GEOTECHNICAL REPORT ENTITLED: SEEPAGE EVALUATION PROJECT #5747.000.000

REGISTERED PROFESSIONAL ENGINEER
JAMES TEMPLETON
No. 43061
EXP. 3/31/14
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STATE OF CALIFORNIA

PLANS PREPARED UNDER THE DIRECTION OF:
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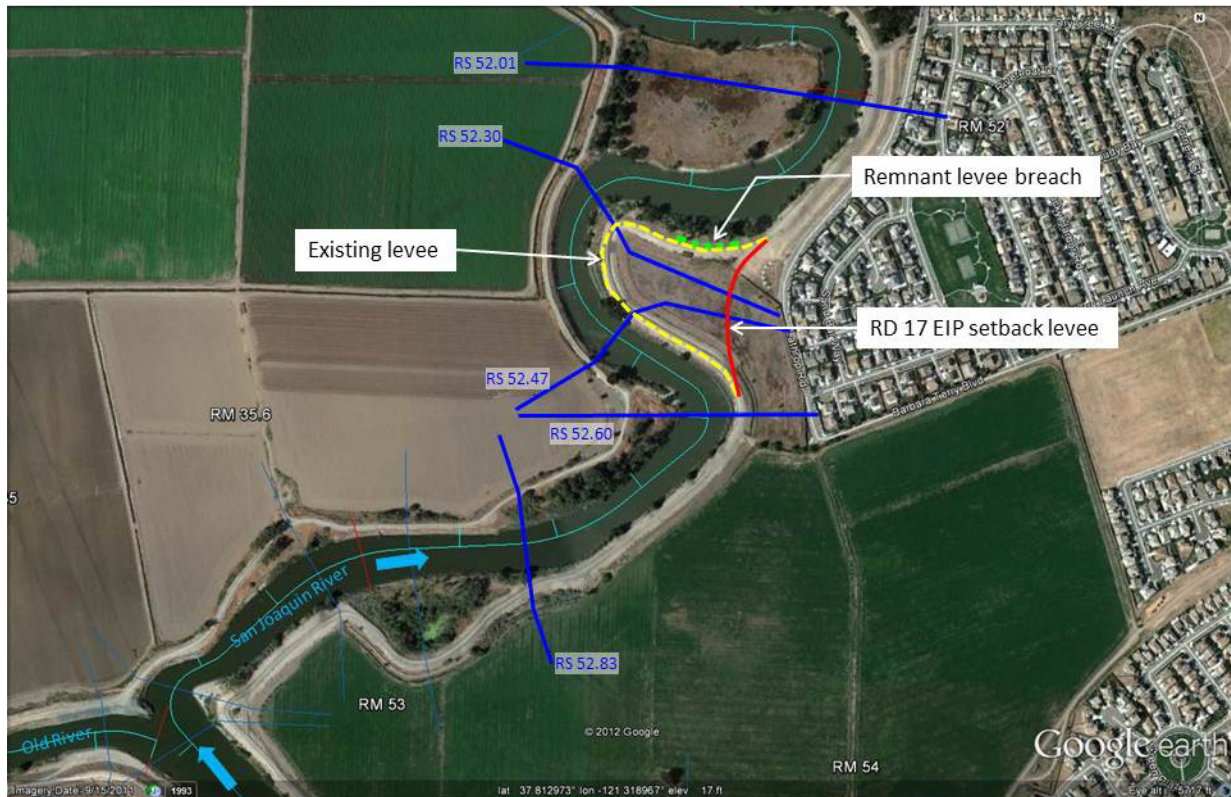


Figure 2. Proposed Setback Levee Site Map

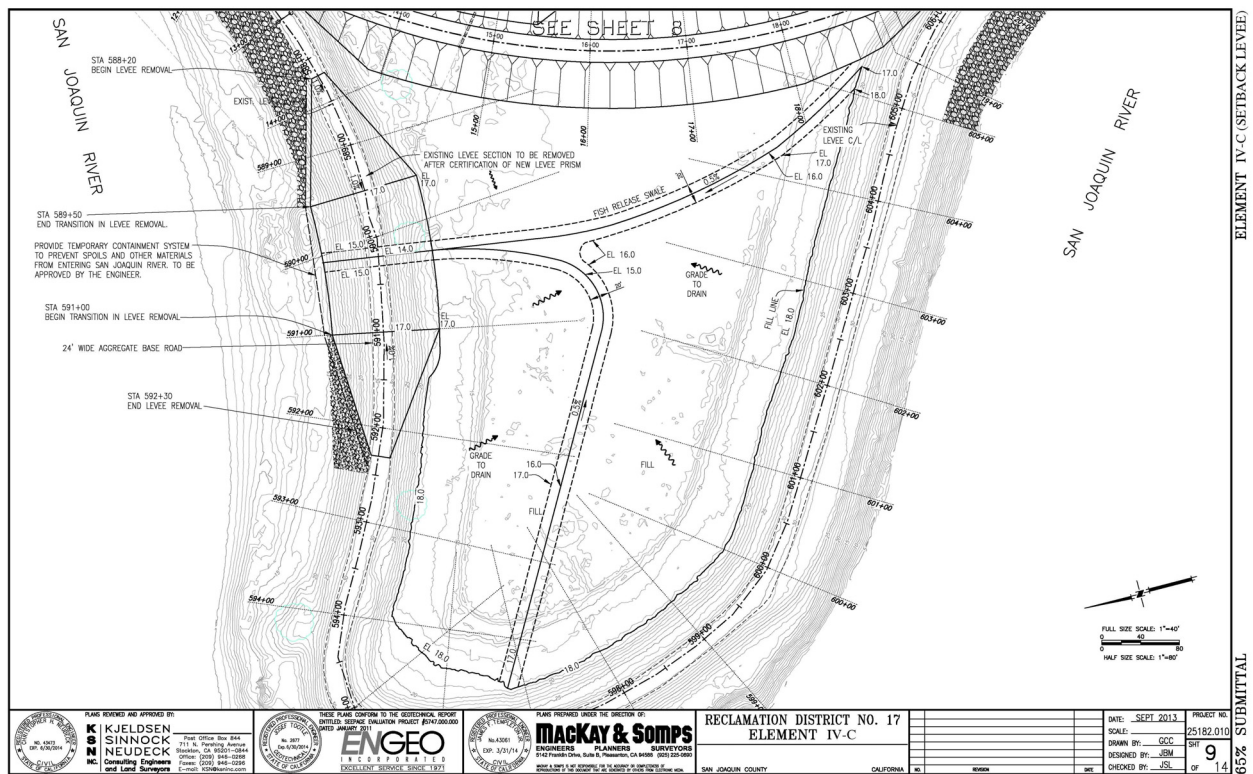


Figure 3. Remnant Levee Breach and Offset Area Grading Plan



Water Resources • Flood Control • Water Rights

MEMORANDUM

DATE: August 29, 2014

TO: Chris Neudeck
Kjeldsen, Sinnock & Neudeck, Inc.

FROM: Michael Archer, P.E.

SUBJECT: Review of Kjeldsen, Sinnock & Neudeck Inc. water surface elevation profile drawing "DWSEL ANALYSIS PROFILE", dated July 2014.

The purpose of this memorandum is to provide background and discussion on the basis and differences of the three water surface elevation (WSEL) profiles displayed on the profile plot "DWSEL ANALYSIS PROFILE" prepared by Kjeldsen Sinnock Neudeck Inc. (KSN), dated July 2014 (see Attachment 1). The "DWSEL ANALYSIS PROFILE" is being used to inform the design of seepage repair work along the Reclamation District 17 (RD 17) segment of the San Joaquin River.

The three WSE profiles shown are:

1. RD 17 Design Water Surface Elevation
 - a. 1990 FEMA approved Gill & Pulver 100-yr WSEL, sta. 100+00 – 693+30
 - b. 2002 USACE Comp Study¹ 200-yr WSEL, sta. 693+30 – 850+00
2. 2013 DWR CVFED 200-yr WSEL (SB1278
3. 1955 USACE Design Profile

Of particular interest in this review is determining why a 100-year water surface elevation (1990 FEMA approved Gill & Pulver) is higher than a 200-year water surface elevation (2013 DWR CVFED).

The following sections provide brief synopses of the assumptions and methodologies used to develop each of the profiles. As shown in these synopses, there are many differences in the development of the subject profiles. Key differences are hydraulic computation methods, levels of topographic detail, and hydrologic data.

¹ Sacramento and San Joaquin River Basins Comprehensive Study

Attachment F_WSE Hydrualic Memo

Chris Neudeck

Review of "DWSEL ANALYSIS PROFILE", dated July 2014

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A summary of peak flows corresponding to the subject profiles is provided in Table 1. This table illustrates the variability in the hydrology assumptions for each of the profiles. The flows corresponding to the KSN profiles are highlighted.

Table 1. Summary of Peak Flows				
Location	Profile 1		Profile 2	Profile 3
	Sta. 100+00 - 693+30	Sta. 693+30 – 850+00	2013 DWR CVFED 200-yr WSEL	1955 USACE Design Profile
	1990 FEMA approved Gill & Pulver 100-yr WSEL	2002 USACE Comp Study 200-yr WSEL		
at Vernalis	79,000	144,400 ^a	82,800	52,000
u/s Paradise Cut	71,800	88,900	82,700	52,000
d/s Paradise Cut	51,950	63,900	62,400	37,000
at Mossdale	49,800	62,200	62,150	37,000
d/s of Old River	23,900	17,500	27,900	18,000
^a Total flow at the latitude of Vernalis; combination of flow in channel and flow in floodplain due to upstream levee overtopping.				

The comparison of the 100-year WSEL profile, Profile 1, and the 200-year WSEL, Profile 2, looks at the following two segments separately:

1. Upstream of station 693+30, where Profile 1 is the 2002 USACE Comp Study 200-yr WSEL, and
2. Downstream of station 693+30, where Profile 1 is the 1990 FEMA approved Gill & Pulver 100-year WSEL.

Upstream of station 693+30, the peak flows, as shown in Table 1, are similar, but the Profile 1 WSEL is about 3 feet higher than Profile 2. In my opinion, the primary cause of the WSEL difference is due to river-floodplain interaction, that is, water spilling into and out of the floodplain. The effects of the floodplain interaction on the peak flows in this reach are shown in Figure 1. The increase and decrease in the peak flows in the Comp Study analysis is due to floodplain flow returning to and leaving the San Joaquin River. The CVFED analysis did not consider floodplain flows, therefore the peak flow is a constant value. In the Comp Study analysis, the increase in peak flow near station 850+00 is the result of flow returning to the river from the floodplain. This causes the higher water surface shown in the KSN profile.

Attachment F_WSE Hydraulic Memo

Chris Neudeck

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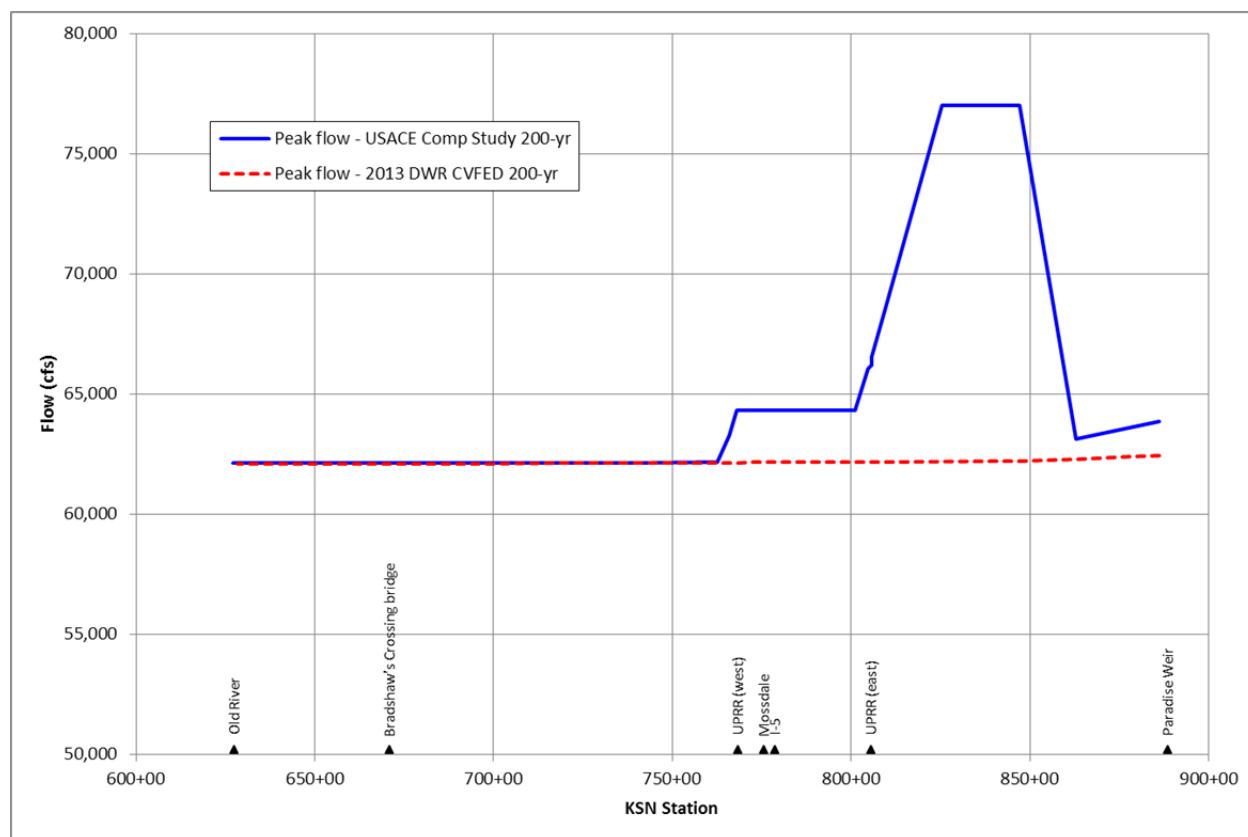


Figure 1. Peak flow profile, San Joaquin River from Paradise Weir to Old River

Downstream of station 693+30, the 1990 FEMA 100-year WSEL is higher than the 2013 CVFED 200-year WSEL by 2 to 3 feet. This difference is not due to hydrologic differences since the 1990 FEMA 100-year peak flow, 49,800 cfs upstream of Old River and 23,900 cfs downstream of Old River, is less than the 2013 CVFED 200-year peak flow, 62,150 cfs upstream of Old River and 27,900 cfs downstream of Old River. The downstream boundary stage near the Stockton Ship Channel in the FEMA profile is about 1 foot higher than that in the CVFED profile, but the effect of that difference would be less than 1 foot moving upstream. It is possible that differences in topographic data, that is, cross section geometry, could also be contributing to the difference, but theoretically these differences should be accounted for in the model calibration, and a review of the cross section geometry differences is outside of the scope of this review. Therefore, it is my opinion that the primary source causing the 100-year WSE with less flow to be higher than the 200-year WSE is the quality of the calibration of the source hydraulic models. Documentation of the CVFED hydraulic model calibration is available and demonstrates reasonable calibration, though not without room for improvement. No documentation is readily available for calibration of the FEMA hydraulic model, but based on comparison of the computed WSE with that from the CVFED model, it can be concluded that the quality of the calibration of the FEMA model is questionable in the KSN profile reach.

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Profile 1.a. FEMA Approved Gill & Pulver 100-yr WSEL, sta. 100+00 – 693+30

Reference: *Weston Ranch Hydraulic Study*, Gill & Pulver, June 1987.

Hydrology:

- 1979 Flood Insurance Study, modified for change in levee performance assumption as described below.
- Flow, San Joaquin River at Vernalis = 79,000 cfs.
- Flow, San Joaquin River at Mossdale = 49,800 cfs
- Flow, San Joaquin River downstream of Old River = 49,800 cfs

Hydraulic analysis:

- HEC-2 simulation model; steady state.
- Originally developed and used by U.S. Army Corps of Engineers (USACE) for FEMA Flood Insurance Study (FIS) in 1979.
- Calibration: no information available.
- Levee performance: The USACE 1979 FIS analysis assumed that levees would fail when the water surface reaches within one foot of the top of levee. With this condition the flow at Mossdale was estimated to be 44,600 cfs. The 1987 Gill & Pulver analysis evaluated a worst case scenario based on the assumption that “levees will remain intact until overtopped.” In this scenario, the flow at Mossdale was estimated to be 49,800 cfs.

Profile 1.b. USACE Comp Study 200-yr WSEL, sta. 693+30 – 850+00

Reference: *Sacramento and San Joaquin River Basins Comprehensive Study Technical Studies Documentation*, USACE, December 2002 and related hydraulic analysis data files.

Hydrology:

- Comp Study.
- Flow, San Joaquin River at Vernalis = 144,400 cfs. This is the total flow at the latitude of Vernalis, which is made up of 124,500 cfs in the river channel and 19,900 cfs in the floodplain as a result of upstream levee overtopping.
- Flow, San Joaquin River at Mossdale = 62,200 cfs
- Flow, San Joaquin River downstream of Old River = 17,500 cfs

Attachment F_WSE Hydrualic Memo

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Hydraulic analysis:

- UNET simulation model; unsteady state.
- Developed by USACE for Comp Study.
- Calibration: March 1995; San Joaquin River at Vernalis peak flow = 26,100 cfs. The only calibration result documented in the KSN profile reach was for the stage hydrograph at the San Joaquin River at Brandt Bridge streamgage (KSN station 315+00, USGS river mile 47.6), with good match of peak stage.
- Levee performance: The Comp Study profile is based on the assumption that levees overtop without failing.

Profile 2. 2013 DWR CVFED 200-yr WSEL (SB 1278)

Reference: *Central Valley Floodplain Evaluation and Delineation (CVFED) Program for the Lower San Joaquin River System, Task Order 32, Senate Bill 1278/Assembly Bill 1965 Urban Level of Protection Informational Maps, City of Lathrop – Technical Memorandum, HDR, August 2013, and related hydraulic model data files.*

Hydrology:

- Central Valley Hydrology Study (CVHS).
- Flow, San Joaquin River at Vernalis = 82,800 cfs. Review of CVHS data indicates that the CVFED analysis only used the river flow and that there was an addition flow with a peak of 35,900 cfs in floodplain at the latitude of Vernalis due to upstream levee overtopping that was not used in the CVFED analysis.
- Flow, San Joaquin River at Mossdale = 62,200 cfs.
- Flow, San Joaquin River downstream of Old River = 17,500 cfs

Hydraulic analysis:

- HEC-RAS simulation model; unsteady state.
- Developed by HDR Inc. for CVFED.
- Calibration: April 2006; San Joaquin River at Vernalis peak flow = 34,800 cfs. Water surface elevation calibration in the KSN profile reach was based on four streamgages: San Joaquin River at Mossdale, San Joaquin River below Old River near Lathrop, San Joaquin River at Brandt Bridge, and Old River at Head. In addition, flow data was available at two of these gages, Mossdale and below Old River near Lathrop, allowing for the calibration of the San Joaquin River-Old River flow split. The flow data at these gages was not available prior to 2004, so earlier calibration efforts could only estimate the flow split.

Attachment F_WSE Hydrualic Memo

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- Levee performance: The CVFED profile is based on the assumption that levees overtop without failing.

Profile 3. 1955 USACE Design Profile

Reference: *Design Memorandum No. 1, San Joaquin River Levees, Lower San Joaquin River and Tributaries Project, General Design*, USACE, December 23, 1955.

Hydrology:

- Project design flows, 1955.
- Flow, San Joaquin River at Vernalis = 52,000 cfs.
- Flow, San Joaquin River at Mossdale = 37,000 cfs.
- Flow, San Joaquin River downstream of Old River = 18,000 cfs

Hydraulic analysis:

- Step backwater analysis.
- Calibration: 1952 flood.
- Levee performance: no failures.

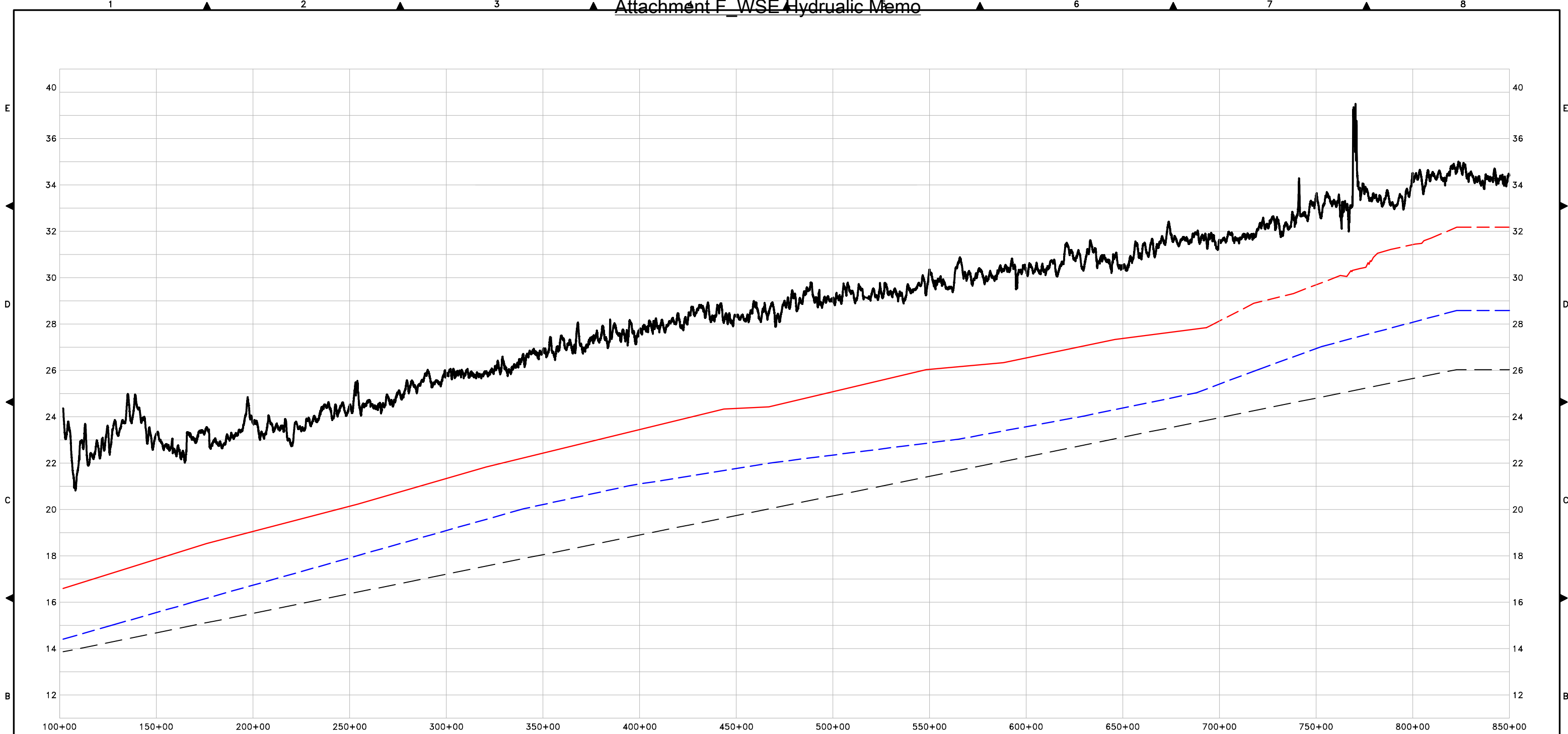


Michael Archer, P.E.

Enclosure: Attachment 1

MA/pa

3901.1/CHRIS NEUDECK MEMO 2014-8-29



PROFILE KEY	
	EXISTING LEVEE CL (NO RAISING PLANNED IN PHASE III LEVEE SEEPAGE REPAIR PROJECT)
	RD 17 DESIGN WATER SURFACE ELEVATION
	1990 FEMA APPROVED GIL & PULVER 100-YR WSEL STA 100+00-693+30
	2002 USACE COMP STUDY 200-YR WSEL STA 693+30-850+00
	2013 DWR CVFED 200-YR WSEL (SB1278)
	1955 USACE DESIGN PROFILE



Submittal	
%	Date

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RECLAMATION DISTRICT NO. 17
MOSSDALE TRACT
SAN JOAQUIN COUNTY

DWSEL ANALYSIS
PROFILE

Revisions				
No.	Description	Date	By	Appr. By

Design
JAM

Drawn
JAM

Check
CHN

Scale
N.T.S.
Original Drawing Scale
0 1/4" 1"

Date
JULY 2014
Sheet Number
1 Of 1
Project File No.
0856-0450

Attachment G_Consistency with CVFPP Goals

RD 17 Consistency with Central Valley Flood Protection Plan & State Systemwide Investment Approach Goals Compared with No Project

CVFPP GOAL	STATE SYSTEMWIDE INVESTMENT APPROACH	RD 17 Seepage Repair Project
Contributions to Primary Goal – Improve Flood Risk Management		
Improve Level of Flood Protection	<p>Overall higher protection consistent with assets being protected</p> <ul style="list-style-type: none"> Urban areas achieve protection from a 200-year flood, and for small communities achieve protection from a 100-year flood 	<ul style="list-style-type: none"> The RD 17 Seepage Repair Project is the first step to providing urban and urbanizing areas with 200-year level of flood protection Improves flood protection for over 50,000 people. Protects critical infrastructure including County Hospital, County Jail and future VA Hospital Protects property valued at over \$4 Billion
Contributions to Supporting Goals		
Improve Operations and Maintenance	<p>Decrease in long-term O&M requirements</p> <ul style="list-style-type: none"> Decrease in long-term costs due to O&M reforms (clarified roles and responsibilities, consistent standards, and revenue generation improvements) and physical modification to reduce geomorphic stressors 	<ul style="list-style-type: none"> The RD 17 Seepage Repair Project expands right of way available to perform O&M. Seepage Repair will reduce O&M costs associated with slope sloughing repair, and flood fighting.
Promote Ecosystem Functions	<p>Enhanced opportunities for systemwide ecosystem benefit</p> <ul style="list-style-type: none"> Floodway expansion provides substantial opportunity to improve ecosystem functions, fish passage, and the quantity, quality, and diversity of natural habitats 	<ul style="list-style-type: none"> The RD 17 Seepage Repair Project includes a setback levee which will create waterside seasonally inundated floodplain habitat, improving ecosystem function diversity of natural habitat along the Lower San Joaquin River.
Improve Institutional Support	<ul style="list-style-type: none"> Improve flood management functions through changes and/or clarifications in current State policy directives, legislated authority and responsibilities, and partnerships with federal and local partners 	<ul style="list-style-type: none"> RD 17 has significantly improved institutional support for flood management within the basin, including supporting the USACE's Lower San Joaquin Feasibility Study. RD 17 has brought 4 land use agencies together to work collaborative on flood risk reduction. RD 17 has bridged the gap between land use agencies and regional flood management agencies which will lead to better flood risk reduction land use decisions.
Promote Multi-Benefit Projects	<ul style="list-style-type: none"> Enhanced opportunities to integrate water quality, groundwater recharge, recreation, power, and other benefits 	<ul style="list-style-type: none"> The RD 17 Seepage Repair Project includes the landside urban parks adjacent to the levee in urban areas.

Attachment H_Project Summary Report

August 22, 2014

408 Summary Report
RD 17 – Phase III LSRP
25182.010

A Project Summary Report prepared for:

**Reclamation District 17
c/o Nomellini, Grilli & McDaniel
PO Box 1461
Stockton, CA 95201**

and

**US Army Corps of Engineers
1325 J Street
Sacramento, CA 95814**

For the project entitled:

**Reclamation District 17
Phase III- 100-Year Levee Seepage Repair Project
San Joaquin County, CA**

Attachment H Project Summary Report

August 22, 2014

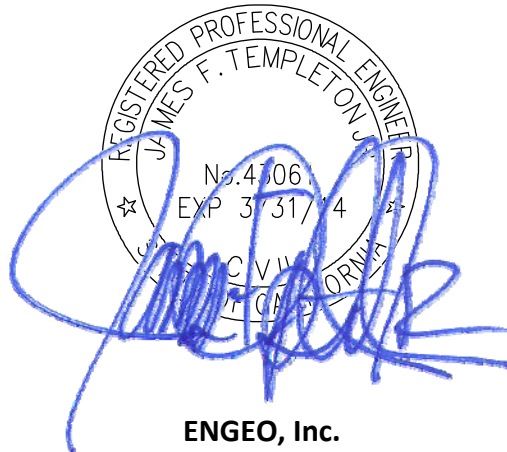
408 Summary Report
RD 17 – Phase III LSRP
25182.010

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408 Summary Report

RD 17 – Phase III LSRP

25182.010

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1.0 NON-FEDERAL REQUEST FOR PROJECT MODIFICATION

Reclamation District 17 (RD17), in cooperation with the California Department of Water Resources (DWR) and the Central Valley Flood Protection Board (CVFPB), is the local project sponsor for the ongoing Levee Seepage Repair Project (LSRP).

RD17 has requested permission to alter segments of the San Joaquin River Levee System within Reclamation District 17 (a Federal Project levee). This request is formally provided to the CVFPB by means of an encroachment permit application for the RD17 Phase III LSRP, submitted by RD17 concurrently with this 408 Summary Report. RD17 is continuing to coordinate closely with the CVFPB and the USACE on finalizing the design and permitting of these projects. CVFPB Permits were obtained for Phase I and Phase II and both projects were successfully completed maintaining full compliance with all permit conditions.

To construct the LSRP, RD17 is requesting permission from the United States Army Corps of Engineers (USACE) pursuant to Section 14 of the Rivers and Harbors Act of 1899 (Title 33 of the United States Code [USC], Section 408, [33 USC 408]), hereinafter referred to as Section 408, for the alteration of a levee which is a part of the Sacramento River Flood Control Project (SRFCP), a Federal work.

2.0 PROGRAM OVERVIEW

The overall purpose of the LSRP is to implement levee repairs at various locations along the existing levees to increase the resistance of RD17's levee system to under seepage and through seepage.

RD17's objectives for the LSRP are to:

- ❖ Provide seepage exit gradients equal to or less than 0.5 at the landside levee toe and equal to or less than 0.8 at the landside drained seepage berm toe at the water surface elevation associated with the design water surface.
- ❖ Increase the levee's resistance to under seepage and/or through seepage; and

Levee repairs for Phase III include construction of drained seepage berms, undrained seepage berms, and cutoff walls to address under seepage, chimney drains and cutoff walls to address through seepage and the construction of a setback levee with cutoff wall to address both under seepage and through seepage at one location.

The RD17 LSRP is being implemented in three phases:

- ❖ The Phase I LSRP included under seepage repair at 2 (two) locations along the RD17 levee system to address under seepage deficiencies. These repairs were completed in 2009 under a USACE Section 208.10 permit.
- ❖ The Phase II LSRP included under seepage and through seepage repair at 7 (seven) locations along the RD17 levee system to address under seepage and through seepage deficiencies. These repairs were completed during the summer of 2010 under a USACE Section 208.10 permit.
- ❖ The Phase III LSRP, which is the subject of this Section 408 request, will address under seepage and through seepage repairs at 12 (twelve) locations along the RD17 levee system to address under seepage and through seepage deficiencies.

3.0 PHYSICAL AND FUNCTIONAL DESCRIPTION OF THE EXISTING PROJECT

3.1. PROJECT HISTORY AND AUTHORIZATION

The RD17 levee system, like other flood protection systems in the San Joaquin Valley, was initially designed to reduce the risk of flooding for the purposes of facilitating agricultural development of the extensive floodplains encompassed by the San Joaquin Valley and to support river navigation. Prior to levee construction, the RD17 area, like much of the Delta was originally designated swamp and overflow lands due to the fact that during times of high flows, water overflowed the banks and inundated adjacent lands. The banks of the channels were created along the natural high ground adjacent to the San Joaquin River due to sedimentation of the materials carried by the high river flows. Farmers, using the high ground of the river banks as a foundation, constructed levees with horses and hand labor using material adjacent to the river bank. Once levees were in place, the protected lands were drained and used for agriculture. Starting in about 1863, RD17 was created to maintain the RD17 levee system.

Several decades later, Congress authorized the Lower San Joaquin River and Tributaries Project (LSRTP) in the Flood Control Act of 1944, and the USACE subsequently commenced work to improve the RD17 levee system. Included in the LSRTP were the RD17 levees along the left bank of French Camp Slough, those along the right bank of the San Joaquin River, and those along the right bank of Walthall Slough. The LSRTP was completed by the USACE in 1963.

In about 1989, the RD17 levees, including those authorized as part of the LSRTP, were improved as a part of the development of Weston Ranch in the City of Stockton. The purpose of the improvement project was to meet FEMA's 100-year flood protection requirements for urban development (44 CFR 65.10). FEMA accredited the levee as meeting the requirements for flood protection for urban development for a 100-year flood event in February 1990.

During a high-water event on the San Joaquin River in January 1997, seepage and boils occurred at a number of locations along the RD17 levees. The USACE, DWR, CVFPB, and RD17 actively and successfully contained the seepage and boils and the levees were not compromised. After the 1997 event, the USACE, CVFPB, and RD17 funded a project to repair the seepage and boil areas under the Public Law 84-99 Rehabilitation Assistance Program (PL 84-99). The project referred to as "Reconstruction of the California Central Valley Levees San Joaquin Basin #4, Reclamation District #17" consisted of the installation of landside drained seepage berms. Design and construction was performed by the USACE. In October, 2004, the USACE provided an addendum to the Standard Operation and Maintenance Manual for work completed as of October, 2001.

In the Fall of 2007, RD17 initiated the LSRP to increase the resistance of RD17's levee system to under seepage and through seepage. RD17 requested State funding through the DWR Early Implementation Program (EIP).

In order to identify repair locations for the LSRP and facilitate the EIP funding agreement, RD17 contracted the geotechnical firm, ENGEO, Inc, to prepare an *Under Seepage Evaluation Report*

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RD 17 – Phase III LSRP
25182.010

for the limits of the RD17 levee system. In addition to those areas identified by geotechnical evaluation as requiring under seepage repair, historical seepage locations identified by RD17 maintenance and inspection crews were also included in the LSRP.

A phasing plan (3 phases total) was developed to facilitate accelerated construction schedules for those elements thought to have the highest seepage concerns. Phase I was completed in 2009 and Phase II was completed in 2010. Phases I and II were completed under Section 208.10 authority.

Phase III proposes to implement under seepage, through seepage and levee geometry repair/remediation to approximately 5.3 miles of Project levee along the east (right) bank of the San Joaquin River and north bank of Walthall Slough. The project consists primarily of in-place repair/remediation, but does include a single setback levee. The project does not include any work that consists of raising of the existing levee or performing any work on the waterside of the levee with the exception of vegetation control. Construction of the Phase III LSRP is scheduled to begin in 2015 and is expected to be completed in 2016.

3.2. EXISTING CONDITION OF THE PROJECT LEVEE

The RD17 Project levee system is situated along the south (left) bank of French Camp Slough, the east (right) bank of the San Joaquin River, the north (right) bank of Walthall Slough,. The levee is continuous, extending approximately 19 miles (from before STA 0+00 to 992+02). The area currently protected by the Project levee system includes agricultural production, and existing urban development consisting of residential, commercial, industrial, and public land uses. The Project levee system is accredited by FEMA as providing protection of the 100-year (0.01 AEP) Flood event.

To facilitate design and implementation of the LSRP, the RD17 levees have been divided into 7 distinct “reaches” based on soil stratigraphy (identified by Roman numerals I-VII). The reaches are further subdivided into “elements,” (identified by the reach number followed by a lower case letter, etc – for example Ia, IIa, IIb, ..., Va, VIa.1, VIa.2, VIa.4, ...). See attached Figure 1-2 for location of each of the following described elements.

Below is a list of the elements identified to require repair, a brief discussion of each is also included.

3.2.1. PROJECT ELEMENT IA

Project Element Ia is located directly north of the Howard Road Bridge at the San Joaquin River in unincorporated San Joaquin County. Lands to the east are primarily utilized for agricultural and rural residential purposes. The US Army Corps of Engineers constructed drained seepage berms along portions of this project element in response to the January 1997 high water event under PL84-99. Three high voltage towers that are owned and operated by PG&E are directly adjacent to the landside toe of the levee and PL84-99 drained seepage berm as well as an irrigation system serving the adjacent agricultural development.

3.2.2. PROJECT ELEMENT IB

Project Element Ib is located directly south of the Howard Road Bridge at the San Joaquin River in unincorporated San Joaquin County. Lands to the east are primarily utilized for agricultural and rural residential purposes. Directly adjacent to the landside toe of the levee is an approximately 5 foot deep depression that was used as a borrow site to facilitate the construction of the Howard Road Bridge. In addition, several trees are located directly within this depressed area.

3.2.3. PROJECT ELEMENT IE

Project Element Ie is located approximately 500 feet downstream of Bowman Road in unincorporated San Joaquin County. Lands to the east are primarily utilized for agricultural and rural residential purposes. The US Army Corps of Engineers constructed drained seepage berms along portions of this project element in response to the January 1997 high water event under PL84-99. Power poles and power lines that are owned and

operated by PG&E are directly adjacent to the landside toe of the levee and PL84-99 drained seepage berm as well as an irrigation system serving the adjacent agricultural development.

3.2.4. PROJECT ELEMENT IIAB

Project Element IIab is located to the north of the intersection of Manila Road and the San Joaquin River in unincorporated San Joaquin County. Lands to the east are primarily utilized for agricultural and rural residential purposes. In addition a lake, private residence, stables, and an equestrian arena are in close proximity to the levee. The US Army Corps of Engineers constructed drained seepage berms along portions of this project element in response to the January 1997 high water event under PL84-99. Power poles and power lines that are owned and operated by PG&E are directly adjacent to the landside toe of the levee and PL84-99 drained seepage berm as well as an irrigation system and several above ground structures serving the adjacent residential development.

3.2.5. PROJECT ELEMENT IIIAB

Project Element IIIab is located north of the Mossdale Subdivision, adjacent to the San Joaquin River in the City of Lathrop. Lands to the east are currently fallow, but have planning approvals for future residential, commercial and public use development. A stand of heritage oak trees are located directly adjacent to the landside toe of the levee.

Drained seepage berms were constructed at Project Element IIIa during the Phase I LSRP to mitigate under seepage.

3.2.6. PROJECT ELEMENT IVA

Project Element IVa is located to the north of the northerly termination of Lathrop Road in the City of Lathrop. Lands to the east consist of an improved residential subdivision, a proposed residential subdivision and an improved high school facility. Several trees are located directly adjacent to the landside toe of the levee within this element.

3.2.7. PROJECT ELEMENT IVc

Project Element IVc is located adjacent to Lathrop Road in the City of Lathrop. Lands to the east are primarily utilized as an improved residential subdivision with elementary schools and commercial shopping centers. The US Army Corps of Engineers constructed drained seepage berms along portions of this project element in response to the January 1997 high water event under PL84-99.

3.2.8. PROJECT ELEMENT VA / VIa1

Project Va/VIa1 is located along the western edge of the City of Lathrop at the San Joaquin River. Lands to the east are an improved residential subdivision with elementary schools, City Hall, and several commercial developments. The US Army Corps of Engineers

constructed drained seepage berms along portions of this project element in response to the January 1997 high water event under PL84-99. Above ground irrigation facilities (earthen berms and ditches) are located directly adjacent to the landside toe of the levee.

3.2.9. PROJECT ELEMENT VI BCDE

Project Element VIb is located at the South end of the Mossdale subdivision, to the South of Sadler Oak Drive and to the North of Manthey Road where it crosses the San Joaquin River in the City of Lathrop. Lands to the east include existing and planned subdivision improvements with residential, elementary schools, City Hall, and several small commercial developments. A Union Pacific Railroad (UPRR) track also crosses the levee at the approximate mid-point of this element.

3.2.10. PROJECT ELEMENT VIIb

Project Element VIIb is located to the south of Interstate 5 in unincorporated San Joaquin County. Lands to the east are primarily utilized for agricultural, rural residential, and rural commercial uses.

3.2.11. PROJECT ELEMENT VIIe

Project Element VIIe is located adjacent to the Oakwood Lakes subdivision just south of a UPRR railroad track in unincorporated San Joaquin County. To the east of this element is the Oakwood Lakes subdivision. Also, a small wastewater treatment plant and several residential lots with “Mobile Home” style residences back the levee. These homeowners have installed landscaping, small diameter irrigation lines, stairs and other minor improvements directly adjacent to the landside levee toe.

3.2.12. PROJECT ELEMENT VIIg

Project Element VIIg is located directly adjacent to Woodward Avenue on the Wathall Slough in unincorporated San Joaquin County. To the north of this element is the Oakwood Lake subdivision, residential lots back the levee, which were purchased by RD17 during the Phase II LSRP. An agricultural pump and associated pipelines and power poles are located directly adjacent to the landside levee toe.

4.0 PURPOSE AND NEED FOR THE MODIFICATION

The purpose of the LSRP is to implement levee repairs at various locations along the system to increase the resistance to under seepage and through seepage.

The approach to meet this purpose is to provide a comprehensive evaluation of the entire Project levee system, develop recommended strategies for improvement, and provide a basis for partnerships with Federal and State agencies to implement the necessary repairs.

The objectives under this purpose and approach are to:

- ❖ Construct levee repairs as soon as possible to reduce flood risk as quickly as possible;
- ❖ Construct repairs that are politically, socially, economically, and environmentally acceptable;

The RD17 levee system protects approximately 10,698 residential units, and 182 nonresidential (commercial/industrial and public) properties with a total floor area of 11,858,000 square feet. Examples of some large commercial facilities within RD17 include the Del Monte Foods Distribution Center, In and Out Burger Distribution Center, Ghirardelli Chocolate Factory Outlet, and a Tesla manufacturing plant. Main transportation arteries within RD17 include Interstate 5 and State Route 120. Other facilities within RD17 include San Joaquin General Hospital, San Joaquin County Jail, San Joaquin County Honor Farm, San Joaquin County Juvenile Hall, two high schools, six elementary schools, and 28 other facilities that house and/or provide services to special needs populations. RD17 contains over 6,345 acres of agricultural lands that produce tomatoes, alfalfa, and corn (among other crops). The potential structural and content value of property damages for a levee breach within the area protected by the RD17 levee system is estimated to be greater than \$900 million.

5.0 DESCRIPTION OF THE PROPOSED MODIFICATION

The RD17 Phase III Levee Seepage Repair Project (LSRP) proposes to undertake under seepage, through seepage and levee geometry repair/remediation to approximately 5.2 miles of Project levee along the east bank of the San Joaquin River and north bank of Walthall Slough. The project consists primarily of in-place repair/remediation, but does include a single setback levee at Element IVc. The project does not include any work that consists of raising of the existing levee or performing any work on the waterside of the levee. Construction of the Phase III LSRP is scheduled to begin in 2015 and is expected to be completed in 2016.

The Phase III LSRP will include the following components:

5.1. Drained Seepage Berms

Total linear footage of new drained seepage berms will be approximately 8,800 feet. Drained seepage berm widths will range from 60 to 125 feet from the landside toe of the existing levee. The drained seepage berms will be approximately 5 to 8 feet thick at the toe of the existing levee and gradually slope downward to approximately 5 feet thick at the landside edge.

Among the elements where new seepage berms will be installed (Elements Ia, Ib, Ic, IIIab, IVa, , VIIb and VIIg), the length, width, and surface area of the berm and amount of soil required to construct the berm will vary. Elements within the Phase III LSRP that utilize drained seepage berms and chimney drains that collect and convey seepage flows coming from the adjoining waterway under and/or through the levee will discharge seepage flows landward of the levee onto the land surface (in agricultural areas) or into existing storm drains (within urban areas).

5.2. CHIMNEY DRAINS

All of the elements proposed for seepage berms will require installation of a chimney drain to mitigate through seepage. Seepage will flow through the chimney drain to the drained seepage berm at the landside base of the levee.

5.3. CUTOFF WALLS

Approximately 19,200 feet of slurry cutoff walls will be constructed using a combination of deep mixing and open-cut methods in Elements IIab, IVc, Va/VIa1, VIbcde and VIIe. Slurry cutoff walls will be installed on the waterside of the existing levee crown and will extend to 40-110 feet below the top of the levee depending on the depth of the impermeable soil layers. Cutoff walls will be extended 300 feet upstream and downstream of the element boundary to provide the required overlap to the adjacent levee systems.

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5.4. RAISED LANDSIDE GRADE

Within element Ib, a satisfactory exit gradient can be achieved by placing fill adjacent to the landside toe of the levee and in the adjacent low-lying areas. The depth and width of fill required varies by element but generally extends 300 feet from the landside toe of the levee and varies in depth between 3 and 5 feet.

5.5. SETBACK LEVEE

Within element IVc, a setback levee will be constructed with an underlying cutoff wall. This work will include a breach and degrade of the existing levee system for the purpose of restoration of the San Joaquin River floodplain. The inlet/outlet location would be armored to prevent erosion and appropriate measures employed to prevent stranding of fish within the newly created flood plain area.

SUMMARY TABLE

Element	USACE Station (miles)	Length (feet)	Proposed Activities
Ia	2.77 thru 2.88	590	Construct a drained seepage berm to meet required through seepage and exit gradient criteria. Place levee fill material along landside of existing levee slope where needed to meet levee geometry requirements.
Ib	2.88 thru 2.93	125	Construct a drained seepage berm to meet required through seepage and exit gradient criteria. Place levee fill material along landside of existing levee slope where needed to meet levee geometry requirements.
Ie	3.89 thru 4.01	655	Construct a drained seepage berm to meet required through seepage and exit gradient criteria. Place levee fill material along landside of existing levee slope where needed to meet levee geometry requirements.
IIab	4.96 thru 5.44	2,550	Install open-cut cutoff wall to meet required through seepage and exit gradient criteria. Place levee fill material along landside of existing levee slope where needed to meet levee geometry requirements. Construction of open-cut cutoff walls for shallow walls will involve degrading the top 1/3 of the levee height.
IIIab	7.85 thru 8.88	5,400	Construct a drained seepage berm to meet required through seepage and exit gradient criteria. Place levee fill material along landside of existing levee slope where needed to meet levee geometry requirements.
IVa	8.88 thru 8.97	525	Construct a drained seepage berm to meet required through seepage and exit gradient criteria. Place levee fill material along landside of existing levee slope where needed to meet levee geometry requirements.
IVc	9.15 thru 9.60	2400	Construct a setback levee with an underlying cutoff wall to meet required through seepage and exit gradient criteria. This work will include a breach and degrade of the existing levee system for the purpose of restoration of the San Joaquin River floodplain. The inlet/outlet location would be armored to prevent erosion and appropriate measures employed to prevent stranding of fish within the newly created flood plain area.

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Va/Vla1	9.60 thru 11.40	9,520	Install open-cut cutoff wall to meet required through seepage and exit gradient criteria. Place levee fill material along landside of existing levee slope where needed to meet levee geometry requirements. Construction of open-cut cutoff walls for shallow walls will involve degrading the top 1/3 of the levee height.
Vibcde	12.13 thru 12.66	2,800	Install open-cut cutoff wall to meet required through seepage and exit gradient criteria. Place levee fill material along landside of existing levee slope where needed to meet levee geometry requirements. Construction of open-cut cutoff walls for shallow walls will involve degrading the top 1/3 of the levee height.
VIIb	12.77 thru 12.83	385	Construct a drained seepage berm to meet required through seepage and exit gradient criteria. Place levee fill material along landside of existing levee slope where needed to meet levee geometry requirements.
VIIe	13.30 thru 13.77	2,500	Install DSM cutoff wall to meet required through seepage and exit gradient criteria. Place levee fill material along landside of existing levee slope where needed to meet levee geometry requirements. No degrade is anticipated to facilitate construction of the cutoff wall.
VIIg	14.19 thru 14.26	385	Construct a drained seepage berm to meet required through seepage and exit gradient criteria. Place levee fill material along landside of existing levee slope where needed to meet levee geometry requirements.

6.0 RELATED AND ON-GOING STUDIES

Below is a list of past, present, and reasonably foreseeable future flood management activities that comprise the regional planning context for the RD17 Phase III LSRP.

6.1. LOWER SAN JOAQUIN RIVER FEASIBILITY STUDY

The Lower San Joaquin River Feasibility Study is a multi-year, \$10 million study that will reach to the southern part of San Joaquin County along the San Joaquin River up to and through Stockton, including the Lodi waste water treatment plant. The study includes the watersheds east of Stockton, and covers nearly 140 miles of levees. The results of this study will help determine the need for future flood protection systems to reach or exceed a 200-year level of flood protection.

Responsible Parties: USACE/CVFPB/DWR/SJAFCA

6.2. SAN JOAQUIN RIVER RESTORATION PROGRAM

The goal of the program is to restore and maintain fish populations in the main stem of the San Joaquin River below Friant Dam to the confluence of the Merced River and to reduce or avoid adverse water supply impacts on all of the Friant Division long-term contractors. The San Joaquin River Restoration Program involves reoperation of Friant Dam and downstream flow-control structures to release flows to the San Joaquin River and diversion of surplus water during wet hydrologic conditions to the Friant-Kern and Madera canals.

Responsible Parties: Bureau of Reclamation/USFWS/NMFS/DWR/DFG/CalEPA

6.3. BAY DELTA CONSERVATION PLAN

The Bay Delta Conservation Plan (BDCP) is being prepared through a collaboration of state, federal, and local water agencies, state and federal fish agencies, environmental organizations, and other interested parties with the goal of identifying water flow and habitat restoration actions to recover endangered and sensitive species and their habitats in California's Sacramento-San Joaquin River Delta.

A range of alternatives for providing species/habitat protection and improving water supply reliability is being evaluated through the development of an EIS/EIR.

Responsible Party: California Department of Water Resources

6.4. CALFED LEVEE STABILITY PROGRAM

Levee repairs are being considered for a project site located on the right bank of the San Joaquin River and French Camp Slough within the "legal" Delta boundary to address under seepage and through-seepage, as well as waterside erosion to reduce the flood risk to 2000 acres of residential and industrial land. Repairs under consideration include construction of a seepage berm and installation of a slurry cutoff wall.

Responsible Party: Reclamation District No. 404

6.5. CALFED LEVEE STABILITY PROGRAM

The River Junction levee has severely eroded such that there is almost a vertical waterside slope. Increased risk of levee failure from overtopping and erosion along the San Joaquin River could result in flood effects of people, a public school, infrastructure and a major transportation route (Highway 120). Alternatives under consideration include (1) continued maintenance coupled with stockpiled riprap for emergency response; (2) repair scoured riverbank with installation of waterside riprap below mean summer water surface, and cover riprap above water surface with soil to create a 10-foot wide riparian bench; and (3) same as previous alternative with addition of fill on the landside slope to conform with the PL 84-99 Delta specific standard (Stations TBD) template, construction of a toe ditch, and relocation of the adjacent county road.

Responsible Party: Reclamation District No. 2064

7.0 ENVIRONMENTAL CONSIDERATIONS

The Phase III RD17 100-Year Levee Seepage Area Project DEIR/DEIS (September 2011) was prepared in accordance with NEPA/CEQA regulations. It describes the existing environmental resources in the project area and provides a project-level analysis of the environmental effects of the Phase III LSRP. The DEIS/DEIR will facilitate USACE planning and regulatory activities in connection with the RD17 Phase III LSRP.

7.1. EFFECTS OF THE PROPOSED MODIFICATIONS

This section provides a brief summary of the indirect effects identified in the RD17 Phase III LSRP DEIS/DEIR deemed significant, significant and unavoidable, or potentially significant and unavoidable after implementation of the proposed mitigation measures. Reference is made to the DEIS/DEIR for a complete discussion of impacts, significance level and proposed mitigation measures.

7.1.1. AGRICULTURAL RESOURCES

Implementation of the RD17 LSRP would involve the conversion of approximately 68 acres of farmland (as designated by the Farmland Mapping and Monitoring Program). This includes Prime Farmland, Farmland of Statewide Importance, Unique Farmland, Farmland of Local Importance, and Grazing Land. This is considered a significant and unavoidable impact.

In addition to the conversion of farmland to non-agricultural uses, approximately 40 acres of the 68 acres of farmland to be acquired is currently under Williamson act contracts. This is also considered a significant and unavoidable impact.

7.1.2. CULTURAL RESOURCES

During construction, it is feasible that the project could cause a significant effect on Identified Cultural Resources, Previously Undiscovered Cultural Resources or Previously Unidentified Human Remains through ground disturbance, and other construction related activity.

The incorporation of mitigation measures and compliance with the existing state and Federal laws including completion of pre-construction surveys, training of construction workers, and monitoring construction activities would reduce these effects. Due to the uncertainty of whether or not cultural resources may be encountered during construction, this is considered a potentially significant and unavoidable impact.

7.1.3. NOISE

The RD17 LSRP would result in an increase in the generation of temporary and short-term construction noise as well as temporary and short-term ground borne vibration. The incorporation of mitigation measures relating to noise reducing construction practices and vibration reducing construction practices would reduce these effects. Although

construction noise and vibration would be temporary and highly localized, this is considered a significant and unavoidable impact.

7.1.4. VISUAL RESOURCES

As a result of construction activities and construction equipment, the RD17 LSRP would result in temporary changes in the visual quality of construction areas and access roads that would not normally include construction related views. In order to facilitate construction of the LSRP, this is considered a significant and unavoidable impact.

7.1.5. ENVIRONMENTAL JUSTICE

Environmental Justice is the potential for the project to result in a disproportionately high and adverse environmental effect on minority or low-income populations. The DEIS/DEIR discusses Environmental Justice in the context of the effects of construction on the remains of Native Americans with regards to resources with cultural or religious significance that may be impacted by construction.

It is feasible that the project could cause a significant effect with regards to resources with cultural or religious significance however by performing a consultation with Native Americans prior to construction, providing training and construction monitoring, the potential impacts can be minimized. Due to the uncertainty of whether or not these resources may be encountered during construction, this is considered a potentially significant and unavoidable impact.

8.0 PUBLIC INTEREST DETERMINATION

Proposed Federal projects are to be reviewed to determine a project's probable impacts (including cumulative impacts) on the public interest (33 CFR §320.4). The public interest review is described as a balancing of the benefits which reasonably may be expected to accrue from the proposal against its reasonably foreseeable detriments, with consideration of the national concern for both protection and utilization of important resources (33 CFR §320.4). The basis for this public interest review is the DEIS/DEIR prepared by AECOM dated September 2011.

The general policies for conducting a public interest review included in 33 CFR §320.4, include three general criteria to be considered in the evaluation of every Federal project:

- 1) The relative extent of the public and private need for the proposed structure or work: As mentioned in Section 3 of this Project Summary Report, the deficiencies identified in the Project levees may pose significant threats to public safety, property, and infrastructure during flood events. Without the proposed Project repairs, residents, their property and infrastructure would remain vulnerable to an unacceptable high risk of flooding;
- 2) Where there are unresolved conflicts as to resource use, the practicability of using reasonable alternative locations and methods to accomplish the objective of the proposed structure or work. Alternatives to the proposed Project were evaluated in the DEIS/DEIR to determine if it was feasible to mitigate the under seepage and through seepage deficiencies via more benign methods. The No Action Alternative, which would involve no repairs to the levee system at this time, with emergency repairs to the existing levee completed on an as needed basis, would not provide an adequate level of flood control. Additionally, repairs done under emergency conditions are less likely to include avoidance, mitigation and BMPs measures (which the proposed Project does) and short-term impacts associated with emergency repairs would, over time, be cumulatively more significant than those of the proposed Project. The proposed action would facilitate the under seepage and through seepage repairs through a variety of methods including drained seepage berms, cutoff walls, chimney drains and landside fills.
- 3) The extent and permanence of the beneficial and/or detrimental effects which the proposed structure or work is likely to have on the public and private uses to which the area is suited. NEPA policy is to assess and avoid, as practical, all the potential impacts of a Federal action to the environment in an effort to “foster and promote the general welfare” (42 USC 4331, Section 101). The EIS/EIR assessed short- and long-term effects of the proposed Project and its alternatives, as well as cumulative and growth-inducing effects. From this assessment it was determined that the proposed Project will have no significant short- or long-term negative direct or indirect effects.

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The measure of public interest and support for the RD17 LSRP was validated by the citizens protected by the RD17 levee system in July 2008. Property owners overwhelmingly approved the assessment with 69% voting for the establishment of a new flood control assessment.

9.0 EXECUTIVE ORDER 11988

Executive Order 11988 (May 24, 1977) requires a Federal agency, when taking an action, to avoid short- and long-term adverse effects associated with the occupancy and the modification of a floodplain. In February 1978, the Water Resources Council issued Floodplain Management Guidelines for Implementing Executive Order 11988. These guidelines provide analysis of the Executive Order, definitions of key terms, and an eight-step decision-making process for carrying out the Executive Order's directives. The DEIS/DEIR documents the eight-step process and a discussion of the project's application of the process. The process contained in the Water Resources Council guidelines incorporates the basic requirements of the Executive Order.

In summary, the LSRP would reduce the risk of flood loss and minimize the effect of floods on human health, safety, and welfare by improving existing, authorized flood management infrastructure, and would increase protection for the existing population. Importantly, the LSRP would further protect farmland, agricultural commodities, and agricultural infrastructure for this crucial agricultural region. The area protected by the levee system is currently not within a FEMA designated floodplain. Therefore, the LSRP is not in conflict with Executive Order 11988 because the project would improve flood protection and because there is no reasonable and feasible alternative to the urban development already existing in the affected area. The Project further complies with this Executive Order as it is the most reasonable and feasible flood improvement alternative and the potential direct and indirect effects of the LSRP on growth and development have been disclosed in the DEIS/DEIR as part of the NEPA and CEQA processes. Because there is no reasonable and feasible alternative to levee improvements to provide protection to the existing urbanized communities, this action does not induce growth beyond existing community planning.

10.0 RESIDUAL RISK AND TRANSFER OF RISK EFFECTS OF THE PROPOSED MODIFICATION

10.1. RESIDUAL RISK

Implementation of the LSRP would substantially lessen the probability of flooding in the areas protected by levees by addressing the seepage, under seepage, and geometry deficiencies.

10.2. TRANSFER OF RISK

Improving portions of the federal project levee system protecting the basin as proposed by RD17 would not result in any significant, adverse hydraulic impacts or induce flooding to other sub-basins protected as part of the levee system. Indeed, the work proposed will bring these levees closer to the authorized level of protection. Furthermore, these improvements would be consistent with the principles that have guided the management of RD17 over the past century and with the policies adopted by the State Legislature calling for an immediate and comprehensive effort to increase the level of flood protection provided to urban areas within the California Central Valley.

The majority of the LSRP improvements consist of cutoff walls and seepage berms, which have no effect on the existing river channel hydraulics of the San Joaquin River. A setback levee is proposed at Element IVc and was found to have a negligible effect on hydraulics. Hydraulic analysis of the setback levee indicates that no changes to the water surface elevation are expected and the project would not affect the authorized level of protection locally or regionally.

11.0 TECHNICAL ANALYSIS AND ADEQUACY OF DESIGN

11.1. GEOTECHNICAL ANALYSIS

In 2007, RD17 contracted the geotechnical firm, ENGEO, Inc. to prepare an Under Seepage Evaluation Report for the limits of the RD17 levee system. A final report was issued in January 2014. Proposed repair projects were designed to meet under seepage and through seepage criteria provided by USACE and DWR (within the Urban Levee Design Criteria document).

The geotechnical design aspects of several potential seepage mitigation alternatives were originally evaluated for the LSRP including:

- ❖ Drained seepage berms
- ❖ Undrained seepage berms
- ❖ Cut-off walls
- ❖ Relief wells
- ❖ Setback levees
- ❖ Drainage collection trenches
- ❖ Chimney Drains
- ❖ Raised Landside Grade

To develop the preferred alternative for each element, each alternative was evaluated based on the ability to achieve the following results:

- ❖ Mitigation of historic performance concerns
- ❖ Reduction in under seepage exit gradient
- ❖ Reduction in through seepage induced slope instability
- ❖ Flood fighting flexibility
- ❖ Seismic resiliency
- ❖ Design water surface elevation adaptability
- ❖ Minimization of long-term maintenance
- ❖ Minimization of hydraulic impacts

Based on the above selection criteria, drained seepage berms (for under seepage) with chimney drains (for through seepage) were selected as the preferred mitigation alternative. In locations where drained seepage berms were not feasible (due to landside encroachments or construction constraints) cut-off walls were the preferred alternative (for both under seepage and through seepage). In low-lying areas, drained and undrained seepage berms are proposed in conjunction with raising the landside grade. Also, at one location within the Phase III LSRP a setback levee was selected as the preferred alternative.

Reference is made to the following documents for detailed information regarding the geotechnical investigation and analysis performed for the RD17 LSRP:

- ❖ Under-Seepage Evaluation, Reclamation District 17 Mossdale Tract (ENGEO, February 2009)
- ❖ Seepage Evaluation, Reclamation District 17, Mossdale Tract, Phase III Levee Seepage Repair Project (ENGEO, January 2014)

11.2. HYDRAULICS AND HYDROLOGY ANALYSIS

Over the years numerous hydraulic analyses have been performed for this section of the San Joaquin River system including the following

- ❖ 1955 USACE Project Design Flood Plane Evaluation
- ❖ 1979 USACE Flood Insurance Study 100-yr WSEL
- ❖ 1988 FEMA Flood Insurance Study 100-yr WSEL
- ❖ 1990 FEMA accredited 100-year DWSEL and
- ❖ 2002 USACE Comp Study 100-yr WSEL
- ❖ 2009 FEMA Flood Insurance Study 100-yr WSEL
- ❖ The 200-year and 500-year water surface elevations established in the 2002 USACE Comprehensive Study (as provided to us by the California DWR).

In selecting a Design Water Surface Elevation (DWSEL) RD17 evaluated the prior analyses and chose the higher and thus more conservative water surface as the DWSEL. This resulted in using the 1990 FEMA 100-year DWSEL from stations 0+00 to approximately 693+00 and the 200-year Corps Comprehensive Study from approximately station 693+00 to 854+00.

11.3. RISK AND UNCERTAINTY ANALYSIS

Hydraulic analysis of the setback levee indicates that no changes to the water surface elevation are expected and the project would not affect the authorized level of projection locally or regionally.

11.4. LEVEE VEGETATION MANAGEMENT

The RD17 Phase III LSRP will be implemented consistent with the Corps' current levee vegetation standards.

11.5. REAL ESTATE ANALYSIS

The Phase III Project involves real property interests required for its construction and subsequent operation and maintenance. RD17 will acquire fee title to the areas required for the levee improvement facilities. In addition, permanent easements will be acquired for access to the levee system and temporary construction easements will be acquired for haul routes and working areas. As of January 2012, property rights have only been acquired for construction of Elements IIIa & IVb (acquired during the Phase I project) and Elements IIIb, IVa (from the City of Lathrop during the Phase II project). Additional

property rights will need to be acquired for the remaining Elements in support of the Phase III LSRP.

11.5.1. PROPERTY/EASEMENTS TO BE ACQUIRED

Due to the age of the system, and the numerous projects to upgrade the levee system over the years, the land rights vary significantly throughout the project. One objective of the project is to, where feasible, upgrade these rights so that the State and local maintaining agencies have appropriate and consistent land rights throughout the length to construct the project and to operate and maintain the levee system. To this end, RD17 will attempt to acquire 20 feet from the landside toe of the levee or landside drained seepage berm toe. In developed areas, RD17 would seek to acquire as much right-of-way as feasible; at a minimum, to facilitate construction of the project and as feasible 20 feet from the landside toe of the levee or landside drained seepage berm toe. Where the current rights beneath or adjacent to the levee are currently owned as an easement, the project would attempt to upgrade the rights to fee ownership in most cases.

11.5.2. RELOCATION ASSISTANCE

Although no acquisitions identified within the RD17 are expected to require relocation assistance, should they be required, RD17 will comply with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (42 USC 4601 et seq.), Public Law 916456 for eligible owners and/or tenants. If needed, a comprehensive Relocation Plan will be developed to address the needs of displaced owners and tenants.

11.6. SAFETY ASSURANCE REVIEW

The purpose of a Safety Assurance Review (SAR) Plan is to verify that sound engineering is used in the design of the proposed LSRP. The SAR Plan includes an Independent External Peer Review (IEPR) by impartial experts in the fields of geotechnical and hydraulic engineering. The IEPR team consists of the Board of Senior Consultants (BOSC). The LSAP BOSC includes Dr. Robert Pyke, Mr. Edwin M. Hultgren, Mr. Don Babbitt, and Dr. John DeGeorge. Dr. Pyke, Mr. Hultgren and Mr. Babbitt are recognized experts in civil engineering and geotechnical engineering related to the planning, design and construction of flood control projects. Dr. DeGeorge is a recognized expert in hydrologic and hydraulic engineering.

The panel has provided independent review of the engineering design, geotechnical reports, and the project alternatives descriptions, and they have provided a letter commenting on the adequacy, appropriateness, and acceptability of the final engineering.

12.0 ADMINISTRATIVE RECORD

RD17 and its consultants are continuing to compile an Administrative Record as required by NEPA and CEQA. The Administrative Record includes everything the District has considered in reaching a Federal decision regarding this proposed action. Significant contributions to this effort are listed in the RD17 Phase III – 100-Year Levee Seepage Area Project DEIS/DEIR.

13.0 TECHNICAL SUPPORT DOCUMENTS

There are two types of references for this project; Design Criteria Documents and RD17 Design Documents. The design criteria documents are guidelines developed by regulatory agencies, and RD17 design documents are consultant reports, plans and studies that contain information specific to the RD17 levee system utilized in design of the Project.

13.1. DESIGN CRITERIA DOCUMENTS

13.1.1. U.S. ARMY CORPS OF ENGINEERS (USACE)

Engineer Technical Letters (ETL)

ETL 1110-2-569, Design Guidance for Levee Under-seepage, May 1, 2005.

Engineer Regulations (ER)

ER 1110-1-12, Quality Management, September 30, 2006

ER 1105-2-100, Planning Guidance Notebook, April 22, 2000. Amended: June 20, 2004, January 31, 2007, and November 30, 2007.

ER 1130-2-530, Flood Control Operations & Maintenance Policies, October 30, 1996.

ER 1110-2-1150, Engineering and Design for Civil Works Projects, August 31, 1999.

Engineer Manuals (EM)

EM 1110-1-1804, Geotechnical Investigations, January 1, 2001.

EM 1110-1-1904, Settlement Analysis, September 30, 1990.

EM 1110-2-1901, Seepage Analysis and Control for Dams, April 30, 1993.

EM 1110-2-1902, Slope Stability, October 31, 2003.

EM 1110-2-1908, Instrumentation of Embankment Dams and Levees, June 30, 1995.

EM 1110-2-1913, Design and Construction of Levees, April 30, 2000.

EM 1110-2-2902, Conduits, Culverts, and Pipes, March 31, 1998.

Other USACE Documents

USACE, Sacramento District, Geotechnical Levee Practice, April 11, 2008.

USACE, Sacramento and San Joaquin River Basins, California, Comprehensive Study Interim Report. December 20, 2002.

USACE, Sacramento and San Joaquin River Basins, California, Comprehensive Study Technical Studies Documentation. December 2002.

USACE, Economic Guidance Memorandum, Federal Interest Rates for Corps of Engineers Projects for Fiscal Year 2010. October 26, 2009.

USACE, Memorandum to SAFCS, Subject: Responses to the Letter Dated 14 November 2008 Regarding Natomas Levee Improvement Project. August 14, 2009.

13.1.2. FEMA

Federal Emergency Management Agency, Guidance on Levee Certification for the National Flood Insurance Program, March 25, 1997.

Federal Emergency Management Agency, Requirements of 44 CFR Section 65.10: Mapping of Areas Protected by Levee Systems, March 2007.

Federal Emergency Management Agency, Title 44 Emergency Management and Assistance.

Chapter 1, Federal Emergency Management Agency Part 65 – Identification and Mapping of Special Hazard Area, October 1, 2002.

13.1.3. STATE/COUNTY AGENCIES

California Code of Regulations, Title 23

California Department of Water Resources (DWR), Urban Levee Design Criteria, May 2012

13.1.4. RD17 DESIGN DOCUMENTS

Reclamation District 17 EIP application, March 2, 2009.

Survey Control Report, August 10, 2010

65% Civil Improvement plans (Draft), February 2014.

65% Geotechnical reports, February 2014.

65% Cost Estimate, February 2014.

Erosion Assessment Memorandum, February 2014.

Deterministic Hydraulic Impact Analysis for RD 17, February 2014.

DEIS/DEIR, February 2014.