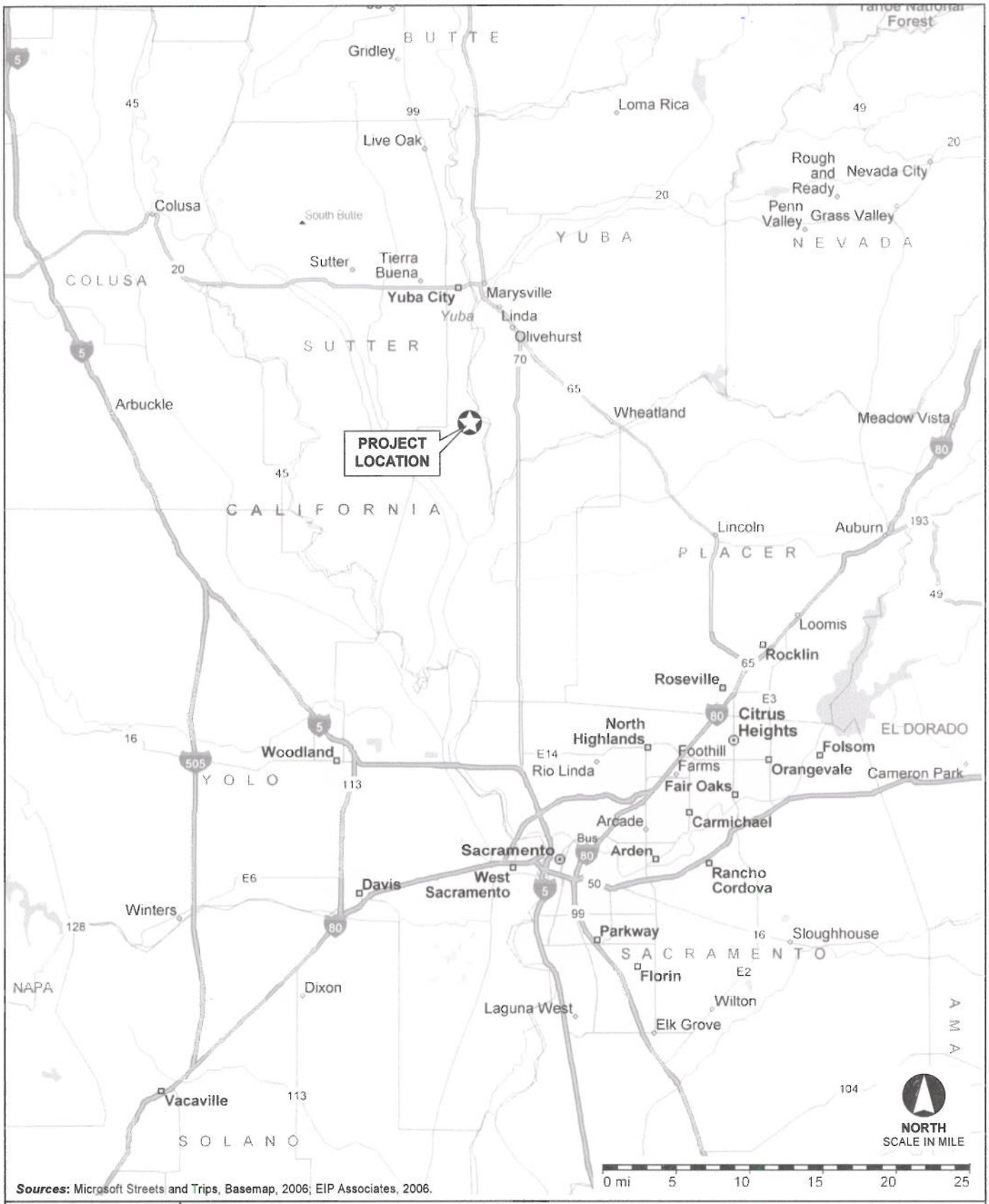


Sources: Microsoft Streets and Trips, Basemap, 2006; EIP Associates, 2006.

EIP

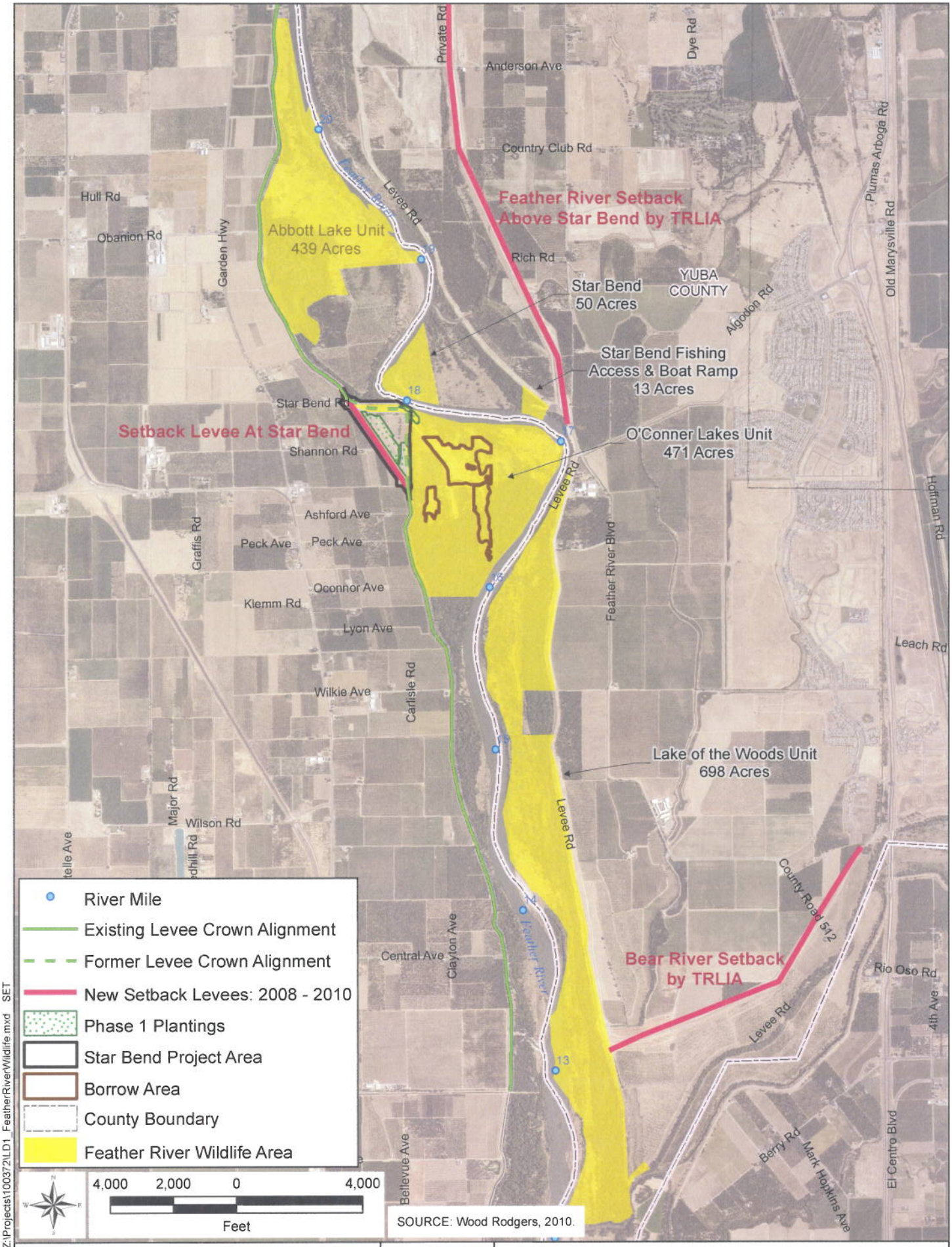
A Division of PBS

FIGURE **2-1**

Regional Location Map

D51183.00

Star Bend Setback Levee EIR

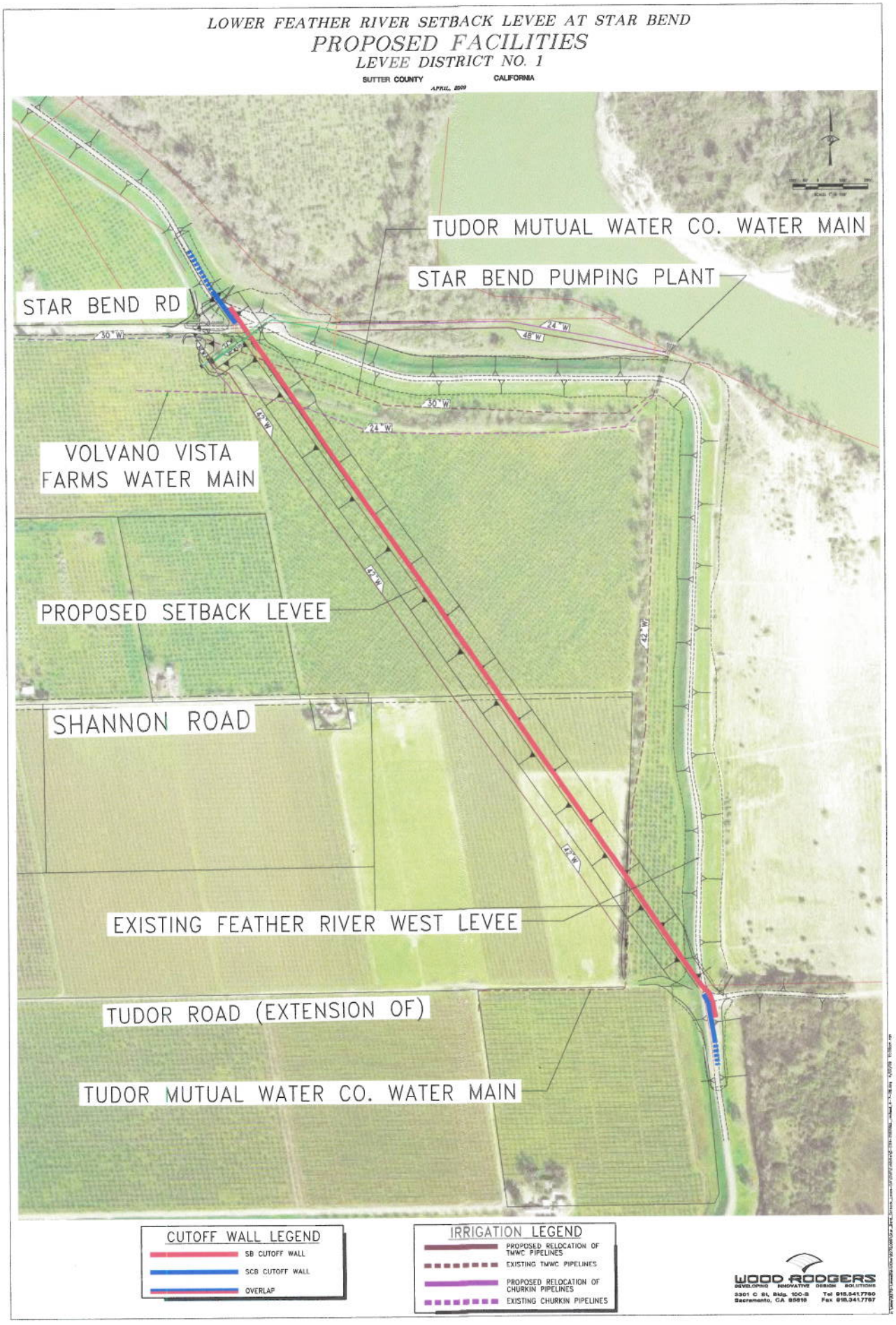


Z:\Projects\100372\LD1_FeatherRiverWildlife.mxd SET

3-Jan-2011

Supplement to Standard O&M Manual	GEI Consultants Bookman-Edmonston Division	Local Units of Feather River Wildlife Area
Levee District One of Sutter County		JULY 2012 FIGURE 6

Attachment A3
Figure 2



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

December 20, 2013

Francis K. Silva, Chairman
Levee District 1, Sutter
250 Second Street
Yuba City, California 95991

Subject: Transfer of Operations and Maintenance Responsibilities for the Feather River Setback at Star Bend Project

Dear Mr. Silva:

This letter transfers responsibilities for operations and maintenance of the Star Bend Setback Levee, a portion of the Feather River west (right) bank levee in Unit 144 of the Sacramento River Flood Control Project (SRFCP), from the Central Valley Flood Protection Board (Board) to Levee District 1, Sutter (LD 1).

The project included degrade of approximately 4,500 feet of existing project levee, and construction of approximately 3,400 feet of setback levee and cutoff wall between Levee Mile 4.20 and 3.55.

In accordance with the U.S. Army Corps of Engineers (USACE), Sacramento District *Supplement to Standard Operation and Maintenance Manual, Sacramento River Flood Control Project, Unit No. 144, West Levee of Feather River from North Boundary of Levee District No. 1 to North Boundary of Maintenance Area 3 (Previously Reclamation District No. 823),* assurances are provided by local interests and the Board. Paragraphs 1-06 through 1-08 state:

> 1-06 "*Assurance of cooperation by local interests is provided by State Legislation, as contained in Chapter 3, Part 2, Division 5, of the State Water Code under paragraph 2-02a of the Standard Manual."*
>
> 1-07 *"Responsibility for operating and maintaining the completed works was officially accepted by the Reclamation Board of the State of California on 18 December 1951 and 2 December 1952, as included in the SSO&M, letters of acceptance, Exhibit E."*
>
> 1-08 *"The name and address of the Superintendent appointed by local interests to be responsible for the continuous inspection, operation and maintenance of the project works shall be furnished to the District Engineer, and in case of any change of Superintendent, the District Engineer shall be so notified."*

In accordance with USACE Engineer Regulation (ER) 1110-2-401, "*Operation, Maintenance, Repair, Replacement, and Rehabilitation Manual for projects and separable elements managed by project sponsors*" the permit applicant, LD 1, is required to submit specified documents that are outlined in the manual as part of the finalization of the project and ultimate final project closeout. This letter documents completion of these requirements.

On June 1, 2009, pursuant to 33 USC 408, the USACE Director of Civil Works approved the Board's November 14, 2008 request on LD 1's behalf to alter the SRFCP as part of the Feather

River Setback at Star Bend project. This project, implemented by LD 1 was the subject of Board permit number 18191 (Enclosure 1). The USACE Sacramento District granted permission to alter the SRFCP on June 16, 2009, as it had determined that such alteration would not be injurious to the public interest and would not impair the usefulness of the project work. LD 1 substantially completed project construction in fall 2009 followed by project certifications of four registered professional engineers.

As directed by the USACE in its June 2009 permission, LD 1 submitted a revised *Supplement to Standard Operation and Maintenance Manual,* along with project as-built drawings, a Construction Completion Report, and a Flood Safety and Preparedness Plan in July 2012. Board staff reviewed these submittals and determined that the project: (1) was constructed in accordance with final (100 percent) plans and specifications, (2) met all Board permit conditions (including all USACE conditions incorporated into the Board permit), and (3) was compliant with the Board's California Code of Regulations, Title 23. On October 23, 2012 Board staff notified the USACE Sacramento District by letter of these determinations.

On July 18, 2013 the USACE Sacramento District informed Board staff by letter that it had: (1) completed its review of the LD 1 submittals, (2) determined that the improvements were constructed in accordance with the final (100 percent) plans and specifications, (3) accepted the Star Bend Setback Levee project as part of the SRFCP, (4) transmitted the revised Supplement to the Standard O&M Manual and project as-built drawings to the Board staff, (5) accepted the *Levee District 1 Flood Safety and Preparedness Plan* as submitted, and (6) assigns the responsibility to operate and maintain the setback levee as part of the SRFCP to the Board.

Board Resolution 2013-21, adopted December 20, 2013, accepts operations and maintenance responsibilities for the Feather River Levee Setback Star at Star Bend from the USACE, and subsequently transfers those responsibilities to LD 1. Enclosure 2 of this letter is the "*Supplement to Standard Operation and Maintenance Manual for the Sacramento River Flood control Project, Unit No. 144, West Levee of the Feather River from North Boundary of LD-1 to North Boundary of Maintenance Area 3 (Previously Reclamation District 823)"* and project as-built drawings. This revised supplemental manual replaces the previous version in its entirety.

If you have any questions, please contact the Board's Project Manager, David R. Williams by phone at (916) 574-2379, or via email at David.R.Williams@water.ca.gov.

Sincerely,

Jay S. Punia
Executive Officer

Enclosures:
1) Board issued Permit No. 18191 BD
2) Supplement to Standard Operation and Maintenance Manual with As-built drawings, Sacramento River Flood Control Project, Unit No. 144, West Levee of Feather River from North Boundary of Levee District No. 1 to North Boundary of Maintenance Area 3

(Previously Reclamation District 823), June 2013. [On file at Board and USACE Sacramento District Offices] and included in the enclosed DVD.

cc: (Please see attached list)

cc: (via electronic file)

Central Valley Flood Protection Board
Mr. Len Marino, Chief Engineer
Mr. Eric Butler, Chief, Flood Projects and Environmental Branch

Department of Water Resources
Mr. Noel Lerner, Flood Maintenance Office
Mr. Michael Sabbaghian, Local Assistance Programs Branch
Mr. Don Rasmussen, Flood Project Integrity & Inspection Branch
Mr. David Pesavento, Inspections Section
Mr. Andrew Pendery, Chief Inspector, EIP
Ms. Kelly Fucciolo, Urban Flood Programs Section
Ms. Jennifer Fasani, Urban Flood Programs Section

U.S. Army Corps of Engineers, Sacramento District
Mr. Ryan Larson
Mr. Gary Kamei

Levee District 1 of Sutter County
Mr. Francis K. Silva, Chairman
Mr. Bill Hampton, General Manager

GEI Consultants, Inc.
Mr. Jeffery Twitchell

MHM Engineers Inc.
Mr. Sean Minard

STATE OF CALIFORNIA – THE RESOURCES AGENCY **ARNOLD SCHWARZENEGGER,** GOVERNOR

CENTRAL VALLEY FLOOD PROTECTION BOARD
3310 El Camino Ave., Rm. LL40
SACRAMENTO, CA 95821
(916) 574-0609 FAX: (916) 574-0682
PERMITS: (916) 574-0653 FAX: (916) 574-0682

November 14, 2008

Colonel Thomas C. Chapman, District Engineer
U.S. Army Corps of Engineers
Sacramento District
1325 J Street
Sacramento, California 95814

Dear Colonel Chapman:

Based on the Policy and Procedural Guidance for the Approval of Modification and Alteration of Corps of Engineers Projects dated October 23, 2006, and on behalf of Levee District No. 1 of Sutter County (LD1), the California Central Valley Flood Protection Board (Board) is requesting permission from the U.S. Army Corps of Engineers (Corps) to alter a portion of the Sacramento River Flood Control Project (SRFCP). The Board is making this request pursuant to 33 U.S.C. Section 408.

The Board has reviewed the project plans and drawings, the geotechnical report, hydraulic analysis, and other reports submitted by LD1 for the construction of a 3,400 foot backup levee that will eventually replace a portion of the existing Feather River west levee in Sutter County. The Board has determined that LD1 will accomplish this alteration in a manner that will not be injurious to the public interest and will not impair the usefulness of the SRFCP. Attached is the information you required to accompany this request as outlined in your October 23, 2006 policy and procedural guidance.

If the Corps approves this request, the Board will consider authorizing the proposed work by way of its permit process. If the proposed project is ultimately approved by the Board, and, upon completion, is formally incorporated within the federal SRFCP by the Corps, the State of California, acting through the Board, will accept the altered project for operation and maintenance and hold and save the United States free from damage due to the constructed works.

Within 180 days of completion of the project alteration the Board will provide both information to the Corps for the purposes of preparing a revised Operation and Maintenance Manual for this portion of the SRFCP, and as-built Plans and Specifications for the alteration.

In order to achieve the flood control benefits of this work for the 2009-2010 flood season, the Board is requesting that the Corps make any necessary determination so that LD1 may proceed with this alteration by April 2009.

If you have any questions, please feel free to contact me at (916) 574-0609, or your staff may contact Dan S. Fua, Staff Engineer of the Board, at (916) 574-0698.

Sincerely,

Jay S. Punia

Jay. S. Punia
Executive Officer

Attachment

cc: Mr. Bill Hampton, General Manager (w/o attachment)
Levee District No. 1 of Sutter County
243 Second Street
Yuba City, California 95991

Mr. Jeffrey E. Twitchell (w/o attachment)
Wood Rodgers, Inc
3301 C Street, Bldg. 100-B
Sacramento, California 95816

STATE OF CALIFORNIA
THE RESOURCES AGENCY
CENTRAL VALLEY FLOOD PROTECTION BOARD

PERMIT NO. 18191 BD

This Permit is issued to:

Levee District No. 1, Sutter County
243 Second Street
Yuba City, California 95991

To remove approximately 4,500 linear-feet of existing project levee and construct a 3,400-linear-foot-long setback levee (LM 3.75 to 4.5) with a slurry cutoff wall; and modifying the existing pipelines at Star Bend on the right (west) bank of the Feather River. The project is located south of Yuba City, northeast of the intersection of Highway 99 and Garden Highway (Section 1&2, T13N, R3E, MDB&M, Levee District 1 Sutter, Feather River, Sutter County).

NOTE: Special Conditions have been incorporated herein which may place limitations on and/or require modification of your proposed project described above.

(SEAL)

Dated: MAY 11 2009

Jay S. Punia
Executive Officer

GENERAL CONDITIONS:

ONE: This permit is issued under the provisions of Sections 8700 – 8723 of the Water Code.

TWO: Only work described in the subject application is authorized hereby.

THREE: This permit does not grant a right to use or construct works on land owned by the Sacramento and San Joaquin Drainage District or on any other land.

FOUR: The approved work shall be accomplished under the direction and supervision of the State Department of Water Resources, and the permittee shall conform to all requirements of the Department and the Central Valley Flood Protection Board.

FIVE: Unless the work herein contemplated shall have been commenced within one year after issuance of this permit, the Board reserves the right to change any conditions in this permit as may be consistent with current flood control standards and policies of the Central Valley Flood Protection

Board.

SIX: This permit shall remain in effect until revoked. In the event any conditions in this permit are not complied with, it may be revoked on 15 day's notice.

SEVEN: It is understood and agreed to by the permittee that the start of any work under this permit shall constitute an acceptance of the conditions in this permit and an agreement to perform work in accordance therewith.

EIGHT: This permit does not establish any precedent with respect to any other application received by the Central Valley Flood Protection Board.

NINE: The permittee shall, when required by law, secure the written order or consent from all other public agencies having jurisdiction.

TEN: The permittee is responsible for all personal liability and property damage which may arise out of failure on the permittee's part to perform the obligations under this permit. If any claim of liability is made against the State of California, or any departments thereof, the United States of America, a local district or other maintaining agencies and the officers, agents or employees thereof, the permittee shall defend and shall hold each of them harmless from each claim.

ELEVEN: The permittee shall exercise reasonable care to operate and maintain any work authorized herein to preclude injury to or damage to any works necessary to any plan of flood control adopted by the Board or the Legislature, or interfere with the successful execution, functioning or operation of any plan of flood control adopted by the Board or the Legislature.

TWELVE: Should any of the work not conform to the conditions of this permit, the permittee, upon order of the Central Valley Flood Protection Board, shall in the manner prescribed by the Board be responsible for the cost and expense to remove, alter, relocate, or reconstruct all or any part of the work herein approved.

SPECIAL CONDITIONS FOR PERMIT NO. 18191 BD

THIRTEEN: No construction shall occur until the Army Corps of Engineers approves the project under 33 USC Section 408. The approval letter shall be incorporated into this permit as Exhibit A and all conditions from Section 408 approval provided by the Corps of Engineers shall be incorporated into this permit as if fully set forth herein if they are not in conflict with the Central Valley Flood Protection Board's regulations (Title 23 California Code of regulations).

FOURTEEN: No work authorized by this permit shall be performed until the Department of Water Resources have received, reviewed, and approved in writing, a complete set of final submitted plans, drawings, and specifications for the project. The Central Valley Flood Protection Board shall have up to 30 days after receipt of plans, drawings, and specifications for the review process. The Central Valley Flood Protection Board and/or the Department of Water Resources may extend this review period up to 15 days by written notification.

FIFTEEN: All addendums or other changes made to the submitted documents by the permittee after issuance of this permit are subject to submittal and review for approval by the Central Valley Flood Protection Board prior to incorporation into the permitted project. Upon review and approval of any new submitted documents the permit shall be revised, if needed, prior to the construction related to the proposed changes. The Central Valley Flood Protection Board shall have up to 30 days after receipt of any documents, plans, drawings and specifications for review and approval. The Central Valley Flood Protection Board may extend this review and approval period up to 15 days by written notification.

SIXTEEN: The mitigation measures approved by the permittee and found in its Mitigation and Monitoring Reporting Plan (MMRP) are made a condition of this permit. The permittee shall

implement all such mitigation measures. However, the measures in the MMRP may be modified to accommodate changed circumstances or new information not triggering the need for subsequent or supplemental analysis under CEQA Guidelines sections 15062 and 15063 with advance notice of the proposed changes and submittal of supporting documentation for review and comment to the Environmental Scientist of the Central Valley Flood Protection Board.

SEVENTEEN: The permittee shall comply with all conditions set forth in the letter from the Deparment of the Army dated April 03, 2009, which is attached to this permit as Exhibit A and is incorporated by reference.

EIGHTEEN: Within three years from completion of the construction of the work authorized under this permit, the permittee shall provide the Sacramento and San Joaquin Drainage District, acting by and through the Central Valley Flood Protection Board of the State of California, a fee interest or a permanent easement granting all flood control rights upon, over and across the property to be occupied by the existing or to-be-constructed levee and to-be-reconstructed levee, including the area of the backup levee, cutoff walls and the tie-ins to the existing federal project levees. The easement must include the area within the floodway, the levee section, and the area within fifty (50) feet in width adjacent to the landward levee toe if the area is not presently encumbered by a Central Valley Flood Protection Board easement. For information regarding existing Central Valley Flood Protection Board easements, please contact J. D. Asis at (916) 653-3947.

NINETEEN: All work approved by this permit shall be in accordance with the final (100%) submitted drawings and specifications except as modified by special permit conditions herein. No further work, other than that approved by this permit, shall be done in the area without prior approval of the Central Valley Flood Protection Board.

TWENTY: Prior to commencement of work, the permittee shall create a photo record, including associated descriptions, of existing levee conditions. The photo record shall be certified (signed and stamped) by a licensed land surveyor or professional engineer registered in the State of California and submitted to the Central Valley Flood Protection Board within 30 days of beginning the project.

TWENTY-ONE: Upon completion of the project, the permittee shall perform a levee crown profile survey and create a photo record, including associated descriptions, of "as-built" levee conditions. The levee crown profile survey and photo record shall be certified (stamped and signed) by a licensed land surveyor or professional engineer registered in the State of California and submitted to the Central Valley Flood Protection Board within 120 days of project completion.

TWENTY-TWO: The permittee shall maintain the permitted encroachment(s) and the project works within the utilized area in the manner required and as requested by the authorized representative of the Department of Water Resources or any other agency responsible for maintenance.

TWENTY-THREE: The permittee shall contact the Department of Water Resources by telephone, (916) 574-0648, and submit the enclosed postcard to schedule a preconstruction conference. Failure to do so at least 10 working days prior to start of work may result in delay of the project.

TWENTY-FOUR: Prior to starting construction under this permit, the permittee shall contact the Department of Water Resources regarding inspection of the project during construction for EIP purposes.

TWENTY-FIVE: The permittee shall provide supervision and inspection services acceptable to the Central Valley Flood Protection Board.

TWENTY-SIX: Within 120 days of completion of the project, the permittee shall submit to the Central Valley Flood Protection Board a certification report, stamped and signed by a professional engineer registered in the State of California, certifying that the work was inspected and performed in accordance with the Central Valley Flood Protection Board permit conditions and submitted drawings and specifications.

TWENTY-SEVEN: Within 120 days of completion of the project, the permittee shall submit to the Central Valley Flood Protection Board proposed revisions to the Corps of Engineers, Supplement to Standard Operation and Maintainance Manual, Sacramento River Flood Control Project, Unit 144 and the associated as-built drawings for system alterations approved by this permit that are to be incorporated into the federal Sacramento River Flood Control Project.

TWENTY-EIGHT: If FEMA certification of the levee by the U. S. Army Corps of Engineers is being considered, the project proponent should contact the U. S. Army Corps of Engineers regarding inspection of the project during construction for FEMA certification purposes.

TWENTY-NINE: The permittee shall contact the U. S. Army Corps of Engineers regarding inspection of the project during construction as the proposed work is an alteration to the existing Federal Flood Control Project that will be incorporated into the Sacramento River Flood Control Project, an adopted plan of flood control.

THIRTY: The Central Valley Flood Protection Board and Department of Water Resources shall not be held liable for any damages to the permitted encroachment(s) resulting from flood fight, operation, maintenance, inspection, or emergency repair.

THIRTY-ONE: The permittee may be required, at permittee's cost and expense, to remove, alter, relocate, or reconstruct all or any part of the permitted encroachment(s) if removal, alteration, relocation, or reconstruction is necessary as part of or in conjunction with any present or future flood control plan or project or if damaged by any cause. If the permittee does not comply, the Central Valley Flood Protection Board may remove the encroachment(s) at the permittee's expense.

THIRTY-TWO: The permittee should contact the U.S. Army Corps of Engineers, Sacramento District, Regulatory Branch, 1325 J Street, Sacramento, California 95814, telephone (916) 557-5250, as compliance with Section 10 of the Rivers and Harbors Act and/or Section 404 of the Clean Water Act may be required.

THIRTY-THREE: The permittee shall be responsible for repair of any damages to the project levee and other flood control facilities due to construction, operation, or maintenance of the proposed project.

THIRTY-FOUR: The permittee is responsible for all liability associated with construction, operation, and maintenance of the permitted facilities and shall defend and hold harmless the State of California, or any departments thereof, from any liability or claims of liability associated therewith.

THIRTY-FIVE: If the project, or any portion thereof, is to be abandoned in the future, the permittee or successor shall abandon the project under direction of the Central Valley Flood Protection Board and Department of Water Resources, at the permittee's or successor's cost and expense.

THIRTY-SIX: Upon completion of the project, the permittee shall submit as-built drawings to: Department of Water Resources, Flood Project Inspection Section, 3310 El Camino Avenue, Suite LL30, Sacramento, California 95821.

THIRTY-SEVEN: No construction work of any kind shall be done during the flood season from November 1 to April 15 without prior approval of the Central Valley Flood Protection Board.

THIRTY-EIGHT: Cleared trees and brush shall be completely burned or removed from the floodway, and downed trees or brush shall not remain in the floodway during the flood season from November 1 to April 15.

THIRTY-NINE: No material stockpiles, temporary buildings, or equipment shall remain in the floodway during the flood season from November 1 to April 15.

FORTY: The permitted encroachment(s) shall not interfere with operation and maintenance of the flood control project. If the permitted encroachment(s) are determined by any agency responsible for operation or maintenance of the flood control project to interfere, the permittee shall be required, at permittee's cost and expense, to modify or remove the permitted encroachment(s) under direction of the Central Valley Flood Protection Board or Department of Water Resources. If the permittee does not comply, the Central Valley Flood Protection Board may modify or remove the encroachment(s) at the permittee's expense.

FORTY-ONE: During demolition/construction of the project, any and all anticipated or unanticipated conditions encountered which may impact levee integrity or flood control shall be brought to the attention of the Flood Project Inspector immediately and prior to continuation.

FORTY-TWO: The stability of the levee shall be maintained at all times during construction.

FORTY-THREE: Excavations below the design flood plane and within the levee section or within 10 feet of the projected waterward and landward levee slopes shall have side slopes no steeper than 1 horizontal to 1 vertical. Flatter slopes may be required to ensure stability of the excavation.

FORTY-FOUR: A profile of the levee crown roadway and access ramps that will be utilized for access to and from the borrow area shall be submitted to the Central Valley Flood Protection Board prior to commencement of excavation.

FORTY-FIVE: The haul ramps and utilized levee crown roadway shall be maintained in a manner prescribed by the authorized representative of the Department of Water Resources or any other agency responsible for maintenance.

FORTY-SIX: Any damage to the levee crown roadway or access ramps that will be utilized for access for this project shall be promptly repaired to the condition that existed prior to this project.

FORTY-SEVEN: Equipment used in the construction of the cutoff walls shall not exceed live-load

surcharge to a level that causes or contributes to the instability of the levee during construction operations.

FORTY-EIGHT: Fluid pressures in the cutoff wall construction zones shall be carefully monitored and controlled to minimize the potential for hydrofracturing.

FORTY-NINE: The permittee shall be responsible for all damages due to settlement, consolidation, or heave from any construction-induced activities.

FIFTY: Excess bentonite or other cutoff wall fluids shall be properly disposed of outside of the floodway. The bentonite or other cutoff wall fluids shall not be used as backfill material during construction or reconstruction of the levee.

FIFTY-ONE: All fencing, gates and signs removed during construction of this project shall be replaced in kind and at the original locations. If it is necessary to relocate any fence, gate or sign, the permittee is required to obtain written approval from the Central Valley Flood Control Board prior to installation at a new location if not shown on the submitted plans.

FIFTY-TWO: All temporary fencing, gates and signs shall be removed upon completion of the project.

FIFTY-THREE: Any pipe or conduit being reinstalled in the levee section or within fifty (50) feet of both the waterward and landward levee toes shall meet Title 23 standards.

FIFTY-FOUR: Fill on the levee slopes shall be keyed into the existing levee section with each lift.

FIFTY-FIVE: Backfill material for excavations within the existing levee sections, the new levee and within 10 feet of the levee toes of both levees shall be placed in 4- to 6-inch layers, moisture conditioned above optimum moisture content, and compacted to a minimum of 95 percent relative compaction as measured by ASTM Method D698.

FIFTY-SIX: Density tests by a certified materials laboratory will be required to verify compaction of backfill within the levee section and within ten (10) feet of the levee toes on both the existing and new levee sections.

FIFTY-SEVEN: Earthen material meeting the requirements designated in Condition Fifty-Nine shall be used when constructing the backup levee or reconstructing the degraded areas of the existing levee, and no cuts shall remain in the levee section upon completion.

FIFTY-EIGHT: Fill material shall be placed only within the area indicated on the approved plans.

FIFTY-NINE: All fill material shall be imported impervious material with 20 percent or more passing the No. 200 sieve, a plasticity index of 8 or more, and a liquid limit of less than 50 and free of lumps or stones exceeding 3 inches in greatest dimension, vegetative matter, or other unsatisfactory material.

SIXTY: The fill surface areas shall be graded to direct drainage away from the toes of the levees.

SIXTY-ONE: The slopes of the proposed and reconstructed levees shall be no steeper than 3 horizontal to 1 vertical on the water side and 2 horizontal to 1 vertical on the land side.

SIXTY-TWO: The new and reconstructed crown roadway and access ramps shall be surfaced with a minimum of 4 inches of compacted, Class 2, aggregate base (Caltrans Specification 26-1.02A).

SIXTY-THREE: Aggregate base material shall be compacted to a relative compaction of not less than 95 percent per ASTM Method D1557-91, with a moisture content sufficient to obtain the required compaction.

SIXTY-FOUR: The project site including the levee sections and access ramps shall be restored to at least the condition that existed prior to commencement of work and there shall be no visible trace of the cutoff walls.

SIXTY-FIVE: All debris generated by this project shall be disposed of outside the floodway and off the levee sections.

SIXTY-SIX: The permittee shall replant or reseed the levee slopes to restore sod, grass, or other non-woody ground covers if damaged during project work.

SIXTY-SEVEN: In the event existing revetment on the channel banks or levee slopes is disturbed or displaced, it shall be restored to its original condition upon completion of the proposed installation.

SIXTY-EIGHT: In the event that levee or bank erosion injurious to the adopted plan of flood control occurs at or adjacent to the permitted encroachment(s), the permittee shall repair the eroded area and propose measures, to be approved by the Central Valley Flood Protection Board, to prevent further erosion.

SIXTY-NINE: No material, other than temporarily stored materials during construction, shall be stockpiled closer than 50 feet from the landward toe of the project or new levees.

SEVENTY: Any damage caused to the levees during placement or removal of the stockpiled material shall be repaired.

SEVENTY-ONE: All reconstructed and new pipelines shall be tested and confirmed free of leaks by X-ray, pressure tests, or other approved methods during construction or anytime after construction upon request by the Central Valley Flood Protection Board.

SEVENTY-TWO: All abandoned piping, conduits and appurtenances shall be removed from the levee section and areas encompassed by the easements as defined by this permit.

SEVENTY-THREE: Any additional encroachment(s) in the floodway, on or in the levee section and within ten (10) feet of the landward levee toe by the permittee or other parties require an approved permit from the Central Valley Flood Protection Board and shall be in compliance with the Central Valley Flood Protection Board's regulations (Title 23 California Code of Regulations).

SEVENTY-FOUR: By acceptance of this permit, the permittee acknowledges the authority of the Central Valley Flood Control Board to regulate all future encroachments along this levee reach

including those that may encroach upon alterations approved by this permit prior to incorporation into the federal Sacramento River Flood Control Project by the U. S. Army Corps of Engineers.

SEVENTY-FIVE: If the permittee or successor does not comply with the conditions of this permit and an enforcement by the Central Valley Flood Protection Board is required, the permittee or successor shall be responsible for bearing all costs associated with the enforcement action, including reasonable attorney's fees.

SEVENTY-SIX: The permittee acknowledges that some portions of the levee may be overbuilt to account for settlement and that upon adoption of the updated Central Valley Flood Managenent Plan the permittee shall perform a levee crown survey of all levee crown covered by this permit and said profile shall be compared to the levee crown profile adopted in the updated Central Vallet Flood Management Plan. The permittee shall ensure that the levee crown does not exceed the updated Central Valley Flood Management Plan.

SEVENTY-SEVEN: The permittee shall not start construction of the foundation cutoff wall until the permittee can assure the Central Valley Flood Protection Board that the backup levee can be completely constructed in one construction season. If unforseen circumstances occur that could jeopardise the assurance given the permittee must have a mitigation plan to address those circumstances as soon as they are encountered and approved by the Central Valley Flood Protection Board with Board staff participation as to the mitigation.

EXHIBIT A
Attachment D

DEPARTMENT OF THE ARMY
U.S. Army Engineer District, Sacramento
Corps of Engineers
1325 J Street
Sacramento, California 95814-2922

REPLY TO
ATTENTION OF

Flood Protection and Navigation Section (18191)

Mr. Jay Punia, Executive Officer
Central Valley Flood Protection Board
3310 El Camino Ave. Rm. LL40
Sacramento, California 95821

APR 03 2009

Dear Mr. Punia:

We have reviewed a permit application by Levee District No. 1, Sutter County (application number 18191). This project includes removing approximately 1.5 miles of existing project levee and constructing a 3,400 foot long setback levee (river mile 16.75 to 18.25) with a slurry cutoff wall, and modifying the existing pipelines at Star Bend on the right (west) bank of the Feather River. This project is located south of Yuba City, at 39.0074°N 121.5997°W NAD83, Sutter County, California.

The District Engineer has no objection to conditional approval of this application by your Board from a flood control standpoint, subject to the following conditions:

a. That the permit shall be subject to HQ USACE issuing Section 408 approval. If HQ USACE disapproves the Section 408 request, the Central Valley Flood Protection Board shall notify the applicant that the conditional permit is no longer valid.

b. That the modifications to the existing pipelines shall be subject to conditions outlined in our letters dated March 26, 2009 for permits 18437 and 18438.

c. That no stockpiles of material or equipment shall remain in the floodway during the flood season of November 1 to April 15.

d. That in the event trees and brush are cleared, they shall be grubbed and properly disposed of either by complete burning or complete removal outside the limits of the project right-of-way.

Based upon the information provided, no Section 10 or Section 404 permit is needed.

If you have any questions concerning our comments on this permit application, please contact Mr. Ryan Larson at (916) 557-7568 or Mr. Robert Murakami at (916) 557-6738.

Sincerely,

Kevin Knuuti, P.E.
Chief, Engineering Division

Copy Furnished:
Mr. Jeremy Arrich, Chief, Flood Project Integrity and Inspection Branch,
3310 El Camino Avenue, Suite LL30, Sacramento, CA 95821

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
441 G STREET NW
WASHINGTON, D.C. 20314-1000

CEMP-SPD

JUN 1 2009

MEMORANDUM FOR Commander, South Pacific Division (ATTN: CESPD-PDC)

SUBJECT: Sutter Basin, Sutter County, California - Feather River Levee Setback and Levee Degradation at Star Bend – Approval of a Flood Damage Reduction Project Alteration

1. Reference is made to CESPK-DE Memorandum dated 23 April 2009, providing the initial submission package for the subject request, and CESPD-PDC Memorandum dated 26 May 2009, providing the South Pacific Division endorsement of the request.

2. The request for approval of a Flood Damage Reduction Project Alteration under 33 U.S.C. 408 is approved. In addition, the Safety Assurance Review Plan, as mandated by Section 2035 of the Water Resources Development Act of 2007, is hereby approved for the subject project.

FOR THE COMMANDER:

STEVEN L. STOCKTON, P.E.
Director of Civil Works

File

DEPARTMENT OF THE ARMY
U.S. Army Engineer District, Sacramento
Corps of Engineers
1325 J Street
Sacramento, California 95814-2922

Executive Office

JUN 16 2009

Mr. Jay Punia
Executive Officer
Central Valley Flood Protection Board
3310 El Camino Avenue, Room LL40
Sacramento, California 95821

Dear Mr. Punia:

The Director of Civil Works for the U.S. Army Corps of Engineers has approved your request to alter the Federal flood damage reduction project, Sacramento River Flood Control Project, pursuant to U.S.C. Title 33, Chapter 9, Subchapter 1, Section 408. These alterations, collectively referred to as the Feather River Levee Setback Project at Star Bend, Sutter County, California, are the subject of encroachment permit # 18191. Permission has been granted for you to alter the aforementioned project works as it has been determined that such alteration will not be injurious to the public interest and will not impair the usefulness of the project works (Encl 1).

This letter of permission approves your proposed work, including construction of a 3,300-foot long setback levee along the right bank of the Feather River between Levee Mile (LM) 3.75 and 4.5 and simultaneous degradation of the existing levee between LM 3.75 and 4.5 as described in the plans and specifications reviewed by this office.

The term "you" and its derivatives, as used in this approval letter, means the Central Valley Flood Protection Board or any future transferee. The term "this office" refers to the Sacramento District of the U.S. Army Corps of Engineers. Alteration of this project must be in accordance with the following conditions:

Special Conditions:

a. This letter of permission does not authorize you to take any threatened or endangered species or designated critical habitat. In order to legally take a listed species, you must have a separate authorization under an Endangered Species Act Section 10 permit, or a Biological Opinion under Endangered Species Act Section 7, with incidental take provisions with which you must comply. The U.S. Fish and Wildlife Service (USFWS) Biological Opinion Number 81420-2009-F-0372-1, dated February 6, 2009, contains mandatory terms and conditions to implement the reasonable and prudent measures that are associated with incidental take that is also specified in the Biological Opinion. Your authorization under this Corps permission is conditional upon your compliance with all of the mandatory terms and conditions associated with the Biological Opinion, which terms and conditions are incorporated herein by reference

(Encl 2). Failure to comply with the terms and conditions associated with the incidental take statement in the Biological Opinion where a take of the listed species occurs, would constitute an unauthorized take, and it would also constitute non-compliance with your Corps permission. The USFWS is the appropriate authority to determine compliance with the terms and conditions of its Biological Opinion, and with the Endangered Species Act. The Central Valley Flood Protection Board must comply with all conditions of this Biological Opinion, including those ascribed to the Corps.

b. No work may result in a discharge, including a temporary discharge, of any material into any waters of the United States, including wetlands. You must employ best management practices, such as silt fences and mulching, to ensure that exposed soils do not erode and wash into any waters of the US.

c. To ensure your project complies with Section 106 of the National Historic Preservation Act and Public Resources Code 5097.98, you must comply with all terms of the Inadvertent Discovery Treatment Plan being developed in consultation with the Native American Most Likely Descendent (MLD) and State Historic Preservation Office (SHPO).

d. You are required to submit a revision to the LD 1 Operation and Maintenance (O&M) (33 CFR Section 208.10) Manual for this office's review within 180 days of project completion. You must also furnish a certification report that the work has been completed in accordance with the conditions of this permission, as-built drawings, and permanent maintenance easement boundaries in conjunction with the draft Operation and Maintenance manual. Upon receipt of the draft O&M manual, this office will schedule a transfer inspection with you to verify all construction has been completed in accordance with this permission. Any features found to be deficient during that inspection will require your correction prior to the Corps acknowledging that the work was completed in accordance with this permission.

e. Construction should be coordinated with this office. The proposed work shall be completed in one construction season beginning April 15 and ending November 1, unless otherwise approved in writing by your Board. Additionally, you must ensure adequate funding is available for complete construction of the setback levee and complete degradation of the existing levee in one construction season prior to initiation of construction.

f. Upon initiation of degradation, upstream dam operators shall be notified by the applicant and provided a notification roster for use upon decision of a release.

g. Degradation of the existing levee shall take place in layers and shall not be degraded more than 50 percent of design height, except for the southern and northern tie-in reaches during slurry-wall construction, until the new setback levee is at or above 50 percent of its design height. Degradation of the remaining levee may continue once the new levee is entirely at or above 50 percent of its design height.

h. If high water conditions occur, the southern and northern tie-in reaches shall be filled immediately to the height of the remainder of the levee and flood fighting procedures shall be followed.

i. You will follow and abide by your approved Safety Assurance Review plan dated April 20, 2009 prior to and during construction.

General Conditions:

a. You must accept the operation and maintenance responsibility of the completed work including all vegetation management requirements specified in your O&M manual.

b. You are responsible for continued operations and maintenance for this project during construction.

c. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of this approval.

d. Construction records, documenting field conditions, will be submitted to this office on a weekly basis.

e. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permission, you must immediately notify this office of your discovery. Inadvertent discoveries must be treated in accordance with the procedures specified by 36CFR800.13 requiring preparation of a treatment plan and consultation with the SHPO. If prehistoric human remains are discovered, the Corps is required to consult with the MLD to determine treatment of the remains.

f. To ensure there is mitigation for any increased residual flood risk, you are required to develop and submit a Floodplain Management Plan within one year of issuance of this permission that includes elements for flood information dissemination, public awareness training, flood warning and evacuation plans, emergency flood operations plan with annual exercise, dedicated evacuation resources, and post-flood recovery plans. You are required to participate in and comply with applicable Federal floodplain management and flood insurance programs.

Further Information:

a. Limits of this permission.

1. This permission does not obviate the need to obtain other Federal, state or local authorizations, approvals or permissions required by law.

2. This permission does not grant any property rights or exclusive privileges.

3. This permission does not authorize any injury to the property or rights of others.

b. The determination of this office to approve this action as not injurious to the public interest, nor will it impair the usefulness of the project works, was made in reliance on the information you provided.

c. The Corps may reevaluate its decision on this approval at any time the circumstances warrant. Circumstances that could require a reevaluation include, but are not limited to the following:

1. You fail to comply with the terms and conditions of this approval.

2. The information provided by you in support of your application proves to have been false, incomplete, or inaccurate. Should field conditions or future investigations require a deviation from the final Plans and Specifications referenced above, this deviation must be approved by this office though a request from the Board.

3. Significant new information surfaces which this office did not consider in reaching the original public interest decision.

d. This approval should not be construed as an endorsement of certification for the FEMA base flood event.

e. The Corps acknowledges your commitment to accept the altered project for operation and maintenance and hold and save the United States free from damage due to the construction works.

My point of contact for this action is Ms. Meegan Nagy, Chief, Flood Protection and Navigation Section. She may be reached at 916-557-7257 or by emailing Meegan.G.Nagy@usace.army.mil.

Sincerely,

Thomas C. Chapman
Colonel, U.S. Army
District Engineer

Enclosures
Encl 1 408 Approval Letter
Encl 2 Biological Opinion

CF: Bill Hampton, General Manager, Levee District 1 of Sutter County, 243 Second Street, Yuba City, California, 95991

DEPARTMENT OF THE ARMY
U.S. Army Engineer District, Sacramento
Corps of Engineers
1325 J Street
Sacramento, California 95814-2922

REPLY TO
ATTENTION OF

July 20, 2009

Flood Protection and Navigation Section

Mr. Jay Punia
Executive Officer
Central Valley Flood Protection Board
3310 El Camino Avenue, Room LL40
Sacramento, California 95821

Dear Mr. Punia:

This letter serves to supplement the letter of permission for the Feather River Levee Setback Project at Star Bend, Sutter County, California (permit #18191) dated June 16, 2009. The following special condition replaces Special Condition g on the original letter.

Special Conditions:

g. Degradation of the existing levee shall take place uniformly over its entire length in horizontal layers. No portion of the existing levee shall be degraded to less than one-third of its original height, except for the southern and northern tie-in reaches during slurry wall construction, until the entire length of the new setback levee is constructed to an elevation corresponding to one-third the original height of the existing levee. Degradation of the existing levee may continue in non-uniform layers once the entire length of the new levee reaches this height. The new setback levee shall be no less than 50 percent of design height by October 1st; no less than 80 percent of the design height by October 15th; and 100 percent complete by November 1st. Beginning September 1, 2009, weekly reports shall include the height of both the existing and new levee at least 4 points, including the northern and southern tie-ins. Reports shall be submitted to the POC listed below.

All other conditions listed in the June 16, 2009 letter of permission remain in effect. If you have any questions or concerns, my point of contact for this action is Ms. Meegan Nagy, Chief, Flood Protection and Navigation Section. She may be reached at 916-557-7257 or by emailing Meegan.G.Nagy@usace.army.mil. A copy of this letter is being sent to Levee District 1 of Sutter County.

Sincerely,

for John R. Hess

Kevin Knuuti, P.E.
Chief, Engineering Division

Agreement 4600008139

OPERATION, MAINTENANCE, REPAIR, REPLACEMENT, AND REHABILITATION AGREEMENT BETWEEN The Central Valley Flood Protection Board and Levee District No. 1 of Sutter County for The Lower Feather River Setback Levee Project at Star Bend

This Operation, Maintenance, Repair, Replacement, and Rehabilitation Agreement ("OMRR&R Agreement") is entered into by and between the State of California ("State"), acting by and through the Central Valley Flood Protection Board, or any successor thereto, ("Board"), and Levee District No. 1 of Sutter County ("Local Maintaining Agency" and "Funding Recipient"), on this third day of December, 2010 in view of the following circumstances:

1. The Feather River Setback Levee Project at Star Bend ("EIP Project") is a modification of the Sacramento River Flood Control Project which was authorized by Congress on March 1, 1917, and amended on May 15, 1928, August 26, 1937, August 18, 1941, August 17, 1954, and July 14, 1960.

2. State funding has been provided for the EIP Project:

   - The voters of California approved Propositions IE and 84 on November 7, 2006, making available bond funds for flood control work and other purposes.

   - The State, acting by and through the Department of Water Resources ("Department"), has solicited applications for early implementation funding for its State-Federal Flood Control System Modifications Program.

   - As a result, a Funding Agreement between the State of California and Levee District No. 1 of Sutter County for the Feather River Setback Levee Project at Star Bend has been signed. ("Funding Agreement").

   - The Funding Agreement provides that Levee District No. 1 of Sutter County as the Funding Recipient shall be responsible for construction, operation, maintenance, repair, replacement, and rehabilitation ("OMRR&R") of the EIP Project. Under this OMRR&R Agreement the Board will oversee OMRR&R for the EIP Project for the State, as part of the State Plan of Flood Control.

   - The Department has agreed to enter into the Funding Agreement with the Funding Recipient on the condition that it also enter into the OMRR&R Agreement.

3. It is not expected that the federal government will provide funding for the EIP Project at this time, but in anticipation that federal funds may become available eventually:

   - The Funding Agreement requires the Funding Recipient to seek credit for the expenditures made under the Funding Agreement from the federal government, acting by and through the U.S. Army Corps of Engineers ("Corps"), and to enter into agreements necessary to obtain credit or reimbursement from the Corps.

   - The parties agree that this OMRR&R Agreement may be superseded by one or more agreements acceptable to the Corps and the Board that gives satisfactory assurances to the federal government and the Board that the required local cooperation will be furnished in connection with the EIP Project.

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4. The Local Maintaining Agency agrees that it already has responsibility for OMRR&R for existing portions of the Project (as hereinafter defined) under California Water Code Section 12642 which states, and under which the State contends, that in all cases where the Federal Government does not maintain and operate projects, it is the responsibility and duty of the county, city, state agency, or public district affected to maintain and operate flood control and other works, after completion, and hold and save the State and the United States free from damages.

5. The Board has agreed to enter into this OMRR&R Agreement on the condition that the Local Maintaining Agency provides the Board with the assurances specified in this OMRR&R Agreement that Local Maintaining Agency will be responsible for OMRR&R of the EIP Project upon its completion; and will, as described below, hold and save the federal government, State, their representatives, officers, directors, and employees, as well as but not limited to their successors and assigns, free and harmless from any and all claims and damages arising from OMRR&R of the EIP Project.

6. The Board and the Local Maintaining Agency have agreed that this OMRR&R Agreement will set forth not only their agreement with respect to OMRR&R for the EIP Project, but also for all of the federally and State authorized flood facilities related to the EIP Project that are within the Local Maintaining Agency's boundaries.

NOW, THEREFORE, IT IS HEREBY AGREED:

For purposes of this OMRR&R Agreement, the terms below are defined as indicated:

"Board:" The State of California Central Valley Flood Protection Board or any successor thereto.

"Corps:" The United States Army Corps of Engineers.

"Department:" The State of California Department of Water Resources.

"EIP Project:" The project described in the Overall Work Plan described in the Funding Agreement.

"Functional Portion of the EIP Project:" A completed portion of the EIP Project to be constructed under the Overall Work Plan which is determined by the Board to be suitable to operate and maintain in advance of completion of construction of the entire EIP Project.

"Funding Agreement:" Agreement between the State of California Department of Water Resources and Levee District No. 1 of Sutter County dated June 16, 2008 as amended.

"Funding Recipient:" Levee District No. 1 of Sutter County

"**Local Maintaining Agency**:" Levee District No. 1 of Sutter County being the agency which will assume responsibility for OMRR&R for any Functional Portion of the EIP Project, the EIP Project, and the Project.

"OMRR&R:" Operation, maintenance, repair, replacement, and rehabilitation of the Project.

"OMRR&R Agreement:" This agreement between the State of California Department of Water Resources and Levee District No. 1 of Sutter County.

"Overall Work Plan:" The plan described in the Funding Agreement in Paragraph 22(a), as amended, and Exhibit A-1, as amended.

"Post Construction Performance Reports:" The reports required by Funding Agreement Paragraph 22(e), as amended.

"EIP Project:" The project described in the Funding Agreement, as amended.

"Project:" All of the federally and State authorized flood facilities to the extent to which they are within the Local Maintaining Agency's boundaries.

"Project Site:" The location of the Project.

"Standard Operation and Maintenance Manual:" A document prepared by the Local Maintaining Agency and submitted to the State for review, comment and approval that will govern the operation, maintenance, repair, replacement and rehabilitation of the Project. This manual will include all manuals related to the Project and facilities covered by this OMRR&R agreement, including those prepared by the Corps and/or Board for flood, ecosystem, habitat, mitigation or other purposes and any other such manuals.

"State:" The State of California, acting by and through the Board.

"State Plan of Flood Control:" The state and federal flood control works, lands, programs, plans, conditions, and mode of maintenance and operations described in Cal. Pub. Res. Code § 5096.805(j).

SECTION I: Obligations of the Local Maintaining Agency.

A. General Obligations. The Local Maintaining Agency agrees to the following:

1. To perform OMRR&R for the EIP Project, including all mitigation features of the EIP Project, without limitation, in accordance with the EIP Project design specifications, environmental permits, environmental impact reports, regulations, and directions prescribed by the State, all without any cost to the State. The duties of the Local Maintaining Agency to perform OMRR&R for all Project features shall be performed in a manner that does not diminish the flood protection afforded by or jeopardize the structural integrity of the Project and the flood control system of which the Project is part. The duties of the Local Maintaining Agency pursuant to this paragraph are described further in Section I-B below.

2. To defend, indemnify, hold and save the federal government and the State, to the extent allowed by law, their representatives, officers, directors, agents, and employees, as well as, but not limited to, their successors and assigns, free and harmless, to the extent permitted by law, from any and all liability for any claims and damages (including inverse condemnation) that may arise out of this OMRR&R Agreement, including but not limited to any claims or damages arising from the construction of the EIP Project and performance of OMRR&R under this Agreement.

B. Specific Obligations to Operate, Maintain, Repair, Replace, and Rehabilitate

1. The Local Maintaining Agency hereby accepts responsibility for OMRR&R of the EIP Project. The Local Maintaining Agency agrees that it will be responsible for OMRR&R of the EIP Project as further explained in: (1) the Standard Operation and Maintenance Manual for the Project and (2) any applicable Supplement to the Standard Operation and Maintenance Manual for the Project.

2. The Local Maintaining Agency as the Funding Recipient will prepare a Standard Operation and Maintenance Manual for the EIP Project as required by Board permits. The Standard Operation and Maintenance Manual for the EIP Project or Functional Portion of the EIP Project may be a stand-alone document or an amendment to the Standard Operation and Maintenance Manual for the Project as directed by the Board. The Local Maintaining Agency acknowledges that changes to the Standard Operation

and Maintenance Manual may be made by the State and the Corps before the document becomes final. The State may make reasonable changes but shall consult with Local Maintaining Agency prior to making such changes. Local Maintaining Agency shall be required to update the Standard Operation and Maintenance Manual as may be necessary or as required by the Central Valley flood Protection Board (CVFPB) and shall make a copy available to the State within three (3) days after the State so requests. Local Maintaining Agency shall be responsible for OMRR&R in accordance with any revised version of the Standard Operation and Maintenance Manual for the Project or any Supplement to the Standard Operation and Maintenance Manual.

3. The Local Maintaining Agency hereby gives State the right to enter, at reasonable times and in a reasonable manner, upon the Project Site and land which it owns or controls for access to the Project Site for the purpose of: (i) conducting subsequent inspections to verify that the Local Maintaining Agency is complying with its obligations under this OMRR&R Agreement; and (ii) operating, maintaining, repairing, replacing, or rehabilitating any part of the Project located at or accessible by the Project Site in conjunction with any present or future flood control plan if in the reasonable judgment of State the Local Maintaining Agency fails to comply with its obligations under this OMRR&R Agreement. In the event the State assumes title to any of the land to which the Local Maintaining Agency needs access to fulfill the obligations set forth in the paragraph, the State grants an irrevocable license to the Local Maintaining Agency to enter the land to fulfill its obligations under this OMRR&R Agreement.

4. If the Local Maintaining Agency has failed or refused to perform the obligations set forth in this OMRR&R Agreement or the requirements of the manuals mentioned above, the State may take appropriate actions including proceedings to establish a maintenance area under Water Code Section 12878 *et seq*.

   If the Local Maintaining Agency has failed or refused to perform the obligations set forth in this OMRR&R Agreement or the requirements of the manuals mentioned above, and for any reason the State is not able to take appropriate actions under these provisions of Water Code Section 12878 *et seq*, then the State may take appropriate actions under this OMRR&R Agreement as follows: If the failure or refusal constitutes, in the sole discretion of the State, a threat to the continued ability of the Project, or functional portion thereof, to perform in a manner necessary to provide its designed level of flood protection, then the State may itself perform the necessary work or do so by contract. The State may, in its sole discretion, develop a work plan and present it to the Local Maintaining Agency with instructions that if the Local Maintaining Agency does not agree to carry out the work plan within the time specified in the work plan, the State will perform the necessary work or do so by contract. The Local Maintaining Agency will reimburse the State for the costs of performing such work in accordance with the procedures set forth in this OMRR&R Agreement. No completion, operation, maintenance, repair, replacement, or rehabilitation by the State shall operate to relieve the Local Maintaining Agency of responsibility to meet the Local Maintaining Agency's obligations as set forth in this OMRR&R Agreement, or to preclude the State from pursuing any other remedy at law or equity to ensure faithful performance pursuant to this OMRR&R Agreement.

C. Additional Obligations:

1. The Local Maintaining Agency shall annually review and, if appropriate or requested by the State, update the safety plan for the EIP Project prepared pursuant to the Funding Agreement or required by Cal. Water Code § 9650. The Local Maintaining Agency agrees to use best efforts to ensure that the updated safety plan is integrated into any other local agency emergency plan and is coordinated with the state emergency plan.

2. No later than June 30 of each calendar year the Local Maintaining Agency shall provide an annual Post Construction Performance Report to the Department, which may be included as part of the report provided pursuant to Water Code Section 9140.

   (a) The Post Construction Performance Report shall generally use the following format:

   - Summary of the operations of the EIP Project;
   - Brief discussion of the EIP Project benefits;
   - Brief comparison and explanations for any differences between the expected versus actual EIP Project success in meeting the goals identified in the original State-Federal Flood Control System Modification Program (Early Implementation Projects) Grant Application;
   - Summary of costs and any additional costs and/or benefits deriving from the EIP Project; and
   - Any additional information relevant to or generated by the continued operation of the EIP Project, including any maintenance issues.

   (b) The Department in its sole determination may modify these reporting requirements as needed to ensure that it has adequate information with which to perform its responsibilities.

3. Local Maintaining Agency shall provide information to the Board as follows:

   (a) No later than June 30 of each calendar year the Local Maintaining Agency shall certify that it has reviewed the Standard Operations and Maintenance Manual and that either: (1) no updates are needed to the Standard Operation and Maintenance Manual; or (2) the Standard Operation and Maintenance Manual has been updated.

   (b) If requested to do so by the Board, the Local Maintaining Agency shall provide copies to the Board of the operation and maintenance reports required pursuant to AB 5 (Wolk), 2007 Cal. Stat. 366 (codified at Cal. Water Code § 9140(a)) that pertain to the Project.

   (c) The Board in its sole determination may modify these reporting requirements as needed to ensure that it has adequate information with which to perform its responsibilities.

4. The Local Maintaining Agency shall submit to the Board for its approval a long-term management plan for the vegetation planting area within the floodway within sixty (60) days of the execution of the agreement.

SECTION II: Hazardous Substances

The Local Maintaining Agency acknowledges State may incur obligations with respect to hazardous substances regulated under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. §§ 9601-9675; California Hazardous Substances Account Act, Calif. Health & Safety Code §§ 25310 *et seq.* or other statutes or regulations (collectively referred to as "state and federal Hazardous Substances Laws") on lands necessary for Project construction and OMRR&R to

the extent the Local Maintaining Agency fails to comply with its obligations under this OMRR&R Agreement. The Local Maintaining Agency agrees:

A. That in the event that the Local Maintaining Agency discovers through an environmental investigation or other means that any lands, easements, or rights of way that have been acquired or provided for the EIP Project contain reportable quantities of hazardous substances regulated under CERCLA and/or other state and federal Hazardous Substances Laws, the Local Maintaining Agency shall promptly notify the State of that discovery if it can be reasonably anticipated that the discovery of reportable quantities of hazardous substances will require Local Maintaining Agency to incur response costs in excess of $10,000.

B. That in the event reportable quantities of hazardous substances regulated under CERCLA and/or other state and federal Hazardous Substances Laws have been found in connection with the EIP Project, the Local Maintaining Agency shall initiate and complete any and all necessary response and cleanup activity required under CERCLA and/or other state and federal Hazardous Substances Laws, which shall include any studies and investigations necessary to determine the appropriate response to the contamination. Payment for the costs of such necessary response and cleanup activity as required under CERCLA and/or other state and federal Hazardous Substances Laws shall be made by the Local Maintaining Agency. In the event that the Local Maintaining Agency fails to provide the funds necessary for response and cleanup activity required under CERCLA and/or other state and federal Hazardous Substances Laws or to otherwise discharge the Local Maintaining Agency's responsibilities under this Paragraph B, then the State may perform the necessary response and cleanup activity, and the Local Maintaining Agency shall reimburse the State in accordance with the procedures set out in this OMRR&R Agreement. If the State performs the necessary response and cleanup activity required under CERCLA and/or other state and federal Hazardous Substances Laws, the State shall consult with the Local Maintaining Agency concerning the selection of the person(s) to perform the work, the amount of money to be spent on the work, the scope of the work, and any other aspect of response and cleanup activity.

C. That the Local Maintaining Agency shall consult with the State in order to ensure that responsible persons under CERCLA and/or other state and federal Hazardous Substances Laws ultimately bear all necessary response and cleanup costs as defined in CERCLA and/or other state and federal Hazardous Substances Laws.

D. That the Local Maintaining Agency shall operate, maintain, repair, replace, and rehabilitate the Project in a manner that will control and minimize the release or threatened release of hazardous substances regulated under CERCLA and/or other state and federal Hazardous Substances Laws on lands necessary for Project construction, operation, maintenance, repair, replacement, or rehabilitation.

E. That in the event that the State, their representatives, officers, directors, employees, as well as but not limited to their successors and assigns, are found to be liable under CERCLA and/or other state and federal Hazardous Substances Laws for the release or threatened release of hazardous substances arising out of the operation, maintenance, repair, replacement, or rehabilitation of the Project, the Local Maintaining Agency shall indemnify and hold the State, their representatives, officers, directors, employees, as well as but not limited to their successors and assigns, harmless from any response or cleanup costs for which the State, their representatives, officers, directors, employees, as well as but not limited to their successors and assigns, may be found to be liable under CERCLA and/or other state and federal Hazardous Substances Laws.

F. No decision made or action taken pursuant to any provision of this Section of the EIP Project OMRR&R Agreement shall relieve any responsible person from any liability that may arise under CERCLA and/or other state and federal Hazardous Substances Laws, nor shall such decision or action be considered a waiver by the State or the Local Maintaining Agency of any right to seek from any responsible person as defined by CERCLA and/or other state and federal Hazardous

Substances Laws the recovery, contribution of, or indemnification from costs incurred by the State or the Local Maintaining Agency for response or cleanup activity required under CERCLA and/or other state and federal Hazardous Substances Laws, nor shall such decision or action be considered a waiver by the State of any other right or remedy provided by law.

SECTION III: Authorization for Delegation or Subcontracting

The Local Maintaining Agency may delegate or subcontract its responsibilities under this OMRR&R Agreement. In performing the obligations called for in this OMRR&R Agreement, the Local Maintaining Agency shall notify the State when it initially retains, employs, or uses any agencies or firms to perform work that is material to successful execution of the duties of Local Maintaining Agency under this OMRR&R agreement. The Local Maintaining Agency shall be responsible for all work to be performed under the contract, including any delegated work. The State shall have the right to ask that any services for this OMRR&R Agreement provided by any subcontractor be terminated if the State deems its performance unsatisfactory.

Payment for services rendered by subcontractors shall be made entirely by the Local Maintaining Agency; the State shall not have any responsibility for making any payments to the subcontractors for any services they may render in connection with this OMRR&R Agreement.

SECTION IV: Procedures for Reimbursing the State

To the extent Local Maintaining Agency fails to fulfill its obligations under this Agreement, the State may perform such obligations and bill Local Maintaining Agency accordingly. In such circumstances, the State shall provide an invoice to the Local Maintaining Agency for the costs of performing the work. Local Maintaining Agency agrees, subject to compliance with applicable state law, to reimburse the State by promptly paying any such invoices within thirty days.

SECTION V: Disputes

Before any party to the OMRR&R Agreement may bring suit in any court concerning an issue relating to this OMRR&R Agreement, that party must first seek in good faith to resolve the issue through negotiation or other forms of nonbinding alternative dispute resolution mutually acceptable to all parties.

SECTION VI: Obligation of Future Appropriations

The parties agree that nothing herein shall constitute, or be deemed to constitute, an obligation of future appropriations by the Legislature of the State of California.

SECTION VII: Term of Agreement; Amendment

The effective date of this OMRR&R Agreement is the date it is signed by all parties. The OMRR&R Agreement will continue in full force and effect unless terminated or amended upon written consent of all parties.

The parties acknowledge that in order to obtain federal credits or reimbursement for this Project, it may be necessary to amend this OMRR&R Agreement as required by the U.S. Army Corps of Engineers. The parties agree that they will not unreasonably withhold consent for any amendments necessary to obtain federal credits or reimbursement.

SECTION VIII: Notices

All notices, requests, demands, and other communications required or permitted to be given under this OMRR&R Agreement shall be deemed to have been duly given if in writing and delivered personally or mailed by first class (postage pre-paid), registered, or certified mail, as follows:

If to the Local Maintaining Agency:
Levee District No. 1 of Sutter County
Attention: General Manager
243 Second Street, Yuba City, CA95991

If to the Board:
Central Valley Flood Protection Board
ATTN: Executive Officer
3310 El Camino Avenue, Suite LL40
Sacramento, CA 95821

A party may change the address to which such communications are to be directed by giving written notice to the other party in the manner provided in this section.

Any notice, request, demand, or other communication made pursuant to this section shall be deemed to have been received by the addressee at such time as it is personally delivered or seven calendar days after it is mailed, as the case may be.

SECTION IX: Standard Conditions

This OMRR&R Agreement incorporates by reference the standard conditions that are included in Attachment A to this OMRR&R Agreement.

SECTION X: Authority

The Local Maintaining Agency has provided a copy of a resolution adopted by its governing body designating a representative to execute this OMRR&R Agreement. This resolution is substantially the same as the draft resolution provided in Attachment B to this OMRR&R Agreement.

IN WITNESS WHEREOF, the parties hereto have executed this OMRR&R Agreement.

The Central Valley Flood Protection Board

By _____
Benjamin F. Carter
President

Date: 12/3/10

Levee District One of Sutter County

By _____
Francis K.Silva
President/Chairman, Board of Directors

Date: 11/8/10

Approved as to Legal Form and Sufficiency:

_____
Ward Tabor
Assistant Chief Counsel

Approved as to Legal Form and Sufficiency:

_____
Jesse Barton
Special Counsel

Attachment A

STANDARD CONDITIONS

1. GOVERNING LAW: This OMRR&R Agreement is governed by and shall be interpreted in accordance with the laws of the State of California.

2. TIMELINESS: Time is of the essence in this OMRR&R Agreement.

3. AMENDMENT: This OMRR&R Agreement may be amended at any time by mutual agreement of the Parties, except insofar as any proposed amendments are in any way contrary to applicable law. Requests by the Local Maintaining Agency for amendments must be in writing stating the amendment request and the reason for the request. State shall have no obligation to agree to an amendment.

4. SUCCESSORS AND ASSIGNS: This OMRR&R Agreement and all of its provisions shall apply to and bind the successors and assigns of the parties. No assignment or transfer of this OMRR&R Agreement or any part thereof, rights hereunder, or interest herein by the Local Maintaining Agency shall be valid unless and until it is approved by State and made subject to such reasonable terns and conditions as State may impose.

5. INSPECTION OF BOOKS, RECORDS, AND REPORTS: During regular office hours, each of the parties hereto and their duly authorized representatives shall have the right to inspect and to make copies of any books, records, or reports of either party pertaining to this OMRR&R Agreement or matters related hereto. Each of the parties hereto shall maintain and shall make available at all times for such inspection accurate records of all its costs, disbursements, and receipts with respect to its activities under this OMRR&R Agreement. Failure or refusal by Local Maintaining Agency to comply with this provision shall be considered a breach of this OMRR&R Agreement, and State may take any other action it deems necessary to protect its interests, after complying with paragraph V of the OMRR&R Agreement.

6. PROHIBITION AGAINST DISPOSAL OF EIP PROJECT WITHOUT STATE PERMISSION: Local Maintaining Agency shall not sell, abandon, lease, transfer, exchange, mortgage, hypothecate, or encumber in any manner whatsoever all or any portion of any real or other property necessarily connected or used in conjunction with the EIP Project, without prior permission of State. Local Maintaining Agency shall not take any action, including but not limited to actions relating to user fees, charges, and assessments that could adversely affect the ability of Local Maintaining Agency meet its obligations under this OMRR&R Agreement, without prior written permission of State. State may require that the proceeds from the disposition of any real or personal property acquired, reimbursed or credited with State funds be remitted to State.

7. NO THIRD PARTY RIGHTS: The parties to this OMRR&R Agreement do not intend to create rights in, or grant remedies to, any third party as a beneficiary of this OMRR&R Agreement, or of any duty, covenant, obligation or undertaking established herein.

8. OPINIONS AND DETERMINATIONS: Where the terms of this OMRR&R Agreement provide for action to be based upon, judgment, approval, review, or determination of either party hereto, such terms are not intended to be and shall never be construed as permitting such opinion, judgment, approval, review, or determination to be arbitrary, capricious, or unreasonable.

9. SUIT ON OMRR&R AGREEMENT: Each of the parties hereto may sue and be sued with respect to this OMRR&R Agreement.

10. REMEDIES NOT EXCLUSIVE: The use by either party of any remedy specified herein for the enforcement of this OMRR&R Agreement is not exclusive and shall not deprive the party using such remedy of, or limit the application of, any other remedy provided by law.

11. SEVERABILITY: Should any portion of this OMRR&R Agreement be determined to be void or unenforceable, such shall be severed from the whole and the OMRR&R Agreement shall continue as modified.

12. WAIVER OF RIGHTS: None of the provisions of this OMRR&R Agreement shall be deemed waived unless expressly waived in writing. It is the intention of the parties hereto that from time to time either party may waive any of its rights under this OMRR&R Agreement unless contrary to law. Any waiver by either party of rights arising in connection with the OMRR&R Agreement shall not be deemed to be a waiver with respect to any other rights or matters, and such provisions shall continue in full force and effect.

13. TERMINATION FOR CAUSE: The State may terminate this OMRR&R Agreement should Local Maintaining Agency fail to perform the requirements of this OMRR&R Agreement at the time and in the manner herein provided or in the event of a default by the Funding Recipient under paragraph 20 of the Funding Agreement.

14. INDEPENDENT CAPACITY: Local Maintaining Agency, and the agents and employees of Local Maintaining Agencies, in the performance of the OMRR&R Agreement, shall act in an independent capacity and not as officers, employees, or agents of the State.

15. CONFLICT OF INTEREST

    a) Current State Employees: No State officer or employee shall engage in any employment, activity, or enterprise from which the officer or employee receives compensation or has a financial interest and which is sponsored or funded by any State agency, unless the employment, activity, or enterprise is required as a condition of regular State employment. No State officer or employee shall contract on his or her own behalf as an independent contractor with any State agency to provide goods or services.

    b) Former State Employees: For the two-year period from the date he or she left State employment, no former State officer or employee may enter into a contract in which he or she engaged in any of the negotiations, transactions, planning, arrangements, or any part of the decision-making process relevant to the contract while employed in any capacity by any State agency. For the twelve-month period from the date he or she left State employment, no former State officer or employee may enter into a contract with any State agency if he or she was employed by that State agency in a policy-making position in the same general subject area as the proposed contract within the twelve-month period prior to his or her leaving State service.

    c) Employees of the Local Maintaining Agency: Employees of the Local Maintaining Agency shall comply with all applicable provisions of law pertaining to conflicts of interest, including but not limited to any applicable conflict of interest provisions of the California Political Reform Act, Cal. Gov't Code § 87100 *et seq*.

16. WORKERS' COMPENSATION: Local Maintaining Agency affirms that it is aware of the provisions of Section 3700 of the California Labor Code, which requires every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that code, and Local Maintaining Agency affirms that it will comply with such provisions before commencing the performance of the work under this OMRR&R Agreement and will make its contractors and subcontractors aware of this provision.

17. AMERICANS WITH DISABILITIES ACT: By signing this OMRR&R Agreement, Local Maintaining Agency assures State that it complies with the Americans with Disabilities Act (ADA) of 1990, (42 U.S.C., 12101 et seq.), which prohibits discrimination on the basis of disability, as well as all applicable regulations and guidelines issued pursuant to the ADA.

18. NONDISCRIMINATION CLAUSE: During the performance of this OMRR&R Agreement, Local Maintaining Agency and its subcontractors shall not unlawfully discriminate, harass, or allow harassment against any employee or applicant for employment because of sex, race, color, ancestry, religious creed, national origin, physical disability (including HIV and AIDS), mental disability, medical condition (cancer), age (over 40), marital status, and denial of family care leave. Local Maintaining Agency and subcontractors shall insure that the evaluation and treatment of their employees and applicants for employment are free from such discrimination and harassment. Local Maintaining Agency and subcontractors shall comply with the provisions of the Fair Employment and Housing Act (Gov. Code §12990 (a-f) et seq.) and the applicable regulations promulgated thereunder (California Code of Regulations, Title 2, Section 7285 et seq.). The applicable regulations of the Fair Employment and Housing Commission implementing Government Code Section 12990 (a-f), set forth in Chapter 5 of Division 4 of Title 2 of the California Code of Regulations, are incorporated into this Agreement by reference and made a part hereof as if set forth in full. Local Maintaining Agency and its subcontractors shall give written notice of their obligations under this clause to labor organizations with which they have a collective bargaining or other agreement.

    Local Maintaining Agency shall include the nondiscrimination and compliance provisions of this clause in all subcontracts to perform work under the OMRR&R Agreement.

19. DRUG-FREE WORKPLACE CERTIFICATION

    Certification of Compliance: By signing this OMRR&R Agreement, Local Maintaining Agency, its contractors or subcontractors hereby certify, under penalty of perjury under the laws of State of California, compliance with the requirements of the Drug-Free Workplace Act of 1990 (Government Code 8350 et seq.) and, if such Act applies to Local Maintaining Agency, have or will provide a drug-free workplace by taking the following actions:

    a) Publish a statement notifying employees, contractors, and subcontractors that unlawful manufacture, distribution, dispensation, possession, or use of a controlled substance is prohibited and specifying actions to be taken against employees, contractors, or subcontractors for violations, as required by Government Code Section 8355(a)(1).

    b) Establish a Drug-Free Awareness Program, as required by Government Code Section 8355(a)(2) to inform employees, contractors, or subcontractors about all of the following:

        1. The dangers of drug abuse in the workplace,
        2. Local Maintaining Agency's policy of maintaining a drug-free workplace,
        3. Any available counseling, rehabilitation, and employee assistance programs, and
        4. Penalties that may be imposed upon employees, contractors, and subcontractors for drug abuse violations.

    c) Provide as required by Government Code Sections 8355(a)(3), that every employee, contractor, and/or subcontractor who works under this OMRR&R Agreement:

        1. Will receive a copy of Local Maintaining Agency's drug-free policy statement, and
        2. Will agree to abide by terms of Local Maintaining Agency's condition of employment, contract or subcontract.

    Suspension of Payments: This OMRR&R Agreement may be subject to suspension of payments or termination, or both, and Local Maintaining Agency may be subject to debarment if the State determines that:

    a) Local Maintaining Agency, its contractors, or subcontractors have made a false certification, or

b) Local Maintaining Agency, its contractors, or subcontractors violates the certification by failing to carry out the requirements noted above.

20. UNION ORGANIZING: Local Maintaining Agency, by signing this OMRR&R Agreement, hereby acknowledges the applicability of Government Code 16645 through 16649 to this OMRR&R Agreement. Furthermore, Local Maintaining Agency, by signing this OMRR&R Agreement, hereby certifies that:

    a) No State funds disbursed by this OMRR&R Agreement will be used to assist, promote, or deter union organizing.

    b) Local Maintaining Agency shall account for State funds disbursed for a specific expenditure by this OMRR&R Agreement to show those funds were allocated to that expenditure.

    c) Local Maintaining Agency shall, where State funds are not designated as described in (b) above, allocate, on a pro rata basis, all disbursements that support the program.

    d) If Local Maintaining Agency makes expenditures to assist, promote, or deter union organizing, Local Maintaining Agency will maintain records sufficient to show that no State funds were used for those expenditures and that Local Maintaining Agency shall provide those records to the Attorney General upon request.

21. COMPUTER SOFTWARE: Local Maintaining Agency certifies that it has appropriate systems and controls in place to ensure that state funds will not be used in the performance of this OMRR&R Agreement for the acquisition, operation, or maintenance of computer software in violation of copyright laws.

22. DELIVERY OF INFORMATION, REPORTS, AND DATA: Local Maintaining Agency agrees to expeditiously provide, during work on the State-Federal Flood Control System Modification Program (Early Implementation Projects) and throughout the term of this OMRR&R Agreement, such reports, data, information, and certifications as may be reasonably required by State.

23. RIGHTS IN DATA: Local Maintaining Agency agrees that all data, plans, drawings, specifications, reports, computer programs, operating manuals, notes, and other written or graphic work produced in the performance of this OMRR&R Agreement shall be made available to the State and shall be in the public domain to the extent to which release of such materials is required under the California Public Records Act, Cal. Gov't Code §§ 6250 *et seq*. Local Maintaining Agency may disclose, disseminate and use in whole or in part, any final form data and information received, collected, and developed under this OMRR&R Agreement, subject to appropriate acknowledgement of credit to State for financial support. Local Maintaining Agency shall not utilize the materials for any profit-making venture or sell or grant rights to a third party who intends to do so. The State shall have the right to use any data described in this paragraph for any public purpose.

27. LOCAL MAINTAINING AGENCY NAME CHANGE: Approval of the State's Project Manager is required to change the Local Maintaining Agency's name as listed on this OMRR&R Agreement. Upon receipt of legal documentation of the name change the State will process the amendment. Payment of invoices presented with a new name cannot be paid prior to approval of said amendment.

28. AIR OR WATER POLLUTION VIOLATION: Under State laws, the Local Maintaining Agency shall not be: (1) in violation of any order or resolution not subject to review promulgated by the State Air Resources Board or an air pollution control district; (2) subject to cease and desist order not subject to review issued pursuant to Section 13301 of the Water Code for violation of waste discharge requirements or discharge prohibitions; or (3) finally determined to be in violation of provisions of federal law relating to air or water pollution.

Attachment B
Resolution No. 2010-~~08~~ 11-03

Resolved by the Board of Directors of
Levee District One of Sutter County

Pursuant and subject to all of the terms and provisions of the Safe Drinking Water, Water Quality and Supply, Flood Control, River and Coastal Protection Bond Act of 2006, and the Disaster Preparedness and Flood Prevention Bond Act of 2006, that funds awarded to Levee District One of Sutter County by the California Department of Water Resources for a State-Federal Flood Control System Modification Program project titled: the Lower Feather River Setback Levee At Star Bend have been accepted, and as a condition of accepting these funds the Funding Recipient committed to signing an additional agreement with the Central Valley Flood Protection Board, or successor thereto, which requires Levee District One of Sutter County to assume responsibility for operation, maintenance, repair, replacement, and rehabilitation of the Lower Feather River Setback Levee at Star Bend.

Therefore, the Chairman of the Board, Francis K. Silva of Levee District One of Sutter County, is hereby authorized and directed to sign an operation, maintenance, repair, replacement, and rehabilitation agreement with the Central Valley Flood Protection Board, or successor thereto.

Passed and adopted at a regular meeting of the Board of Directors of Levee District One of Sutter County on November 8, 2010.

Affix official seal here

Authorized Signature Francis K. Silva

Printed Name FRANCIS K SILVA

Title CHAIRMAN

Clerk/Secretary Barbara Solari

DEPARTMENT OF THE ARMY
SACRAMENTO ENGINEER DISTRICT
U.S. ARMY CORPS OF ENGINEERS
1325 J STREET
SACRAMENTO, CALIFORNIA, 95814-2922

REPLY TO
ATTENTION OF

Executive Office

JUL 22 2013

BY:----------

JUL 18 2013

Mr. Jay Punia, Executive Officer
Central Valley Flood Protection Board
3310 El Camino Avenue, Room 151
Sacramento, California 95821

Dear Mr. Punia,

Pursuant to 33 USC 408, the Director of Civil Works for the U.S. Army Corps of Engineers (USACE) approved your request to alter the Sacramento River Flood Control Project (SRFCP) on June 1, 2009, as part of the Feather River Levee Setback at Star Bend project. This project, implemented by Levee District 1 was the subject of encroachment permit number 18191. The Sacramento District granted permission for you to alter the aforementioned project on June 16, 2009 as it had been determined that such alteration would not be injurious to the public interest and would not impair the usefulness of the project work.

In accordance with the above granted approval and permission, while under the direction of the Central Valley Flood Protection Board, alterations to the Federal flood risk management system were substantially completed in fall 2009. Your office subsequently submitted a revised *Supplement to Standard Operation and Maintenance (O&M) Manual Sacramento River Flood Control Project, Unit No. 144, West Levee of Feather River from North Boundary of Levee District No. 1 to North Boundary of Reclamation District 823 (Maintenance Area 3)*; *December 2010 As-Builts*, stamped January 2011; *Construction Completion Report, Volumes 1, 2a, 2b, and 3, dated December 2010*; and *Levee District 1 Flood Safety and Preparedness Plan*, dated July 2012. The Sacramento District has reviewed the above submittals and has determined that the local improvements were constructed in accordance with the final (100 percent) plans and specifications dated February 2009, as approved by the USACE under 33 USC 408.

This letter informs you that the approximately 3,400 feet of setback levee and the 3,400 feet of cutoff wall installed below the setback levee located on the Feather River right bank at Star Bend between Levee Mile 4.20 and 3.55 is accepted as part of the SRFCP. This letter transmits the *Supplement to Standard Operation and Maintenance (O&M) Manual Sacramento River Flood Control Project, Unit No. 144, West Levee of Feather River from North Boundary of Levee District No. 1 to North Boundary of Maintenance Area 3 (Previously Reclamation District 823)* (Encl 1) and the Star Bend Setback levee as-built drawings (Encl 2). This revised supplemental manual replaces, in its entirety, the previous version. Additionally, the *Levee District 1 Flood Safety and Preparedness Plan* has been reviewed and is acceptable as submitted.

In accordance with the assurances you provided on November 14, 2008, you are responsible to operate and maintain this levee as part of the SRFCP. This letter of acceptance into the Federal flood control system should not be construed as an endorsement for inclusion of the alteration described above into the National Flood Insurance Program as outlined in Title 44 of the Code of Federal Regulations Section 65.10 of the National Flood Insurance Regulations (44 CFR Section 65.10). In addition this letter of acceptance shall neither be

interpreted as a Federal assurance regarding later approval of any project or credit nor shall it commit the United States to any type of reimbursement if a Federal project is not undertaken.

My point of contact for this action is Ms. Meegan Nagy, Chief, Flood Protection and Navigation Section. She may be reached by telephone at (916) 557-7257 or by email at Meegan.G.Nagy@usace.army.mil.

A copy of this letter is being furnished to Mr. Bill Hampton, General Manager, Levee District 1, 243 2nd Street, Yuba City, California 95991.

Sincerely,

Michael J. Farrell
Colonel, U.S. Army
District Commander

Enclosures

Attachment G

August 2013

Levee District One of Sutter County Setback Levee at Star Bend
CVFPB Permit No. 18191BD

Vegetation Maintenance and Monitoring Plan

for the Enlarged Floodplain at Star Bend

Prepared for
Levee District One of Sutter County (LD1)
Central Valley Flood Protection Board (CVFPB)
U.S. Army Corps of Engineers (USACE)

GEI Consultants

Prepared by
GEI Consultants, Inc.

VEGETATION MAINTENANCE AND MONITORING PLAN

FOR THE ENLARGED FLOODPLAIN AT STAR BEND

CVFPB Permit No. 18191BD
Levee District One of Sutter County Setback Levee at Star Bend

Prepared for: ***Levee District One of Sutter County (LD1),***
Central Valley Flood Protection Board (CVFPB),
& U. S. Army Corps of Engineers (USACE)

Prepared by: ***GEI Consultants***

AUGUST 2013

VEGETATION MAINTENANCE AND MONITORING PLAN FOR THE ENLARGED FLOODPLAIN AT STAR BEND

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APPENDICES

B Habitat Enhancement Plan (HEP) for Feather River Setback Levee and Habitat Enhancement Project at Star Bend - March 6, 2009, (inclusive of USFWS Biological Opinions of February 6, 2009, for Star Bend VELB and September 9, 2005, for O'Conner Lakes VELB.

C Feather River Setback Levee and Phase 1 Habitat Enhancement Project at Star Bend 2010 Initial Monitoring Report - Year 1, prepared by Restoration Resources, inclusive of Appendix A Planting As-Builts:
As-Built Planting and Irrigation Plan, Sheet 1 of 3
As-Built Planning Plan, Sheet 2 of 3
Sample Planting Matrix, Sheet 1 of 3

D Photographs of Star Bend and O'Conner Lakes VELB Mitigation and Restoration Areas with Representative Roughness "n" Values from 0.025 to 0.070

SECTION 1 INTRODUCTION

This Vegetation Maintenance and Monitoring Plan for the Enlarged Floodplain at Star Bend has been prepared at the request of the Central Valley Flood Protection Board (CVFPB) as condition of approving the Operation, Maintenance, Repair, and Replacement, and Rehabilitation (OMRR&R) Agreement on December 3, 2010. A vegetation management and monitoring component was included in an initial draft of the Supplement to the Standard O&M Manual for the Sacramento River Flood Control Project, Unit No. 144, prepared by GEI, and dated July 2012. However, the U. S. Army Corps of Engineers (USACE) would not accept the Supplement to the O&M Manual with the vegetation management plan included and finalized the Supplement in June of 2013, with the suggestion that Levee District One (LD1) and the CVFPB prepare a stand-alone vegetation maintenance and monitoring plan as an ongoing environmental protection measure associated with the LD1 Setback Levee at Star Bend. Thus, this stand-alone Vegetation Maintenance and Monitoring Plan has been developed for the enlarged floodplain of the Lower Feather River at Star Bend near RM 18.0 to be responsive to the CVFPB conditions of approval as well as the USACE's environmental protection measures that suggest the following:

(1) The vegetation maintenance and monitoring plan for the enlarged floodplain at Star Bend should be developed to be responsive to maintaining the flow conveyance and flood safety attributes of the improved flood control system at Star Bend while collectively meeting the February 6, 2009 USFWS Biological Opinion mitigation, compensatory, and conservation conditions specifically developed for the Setback Levee at Star Bend (see Appendix B); and

(2) In no event shall the vegetation in the floodplain within the Star Bend Project Area be managed to infringe upon the water surface profile defined by the USACE 1957 design profile and associated freeboard.

Riparian habitat mitigation and enhancement efforts for the Valley Elderberry Longhorn Beetle (VELB) and other native species were completed as part of LD1's Lower Feather River Setback

Levee at Star Bend Project. The riparian habitat mitigation and enhancement efforts specific to the VELB includes a project-specific conservation area managed by LD1 at Star Bend near Feather River Mile (RM) 18.0 that totals 20.56 acres, of which 18.23 is proposed for a conservation easement on property held by LD1, and 2.33 acres is located on property owned by CDFW (Figures 4 and 9).

The vegetation maintenance and monitoring plan for the Star Bend Setback Project Area is also responsive and consistent with the Central Valley Flood Protection Board's (CVFPB) desire to have a long-term maintenance plan that ensures flood safety and flood flow conveyance is preserved and maintained in the Star Bend Project Area while acknowledging the environmental conditions and potential incidental take considerations imposed by the USFWS.

1.1 Project Location Relative to Levee Unit No. 144 and Lower Feather River Corridor

Presented in Figures 1 and 2 is a map and aerial photo of the LD1 Boundaries and the alignment of the West Levee of the Feather River, Unit No. 144. The low water channel of the Feather River meanders through an overflow area which has a variable width of 1,200 feet to over 6,000 feet with the incorporation of three new setback levees in the Lower Feather River Corridor (LFRC). The three new setback levees in the LFRC are located on: (1) the west bank of the Feather River (Unit No. 144) at Star Bend completed in 2009 by LD1; (2) the east bank of the Feather River (Unit No. 145) above Star Bend completed in 2010 by the Three Rivers Levee Improvement Authority (TRLIA); (3) and the north bank of the Bear River (Unit No. 145) near its confluence with the Feather River completed in 2008 by TRLIA. The setback levees mentioned above are depicted in Figure 6. The levee of Unit No. 144 provides protection to Yuba City and adjacent agricultural lands to the south against flood waters of the Feather River and is an essential feature of the Sacramento River Flood Control Project.

1.2 Hydraulic Flow and Hydraulic Profile Considerations in Lower Feather River Corridor at Star Bend

The grade of the adopted flood plain profile in the Lower Feather River Corridor (LFRC) varies as noted in Table 1 and Figure 7. The USACE project design capacity in the LFRC is 300,000

cfs upstream of the Bear River (near River Mile 12) and 320,000 cfs downstream of the Bear River. Whereas the 100-yr and 200-yr design flows of the Feather River at Star Bend are approximately 280,000 cfs and 350,000 cfs, respectively. Although the USACE design flow of 300,000 is greater than computed 200-yr flow of 350,000, the USACE 1957 Hydraulic Design Profile shown in Table 1 and Figure 7 is conservatively set higher than the computed 200-year design flow profile. The USACE 1957 Hydraulic Design Profile is the hydraulic control line established by the USACE requiring a minimum of 3.7 to 4.5 feet of freeboard in the reach of the LD1 setback Levee, whereas the CVFPB, LD1 and the California Departments of Water Resources (DWR) have established the 200-yr Annual Exceedance Probability (AEP) hydraulic grade line to manage the improved system with regional setback levees yielding a greater freeboard through the project area along the right bank levee that varies between 4.1 to 4.9 feet.

SECTION 2 VEGETATIVE PLANTINGS AT STAR BEND 2009-2010

The project improvements at Star Bend incorporated environmental and mitigation enhancements, including the planting of elderberry shrubs and associated riparian vegetation on 20.56 acres (18.23 acres on LD1 property and 2.33 acres on CDFW property) waterward of the new setback levee at Star Bend. These mitigation and habitat enhancements have been maintained by LD1 and its designated contractor, Restoration Resources. Responsible maintaining agencies should remain diligent in ensuring the mitigation and habitat enhancements are maintained and monitored for their intended mitigation and enhancement purposes but do not present a hindrance to ongoing maintenance of the adjoining levee system located within the floodway at Star Bend and within 50 feet of the setback levee at Star Bend. These same enhancements should also be monitored and maintained at Star Bend between RMs 16.5 and 18.0 (Levee Unit No. 144 Levee Miles 3.55-4.20) to allow conveyance of the 100-yr. and 200-yr flow events and the USACE design flow of 300,000 cfs at or below the USACE 1957 design profile provided in Table 1 and Figure 7. Refer to Figures 4 and 9 which show the location of the existing 20.56 acre of VELB mitigation and habitat enhancement area (18.23 acres on LD1 property and 2.33 acres on CDFW property) in relation to the new setback levee and adjoining areas suitable for future habitat mitigation and enhancement opportunities.

2.1 Initial Planting and Transplanting of VELB Mitigation and Enhancement Vegetation

Vegetation planting, inclusive of transplanting of VELB shrubs onsite within the enlarged floodplain at Star Bend on 20.56 acres (18.23 acres of VELB conservation on LD1 property and 2.33 acres on CDFW property) included in the obligatory Phase 1 VELB mitigation and enhancement site took place over a period of two years, during the VELB dormancy periods. LD1 contracted with River Partners to transplant existing VELB shrubs on LD1 property prior to construction of the levee in February and early March of 2009; and Restoration Resources planted additional VELB seedlings and associate riparian vegetation plants in the VELB mitigation and enhancement area during the months of January through March of 2010. Restoration Resources also planted blackberry and wildrose vines in the late winter and early

spring of 2010 on 2.46 acres to provide protection and discourage future disturbances of a known cultural site at Star Bend.

SECTION 3 OPERATIONS & MAINTENANCE

The grade of the adopted flood plane profile in the Lower Feather River Corridor (LFRC) varies as noted in Table 1 and Figure 7. The USACE project design capacity in the LFRC is 300,000 cfs upstream of the Bear River (near River Mile 12) and 320,000 cfs downstream of the Bear River. The freeboard above the adopted project flood plane, also known as the 1957 Design Profile, varies greatly between a minimum of 2.80 feet to isolated sections in excess of 6.00 feet. There is considerable growth of trees and brush in the overflow portion of the channel, which at times may require control and removal to maintain the noted freeboard levels and the project design flood plane. The maintenance and operation of the overflow channel of the Feather River for Unit No. 144 (as defined in paragraph 2-03 of the Supplement to Standard O&M Manual dated August 1955) is limited to flood control as specified in the standard O&M manual for Unit No. 144 .

The Operation and Maintenance (O&M) of the improved levee system at Star Bend and the balance of Unit No. 144 falls under the jurisdiction of the CVFPB through the Sacramento and San Joaquin Drainage District. The operation and maintenance of the improved levee system and its associated 20.56 acres of the VELB mitigation and habitat enhancement (18.23 acres of VELB conservation on LD1 property and 2.33 acres on CDFW property) is the responsibility of LD1, under the supervision of the DWR, collectively referred to as the O&M Provider or Superintendent.

3.1 Vegetation Management on Levee Slopes and First 15 to 50 Feet Beyond Toes of Levee at Star Bend

Mowing, burning, spraying, and other vegetation management procedures of the levee slopes and the initial 50 feet beyond the water ward toe of the Setback Levee at Star Bend is outlined in Section 10-01 Maintenance and Inspection of Levees of the USACE approved Supplement to Standard Operation and Maintenance (O&M) Manual Sacramento River Flood Control Project, Unit No. 144, West Levee of Feather River from North Boundary of Levee District No. 1 to North Boundary of Maintenance Area 3 (Previously Reclamation District 823), dated June 2013.

In accordance with Local Maintaining Agency (LMA) standards, remove all brushy and woody vegetation over one inch in diameter at the ground level from: (1) the levee slopes; (2) an area that extends for the first 15 feet from the waterside and landside toes where existing right-of-way is available for Unit No. 144 levee; and (3) an area that extends for the first 50 feet from the waterside and landside toes along the 3,400 lineal ft. section of setback levee between Star Bend and Tudor Roads. The management of Valley elderberry shrubs will be managed in accordance with US Fish & Wildlife (USFWS) Conservation Guidelines for the Valley Elderberry Longhorn Beetle, Revised July 9, 1999 (see Appendix B), as long as Valley Elderberry Longhorn Beetle (VELB) is a threatened species under the Endangered Species Act of 1973. The presence of elderberry shrubs on and within 50 feet of the levee at Star Bend will limit the LMA from performing routine maintenance and inspection on or near the subject levee slopes.

The use of insecticides, herbicides, fertilizers or other chemicals near elderberry shrubs will be consistent with the USFWS conservation guidelines for VELB. The 50-ft. clear area located between the waterward toe of the setback levee and the 20.56 acre VELB mitigation and habitat enhancement area can be seasonally mowed or disked providing avoidance measures are consistent with USFWS conservation guidelines for VELB.

3.2 Vegetation Management in the Enlarged Floodplain 50 Feet beyond the Waterward Toes of Levee at Star Bend

Please refer to Section 4 of this Vegetation Maintenance and Monitoring Plan for specific vegetation control and management measures for the enlarged floodplain at Star Bend particularly for the VELB mitigation and conservation area at Star Bend. The VELB planting and conservation easement areas are shown in Figures 4 and 9. Special vegetation management procedures consistent with USFWS conservation guidelines for VELB must be adhered to while working in or near the area that is immediately water-ward of the waterside access road adjacent to the setback levee at Star Bend. Although certain restrictions apply for maintaining the mitigation and habitat enhancements in this enlarged portion of the floodplain at Star Bend, this same area should be maintained to keep the roughness coefficient “n” values at 0.07 or less. The “n” values of 0.07 or less are further defined by the types and densities of plantings that have

been installed at Star Bend as depicted in pictures included in Appendix D with representative "n" values, and further described in Appendix C - Feather River Setback Levee and Phase 1 Habitat Enhancement Project at Star Bend 2010 Initial Monitoring Report - Year 1, including As-built Exhibit Sheets 1, 2 and 3 of 3, prepared by Restoration Resources. These vegetation as-built exhibits included in Appendix C indicate that elderberry shrubs and the associated plants should be maintained at a collective density of 198 plants or less per acre (37 phase 1 plants + 4048 phase 2 plants/20.65 acres).

SECTION 4 VEGETATION MAINTENANCE AND MONITORING FOR THE ENLARGED FLOODPLAIN AT STAR BEND

4.1 Background of Valley Elderberry Longhorn Beetle (VELB) Mitigation and Habitat Enhancement Plans at Star Bend and Adjoining O'Conner Lakes

Consistent with the Supplement to the Standard Operation and Maintenance Manual Sacramento River Flood Control Project unit No. 144 June 2013, inclusive of its Appendix K, USFWS B.O. #81420-2009-F-0372-1 and Habitat Enhancement Plan (HEP) for the Feather River Setback and Habitat Enhancement Project at Star Bend, dated March 6, 2009, (Attached hereto as Appendix B), LD1 as the LMA, is committed to preserving and maintaining at least 20 acres of VELB habitat as long as the VELB is listed as a threatened species by the USFWS. Figure 5 shows the limits of the Star Bend Setback Levee and the enlarged floodplain inclusive of the associated mitigation and habitat enhancement boundaries in relation to the CDFG O'Conner Lakes Unit Riparian Restoration Plan Area. The O'Conner Lakes restoration area is located within the larger O'Conner Lakes Wildlife Unit that encompasses approximately 471 acres (Figures 6 and 8).

In addition to the 18.23 acres reserved for VELB mitigation and habitat enhancement easements in the enlarged floodplain on property owned by LD1 at Star Bend there are another 19.92 acres (Figure 9) that may be available for mitigation or restoration to LD1 and its local flood control partners within the Sutter Butte Flood Control Agency (SBFCA). The regional flood control improvements contemplated by SBFCA in connection with securing at least a 100-yr level of flood protection for the Yuba City Basin, inclusive of areas south of Yuba City along the west Levee of the Feather River - Unit No. 144, may likely require environmental mitigation and/or enhancement within the remaining 19.9 acres of property in the enlarged floodplain owned by LD1 and possibly and an additional 8.5 acres of the enlarged floodplain that is owned by CDFW where the former levee system was located as indicated in Figure 4.

4.2 Consistency of Vegetation Maintenance Plan with CVFPB Requirements and the Star Bend Habitat Enhancement Plan

The vegetation maintenance and monitoring plan for the enlarged floodplain at Star Bend is developed herein to be responsive to maintaining the flow conveyance and flood safety attributes of the improved flood control system at Star Bend while collectively meeting the USFWS Biological Opinion mitigation, compensatory, and conservation conditions specifically developed for the Setback Levee at Star Bend. The vegetation maintenance and monitoring is also intended to be responsive and consistent with the Central Valley Flood Protection Board's (CVFPB) desire to have a long-term maintenance plan that ensures flood safety and flood flow conveyance is preserved and maintained in the Lower Feather River while acknowledging the environmental conditions and potential incidental take considerations imposed by the USFWS.

The vegetation maintenance and monitoring plan for the floodplain enlarged at Star Bend is intended to be implemented for the current 20.56 acres of VELB mitigation and habitat improvement area (18.23 acres of VELB conservation on LD1 property and 2.33 acres on CDFW property), as well as for any subsequent additions of up to 19.92 acres on LD1 property and up to 8.5 acres on the adjoining CDFW property where the former levee system existed prior to the construction of the LD1 Setback Levee at Star Bend as depicted in Figure 4..

4.3 Hydraulic Designs, Baseline Conditions, and Freeboard Operational Parameters for Enlarged Floodplain in Star Bend Project Area (RM 16.50 to RM 18.25)

By incorporating the Star Bend Setback Levee into the West Levee of the Feather River - Unit No. 144 of the Sacramento River Flood Control Project it enlarged the floodplain incrementally by approximately 49.5 acres, and it also incrementally lowered the flood stage elevations along the right bank, Unit No. 144, levees below the USACE 1957 Design Profile by 0.10 to 0.30 feet at and above Star Bend between River Mile (RM) 17.50 and RM 23.25. Refer to Table 1 and Figure 7 for the 2010 post-project baseline conditions of the improved freeboard conditions within Unit No. 144 gained relative to the USACE 1957 Design Flow of 300,000 cfs as well as the 100-yr (280,000 cfs) and 200-yr (350,000 cfs) Annual Exceedance Probability (AEP) events. Table 1 shows that approximately 3.7 to 4.5 feet of freeboard exists in the Star Bend Area (RM 16.50 to RM 18.25) above the USACE 1957 Design Profile, 4.1 to 4.9 feet of freeboard exists for the 200-yr AEP event, and approximately 7.3 to 8.0 feet of freeboard exists for the 100-yr AEP event. The water surface profiles and freeboard conditions improved by implementing setback

levees in the Lower Feather River Corridor were calculated with the assumption that the Manning roughness coefficient "n" value for the enlarged and adjoining floodplain at Star Bend would not exceed 0.07 in the future. The latest baseline freeboard calculations also assumed "n" values in the O'Conner Lakes Wildlife Unit of 0.035 for native grass areas as noted in Figure 8. Given the baseline freeboard conditions with the setback levees in place, LD1 and any of its vegetation management partners and successors shall manage the enlarged floodplain of the Star Bend Project Area at or below the "n" values shown in Figure 8 to maintain the minimum levels of freeboard as noted in Table 1 and shown in Figure 7. The enlarged floodplain, inclusive of the Phase 1A, 1B, and 1C planting areas at Star Bend as shown in Figures 4, 8 and 9 contain mostly herbaceous plants and limited hardwood plant species that can be easily managed to keep "n" values collectively below 0.07. The Feather River Setback Levee and Phase 1 Habitat Enhancement Project at Star Bend 2010 Initial Monitoring Report, inclusive of as-built sheets, dated December 2010 (Included as Appendix C) indicates the density of plants per acre for each component for the Phase 1A, 1B, and 1C Plantings. The plant densities of approximately 200 plants per acre can be utilized as a benchmark for establishing "n" values of less than 0.07 for the Star Bend Project Area. Photographs of the site conditions and representative "n" values at Star Bend and the adjoining O'Conner Lakes restoration and mitigation are provided in Appendix D. In the event the "n" values increase above 0.07 within the 20.56-acre VELB Phase 1A and 1B mitigation/conservation area and the 2.46-acre cultural resource (Phase 1C) area, LD1 could reduce the "n" values by selectively thinning vegetation (elderberry shrubs shall be protected or avoided in accordance with USF&WS Conservation Guidelines for the Valley Elderberry Longhorn Beetle Revised July 9, 1999) within the mitigation/conservation area and/or adjoining areas immediately north and east to maintain an average "n" value of 0.07 or less for the Star Bend Project Area as shown in Figure 8.

The minimum stated 2010 baseline freeboard conditions stated in Table 1 for the Star Bend Project Area shall apply and be maintained on the right bank levee between RM 16.50 on the downstream end through RM 18.25 on the upstream end. This stretch of the West Levee of the Feather River - Unit No. 144, corresponds to the levee reach defined with its downstream limit as the easterly extension of Tudor Road, and its upstream limit being the easterly extension of Star Bend Road. The minimum 2010 baseline freeboard levels for the 100-yr and 200-yr AEP events

between River Miles 16.50 and 18.25 (between Levee Unit No. 144 LM 3.55 and LM 4.20) as noted in Table 1 shall be maintained by the Superintendent and any of its vegetation management partners and successors, unless otherwise mutually agreed upon by LD1 and the CVFPB and/or its collective successors. The water surface profile shall not be allowed to increase above the USACE 1957 design profile in the Star Bend Project Area. In no event shall the vegetation in the floodplain within the Star Bend Project Area be managed to infringe upon the water surface profile defined by the USACE 1957 Design Profile and associated freeboard as stipulated on page 15, paragraph 10-05 Environmental Protection b, 2) of the Supplement to Standard Operations and Maintenance Manual Sacramento River Flood Control Project, Unit No. 144, prepared and dated June 2013 by the USACE.

4.4 Maintenance and Monitoring Requirements of 20.56-Acre VELB Mitigation and Habitat Enhancement Area and 2.46-Acre Cultural Site

The USFWS Biological Opinion dated February 6, 2009, for the VELB at Star Bend, coupled with the Habitat Enhancement Plan (HEP) for the Feather River Setback Levee and Habitat Enhancement Project at Star Bend - Appendix B, requires the LMA/ Superintendent to preserve at least 20.0 acres of VELB habitat. This requirement is to ensure that the compensatory habitat mitigation and enhancements are sustained as long as the VELB is deemed as a threatened species by the USFWS. Consistent with the USFWS VELB programmatic conservation guidelines (revised July 9, 1999 and included in Appendix B), the Star Bend Setback Project Area is conditioned to ensure the mitigation and habitat enhancements are sustained as long as the VELB is listed as a threatened species by the USFWS, and it requires LD1 to monitor and maintain a 60% survivorship of the elderberry transplants and seedlings as well as the associate plants on a minimum of 20 acres. The initial monitoring report prepared in December of 2010 by Restoration Resources (Appendix C) noted that all but 3 of 37 transplanted elderberry shrubs had survived, and that 1377 of 1475 (94%) elderberry seedlings had survived and that 2544 of 2573 (99%) of the associate plants had survived. A fire occurred on the site on June 12, 2012, but the extent of the long-term damage relative to plant survivorship and the full extent of replanting may not be known until the fall of 2013. As long as the VELB is listed as a threatened species by the USFWS annual monitoring and reporting are required by the LMA/Superintendent

over a period of 10 consecutive years through June of 2019 or seven years out of a period of 15 years concluding in 2025, consistent with the USFWS conservation guidelines. Annual monitoring of plant survivorship and population surveys of VELB, consistent with the USFWS conservation guidelines, are also required to take place twice a year between February 15 and June 30.

To ensure high plant survivorship LD1 is required to irrigate the VELB when appropriate, and not use insecticides, herbicides, fertilizers or other chemicals within 100 feet of any elderberry plant with one or more stems measuring 1.0 inch in diameter at ground level. To avoid exceeding an "n" value of 0.07 as shown in Figure 8, mowing will be conducted consistent with USFWS VELB programmatic conservation guidelines (revised July 9, 1999, see Appendix B) which allows mowing of grasses/ground cover from July through April to reduce fire hazard. No mowing should occur within five (5) feet of elderberry plant stems. Mowing must be done in a manner that avoids damaging plants (e.g., stripping away bark through careless use of mowing/trimming equipment). As long as the VELB is listed as a threatened species by the USFWS the LMA/Superintendent shall provide seasonal training to all field personnel relative to identifying elderberry shrubs during dormant and non-dormant periods prior to any vegetation control activities within 100 feet of any elderberry shrubs.

The Phase 1C native blackberry and wildrose plantings covering 2.46 acres of a known cultural site are intended to serve as a deterrent to future disturbance of the known site. The density of plantings per acre (as noted in Appendix C – As-Built Sheet 1 of 3) are greater in Phase 1C, than 1A and 1B, but represent a similar "n" value of 0.07 or less with approximately 415 blackberry and 415 wildrose plants per acre.

4.5 Vegetation Maintenance Practices Adjacent to 20.56-Acre VELB Mitigation and Habitat Enhancement Area

Use of insecticides, herbicides, fertilizers or other chemicals within 50-ft. clear area located between the waterward toe of the setback levee and the 20.56 acre VELB mitigation and habitat

enhancement area must be consistent with the USFWS conservation guidelines for VELB included in Appendix B. The noted 50-ft. wide strip waterward of the levee will be seasonally mowed or disked to keep vegetation to less than one inch in diameter at ground level consistent with the USFWS conservation guidelines for VELB included in Appendix B.

SECTION 5 VEGETATION MANAGEMENT CONTRACTS AND FUNDING SOURCES

In July of 2010 LD1 entered into a two year contract with Restoration Resources to maintain and monitor the 20.56 acre VELB mitigation and habitat enhancement site consistent with the USFWS conservation and reporting guidelines. LD1 has also contracted with Restoration Resources for maintaining and monitoring the vegetation of blackberries and wildrose on 2.46 acres providing protection to a known cultural site. The two year maintenance and monitoring contract between LD1 and Restoration Resources is in the amount of approximately $60,000, or approximately $30,000 per year. The two-year contract with Restoration Resources has been funded by the EIP funds and LD1 through July of 2013. Subsequent funding for monitoring and maintenance will be funded by LD1 and possibly by its regional cost sharing partner the Sutter Butte Flood Control Agency (SBFCA) at costs estimated at less than $25,000 per year. Cost-sharing with SBFCA will be pursued in connection with enlarging the current 18.23-acre VELB habitat mitigation and enhancement site by as much 19.9 acres on LD1 property, and possibly by an additional 8.5 acres where the former levee system existed on adjoining property owned by CDFW. It is possible with the potential enlargement of the existing VELB 20.56-acre restoration mitigation area managed by LD1 (with 18.23 acres located on LD1 property and 2.23 acres on CDFW property adjoining the CDFW O'Conner Lakes VELB Restoration Area) by an additional 28.4 net acres by SBFCA or others as shown in Figure 4, that the enlarged floodplain at Star Bend adjacent to the O'Conner Lakes 228-acre Riparian Vegetation Plan Area can be passively managed in the near future with little or no vegetation control or monitoring required. Enlargement of the enhancement area with advanced restoration efforts in consultation with the USFWS and encroachment permitting by the Central Valley Flood Protection Board may ultimately lead to the elimination or reduction of ongoing maintenance, monitoring, and reporting requirements for the 20.56-acre VELB mitigation and habitat enhancement site presently managed by LD1.

SECTION 6 REFERENCES

6.1 USACE Engineer Regulations

ER 1110-2-401 Operation, Maintenance, Repair, Replacement, and Rehabilitation Manual for Projects and Separable Elements Managed by Project Sponsors, September 1994

ER 1110-2-100 Periodic Inspection and Continuing Evaluation of Completed Civil Works Structures, February 1995

6.2 References Specific to Unit No. 144

Supplement to Standard Operation and Maintenance Manual for Unit No. 144, West Levee of Feather River from North Boundary of Levee District No. 1 to North Boundary of Reclamation District No. 823, dated August 1955

Levee District One Flood Safety and Preparedness Plan for Unit No. 144 of Sacramento River Flood Control Project, supplemented July 2012 by GEI Consultants, Inc.

USACE approved Supplement to Standard Operation and Maintenance (O&M) Manual Sacramento River Flood Control Project, Unit No. 144, West Levee of Feather River from North Boundary of Levee District No. 1 to North Boundary of Maintenance Area 3 (Previously Reclamation District 823) June 2013

6.3 Other References

California Department of Water Resources; "*Urban Levee Design Criteria (ULDC)* May 2012.

U.S. Army Corps of Engineers, ETL 1110-2-571; "*Guidelines for Landscape Planting and Vegetation Management at Levees, Floodwalls, Embankment Dams, and Appurtenant Structures.*"

TABLE 1

2010 Baseline Hydraulic Profile Conditions along West Bank Levee, Unit No 144
Lower Feather River Corridor (River Miles 13.0 - 30.0)
(All Elevations in 1929 NGVD; TOL = Top of Levee)

Lower Feather River Floodplain Mapping Study River Mile	Unsteady Flow								Steady Flow				LD #1 Right Bank Levee Unit No. 144, 2010 Baseline TOL Profile	USACE 1957 Design Profile	2010 Baseline Freeboard Above USACE 1957 Design Profile (Current TOL - 1957 Profile)
	1-in-100 AEP (Peak flow = 280,000 cfs)				1-in-200 AEP (Peak flow = 350,000 cfs)				1957 Design Flow (300,000 cfs)						
	With no Setback Levees	With Only TRLIA Setback Levee Btwn. RMs 16.5 - 24.0	2010 Baseline with Setback Levees on Units 144 and 145 Btwn. RMs 16.5 - 24.0	2010 Baseline Freeboard to TOL	With no Setback Levees	With Only TRLIA Setback Levee Btwn. RMs 16.5 - 24.0	2010 Baseline with Setback Levees on Units 144 and 145 Btwn. RMs 16.5 - 24.0	2010 Baseline Freeboard to TOL	With no Setback Levees	With Only TRLIA Setback Levee Btwn. RMs 16.5 - 24.0	2010 Baseline with Setback Levees on Units 144 and 145 Btwn. RMs 16.5 - 24.0	2010 Baseline Freeboard to TOL			
30.00	75.33	74.46	74.43	10.59	78.39	77.26	77.29	7.73	77.96	77.03	77.00	8.02	85.02	78.74	6.28
29.83	75.26	74.39	74.36	10.69	78.34	77.20	77.23	7.82	77.91	76.97	76.94	8.11	85.05	78.62	6.43
29.83	75.26	74.39	74.36	10.72	78.34	77.20	77.23	7.85	77.91	76.97	76.94	8.14	85.08	78.62	6.46
29.82	75.26	74.38	74.36	10.78	78.34	77.20	77.23	7.91	77.90	76.97	76.94	8.20	85.14	78.61	6.53
29.82	75.26	74.38	74.36	10.81	78.34	77.20	77.23	7.94	77.90	76.96	76.94	8.23	85.17	78.61	6.56
29.75	75.20	74.32	74.29	9.04	78.29	77.14	77.17	6.16	77.83	76.88	76.86	6.47	83.33	78.56	4.77
29.50	75.14	74.24	74.22	9.00	78.24	77.09	77.12	6.10	77.79	76.83	76.81	6.41	83.22	78.36	4.86
29.25	75.14	74.24	74.22	9.11	78.24	77.09	77.12	6.21	77.71	76.75	76.73	6.60	83.33	78.16	5.17
29.00	74.96	74.04	74.02	8.70	78.11	76.93	76.97	5.75	77.50	76.51	76.48	6.24	82.72	77.96	4.76
28.75	74.68	73.70	73.67	8.00	77.87	76.66	76.70	4.97	77.16	76.13	76.10	5.57	81.67	77.76	3.91
28.50	74.49	73.48	73.45	7.87	77.71	76.48	76.51	4.81	76.96	75.91	75.88	5.44	81.32	77.56	3.76
28.32	74.35	73.32	73.28	16.76	77.60	76.35	76.38	13.66	76.80	75.73	75.69	14.35	90.04	77.42	12.62
28.32	74.35	73.31	73.28	17.45	77.60	76.34	76.38	14.35	76.79	75.72	75.69	15.04	90.73	77.42	13.31
28.31	74.32	73.27	73.24	17.40	77.57	76.31	76.35	14.29	76.73	75.65	75.62	15.02	90.64	77.41	13.23
28.25	74.26	73.21	73.18	8.28	77.53	76.26	76.30	5.16	76.67	75.58	75.55	5.91	81.46	77.36	4.10
27.97	73.92	72.82	72.79	12.95	77.23	75.91	75.95	9.79	76.39	75.27	75.24	10.50	85.74	76.56	9.18
27.96	73.88	72.77	72.73	11.35	77.18	75.86	75.90	8.18	76.10	74.95	74.92	9.16	84.08	76.48	7.60
27.75	73.65	72.51	72.48	8.55	76.98	75.62	75.66	5.37	76.05	74.90	74.86	6.17	81.03	76.21	4.82
27.50	73.19	72.04	72.00	8.21	76.56	75.13	75.17	5.04	75.82	74.63	74.59	5.62	80.21	75.98	4.23
27.25	72.66	71.42	71.38	7.27	76.01	74.47	74.51	4.14	75.13	73.85	73.81	4.84	78.65	75.74	2.91
27.00	72.66	71.42	71.38	6.93	76.01	74.47	74.51	3.80	74.20	72.77	72.72	5.59	78.31	75.51	2.80
26.75	72.30	70.98	70.94	8.45	75.65	74.01	74.06	5.33	73.95	72.45	72.41	6.98	79.39	75.27	4.12
26.50	71.84	70.39	70.34	9.22	75.21	73.43	73.48	6.08	73.59	72.01	71.96	7.60	79.56	75.04	4.52
26.25	71.49	69.93	69.88	10.11	74.89	72.99	73.04	6.95	73.12	71.38	71.33	8.66	79.99	74.80	5.19
26.00	71.21	69.55	69.50	10.24	74.62	72.62	72.68	7.06	72.81	70.96	70.91	8.83	79.74	74.70	5.04
25.75	70.96	69.22	69.16	10.56	74.39	72.30	72.36	7.36	72.58	70.65	70.59	9.13	79.72	74.60	5.12
25.50	70.74	68.93	68.87	10.54	74.18	72.01	72.07	7.34	72.37	70.35	70.29	9.12	79.41	74.50	4.91
25.25	70.51	68.62	68.56	10.74	73.95	71.69	71.76	7.54	72.16	70.08	70.01	9.29	79.30	74.40	4.90
25.00	70.05	67.99	67.92	11.88	73.51	71.06	71.13	8.67	71.94	69.78	69.71	10.09	79.80	74.06	5.74
24.75	69.63	67.42	67.35	10.64	73.10	70.47	70.54	7.45	71.51	69.16	69.08	8.91	77.99	73.71	4.28
24.50	69.38	67.10	67.03	10.86	72.86	70.11	70.19	7.70	71.11	68.60	68.52	9.37	77.89	73.37	4.52
24.25	69.11	66.75	66.67	11.20	72.59	69.71	69.80	8.07	70.87	68.26	68.17	9.70	77.87	73.03	4.85
24.00	68.88	66.49	66.41	10.61	72.38	69.46	69.55	7.47	70.59	67.87	67.78	9.24	77.02	72.68	4.34
23.75	68.59	66.09	66.00	11.21	72.09	69.06	69.16	8.05	70.36	67.60	67.51	9.70	77.21	72.34	4.87
23.50	68.40	65.82	65.73	12.00	71.90	68.80	68.90	8.83	70.07	67.19	67.09	10.64	77.73	71.97	5.76
23.25	68.03	65.43	65.33	11.92	71.53	68.42	68.52	8.73	69.90	66.95	66.85	10.40	77.25	71.59	5.66
23.00	67.58	65.03	64.92	11.53	71.06	68.03	68.12	8.33	69.53	66.56	66.45	10.00	76.45	71.21	5.24
22.75	67.17	64.71	64.60	11.40	70.60	67.75	67.79	8.21	69.02	66.13	66.01	9.99	76.00	70.82	5.18

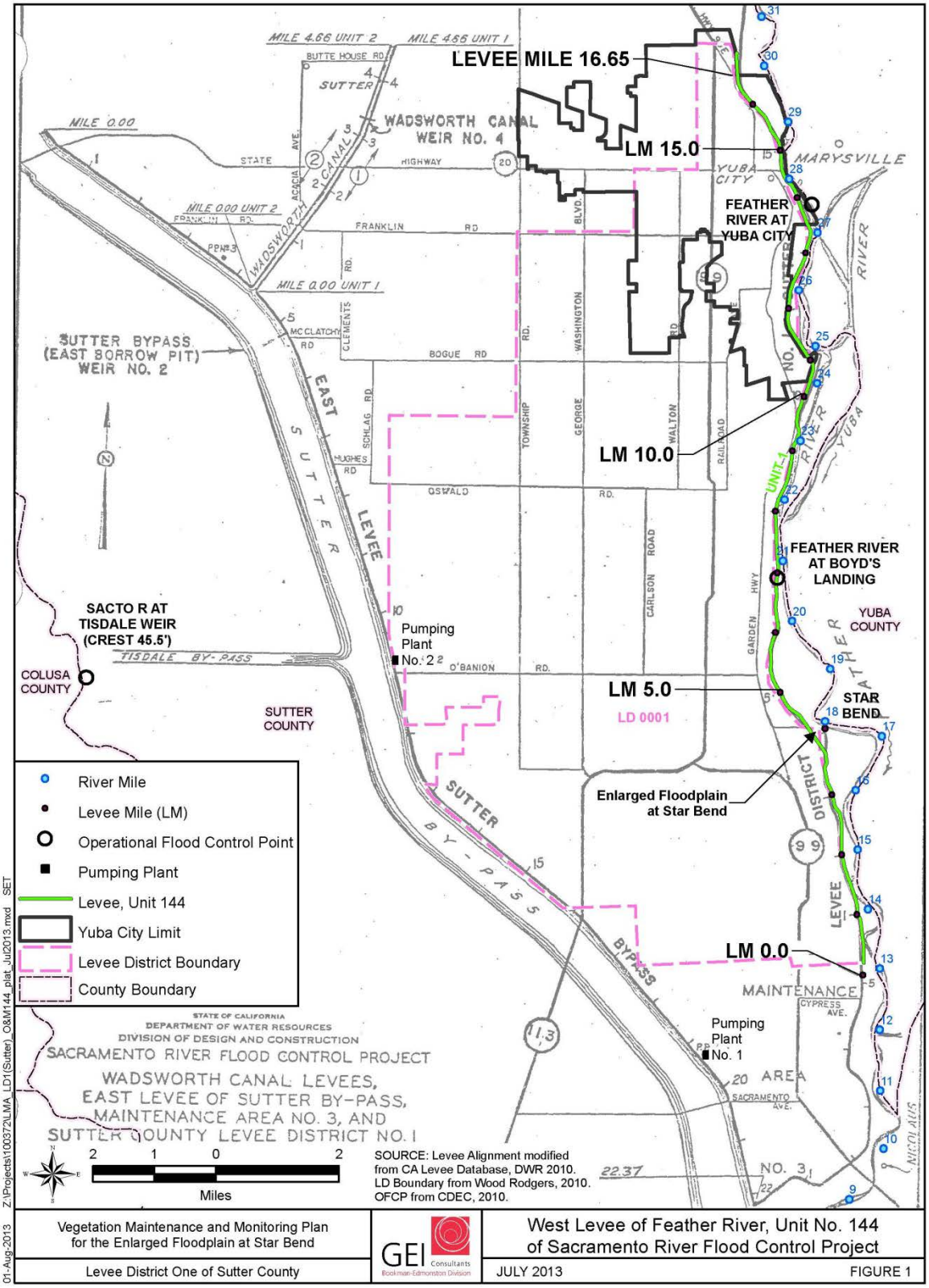
Shaded Cells on Sheet 2 of 2 Represent Star Bend Setback Levee Segment between RM 16.50 and 18.25

TABLE 1

2010 Baseline Hydraulic Profile Conditions along West Bank Levee, Unit No 144
Lower Feather River Corridor (River Miles 13.0 - 30.0)
(All Elevations in 1929 NGVD; TOL = Top of Levee)

Lower Feather River Floodplain Mapping Study River Mile	Unsteady Flow								Steady Flow				LD #1 Right Bank Levee Unit No. 144, 2010 Baseline TOL Profile	USACE 1957 Design Profile	2010 Baseline Freeboard Above USACE 1957 Design Profile (Current TOL - 1957 Profile)
	1-in-100 AEP (Peak flow = 280,000 cfs)				1-in-200 AEP (Peak flow = 350,000 cfs)				1957 Design Flow (300,000 cfs)						
	With no Setback Levees	With Only TRLIA Setback Levee Btwn. RMs 16.5 - 24.0	2010 Baseline with Setback Levees on Units 144 and 145 Btwn. RMs 16.5 - 24.0	2010 Baseline Freeboard to TOL	With no Setback Levees	With Only TRLIA Setback Levee Btwn. RMs 16.5 - 24.0	2010 Baseline with Setback Levees on Units 144 and 145 Btwn. RMs 16.5 - 24.0	2010 Baseline Freeboard to TOL	With no Setback Levees	With Only TRLIA Setback Levee Btwn. RMs 16.5 - 24.0	2010 Baseline with Setback Levees on Units 144 and 145 Btwn. RMs 16.5 - 24.0	2010 Baseline Freeboard to TOL			
22.50	66.68	64.25	64.13	10.97	70.07	67.36	67.32	7.78	68.59	65.84	65.72	9.38	75.10	70.44	4.66
22.25	66.24	63.86	63.73	11.22	69.61	67.00	66.92	8.03	68.09	65.32	65.19	9.76	74.95	70.06	4.89
22.00	65.96	63.58	63.45	11.35	69.32	66.74	66.63	8.17	67.65	64.94	64.80	10.00	74.80	69.68	5.12
21.75	65.40	63.19	63.04	11.26	68.74	66.42	66.25	8.05	67.40	64.71	64.56	9.74	74.30	69.14	5.16
21.50	64.97	62.86	62.71	11.74	68.29	66.11	65.91	8.54	66.76	64.25	64.09	10.36	74.45	68.57	5.88
21.25	64.37	62.46	62.30	11.25	67.68	65.72	65.53	8.02	66.37	63.97	63.80	9.75	73.55	68.00	5.55
21.00	63.88	62.17	62.00	10.35	67.15	65.43	65.22	7.13	65.74	63.57	63.39	8.96	72.35	67.54	4.81
20.75	63.54	61.94	61.77	10.03	66.78	65.20	64.99	6.81	65.25	63.29	63.10	8.70	71.80	67.08	4.72
20.50	63.15	61.76	61.58	8.87	66.34	65.00	64.78	5.67	64.91	63.09	62.89	7.56	70.45	66.62	3.83
20.25	62.63	61.56	61.38	8.62	65.79	64.79	64.57	5.43	64.52	62.91	62.71	7.29	70.00	66.15	3.85
20.00	62.31	61.39	61.20	8.15	65.44	64.61	64.38	4.97	63.97	62.72	62.52	6.83	69.35	65.69	3.66
19.75	62.04	61.21	61.02	8.48	65.18	64.43	64.20	5.30	63.66	62.56	62.35	7.15	69.50	65.43	4.07
19.50	61.93	61.07	60.88	8.22	65.08	64.29	64.06	5.04	63.39	62.39	62.17	6.93	69.10	65.21	3.89
19.25	61.84	60.96	60.76	8.14	64.99	64.17	63.94	4.96	63.27	62.26	62.04	6.86	68.90	65.00	3.90
19.00	61.67	60.86	60.66	7.99	64.81	64.08	63.83	4.82	63.20	62.15	61.93	6.72	68.65	64.79	3.86
18.75	61.45	60.70	60.50	7.95	64.58	63.91	63.66	4.79	63.03	62.07	61.84	6.61	68.45	64.57	3.88
18.50	61.29	60.61	60.40	7.90	64.41	63.81	63.56	4.74	62.81	61.89	61.66	6.64	68.30	64.35	3.95
18.25	61.06	60.50	60.29	7.86	64.17	63.70	63.44	4.71	62.62	61.79	61.55	6.60	68.15	64.08	4.07
18.00	60.38	60.23	60.08	7.92	63.42	63.40	63.22	4.78	62.28	61.64	61.40	6.60	68.00	63.82	4.18
17.75	60.10	60.04	59.92	7.93	63.13	63.21	63.06	4.79	61.41	61.39	61.23	6.62	67.85	63.55	4.30
17.50	59.92	59.92	59.75	7.95	62.95	63.08	62.88	4.82	61.18	61.21	61.07	6.63	67.70	63.29	4.41
17.25	59.60	59.69	59.54	8.01	62.63	62.84	62.66	4.89	60.97	61.05	60.86	6.69	67.55	63.02	4.53
17.00	59.16	59.20	59.09	7.26	62.20	62.36	62.22	4.13	60.54	60.73	60.58	5.77	66.35	62.76	3.59
16.75	58.77	58.82	58.82	7.33	61.81	61.98	61.94	4.21	60.15	60.15	60.05	6.10	66.15	62.41	3.74
16.50	58.48	58.53	58.54	7.51	61.50	61.66	61.70	4.35	59.84	59.84	59.88	6.17	66.05	61.94	4.11
16.25	58.30	58.35	58.35	7.30	61.31	61.47	61.46	4.19	59.59	59.59	59.62	6.03	65.65	61.46	4.19
16.00	58.00	58.05	58.05	7.05	60.99	61.15	61.14	3.96	59.44	59.44	59.44	5.66	65.10	60.99	4.11
15.75	57.44	57.49	57.49	7.41	60.34	60.50	60.50	4.40	59.06	59.06	59.06	5.84	64.90	60.52	4.38
15.50	56.96	57.01	57.01	8.09	59.80	59.96	59.96	5.14	58.29	58.29	58.29	6.81	65.10	60.04	5.06
15.25	56.56	56.61	56.61	8.29	59.37	59.54	59.53	5.37	57.74	57.74	57.74	7.16	64.90	59.57	5.33
15.00	56.15	56.20	56.20	7.90	58.90	59.07	59.06	5.04	57.34	57.34	57.34	6.76	64.10	59.09	5.01
14.75	55.76	55.82	55.82	8.19	58.50	58.66	58.66	5.35	56.93	56.93	56.93	7.08	64.01	58.56	5.45
14.50	55.38	55.44	55.44	6.69	58.07	58.24	58.23	3.90	56.53	56.53	56.53	5.60	62.13	58.00	4.13
14.25	54.81	54.87	54.87	8.31	57.43	57.60	57.59	5.59	56.13	56.13	56.13	7.05	63.18	57.44	5.74
14.00	54.50	54.56	54.56	8.28	57.09	57.26	57.25	5.59	55.44	55.44	55.44	7.40	62.84	56.93	5.92
13.75	54.14	54.20	54.20	8.21	56.68	56.84	56.84	5.57	55.08	55.08	55.08	7.33	62.41	56.55	5.86
13.50	53.67	53.73	53.73	8.03	56.16	56.32	56.32	5.44	54.71	54.71	54.71	7.05	61.76	56.18	5.59
13.25	53.32	53.38	53.38	7.65	55.77	55.93	55.93	5.10	54.16	54.16	54.16	6.87	61.03	55.80	5.23
13.00	53.19	53.26	53.26	7.43	55.65	55.81	55.81	4.88	53.75	53.75	53.75	6.94	60.69	55.43	5.26

Shaded Cells on Sheet 2 of 2 Represent Star Bend Setback Levee Segment between RM 16.50 and 18.25
Supplement to Standard O and M Manual - Levee District One of Sutter County



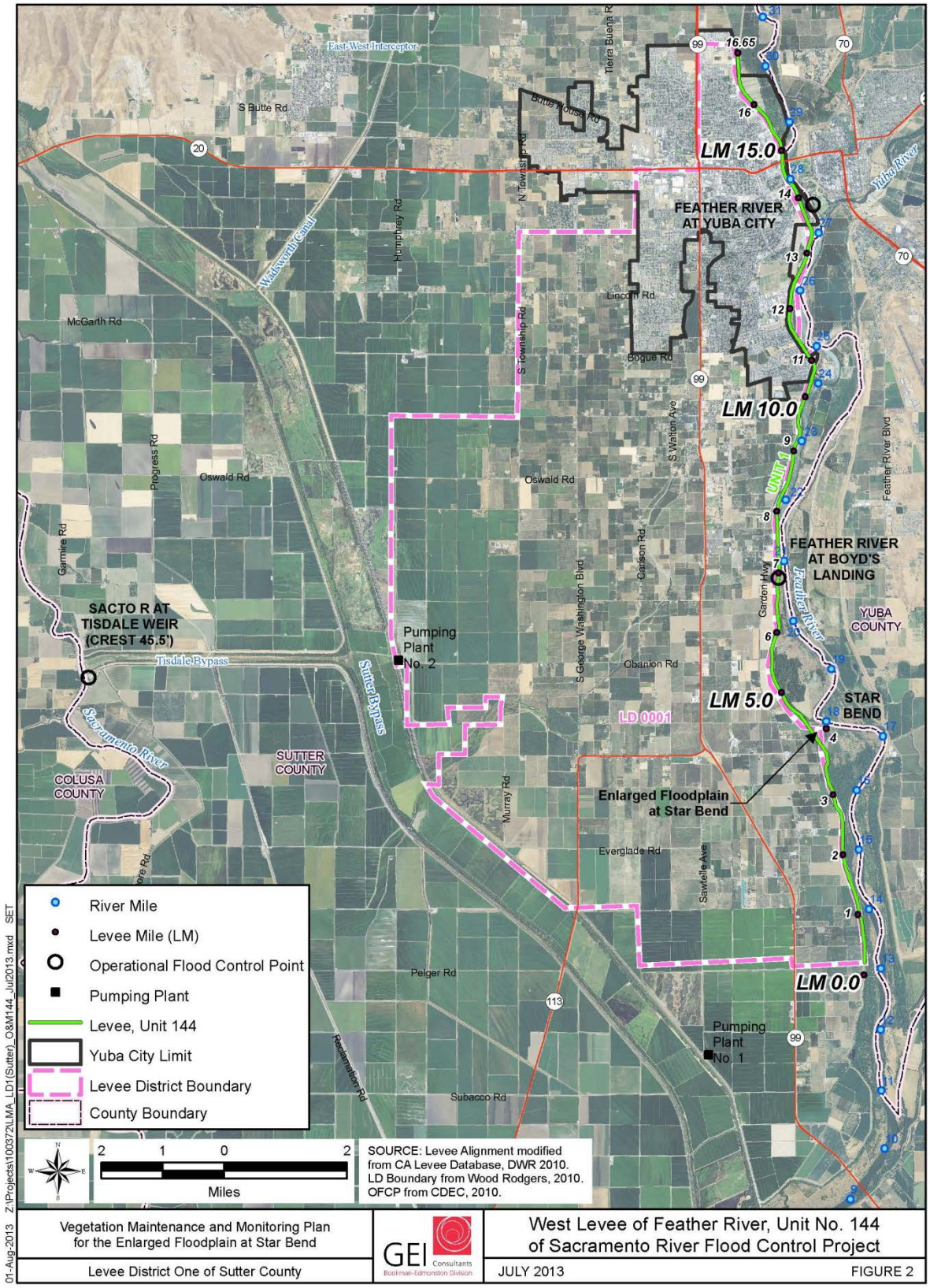
Vegetation Maintenance and Monitoring Plan for the Enlarged Floodplain at Star Bend

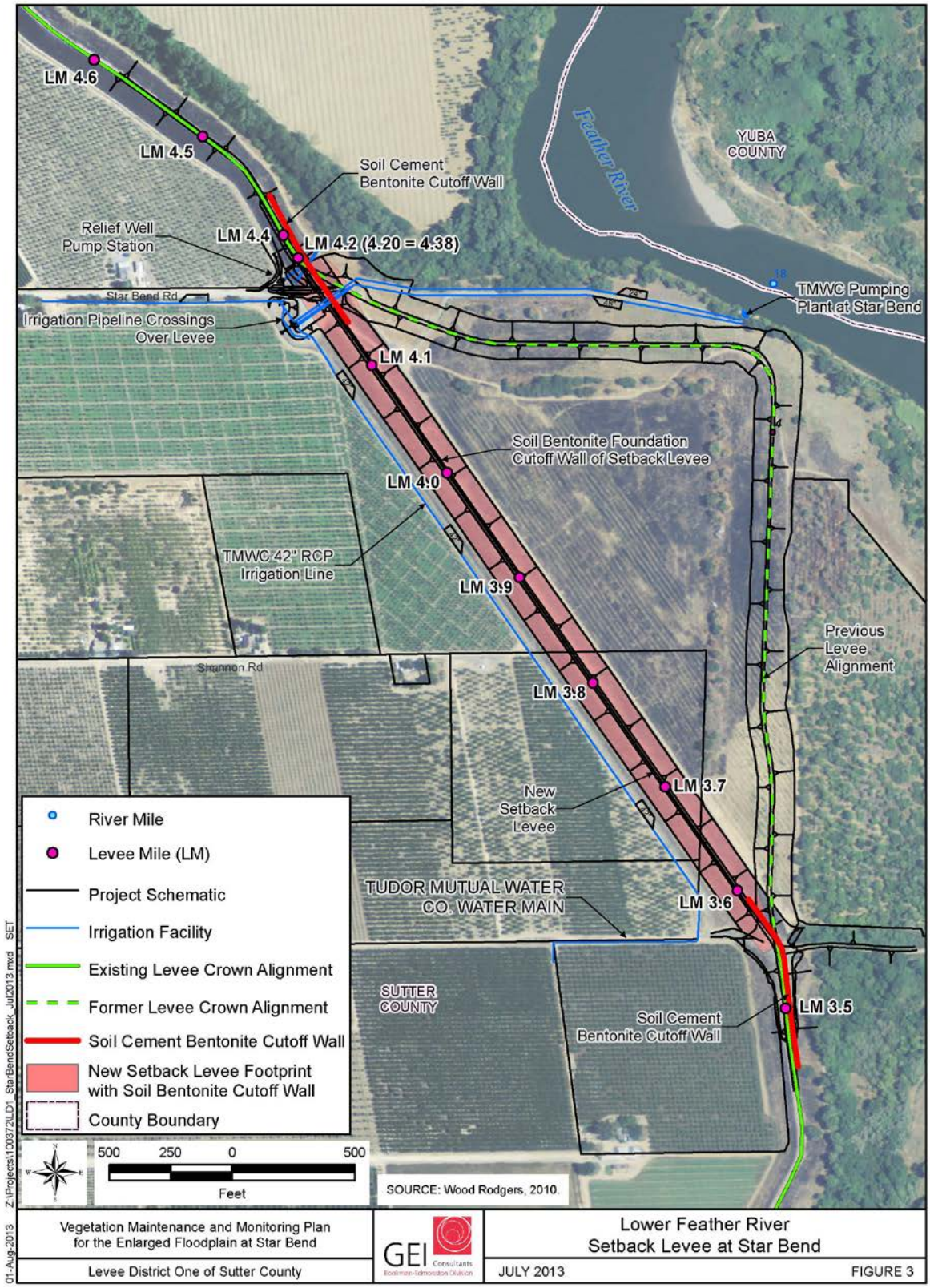
Levee District One of Sutter County

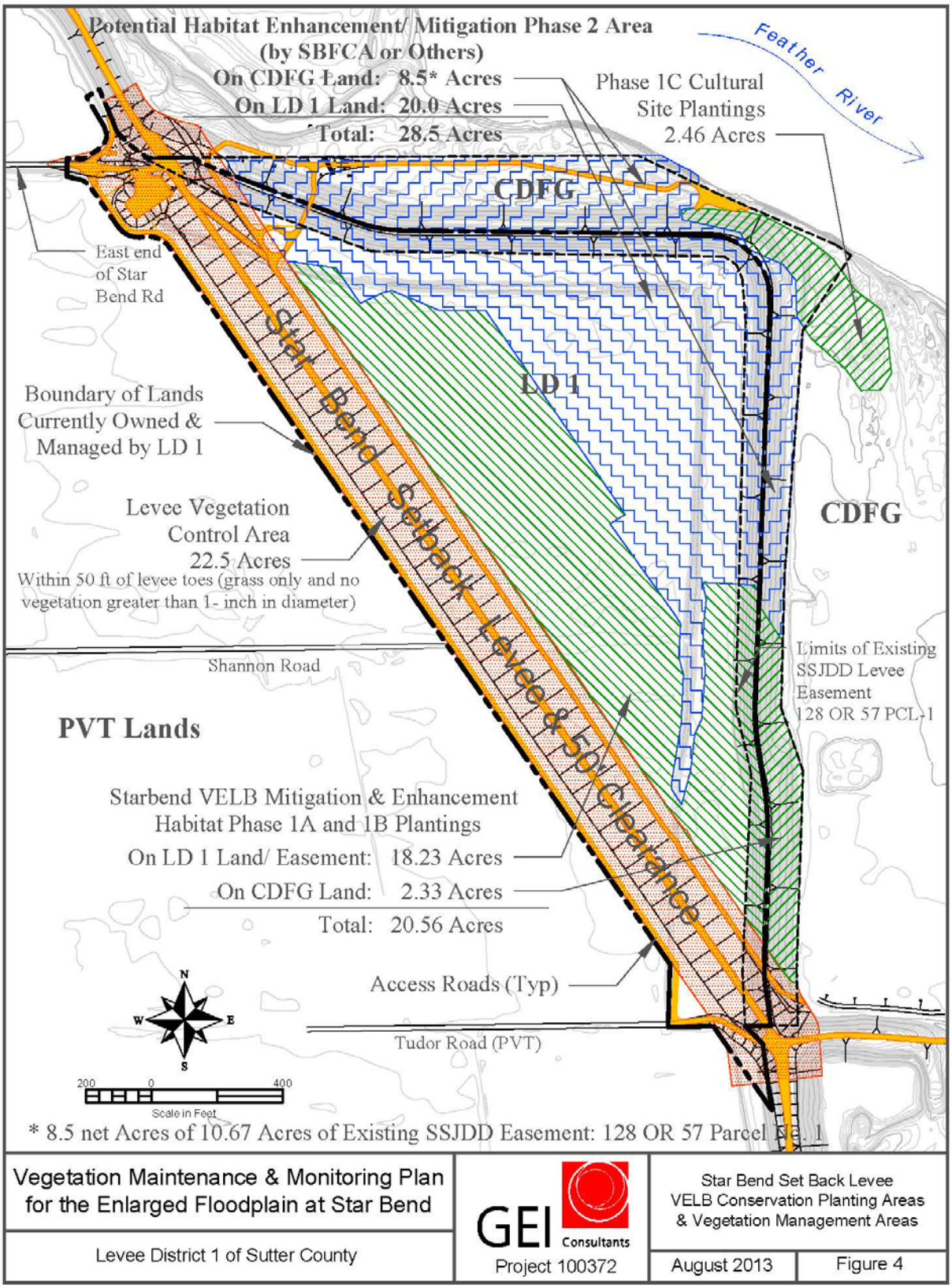
GEI Consultants Bookman-Edmonston Division

West Levee of Feather River, Unit No. 144 of Sacramento River Flood Control Project

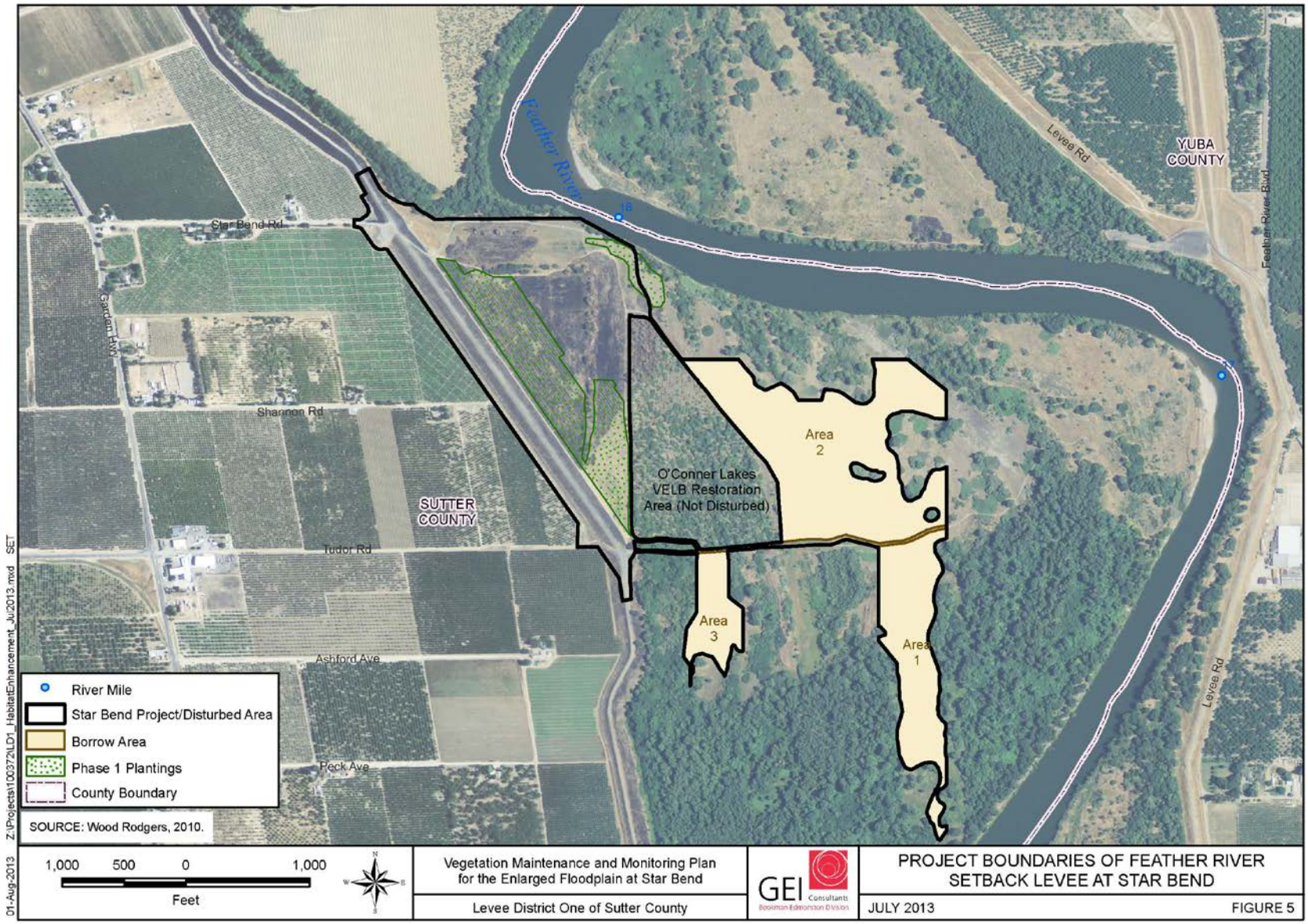
JULY 2013 FIGURE 1

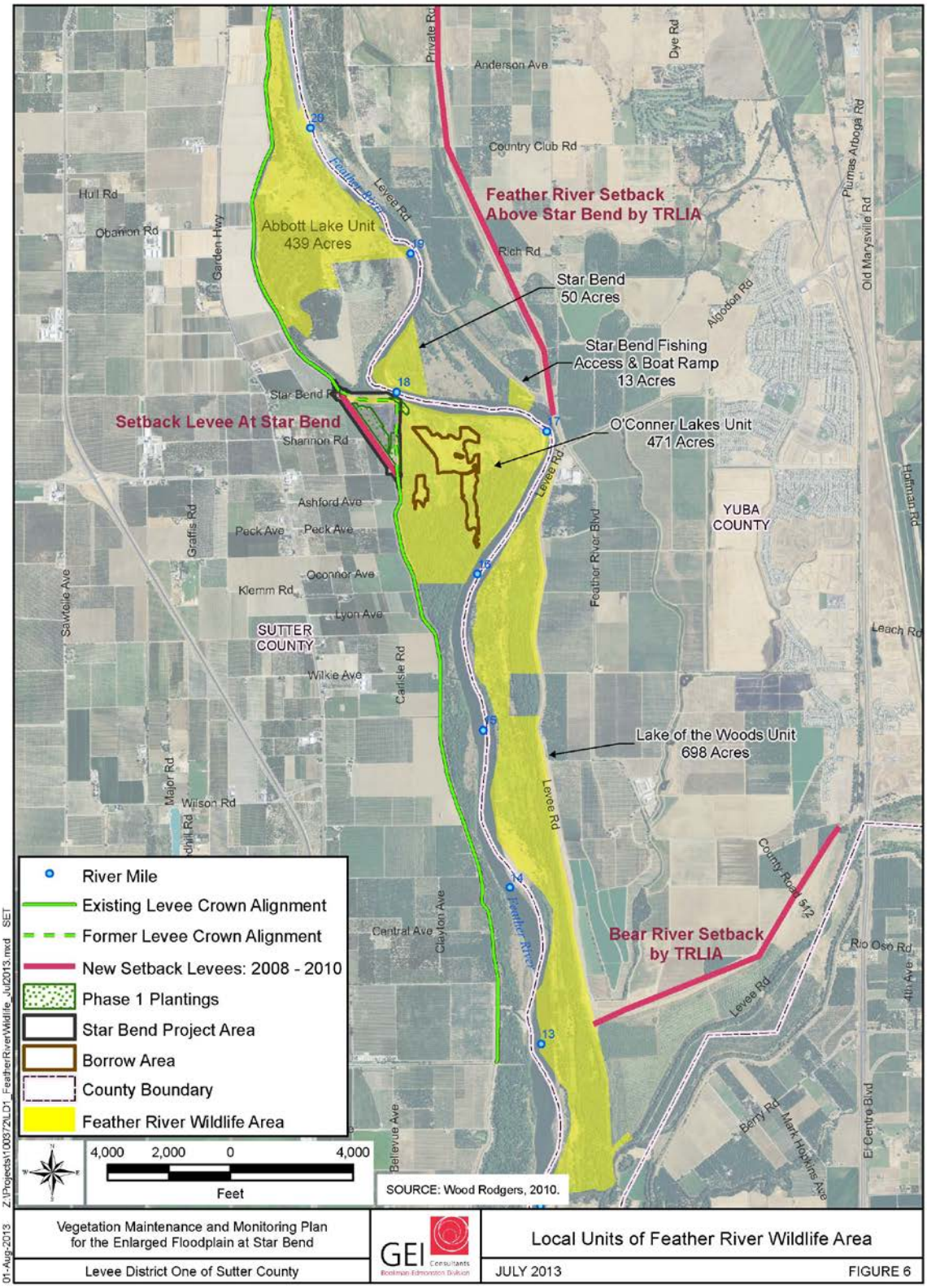

LM 15.0
LM 10.0
LM 5.0
LM 0.0
FEATHER RIVER AT YUBA CITY
FEATHER RIVER AT BOYD'S LANDING
STAR BEND
Enlarged Floodplain at Star Bend
SACTO R AT TISDALE WEIR (CREST 45.5')
Pumping Plant No. 2
Pumping Plant No. 1
LD 0001
UNIT 1
SUTTER COUNTY
COLUSA COUNTY
YUBA COUNTY
East-West Interceptor
Wadsworth Canal
Sutter Bypass
Tisdale Bypass
Sacramento River
Yuba River
Feather River
Feather River Blvd
S Butte Rd
McGarth Rd
Oswald Rd
Lincoln Rd
Bogue Rd
Obanion Rd
Everglade Rd
Pelger Rd
Subacco Rd
Garden Hwy
Carlson Rd
S George Washington Blvd
S Watton Ave
Murray Rd
Sawtelle Ave
Reclamation Rd
Humphrey Rd
S Township Rd
N Township Rd
Terra Buena Rd
Progress Rd
Garmire Rd
Butte House Rd
River Mile
Levee Mile (LM)
Operational Flood Control Point
Pumping Plant
Levee, Unit 144
Yuba City Limit
Levee District Boundary
County Boundary
2 1 0 2
Miles
SOURCE: Levee Alignment modified from CA Levee Database, DWR 2010. LD Boundary from Wood Rodgers, 2010. OFCP from CDEC, 2010.
01-Aug-2013 Z:\Projects\100372\LMA_LD1(Sutter)_O&M144_Jul2013.mxd SET
Vegetation Maintenance and Monitoring Plan for the Enlarged Floodplain at Star Bend
Levee District One of Sutter County
GEI Consultants Bookman-Edmonston Division
West Levee of Feather River, Unit No. 144 of Sacramento River Flood Control Project
JULY 2013
FIGURE 2


LM 4.6
LM 4.5
LM 4.4
LM 4.2 (4.20 = 4.38)
LM 4.1
LM 4:0
LM 3:9
LM 3:8
LM 3.7
LM 3:6
LM 3.5
Soil Cement Bentonite Cutoff Wall
Relief Well Pump Station
Star Bend Rd
Irrigation Pipeline Crossings Over Levee
Feather River
YUBA COUNTY
TMWC Pumping Plant at Star Bend
Soil Bentonite Foundation Cutoff Wall of Setback Levee
TMWC 42" RCP Irrigation Line
Shannon Rd
Previous Levee Alignment
New Setback Levee
TUDOR MUTUAL WATER CO. WATER MAIN
SUTTER COUNTY
Soil Cement Bentonite Cutoff Wall
River Mile
Levee Mile (LM)
Project Schematic
Irrigation Facility
Existing Levee Crown Alignment
Former Levee Crown Alignment
Soil Cement Bentonite Cutoff Wall
New Setback Levee Footprint with Soil Bentonite Cutoff Wall
County Boundary
500 250 0 500
Feet
SOURCE: Wood Rodgers, 2010.
Z:\Projects\100372\LD1_StarBendSetback_Jul2013.mxd SET
01-Aug-2013
Vegetation Maintenance and Monitoring Plan for the Enlarged Floodplain at Star Bend
Levee District One of Sutter County
GEI Consultants
Bookman-Edmonston Division
Lower Feather River Setback Levee at Star Bend
JULY 2013
FIGURE 3



Vegetation Maintenance & Monitoring Plan for the Enlarged Floodplain at Star Bend	GEI Consultants	Star Bend Set Back Levee VELB Conservation Planting Areas & Vegetation Management Areas
Levee District 1 of Sutter County	Project 100372	August 2013 / Figure 4


Feather River
Levee Rd
YUBA COUNTY
Feather River Blvd
Star Bend Rd
Garden Hwy
Shannon Rd
SUTTER COUNTY
Tudor Rd
Ashford Ave
Peck Ave
Area 2
O'Conner Lakes VELB Restoration Area (Not Disturbed)
Area 3
Area 1
Levee Rd
River Mile
Star Bend Project/Disturbed Area
Borrow Area
Phase 1 Plantings
County Boundary
SOURCE: Wood Rodgers, 2010.
1,000 500 0 1,000
Feet
Vegetation Maintenance and Monitoring Plan for the Enlarged Floodplain at Star Bend
Levee District One of Sutter County
GEI Consultants
Bowman-Edmonston Division
PROJECT BOUNDARIES OF FEATHER RIVER SETBACK LEVEE AT STAR BEND
JULY 2013
FIGURE 5
01-Aug-2013 Z:\Projects\100372NLD1_HabitatEnhancement_Jul2013.mxd SET



Vegetation Maintenance and Monitoring Plan for the Enlarged Floodplain at Star Bend

Levee District One of Sutter County

GEI Consultants
Bookman-Edmonston Division

Local Units of Feather River Wildlife Area

JULY 2013 FIGURE 6

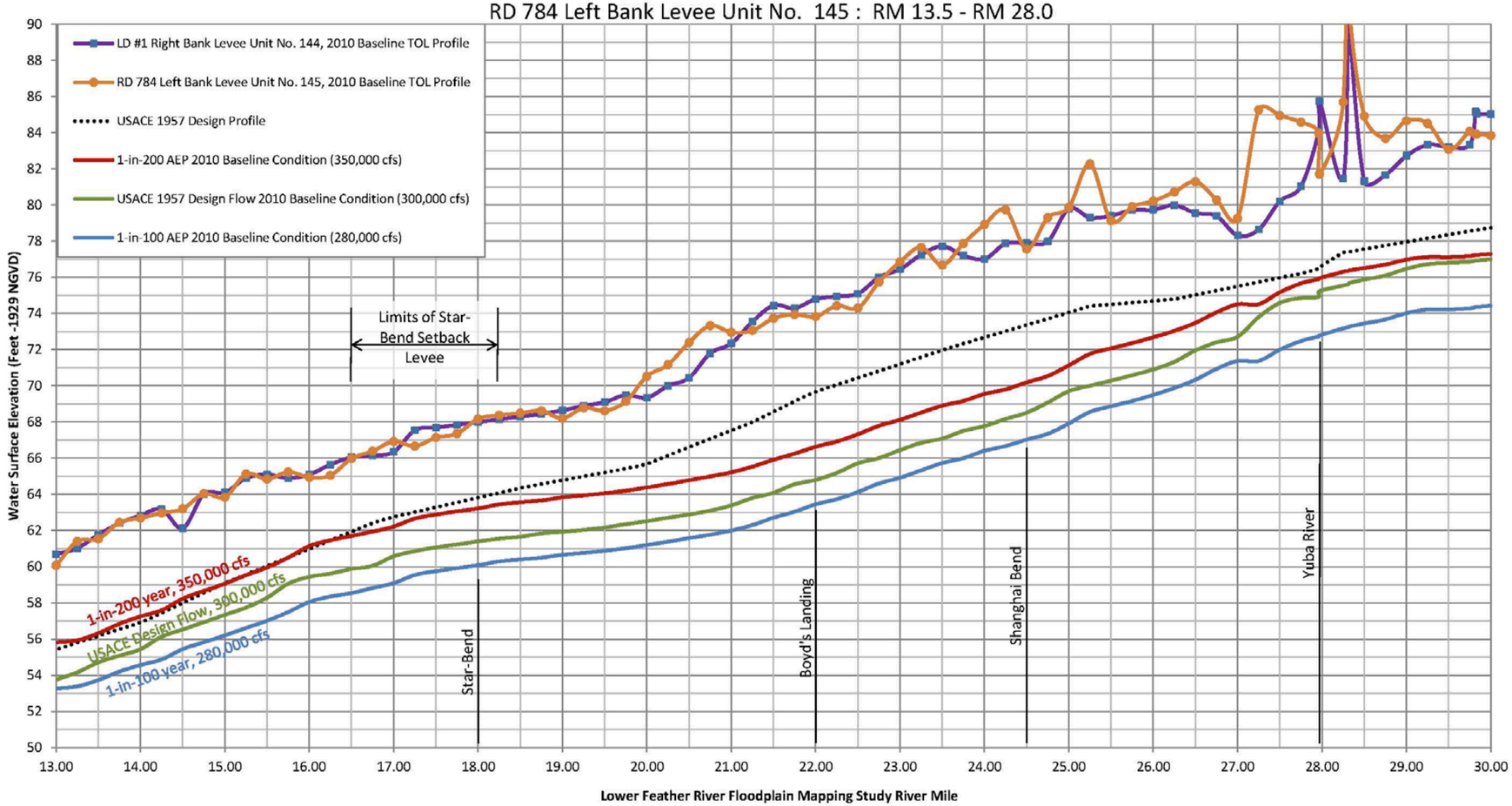
Figure 7

2010 Baseline Hydraulic Profile Conditions along Unit No'. 144

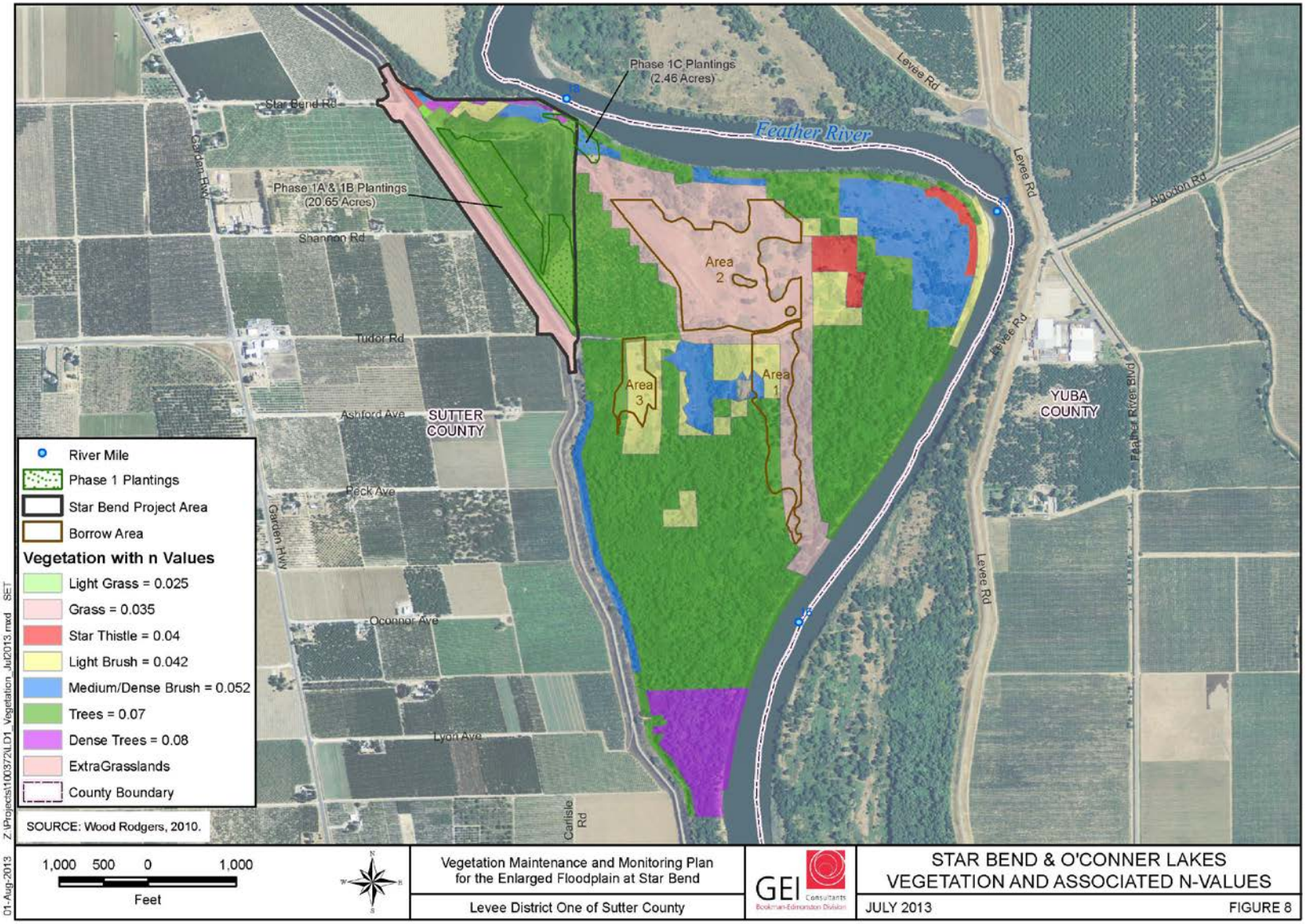
Lower Feather River Corridor (River Miles 13.0 - 30.0)

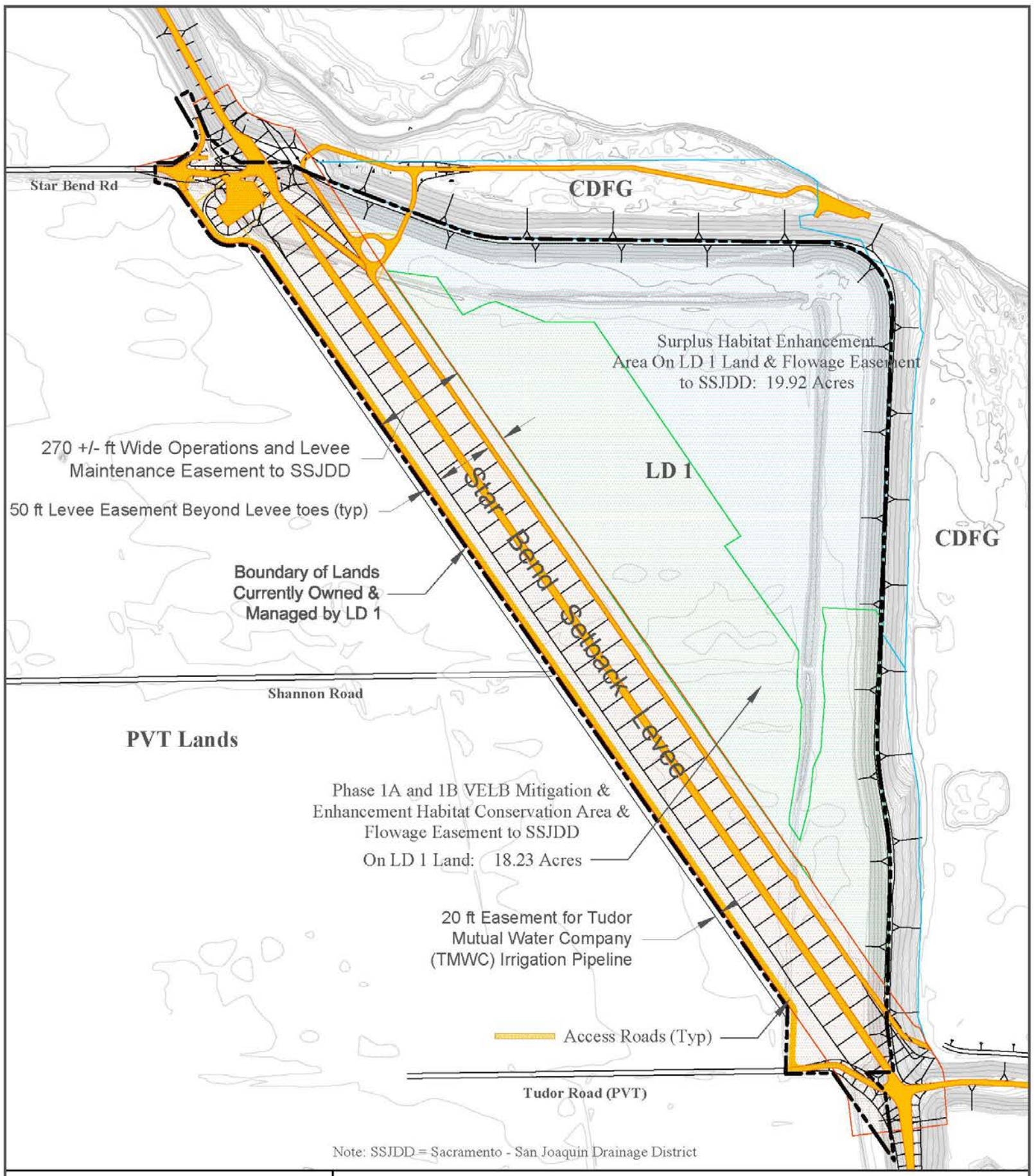
LD # 1 Right Bank Levee Unit No. 144: RM 12.8 - RM 30.0

RD 784 Left Bank Levee Unit No. 145 : RM 13.5 - RM 28.0



Sources: Wood Rodgers November 2007, and MBK Engineers April 2009


Phase 1C Plantings
(2.46 Acres)
Star Bend Rd
Feather River
Levee Rd
Phase 1A & 1B Plantings
(20.65 Acres)
Shannon Rd
Area
2
Area
3
Area
1
Tudor Rd
Ashford Ave
SUTTER
COUNTY
YUBA
COUNTY
Peck Ave
Garden Hwy
Oconnor Ave
Lyon Ave
Carlisle
Rd
Feather River Blvd
Arboleda Rd
River Mile
Phase 1 Plantings
Star Bend Project Area
Borrow Area
Vegetation with n Values
Light Grass = 0.025
Grass = 0.035
Star Thistle = 0.04
Light Brush = 0.042
Medium/Dense Brush = 0.052
Trees = 0.07
Dense Trees = 0.08
ExtraGrasslands
County Boundary
SOURCE: Wood Rodgers, 2010.
Z:\Projects\100372\LD1_Vegetation_Jul2013.mxd SET
01-Aug-2013
1,000 500 0 1,000
Feet
Vegetation Maintenance and Monitoring Plan
for the Enlarged Floodplain at Star Bend
Levee District One of Sutter County
GEI Consultants
Bookman-Edmonston Division
STAR BEND & O'CONNER LAKES
VEGETATION AND ASSOCIATED N-VALUES
JULY 2013
FIGURE 8



Limits of Land Acquired for Starbend Setback Levee

Access Roads

Former Levee System Removed

N W E S

150' 0 300'
Scale in Feet

Lands Acquired by LD1 for Star Bend Setback Levee

(1)	Levee Footprint Area & 50 ft beyond landside and waterside toes of levee: Approximately 270 ft in width Fee Title by LD1 & Levee Easement to SSJDD	21.29 Acres
(2)	Phase 1A &1B VELB Mitigation and Enhancement Habitat Conservation Area in Floodway Fee Title by LD1 & Flowage Easement to SSJDD	18.23 Acres
(3)	Surplus Habitat Enhancement Area On LD 1 Land & Flowage Easement to SSJDD	19.92 Acres
Total Acres of Fee Title Acquired by LD1 and Easements Conveyed to SSJDD and Others		59.44 Acres

Vegetation Maintenance & Monitoring Plan for the Enlarged Floodplain at Star Bend

Levee District 1 of Sutter County

GEI Consultants

Project 100372

Star Bend Setback Levee Area
Lands and Easements
Near River Mile 18.0

July 2013 | Figure 9

APPENDIX A

Central Valley Flood Protection Board Encroachment (CVFPB) Permits

CVFPB Permit No. 18191 BD for LD1 Setback Levee at Star Bend
CVFPB Permit No. 18437 BD for Tudor Mutual Water Company Facilities
CVFPB Permit No. 18438 BD for Volcano Vista Farms Irrigation Facilities

STATE OF CALIFORNIA
THE RESOURCES AGENCY

CENTRAL VALLEY FLOOD PROTECTION BOARD

PERMIT NO. 18191 BD

This Permit is issued to:

Levee District No. 1, Sutter County
243 Second Street
Yuba City, California 95991

To remove approximately 4,500 linear-feet of existing project levee and construct a 3,400-linear-foot-long setback levee (LM 3.75 to 4.5) with a slurry cutoff wall; and modifying the existing pipelines at Star Bend on the right (west) bank of the Feather River. The project is located south of Yuba City, northeast of the intersection of Highway 99 and Garden Highway (Section 1&2, T13N, R3E, MDB&M, Levee District 1 Sutter, Feather River, Sutter County).

NOTE: Special Conditions have been incorporated herein which may place limitations on and/or require modification of your proposed project described above.

(SEAL)

Dated: MAY 11 2009

Jay S. Punia
Executive Officer

GENERAL CONDITIONS:

ONE: This permit is issued under the provisions of Sections 8700 – 8723 of the Water Code.

TWO: Only work described in the subject application is authorized hereby.

THREE: This permit does not grant a right to use or construct works on land owned by the Sacramento and San Joaquin Drainage District or on any other land.

FOUR: The approved work shall be accomplished under the direction and supervision of the State Department of Water Resources, and the permittee shall conform to all requirements of the Department and the Central Valley Flood Protection Board.

FIVE: Unless the work herein contemplated shall have been commenced within one year after issuance of this permit, the Board reserves the right to change any conditions in this permit as may be consistent with current flood control standards and policies of the Central Valley Flood Protection

Board.

SIX: This permit shall remain in effect until revoked. In the event any conditions in this permit are not complied with, it may be revoked on 15 day's notice.

SEVEN: It is understood and agreed to by the permittee that the start of any work under this permit shall constitute an acceptance of the conditions in this permit and an agreement to perform work in accordance therewith.

EIGHT: This permit does not establish any precedent with respect to any other application received by the Central Valley Flood Protection Board.

NINE: The permittee shall, when required by law, secure the written order or consent from all other public agencies having jurisdiction.

TEN: The permittee is responsible for all personal liability and property damage which may arise out of failure on the permittee's part to perform the obligations under this permit. If any claim of liability is made against the State of California, or any departments thereof, the United States of America, a local district or other maintaining agencies and the officers, agents or employees thereof, the permittee shall defend and shall hold each of them harmless from each claim.

ELEVEN: The permittee shall exercise reasonable care to operate and maintain any work authorized herein to preclude injury to or damage to any works necessary to any plan of flood control adopted by the Board or the Legislature, or interfere with the successful execution, functioning or operation of any plan of flood control adopted by the Board or the Legislature.

TWELVE: Should any of the work not conform to the conditions of this permit, the permittee, upon order of the Central Valley Flood Protection Board, shall in the manner prescribed by the Board be responsible for the cost and expense to remove, alter, relocate, or reconstruct all or any part of the work herein approved.

SPECIAL CONDITIONS FOR PERMIT NO. 18191 BD

THIRTEEN: No construction shall occur until the Army Corps of Engineers approves the project under 33 USC Section 408. The approval letter shall be incorporated into this permit as Exhibit A and all conditions from Section 408 approval provided by the Corps of Engineers shall be incorporated into this permit as if fully set forth herein if they are not in conflict with the Central Valley Flood Protection Board's regulations (Title 23 California Code of regulations).

FOURTEEN: No work authorized by this permit shall be performed until the Department of Water Resources have received, reviewed, and approved in writing, a complete set of final submitted plans, drawings, and specifications for the project. The Central Valley Flood Protection Board shall have up to 30 days after receipt of plans, drawings, and specifications for the review process. The Central Valley Flood Protection Board and/or the Department of Water Resources may extend this review period up to 15 days by written notification.

FIFTEEN: All addendums or other changes made to the submitted documents by the permittee after issuance of this permit are subject to submittal and review for approval by the Central Valley Flood Protection Board prior to incorporation into the permitted project. Upon review and approval of any new submitted documents the permit shall be revised, if needed, prior to the construction related to the proposed changes. The Central Valley Flood Protection Board shall have up to 30 days after receipt of any documents, plans, drawings and specifications for review and approval. The Central Valley Flood Protection Board may extend this review and approval period up to 15 days by written notification.

SIXTEEN: The mitigation measures approved by the permittee and found in its Mitigation and Monitoring Reporting Plan (MMRP) are made a condition of this permit. The permittee shall

implement all such mitigation measures. However, the measures in the MMRP may be modified to accommodate changed circumstances or new information not triggering the need for subsequent or supplemental analysis under CEQA Guidelines sections 15062 and 15063 with advance notice of the proposed changes and submittal of supporting documentation for review and comment to the Environmental Scientist of the Central Valley Flood Protection Board.

SEVENTEEN: The permittee shall comply with all conditions set forth in the letter from the Deparment of the Army dated April 03, 2009, which is attached to this permit as Exhibit A and is incorporated by reference.

EIGHTEEN: Within three years from completion of the construction of the work authorized under this permit, the permittee shall provide the Sacramento and San Joaquin Drainage District, acting by and through the Central Valley Flood Protection Board of the State of California, a fee interest or a permanent easement granting all flood control rights upon, over and across the property to be occupied by the existing or to-be-constructed levee and to-be-reconstructed levee, including the area of the backup levee, cutoff walls and the tie-ins to the existing federal project levees. The easement must include the area within the floodway, the levee section, and the area within fifty (50) feet in width adjacent to the landward levee toe if the area is not presently encumbered by a Central Valley Flood Protection Board easement. For information regarding existing Central Valley Flood Protection Board easements, please contact J. D. Asis at (916) 653-3947.

NINETEEN: All work approved by this permit shall be in accordance with the final (100%) submitted drawings and specifications except as modified by special permit conditions herein. No further work, other than that approved by this permit, shall be done in the area without prior approval of the Central Valley Flood Protection Board.

TWENTY: Prior to commencement of work, the permittee shall create a photo record, including associated descriptions, of existing levee conditions. The photo record shall be certified (signed and stamped) by a licensed land surveyor or professional engineer registered in the State of California and submitted to the Central Valley Flood Protection Board within 30 days of beginning the project.

TWENTY-ONE: Upon completion of the project, the permittee shall perform a levee crown profile survey and create a photo record, including associated descriptions, of "as-built" levee conditions. The levee crown profile survey and photo record shall be certified (stamped and signed) by a licensed land surveyor or professional engineer registered in the State of California and submitted to the Central Valley Flood Protection Board within 120 days of project completion.

TWENTY-TWO: The permittee shall maintain the permitted encroachment(s) and the project works within the utilized area in the manner required and as requested by the authorized representative of the Department of Water Resources or any other agency responsible for maintenance.

TWENTY-THREE: The permittee shall contact the Department of Water Resources by telephone, (916) 574-0648, and submit the enclosed postcard to schedule a preconstruction conference. Failure to do so at least 10 working days prior to start of work may result in delay of the project.

TWENTY-FOUR: Prior to starting construction under this permit, the permittee shall contact the Department of Water Resources regarding inspection of the project during construction for EIP purposes.

TWENTY-FIVE: The permittee shall provide supervision and inspection services acceptable to the Central Valley Flood Protection Board.

TWENTY-SIX: Within 120 days of completion of the project, the permittee shall submit to the Central Valley Flood Protection Board a certification report, stamped and signed by a professional engineer registered in the State of California, certifying that the work was inspected and performed in accordance with the Central Valley Flood Protection Board permit conditions and submitted drawings and specifications.

TWENTY-SEVEN: Within 120 days of completion of the project, the permittee shall submit to the Central Valley Flood Protection Board proposed revisions to the Corps of Engineers, Supplement to Standard Operation and Maintainance Manual, Sacramento River Flood Control Project, Unit 144 and the associated as-built drawings for system alterations approved by this permit that are to be incorporated into the federal Sacramento River Flood Control Project.

TWENTY-EIGHT: If FEMA certification of the levee by the U. S. Army Corps of Engineers is being considered, the project proponent should contact the U. S. Army Corps of Engineers regarding inspection of the project during construction for FEMA certification purposes.

TWENTY-NINE: The permittee shall contact the U. S. Army Corps of Engineers regarding inspection of the project during construction as the proposed work is an alteration to the existing Federal Flood Control Project that will be incorporated into the Sacramento River Flood Control Project, an adopted plan of flood control.

THIRTY: The Central Valley Flood Protection Board and Department of Water Resources shall not be held liable for any damages to the permitted encroachment(s) resulting from flood fight, operation, maintenance, inspection, or emergency repair.

THIRTY-ONE: The permittee may be required, at permittee's cost and expense, to remove, alter, relocate, or reconstruct all or any part of the permitted encroachment(s) if removal, alteration, relocation, or reconstruction is necessary as part of or in conjunction with any present or future flood control plan or project or if damaged by any cause. If the permittee does not comply, the Central Valley Flood Protection Board may remove the encroachment(s) at the permittee's expense.

THIRTY-TWO: The permittee should contact the U.S. Army Corps of Engineers, Sacramento District, Regulatory Branch, 1325 J Street, Sacramento, California 95814, telephone (916) 557-5250, as compliance with Section 10 of the Rivers and Harbors Act and/or Section 404 of the Clean Water Act may be required.

THIRTY-THREE: The permittee shall be responsible for repair of any damages to the project levee and other flood control facilities due to construction, operation, or maintenance of the proposed project.

THIRTY-FOUR: The permittee is responsible for all liability associated with construction, operation, and maintenance of the permitted facilities and shall defend and hold harmless the State of California, or any departments thereof, from any liability or claims of liability associated therewith.

THIRTY-FIVE: If the project, or any portion thereof, is to be abandoned in the future, the permittee or successor shall abandon the project under direction of the Central Valley Flood Protection Board and Department of Water Resources, at the permittee's or successor's cost and expense.

THIRTY-SIX: Upon completion of the project, the permittee shall submit as-built drawings to: Department of Water Resources, Flood Project Inspection Section, 3310 El Camino Avenue, Suite LL30, Sacramento, California 95821.

THIRTY-SEVEN: No construction work of any kind shall be done during the flood season from November 1 to April 15 without prior approval of the Central Valley Flood Protection Board.

THIRTY-EIGHT: Cleared trees and brush shall be completely burned or removed from the floodway, and downed trees or brush shall not remain in the floodway during the flood season from November 1 to April 15.

THIRTY-NINE: No material stockpiles, temporary buildings, or equipment shall remain in the floodway during the flood season from November 1 to April 15.

FORTY: The permitted encroachment(s) shall not interfere with operation and maintenance of the flood control project. If the permitted encroachment(s) are determined by any agency responsible for operation or maintenance of the flood control project to interfere, the permittee shall be required, at permittee's cost and expense, to modify or remove the permitted encroachment(s) under direction of the Central Valley Flood Protection Board or Department of Water Resources. If the permittee does not comply, the Central Valley Flood Protection Board may modify or remove the encroachment(s) at the permittee's expense.

FORTY-ONE: During demolition/construction of the project, any and all anticipated or unanticipated conditions encountered which may impact levee integrity or flood control shall be brought to the attention of the Flood Project Inspector immediately and prior to continuation.

FORTY-TWO: The stability of the levee shall be maintained at all times during construction.

FORTY-THREE: Excavations below the design flood plane and within the levee section or within 10 feet of the projected waterward and landward levee slopes shall have side slopes no steeper than 1 horizontal to 1 vertical. Flatter slopes may be required to ensure stability of the excavation.

FORTY-FOUR: A profile of the levee crown roadway and access ramps that will be utilized for access to and from the borrow area shall be submitted to the Central Valley Flood Protection Board prior to commencement of excavation.

FORTY-FIVE: The haul ramps and utilized levee crown roadway shall be maintained in a manner prescribed by the authorized representative of the Department of Water Resources or any other agency responsible for maintenance.

FORTY-SIX: Any damage to the levee crown roadway or access ramps that will be utilized for access for this project shall be promptly repaired to the condition that existed prior to this project.

FORTY-SEVEN: Equipment used in the construction of the cutoff walls shall not exceed live-load

surcharge to a level that causes or contributes to the instability of the levee during construction operations.

FORTY-EIGHT: Fluid pressures in the cutoff wall construction zones shall be carefully monitored and controlled to minimize the potential for hydrofracturing.

FORTY-NINE: The permittee shall be responsible for all damages due to settlement, consolidation, or heave from any construction-induced activities.

FIFTY: Excess bentonite or other cutoff wall fluids shall be properly disposed of outside of the floodway. The bentonite or other cutoff wall fluids shall not be used as backfill material during construction or reconstruction of the levee.

FIFTY-ONE: All fencing, gates and signs removed during construction of this project shall be replaced in kind and at the original locations. If it is necessary to relocate any fence, gate or sign, the permittee is required to obtain written approval from the Central Valley Flood Control Board prior to installation at a new location if not shown on the submitted plans.

FIFTY-TWO: All temporary fencing, gates and signs shall be removed upon completion of the project.

FIFTY-THREE: Any pipe or conduit being reinstalled in the levee section or within fifty (50) feet of both the waterward and landward levee toes shall meet Title 23 standards.

FIFTY-FOUR: Fill on the levee slopes shall be keyed into the existing levee section with each lift.

FIFTY-FIVE: Backfill material for excavations within the existing levee sections, the new levee and within 10 feet of the levee toes of both levees shall be placed in 4- to 6-inch layers, moisture conditioned above optimum moisture content, and compacted to a minimum of 95 percent relative compaction as measured by ASTM Method D698.

FIFTY-SIX: Density tests by a certified materials laboratory will be required to verify compaction of backfill within the levee section and within ten (10) feet of the levee toes on both the existing and new levee sections.

FIFTY-SEVEN: Earthen material meeting the requirements designated in Condition Fifty-Nine shall be used when constructing the backup levee or reconstructing the degraded areas of the existing levee, and no cuts shall remain in the levee section upon completion.

FIFTY-EIGHT: Fill material shall be placed only within the area indicated on the approved plans.

FIFTY-NINE: All fill material shall be imported impervious material with 20 percent or more passing the No. 200 sieve, a plasticity index of 8 or more, and a liquid limit of less than 50 and free of lumps or stones exceeding 3 inches in greatest dimension, vegetative matter, or other unsatisfactory material.

SIXTY: The fill surface areas shall be graded to direct drainage away from the toes of the levees.

SIXTY-ONE: The slopes of the proposed and reconstructed levees shall be no steeper than 3 horizontal to 1 vertical on the water side and 2 horizontal to 1 vertical on the land side.

SIXTY-TWO: The new and reconstructed crown roadway and access ramps shall be surfaced with a minimum of 4 inches of compacted, Class 2, aggregate base (Caltrans Specification 26-1.02A).

SIXTY-THREE: Aggregate base material shall be compacted to a relative compaction of not less than 95 percent per ASTM Method D1557-91, with a moisture content sufficient to obtain the required compaction.

SIXTY-FOUR: The project site including the levee sections and access ramps shall be restored to at least the condition that existed prior to commencement of work and there shall be no visible trace of the cutoff walls.

SIXTY-FIVE: All debris generated by this project shall be disposed of outside the floodway and off the levee sections.

SIXTY-SIX: The permittee shall replant or reseed the levee slopes to restore sod, grass, or other non-woody ground covers if damaged during project work.

SIXTY-SEVEN: In the event existing revetment on the channel banks or levee slopes is disturbed or displaced, it shall be restored to its original condition upon completion of the proposed installation.

SIXTY-EIGHT: In the event that levee or bank erosion injurious to the adopted plan of flood control occurs at or adjacent to the permitted encroachment(s), the permittee shall repair the eroded area and propose measures, to be approved by the Central Valley Flood Protection Board, to prevent further erosion.

SIXTY-NINE: No material, other than temporarily stored materials during construction, shall be stockpiled closer than 50 feet from the landward toe of the project or new levees.

SEVENTY: Any damage caused to the levees during placement or removal of the stockpiled material shall be repaired.

SEVENTY-ONE: All reconstructed and new pipelines shall be tested and confirmed free of leaks by X-ray, pressure tests, or other approved methods during construction or anytime after construction upon request by the Central Valley Flood Protection Board.

SEVENTY-TWO: All abandoned piping, conduits and appurtenances shall be removed from the levee section and areas encompassed by the easements as defined by this permit.

SEVENTY-THREE: Any additional encroachment(s) in the floodway, on or in the levee section and within ten (10) feet of the landward levee toe by the permittee or other parties require an approved permit from the Central Valley Flood Protection Board and shall be in compliance with the Central Valley Flood Protection Board's regulations (Title 23 California Code of Regulations).

SEVENTY-FOUR: By acceptance of this permit, the permittee acknowledges the authority of the Central Valley Flood Control Board to regulate all future encroachments along this levee reach

including those that may encroach upon alterations approved by this permit prior to incorporation into the federal Sacramento River Flood Control Project by the U. S. Army Corps of Engineers.

SEVENTY-FIVE: If the permittee or successor does not comply with the conditions of this permit and an enforcement by the Central Valley Flood Protection Board is required, the permittee or successor shall be responsible for bearing all costs associated with the enforcement action, including reasonable attorney's fees.

SEVENTY-SIX: The permittee acknowledges that some portions of the levee may be overbuilt to account for settlement and that upon adoption of the updated Central Valley Flood Managenent Plan the permittee shall perform a levee crown survey of all levee crown covered by this permit and said profile shall be compared to the levee crown profile adopted in the updated Central Vallet Flood Management Plan. The permittee shall ensure that the levee crown does not exceed the updated Central Valley Flood Management Plan.

SEVENTY-SEVEN: The permittee shall not start construction of the foundation cutoff wall until the permittee can assure the Central Valley Flood Protection Board that the backup levee can be completely constructed in one construction season. If unforseen circumstances occur that could jeopardise the assurance given the permittee must have a mitigation plan to address those circumstances as soon as they are encountered and approved by the Central Valley Flood Protection Board with Board staff participation as to the mitigation.

Attachment G

EXHIBIT A

DEPARTMENT OF THE ARMY
U.S. Army Engineer District, Sacramento
Corps of Engineers
1325 J Street
Sacramento, California 95814-2922

REPLY TO
ATTENTION OF

Flood Protection and Navigation Section (18191)

Mr. Jay Punia, Executive Officer
Central Valley Flood Protection Board
3310 El Camino Ave. Rm. LL40
Sacramento, California 95821

APR 03 2009

Dear Mr. Punia:

We have reviewed a permit application by Levee District No. 1, Sutter County (application number 18191). This project includes removing approximately 1.5 miles of existing project levee and constructing a 3,400 foot long setback levee (river mile 16.75 to 18.25) with a slurry cutoff wall, and modifying the existing pipelines at Star Bend on the right (west) bank of the Feather River. This project is located south of Yuba City, at 39.0074°N 121.5997°W NAD83, Sutter County, California.

The District Engineer has no objection to conditional approval of this application by your Board from a flood control standpoint, subject to the following conditions:

a. That the permit shall be subject to HQ USACE issuing Section 408 approval. If HQ USACE disapproves the Section 408 request, the Central Valley Flood Protection Board shall notify the applicant that the conditional permit is no longer valid.

b. That the modifications to the existing pipelines shall be subject to conditions outlined in our letters dated March 26, 2009 for permits 18437 and 18438.

c. That no stockpiles of material or equipment shall remain in the floodway during the flood season of November 1 to April 15.

d. That in the event trees and brush are cleared, they shall be grubbed and properly disposed of either by complete burning or complete removal outside the limits of the project right-of-way.

Based upon the information provided, no Section 10 or Section 404 permit is needed.

If you have any questions concerning our comments on this permit application, please contact Mr. Ryan Larson at (916) 557-7568 or Mr. Robert Murakami at (916) 557-6738.

Sincerely,

Kevin Knuuti, P.E.
Chief, Engineering Division

Copy Furnished:
Mr. Jeremy Arrich, Chief, Flood Project Integrity and Inspection Branch,
3310 El Camino Avenue, Suite LL30, Sacramento, CA 95821

STATE OF CALIFORNIA
THE RESOURCES AGENCY

CENTRAL VALLEY FLOOD PROTECTION BOARD

PERMIT NO. 18437 BD

This Permit is issued to:

Tudor Mutual Water Company
280 Wilkie Avenue
Yuba City, California 95992

To abandon and remove existing irrigation pipeline and install a 48-inch-diameter, 1,660-foot-long welded steel pipe from the existing pump station along the overflow area of the right (west) bank levee of the Feather River to the waterside toe of the new setback levee; install two 30-inch-diameter, 510-foot-long welded steel pipes up and over new setback levee; remove distribution box at landside toe of existing Feather River Levee and place fill material on landside slope at upstream end of setback levee. The project is located south of Yuba City, approximately one mile northeast of the intersection of Highway 99 and the Garden Highway (Section 2, T13N, R3E, MDB&M, Levee District 1 Sutter, Feather River, Sutter County).

NOTE: Special Conditions have been incorporated herein which may place limitations on and/or require modification of your proposed project described above.

(SEAL)

Dated: APR 13 2009

Jay S. Punia
Executive Officer

GENERAL CONDITIONS:

ONE: This permit is issued under the provisions of Sections 8700 – 8723 of the Water Code.

TWO: Only work described in the subject application is authorized hereby.

THREE: This permit does not grant a right to use or construct works on land owned by the Sacramento and San Joaquin Drainage District or on any other land.

FOUR: The approved work shall be accomplished under the direction and supervision of the State Department of Water Resources, and the permittee shall conform to all requirements of the Department and the Central Valley Flood Protection Board.

FIVE: Unless the work herein contemplated shall have been commenced within one year after issuance of this permit, the Board reserves the right to change any conditions in this permit as may be consistent with current flood control standards and policies of the Central Valley Flood Protection Board.

SIX: This permit shall remain in effect until revoked. In the event any conditions in this permit are not complied with, it may be revoked on 15 day's notice.

SEVEN: It is understood and agreed to by the permittee that the start of any work under this permit shall constitute an acceptance of the conditions in this permit and an agreement to perform work in accordance therewith.

EIGHT: This permit does not establish any precedent with respect to any other application received by the Central Valley Flood Protection Board.

NINE: The permittee shall, when required by law, secure the written order or consent from all other public agencies having jurisdiction.

TEN: The permittee is responsible for all personal liability and property damage which may arise out of failure on the permittee's part to perform the obligations under this permit. If any claim of liability is made against the State of California, or any departments thereof, the United States of America, a local district or other maintaining agencies and the officers, agents or employees thereof, the permittee shall defend and shall hold each of them harmless from each claim.

ELEVEN: The permittee shall exercise reasonable care to operate and maintain any work authorized herein to preclude injury to or damage to any works necessary to any plan of flood control adopted by the Board or the Legislature, or interfere with the successful execution, functioning or operation of any plan of flood control adopted by the Board or the Legislature.

TWELVE: Should any of the work not conform to the conditions of this permit, the permittee, upon order of the Central Valley Flood Protection Board, shall in the manner prescribed by the Board be responsible for the cost and expense to remove, alter, relocate, or reconstruct all or any part of the work herein approved.

SPECIAL CONDITIONS FOR PERMIT NO. 18437 BD

THIRTEEN: Construction between station 14+38.26 and the proposed flow distribution box under this permit shall not occur until the Army corps of Engineers approves the project under 33 USC Section 408. All conditions from Section 408 approval provided by the Corps of Engineers shall be incorporated into this permit as if fully set forth herein if they are not in conflict with the Central Valley Flood Protection Board's regulations (Title 23 California Code of Regulations).

FOURTEEN: All work approved by this permit shall be in accordance with the submitted drawings and specifications except as modified by special permit conditions herein. No further work, other than that approved by this permit, shall be done in the area without prior approval of the Central Valley Flood Protection Board.

FIFTEEN: The permittee shall maintain the permitted encroachment(s) and the project works within the utilized area in the manner required and as requested by the authorized representative of the Department of Water Resources, Levee District 1 or any other agency responsible for maintenance.

SIXTEEN: The permittee shall contact the Department of Water Resources by telephone, (916) 574-1213, and submit the enclosed postcard to schedule a preconstruction conference. Failure to do so at least 10 working days prior to start of work may result in delay of the project.

SEVENTEEN: The permittee shall provide supervision and inspection services acceptable to the Central Valley Flood Protection Board. A professional engineer registered in the State of California

shall certify that all work was inspected and performed in accordance with submitted drawings, specifications, and permit conditions.

EIGHTEEN: The Central Valley Flood Protection Board, Department of Water Resources, and Levee District 1 shall not be held liable for any damages to the permitted encroachment(s) resulting from flood fight, operation, maintenance, inspection, or emergency repair.

NINETEEN: The permittee may be required, at permittee's cost and expense, to remove, alter, relocate, or reconstruct all or any part of the permitted encroachment(s) if removal, alteration, relocation, or reconstruction is necessary as part of or in conjunction with any present or future flood control plan or project or if damaged by any cause. If the permittee does not comply, the Central Valley Flood Protection Board may remove the encroachment(s) at the permittee's expense.

TWENTY: The permittee should contact the U.S. Army Corps of Engineers, Sacramento District, Regulatory Branch, 1325 J Street, Sacramento, California 95814, telephone (916) 557-5250, as compliance with Section 10 of the Rivers and Harbors Act and/or Section 404 of the Clean Water Act may be required.

TWENTY-ONE: The permittee shall be responsible for repair of any damages to the project levee and other flood control facilities due to construction, operation, or maintenance of the proposed project.

TWENTY-TWO: The permittee is responsible for all liability associated with construction, operation, and maintenance of the permitted facilities and shall defend and hold harmless the State of California, or any departments thereof, from any liability or claims of liability associated therewith.

TWENTY-THREE: The permitted encroachment(s) shall not interfere with operation and maintenance of the flood control project. If the permitted encroachment(s) are determined by any agency responsible for operation or maintenance of the flood control project to interfere, the permittee shall be required, at permittee's cost and expense, to modify or remove the permitted encroachment(s) under direction of the Central Valley Flood Protection Board or Department of Water Resources. If the permittee does not comply, the Central Valley Flood Protection Board may modify or remove the encroachment(s) at the permittee's expense.

TWENTY-FOUR: No construction work of any kind shall be done during the flood season from November 1 to April 15 without prior approval of the Central Valley Flood Protection Board.

TWENTY-FIVE: No excavation shall be made or remain in the levee section during the flood season from November 1 to April 15 without prior approval of the Central Valley Flood Protection Board.

TWENTY-SIX: No material stockpiles, temporary buildings, or equipment shall remain in the floodway during the flood season from November 1 to April 15.

TWENTY-SEVEN: During demolition/construction of the project, any and all anticipated or unanticipated conditions encountered which may impact levee integrity or flood control shall be brought to the attention of the Flood Project Inspector immediately and prior to continuation.

TWENTY-EIGHT: In the event existing revetment on the channel bank or levee slope is disturbed or

displaced, it shall be restored to its original condition upon completion of the proposed installation.

TWENTY-NINE: Cleared trees and brush shall be completely burned or removed from the floodway, and downed trees or brush shall not remain in the floodway during the flood season from November 1 to April 15.

THIRTY: The pipes shall be placed in the center of an open trench 2 times the diameter of the pipe.

THIRTY-ONE: Pipe installed in the levee section and within 10 feet of the levee toes shall be new steel and at least 3 gauge. Steel pipe shall be corrosion-proofed externally with a coating of coal-tar enamel; asphalt-saturated felt wrap; cement mortar; or PVC or polyethylene tape wrapped to a thickness of 30 mils. Steel pipe shall be corrosion-proofed internally with a continuous lining of cement mortar or asphalt.

THIRTY-TWO: A suitable siphon breaker and protective housing shall be installed on the apex of each pipe and shall be located off the levee patrol road.

THIRTY-THREE: The pipelines shall be tested and confirmed free of leaks by X-ray, pressure tests, or other approved methods during construction or anytime after construction upon request by the Central Valley Flood Protection Board.

THIRTY-FOUR: The invert of the pipes through the levee section shall be above the design flood plane elevation of 64.2 feet, NGV Datum.

THIRTY-FIVE: All pipe joints within the levee section shall be butt welded.

THIRTY-SIX: The pipes shall be installed through the levee section at a right angle to the centerline of the levee.

THIRTY-SEVEN: All abandoned pipes shall be removed from in the existing levee section and in the area 10 feet waterward of the waterward toe of the proposed setback levee.

THIRTY-EIGHT: The pipe shall be buried at least 24 inches below the levee slopes and 24 inches below the levee crown.

THIRTY-NINE: The pipe within the overflow area shall be buried with a minimum of 2 feet of cover.

FORTY: Backfill material for excavations in the area 10 feet waterward of the waterward toe of the proposed setback levee shall be placed in 4- to 6-inch layers and compacted to at least the density of the adjacent, firm, undisturbed material.

FORTY-ONE: Backfill material for excavations within the levee section and within 10 feet of the levee toes shall be placed in 4- to 6-inch layers, moisture conditioned above optimum moisture content, and compacted to a minimum of 90 percent relative compaction as measured by ASTM Method D1557-91.

FORTY-TWO: Density tests by a certified materials laboratory will be required to verify compaction of backfill within the levee section and within 10 feet of the levee toes.

FORTY-THREE: Location markers shall be placed near both levee toes for the buried pipes not surfacing near the levee toes.

FORTY-FOUR: All debris generated by this project shall be disposed of outside the floodway and off the levee section.

FORTY-FIVE: Upon completion of the project, the permittee shall submit as-built drawings to: Department of Water Resources, Flood Project Inspection Section, 3310 El Camino Avenue, Suite LL30, Sacramento, California 95821.

FORTY-SIX: In the event that levee or bank erosion injurious to the adopted plan of flood control occurs at or adjacent to the permitted encroachment(s), the permittee shall repair the eroded area and propose measures, to be approved by the Central Valley Flood Protection Board, to prevent further erosion.

FORTY-SEVEN: If the project, or any portion thereof, is to be abandoned in the future, the permittee or successor shall abandon the project under direction of the Central Valley Flood Protection Board and Department of Water Resources, at the permittee's or successor's cost and expense.

FORTY-EIGHT: The permittee shall comply with all conditions set forth in the letter from the Department of the Army dated March 26, 2009, which is attached to this permit as Exhibit A and is incorporated by reference.

Attachment G
EXHIBIT A

DEPARTMENT OF THE ARMY
U.S. Army Engineer District, Sacramento
Corps of Engineers
1325 J Street
Sacramento, California 95814-2922

REPLY TO
ATTENTION OF

MAR 26 2009

Flood Protection and Navigation Section (18437)

Mr. Jay Punia, Executive Officer
Central Valley Flood Protection Board
3310 El Camino Ave., Room LL40
Sacramento, CA 95821

Dear Mr. Punia:

We have reviewed a permit application by Tudor Mutual Water Company (application number 18437). This project includes abandoning portions and removing portions of an existing irrigation pipeline, and installing a 1,660-foot long, 48-inch diameter welded steel pipe from an existing pump station on the waterside of the right bank levee of the Feather River to the waterside toe of a new setback levee (permit number 18191). Two 30-inch diameter welded steel pipes (a maximum of 510 linear feet each) are proposed to be installed from the waterside toe of the new setback levee, up and over the levee, to a new flow distribution box landward of the new setback levee. This project is located near the eastern boundary of Sutter County along the right bank of the Feather River at Star Bend Road, at 39.0113°N 121.5975°W NAD83, Sutter County, California.

The District Engineer has no objection to approval of this application by your Board from a flood control standpoint, subject to the following conditions:

a. That in the event trees and brush are cleared, they shall be properly disposed of by either complete burning or complete removal outside the limits of the project right-of-way.

b. That any debris generated by this project shall be disposed of outside the limits of the project right-of-way.

c. That no work shall be performed and no stockpiles of material or equipment shall remain in the floodway during the flood season of November 1 to April 15, unless otherwise approved in writing by your Board.

d. That the removed portion of pipe, appurtenances, foundations, and tie-downs, shall be completely removed from the project right-of-way. Backfill shall be satisfactory levee material compacted to a minimum 95% ASTM D 698.

e. That the proposed pipeline shall be clearly marked in the field such that its location can be easily established in a flood event/emergency repair action.

f. That in the event of forecasted high water, the applicant shall have a plan in place to prevent scour when the trench is open.

g. That construction between station 14+38.26 and the proposed flow distribution box shall be addressed with the Section 408 process for the Star Bend setback levee. Construction of this work shall not be allowed until Section 408 approval is obtained.

Based upon the information provided, no Section 10 or Section 404 permit is needed.

If you have any questions concerning our comments on this permit application, please contact Mr. Ryan Larson at (916) 557-7568 or Mr. Robert Murakami at (916) 557-6738.

Sincerely,

Kevin Knuuti, P.E.
Chief, Engineering Division

Copy Furnished:
Mr. Jeremy Arrich, Chief, Flood Project Integrity and Inspection Branch,
3310 El Camino Avenue, Suite LL30, Sacramento, CA 95821

STATE OF CALIFORNIA
THE RESOURCES AGENCY

CENTRAL VALLEY FLOOD PROTECTION BOARD

PERMIT NO. 18438 BD

This Permit is issued to:

Volcano Vista Farms
PO Box 9
c/o Michael Churkin
Meridian, California 95957

To abandon and remove existing irrigation pipeline and install a 24-inch-diameter, 1,660-foot-long welded steel pipe from the existing pump station along the overflow area of the right (west) bank levee of the Feather River to the waterside toe of the new setback levee; install an 18-inch-diameter, 510-foot-long welded steel pipe up and over new setback levee; remove distribution box at landside toe of existing Feather River Levee and place fill material on landside slope at upstream end of setback levee. The project is located south of Yuba City, approximately one mile northeast of the intersection of Highway 99 and the Garden Highway (Section 2, T13N, R3E, MDB&M, Levee District 1 Sutter, Feather River, Sutter County).

NOTE: Special Conditions have been incorporated herein which may place limitations on and/or require modification of your proposed project described above.

(SEAL)

Dated: APR 13 2009

Jay S. Punia
Executive Officer

GENERAL CONDITIONS:

ONE: This permit is issued under the provisions of Sections 8700 – 8723 of the Water Code.

TWO: Only work described in the subject application is authorized hereby.

THREE: This permit does not grant a right to use or construct works on land owned by the Sacramento and San Joaquin Drainage District or on any

other land.

FOUR: The approved work shall be accomplished under the direction and supervision of the State Department of Water Resources, and the permittee shall conform to all requirements of the Department and the Central Valley Flood Protection Board.

FIVE: Unless the work herein contemplated shall have been commenced within one year after issuance of this permit, the Board reserves the right to change any conditions in this permit as may be consistent with current flood control standards and policies of the Central Valley Flood Protection Board.

SIX: This permit shall remain in effect until revoked. In the event any conditions in this permit are not complied with, it may be revoked on 15 day's notice.

SEVEN: It is understood and agreed to by the permittee that the start of any work under this permit shall constitute an acceptance of the conditions in this permit and an agreement to perform work in accordance therewith.

EIGHT: This permit does not establish any precedent with respect to any other application received by the Central Valley Flood Protection Board.

NINE: The permittee shall, when required by law, secure the written order or consent from all other public agencies having jurisdiction.

TEN: The permittee is responsible for all personal liability and property damage which may arise out of failure on the permittee's part to perform the obligations under this permit. If any claim of liability is made against the State of California, or any departments thereof, the United States of America, a local district or other maintaining agencies and the officers, agents or employees thereof, the permittee shall defend and shall hold each of them harmless from each claim.

ELEVEN: The permittee shall exercise reasonable care to operate and maintain any work authorized herein to preclude injury to or damage to any works necessary to any plan of flood control adopted by the Board or the Legislature, or interfere with the successful execution, functioning or operation of any plan of flood control adopted by the Board or the Legislature.

TWELVE: Should any of the work not conform to the conditions of this permit, the permittee, upon order of the Central Valley Flood Protection Board, shall in the manner prescribed by the Board be responsible for the cost and expense to remove, alter, relocate, or reconstruct all or any part of the work herein approved.

SPECIAL CONDITIONS FOR PERMIT NO. 18438 BD

THIRTEEN: Construction between station 14+36.01 and the proposed flow distribution box under this permit shall not occur until the Army Corps of Engineers approves this project under 33USC Section 408. All conditions from Section 408 approval provided by the Corps of Engineers shall be incorporated into this permit as if fully set forth herein if they are not in conflict with the Central Valley Flood Protection Board's regulations (Title 23 California Code of Regulations).

FOURTEEN: All work approved by this permit shall be in accordance with the submitted drawings and specifications except as modified by special permit conditions herein. No further work, other than that approved by this permit, shall be done in the area without prior approval of the Central Valley Flood Protection Board.

FIFTEEN: The permittee shall maintain the permitted encroachment(s) and the project works within the utilized area in the manner required and as requested by the authorized representative of the Department of Water Resources, Levee District 1 or any other agency responsible for maintenance.

SIXTEEN: The permittee shall contact the Department of Water Resources by telephone, (916) 574-1213, and submit the enclosed postcard to schedule a preconstruction conference. Failure to do so at least 10 working days prior to start of work may result in delay of the project.

SEVENTEEN: The permittee shall provide supervision and inspection services acceptable to the Central Valley Flood Protection Board. A professional engineer registered in the State of California shall certify that all work was inspected and performed in accordance with submitted drawings, specifications, and permit conditions.

EIGHTEEN: The Central Valley Flood Protection Board, Department of Water Resources, and Levee District 1 shall not be held liable for any damages to the permitted encroachment(s) resulting from flood fight, operation, maintenance, inspection, or emergency repair.

NINETEEN: The permittee may be required, at permittee's cost and expense, to remove, alter, relocate, or reconstruct all or any part of the permitted encroachment(s) if removal, alteration, relocation, or reconstruction is necessary as part of or in conjunction with any present or future flood control plan or project or if damaged by any cause. If the permittee does not comply, the Central Valley Flood Protection Board may remove the encroachment(s) at the permittee's expense.

TWENTY: The permittee should contact the U.S. Army Corps of Engineers, Sacramento District, Regulatory Branch, 1325 J Street, Sacramento, California 95814, telephone (916) 557-5250, as compliance with Section 10 of the Rivers and Harbors Act and/or Section 404 of the Clean Water Act may be required.

TWENTY-ONE: The permittee shall be responsible for repair of any damages to the project levee and other flood control facilities due to construction, operation, or maintenance of the proposed project.

TWENTY-TWO: The permittee is responsible for all liability associated with construction, operation, and maintenance of the permitted facilities and shall defend and hold harmless the State of California, or any departments thereof, from any liability or claims of liability associated therewith.

TWENTY-THREE: The permitted encroachment(s) shall not interfere with operation and maintenance of the flood control project. If the permitted encroachment(s) are determined by any agency responsible for operation or maintenance of the flood control project to interfere, the permittee shall be required, at permittee's cost and expense, to modify or remove the permitted encroachment(s) under direction of the Central Valley Flood Protection Board or Department of Water Resources. If the permittee does not comply, the Central Valley Flood Protection Board may modify or remove the encroachment(s) at the permittee's expense.

TWENTY-FOUR: No construction work of any kind shall be done during the flood season from November 1 to April 15 without prior approval of the Central Valley Flood Protection Board.

TWENTY-FIVE: No excavation shall be made or remain in the levee section during the flood season from November 1 to April 15 without prior approval of the Central Valley Flood Protection Board.

TWENTY-SIX: No material stockpiles, temporary buildings, or equipment shall remain in the floodway during the flood season from November 1 to April 15.

TWENTY-SEVEN: During demolition/construction of the project, any and all anticipated or unanticipated conditions encountered which may impact levee integrity or flood control shall be brought to the attention of the Flood Project Inspector immediately and prior to continuation.

TWENTY-EIGHT: In the event existing revetment on the channel bank or levee slope is disturbed or displaced, it shall be restored to its original condition upon completion of the proposed installation.

TWENTY-NINE: Cleared trees and brush shall be completely burned or removed from the floodway, and downed trees or brush shall not remain in the floodway during the flood season from November 1 to April 15.

THIRTY: The pipes shall be placed in the center of an open trench 2 times the diameter of the pipes.

THIRTY-ONE: Pipe installed in the levee section and within 10 feet of the levee toes shall be new steel and at least 7 gauge. Steel pipe shall be corrosion-proofed externally with a coating of coal-tar enamel; asphalt-saturated felt wrap; cement mortar; or PVC or polyethylene tape wrapped to a thickness of 30 mils. Steel pipe shall be corrosion-proofed internally with a continuous lining of cement mortar or asphalt.

THIRTY-TWO: A suitable siphon breaker and protective housing shall be installed on the apex of the pipe and shall be located off the levee patrol road.

THIRTY-THREE: The pipeline shall be tested and confirmed free of leaks by X-ray, pressure tests, or other approved methods during construction or anytime after construction upon request by the Central Valley Flood Protection Board.

THIRTY-FOUR: The invert of the pipe through the levee section shall be above the design flood plane elevation of 64.2 feet, NGV Datum.

THIRTY-FIVE: All pipe joints within the levee section shall be butt welded.

THIRTY-SIX: The pipe shall be installed through the levee section at a right angle to the centerline of the levee.

THIRTY-SEVEN: All abandoned pipes shall be removed from the existing levee section and in the area 10 feet waterward of the waterward toe of the proposed setback levee.

THIRTY-EIGHT: The pipe shall be buried at least 24 inches below the levee slopes and 24 inches below the levee crown.

THIRTY-NINE: The pipe within the overflow area shall be buried with a minimum of 2 feet of cover.

FORTY: Backfill material for excavations in the area 10 feet waterward of the waterward toe of the proposed setback levee shall be placed in 4- to 6-inch layers and compacted to at least the density of the adjacent, firm, undisturbed material.

FORTY-ONE: Backfill material for excavations within the levee section and within 10 feet of the levee toes shall be placed in 4- to 6-inch layers, moisture conditioned above optimum moisture content, and compacted to a minimum of 90 percent relative compaction as measured by ASTM Method D1557-91.

FORTY-TWO: Density tests by a certified materials laboratory will be required to verify compaction of backfill within the levee section and within 10 feet of the levee toes.

FORTY-THREE: Location markers shall be placed near both levee toes for the buried pipe not surfacing near the levee toes.

FORTY-FOUR: All debris generated by this project shall be disposed of outside the floodway and off the levee section.

FORTY-FIVE: Upon completion of the project, the permittee shall submit as-built drawings to: Department of Water Resources, Flood Project Inspection Section, 3310 El Camino Avenue, Suite LL30, Sacramento, California 95821.

FORTY-SIX: In the event that levee or bank erosion injurious to the adopted plan of flood control occurs at or adjacent to the permitted encroachment(s), the permittee shall repair the eroded area and propose measures, to be approved by the Central Valley Flood Protection Board, to prevent further erosion.

FORTY-SEVEN: If the project, or any portion thereof, is to be abandoned in the future, the permittee or successor shall abandon the project under direction of the Central Valley Flood Protection Board and Department of Water Resources, at the permittee's or successor's cost and expense.

FORTY-EIGHT: The permittee shall comply with all conditions set forth in the letter from the Department of the Army dated March 26, 2009, which is attached to this permit as Exhibit A and is incorporated by reference.

e. That the proposed pipeline shall be clearly marked in the field such that its location can be easily established in a flood event/emergency repair action.

f. That in the event of forecasted high water, the applicant shall have a plan in place to prevent scour when the trench is open.

g. That construction between station 14+36.01 and the proposed flow distribution box shall be addressed with the Section 408 process for the Star Bend setback levee. Construction of this work shall not be allowed until Section 408 approval is obtained.

Based upon the information provided, no Section 10 or Section 404 permit is needed.

If you have any questions concerning our comments on this permit application, please contact Mr. Ryan Larson at (916) 557-7568 or Mr. Robert Murakami at (916) 557-6738.

Sincerely,

Kevin Knuuti, P.E.
Chief, Engineering Division

Copy Furnished:
Mr. Jeremy Arrich, Chief, Flood Project Integrity and Inspection Branch,
3310 El Camino Avenue, Suite LL30, Sacramento, CA 95821

DEPARTMENT OF THE ARMY
U.S. Army Engineer District, Sacramento
Corps of Engineers
1325 J Street
Sacramento, California 95814-2922

REPLY TO
ATTENTION OF

Flood Protection and Navigation Section (18438)

MAR 26 2009

Mr. Jay Punia, Executive Officer
Central Valley Flood Protection Board
3310 El Camino Ave., Room LL40
Sacramento, CA 95821

Dear Mr. Punia:

We have reviewed a permit application by Volcano Vista Farms (application number 18438). This project includes abandoning portions and removing portions of an existing irrigation pipeline and installing a 1,660-foot long, 24-inch diameter welded steel pipe from an existing pump station on the waterside of the right bank levee of the Feather River to the waterside toe of the new setback levee (permit number 18191). One 18-inch diameter welded steel pipe (a maximum of 510 linear feet) is proposed to be installed from the waterside toe of the new setback levee, up and over the levee, to the new flow distribution box landward of the new setback levee. This project is located near the eastern boundary of Sutter County along the right bank of the Feather River at Star Bend Road, at 39.0113°N 121.5975°W NAD83, Sutter County, California.

The District Engineer has no objection to approval of this application by your Board from a flood control standpoint, subject to the following conditions:

a. That in the event trees and brush are cleared, they shall be properly disposed of by either complete burning or complete removal outside the limits of the project right-of-way.

b. That any debris generated by this project shall be disposed of outside the limits of the project works.

c. That no work shall be performed and no stockpiles of material or equipment shall remain in the floodway during the flood season of November 1 to April 15, unless otherwise approved in writing by your Board.

d. That the removed portion of pipe, appurtenances, foundations, and tie-downs, shall be completely removed from the project right-of-way. Backfill shall be satisfactory levee material compacted to a minimum 95% ASTM D 698.

APPENDIX B

Habitat Enhancement Plan (HEP) for Feather River Setback Levee and Habitat Enhancement Project at Star Bend - March 6, 2009, (inclusive of USFWS Biological Opinions of February 6, 2009, for Star Bend VELB and September 9, 2005, for O'Conner Lakes VELB.

Habitat Enhancement Plan for the Feather River Setback Levee and Habitat Enhancement Project at Star Bend

Sutter County, California

March 6, 2009

Prepared for:
Levee District 1 and Wood Rodgers

Prepared by:
River Partners and Stillwater Sciences

RIVER PARTNERS
580 Vallombrosa Avenue
Chico, CA 95926

Stillwater Sciences
2855 Telegraph Avenue, Suite 400
Berkeley, CA 94705

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HABITAT ENHANCEMENT PLAN FOR THE FEATHER RIVER SETBACK LEVEE AND HABITAT ENHANCEMENT PROJECT AT STAR BEND
Sutter County, California

I. INTRODUCTION

A. Project overview

Levee District One (LD1) of Sutter County has proposed to construct the Feather River Setback Levee and Habitat Enhancement Project at Star Bend (Project) to replace a portion of existing levee that poses a high risk of failure in order to decrease the flood stage, velocity, and scour potential; increase and improve floodplain habitat; and improve habitat connectivity between the Abbot Lake and O'Connor Lakes Units of California Department of Fish and Game's (CDFG) Feather River Wildlife Area (Figure 1) (EIP Associates 2007). Setting back the levee will create approximately 55 acres of floodplain habitat, which includes habitat enhancement and on-site mitigation for impacted elderberry (*Sambucus mexicana*). Most of the material needed to build the new setback levee will come from the existing levee embankment and from CDFG's O'Connor Lakes Unit, just southeast of the project location. The project entails 1) filling in the levee toe ditch that is landward of the existing levee to prevent fish stranding; 2) realigning existing irrigation pipelines under the current levee to accommodate the new setback levee configuration; 3) create approximately 55 acres of riparian habitat with native vegetation that will be phased over time; and 4) filling and revegetating borrow areas disturbed by levee construction with native grasses and herbaceous understory species.

The project will occur in two phases. Phase one will consist of three components: (1) elderberry shrubs located on the banks of the existing levee toe ditch and within the path of a new pipeline will be transplanted to a nearby location within the project area prior to construction, (2) twenty acres (inclusive of the elderberry transplant area) of native associate plants will be planted to enhance habitat for the valley elderberry longhorn beetle (*Desmocerus californicus dimorphus)* at the primary project area towards the end of or immediately following project construction, and (3) borrow areas at O'Connor Lakes will be seeded with native grasses and forbs after these areas have been refilled and graded. Phase two, which is optional and has not yet been scheduled, will consist of planting the remaining 35 acres of the primary project area. Consideration will be given to a cultural resources site located in the primary project area.

B. Purpose of the Habitat Enhancement Plan

This plan is to serve as a technical guide for LD1, CDFG or the restoration contractor to implement the habitat enhancement and mitigation planting and post-implementation maintenance and monitoring associated with this project. It is intended to provide technical details to execute the project and assist in meeting the requirements established in the CDFG Streambed Alteration Agreement with LD1 of Sutter County (Notification No. 1600-2007-0217-R2) and partial mitigation requirements outlined in the Project Environmental Impact Report (EIR, EIP Associates 2007), Environmental

Assessment (EA, Stillwater Sciences and Wood Rodgers 2008), Biological Assessment (BA, Stillwater Sciences 2008a), and Elderberry Survey Report (Stillwater Sciences 2008b).

C. Location

The Feather River Setback Levee and Habitat Enhancement Project at Star Bend is located on the west levee of the Feather River, approximately six miles south of Yuba City, Sutter County, California (Figure 1). The 55-acre site is just upstream of the Star Bend boat ramp (near River Mile 18) and is bound by a sharp bend in the river (Figure 2). Access by road is from the west via Star Bend Road off of Garden Highway.

D. Project Objectives

Several objectives have been identified for the Feather River Setback Levee and Habitat Enhancement Project at Star Bend. These objectives also delineate the parameters and guides the actions devoted to habitat restoration. The primary goal of the habitat enhancement work is to identify a feasible restoration project to:

- Enhance and restore fish, wildlife, and riparian habitat in the project area with the restoration of 20 acres (Phase I), which includes on-site mitigation for impacted elderberry shrubs;
- Maximize a variety of riparian plant communities and other floodplain habitat types through the restoration of an additional 32.1 acres (Phase II).
- Improve connectivity between adjacent riparian habitats and river channels;
- Provide mitigation for impacts to elderberry shrubs, the host plant of the federally threatened Valley elderberry longhorn beetle;
- Meet hydraulic roughness value objectives in the expanded floodway, and
- Provide protection for a known archaeological site within the levee setback area.

E. Description of Work Activities

1. Site Prep

To accommodate construction of the setback levee, up to 55 acres of existing agricultural fields and orchards will be cleared and graded. Existing trees within and 50 feet beyond the landward proposed setback levee footprint, as well as within 15 feet of the pipeline realignment, will require removal, including stumps. Construction scrapers will remove the top 6 inches of vegetative matter from the levee footprint and adjacent area. Construction storage and lay-down areas (i.e., staging areas) will be located landward of the existing levee system adjacent to the two tie-ins at either end of the new levee alignment in the cleared and graded areas (Figure 2).

2. Setback Levee Construction

The proposed setback levee will consist of a 23-foot high earthen levee beginning near the intersection of Star Bend Road and the existing right bank of the Feather River at Levee Mile (LM) 4.50 near RM 18.0 and continue in a southeasterly direction to the approximate intersection of the extension of Tudor Road with the right bank of the Feather River at LM 3.75 and RM 16.75 (Figure 2). The total length of the setback will be approximately 3,400 feet with a minimum top width of 20 feet and side slopes that are 1-foot vertical to 3 feet horizontal.

Figure 1. Project Vicinity Map for the Feather River Setback Levee and Habitat Enhancement Project at Star Bend, Sutter County, California.

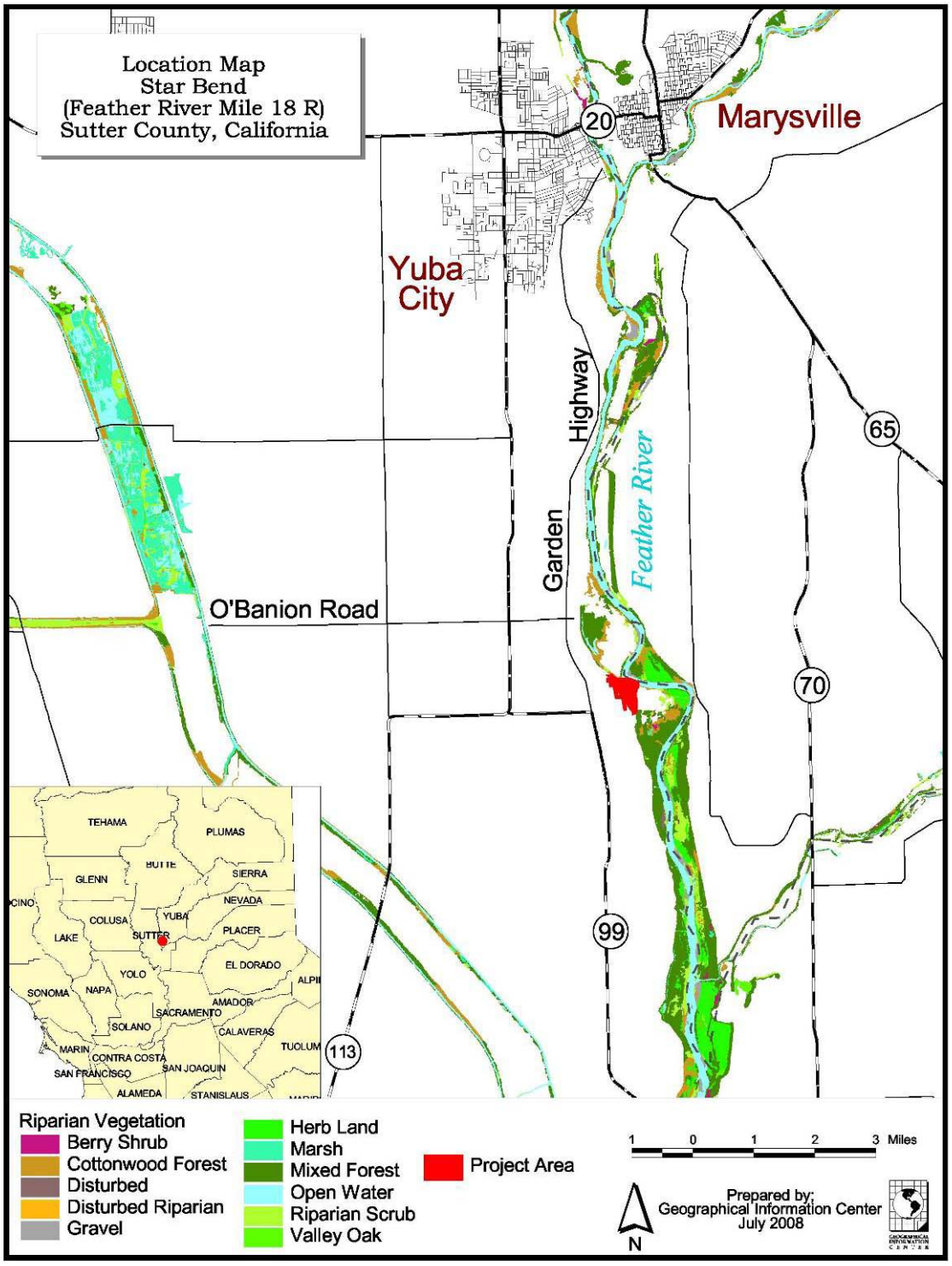
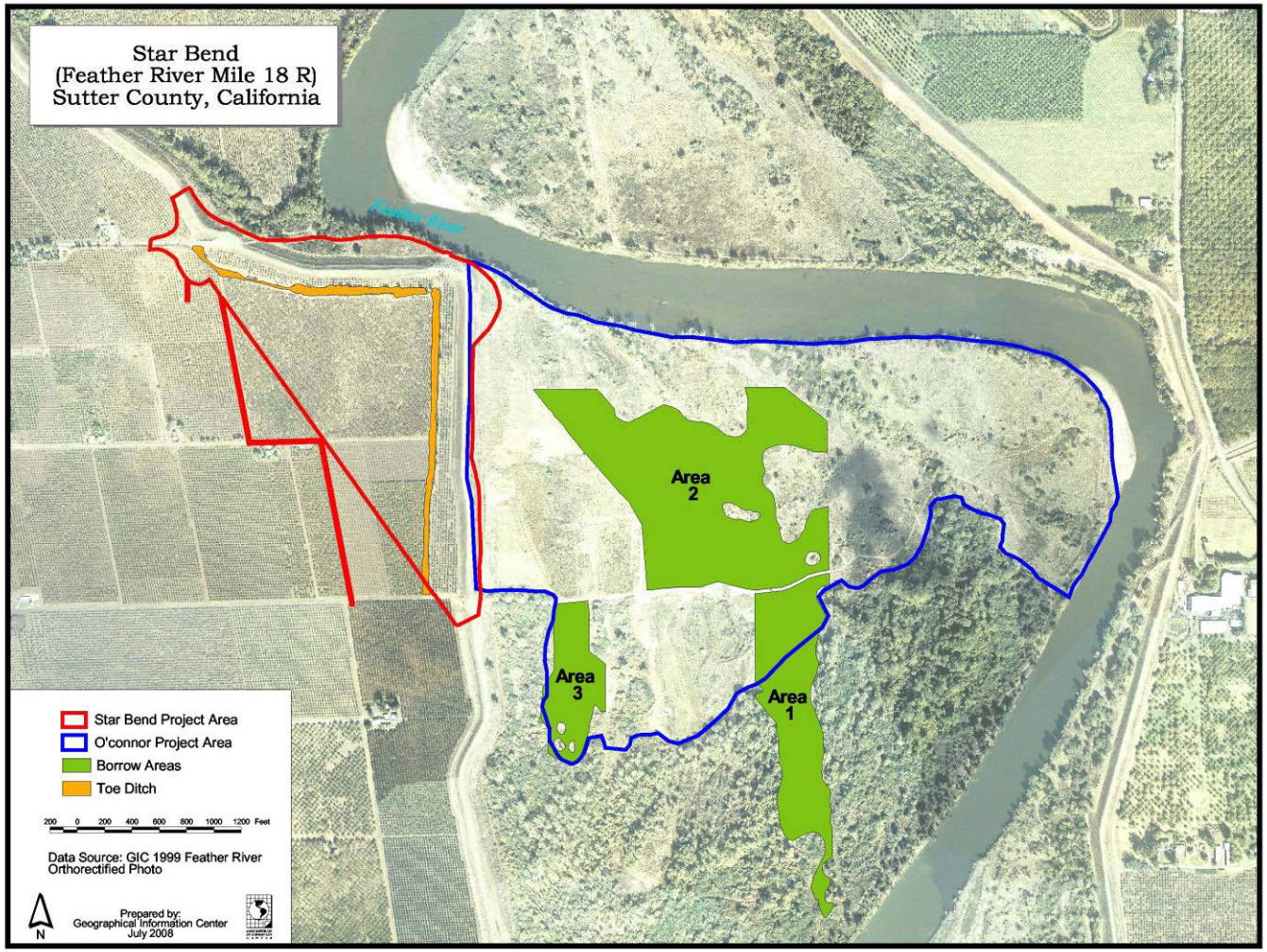


Figure 2. Project Boundaries of the Feather River Setback Levee and Habitat Enhancement Project at Star Bend, Sutter County, California.



Degradation and decommissioning of the existing levee will occur concurrently with the construction of the new setback levee. With the exception of the northeast corner, the existing levee will be fully degraded or removed to ground level. In the northeast corner, the existing levee will be partially degraded or removed to elevations 1 to 4 feet above natural ground level to protect an adjacent cultural resource site (not depicted in a figure, as the location is confidential). Areas disturbed by construction will be graded to provide positive drainage away from the setback levee and revegetated by seeding with native herbaceous plant species.

3. Setback Levee Borrow Areas proactive

Most of the material needed to construct the new setback levee will come from three primary sources: (1) the existing levee that will be degraded; (2) a 12.6 acre triangular-shaped area located between the existing levee and proposed setback levee; and, (3) three areas in the O'Connor Lakes Unit, where material was borrowed previously for the Shanghai Bend Setback Levee Project (Figure 2). The O'Connor Lakes Unit is located immediately east and southeast of the existing levee (Figure 2). The unit is managed by CDFG and California Department of Water Resources (CDWR) to provide wildlife habitat, restore native plant communities, and convey Feather River flood events. CDWR regularly mows and clears a 400-foot swath of vegetation in Borrow Area 1, and portions of the property between borrow areas 2 and 3 were excavated by U.S. Army Corps of Engineers (USACE) to provide material for levee repair following the 1997 flood (Figure 2) (River Partners 2006). Following excavation and construction of the setback levee, all borrow areas adjacent to the new setback levee area and within the O'Connor Lakes Unit will be backfilled with material from the decommissioned levee and restored with native riparian vegetation. Any additional embankment material necessary to construct the setback levee will come from borrow sites within 30 miles of the Project area.

4. Pump and Pipeline Improvements

With construction of the setback levee and decommissioning of the existing levee, various segments of pipelines now conveying water from a pumping facility on the waterside of the existing levee will need to be replaced and rerouted. New parallel pipe systems and a new distribution box will be installed between the existing pump station and the landside of the setback levee. The distribution box and control valves on the landside of the existing levee will be abandoned and/or removed.

5. Levee Ditch Filling

Following the decommissioning of the existing levee, the existing levee ditch will become situated river-side of the new setback levee (Figure 2). There is concern that fish could become stranded in the existing levee ditch following flood events. The levee ditch will, therefore, be filled with material from the nearby orchard and the decommissioned levee so that there are no depressions where fish could become stranded. The levee ditch would be carefully filled to grade to preserve as much of the existing riparian trees and shrubs as possible.

6. Riparian Habitat Enhancement

As part of the Project, LD1 will acquire and manage approximately 60 acres of land from the landowners prior to constructing the setback levee. Upon completing construction of the proposed setback levee and degradation of the existing levee, LD1 will make the

land on the waterside of the setback levee available to CDFG or other entities for native vegetation and wildlife habitat enhancements. LD1 will revegetate up to 52.1 acres for habitat enhancement in accordance with this Habitat Enhancement Plan, and will restrict future activities within this area to ensure that the habitat enhancement is sustained in perpetuity. Phase I will be planted in association with the setback levee construction. Phase II will be implemented for further restoration and expansion of riparian habitat that may be applied as mitigation for the future regional levee improvement projects and/or the Sutter County Habitat Conservation Plan.

F. Regulatory Context

As described in the introduction, this Project is being initiated to replace a portion of the existing levee that poses a high risk of failure. Other related Project reports detail potential mitigation measures required as part of the Project, as well as the broad regulatory context (e.g., EIP Associates 2007 [EIR], Stillwater Sciences 2008a [BA] , Stillwater Sciences 2008b [Elderberry Survey Report], Stillwater Sciences 2008c [Wetland Delineation Report], and Stillwater Sciences and Wood Rodgers 2008 [EA]). Of pertinence to this Habitat Enhancement Plan are the unavoidable impacts that will occur to blue elderberry shrubs. The valley elderberry longhorn beetle is protected under the federal Endangered Species Act as a threatened species (45 FR 52803–52807); conservation is achieved through protection of its potential habitat and host plant, blue elderberry, with one or more stems measuring ≥1 inch in diameter at ground level. Because this Project involves unavoidable impacts to multiple elderberry shrubs, mitigation is required (Stillwater Sciences 2008b). LD1 is mitigating these impacts through on-site transplantation of unavoidable blue elderberry shrubs and on-site mitigation plantings.

II. ENVIRONMENTAL SETTING

A. Land-use History

Prior to the arrival of Europeans, Native Americans of the Valley Nisenan populations established villages along the Feather River and its tributaries in the vicinity of the site. The northwest corner of the site is a historic low rise along the river and contains a recorded indigenous village site (Bayham 2004).

John Sutter laid claim to the region when he secured the New Helvetia Land Grant in the 1840's. He promptly built Hock Farm, a rancho in the vicinity of the site, which provided cattle stock that ranged freely along Feather River. W.H. Ashford owned and farmed a section of the west bank as early as 1880, which includes most of the site. In 1880, the O'Connor family owned the parcel to the south of the site where the lakes are located (Sutter County 1880). The 1912 (U.S. Army Corps of Engineers 1912) geologic survey shows dredging activities to the north and south of the site, but not within the site. The 1912 survey also shows that the site had not been cleared for agriculture.

The Feather River and three other properties surround the Project site (i.e., Churkin, Singh, and CDFG properties). The majority of the primary Project area is a plum (*Prunus* sp.) orchard that is flood irrigated. The existing levee, operated by LD1, and the Star Bend pumping plant also are located in the main Project area. The pumping plant

includes pump station discharge lines and irrigation pipelines that bisect the northern portion of the site and continue to adjacent properties. All the property to the east is part of the O'Connor Lakes unit of CDFG's Feather River Wildlife Area. The unit is managed by CDFG and CDWR to provide wildlife habitat, restore native plant communities, and convey Feather River flood events. CDWR regularly mows and clears vegetation in Borrow Area 1, and portions of the property between Borrow Areas 2 and 3 were excavated by USACE to provide material for levee repair following the 1997 flood (Figure 2) (River Partners 2006).

B. Topography and Soils

Elevations of the Project area average 45 feet above sea level. Topography is generally flat, with steeper gradients at the river's edge. Several small hills and depressions occur in the O'Connor Lakes Unit as a result of overbank flood scour and deposition, and previous soil excavation and habitat enhancement projects.

The Sutter County Soil Survey (Lytle 1988, NRCS 2008) identifies four flood-plain soil series, Columbia, Conejo, Holillipah and Shanghai, within the project and borrow areas and shows that the Conejo mapping unit (124) accounts for the majority of the site (Figure 3). Conejo soils are very deep, well drained soils formed in alluvium and are observed on alluvial fans and stream terraces. Holillipah soil mapping unit (134) occupies the northern boundary of the project area, which runs along the Feather River, and the borrow areas at the O'Connor Lakes Unit. The Holillipah soils, which contain deep sand to loamy sand derived from mixed alluvium, are frequently flooded, and somewhat excessively well drained. Two other soil mapping units occur within the site and a summary of all the soil types is shown in Table 1 and Appendix I.

Figure 3. Soils Map, Feather River Setback Levee and Habitat Enhancement Project at Star Bend, Sutter County, California.

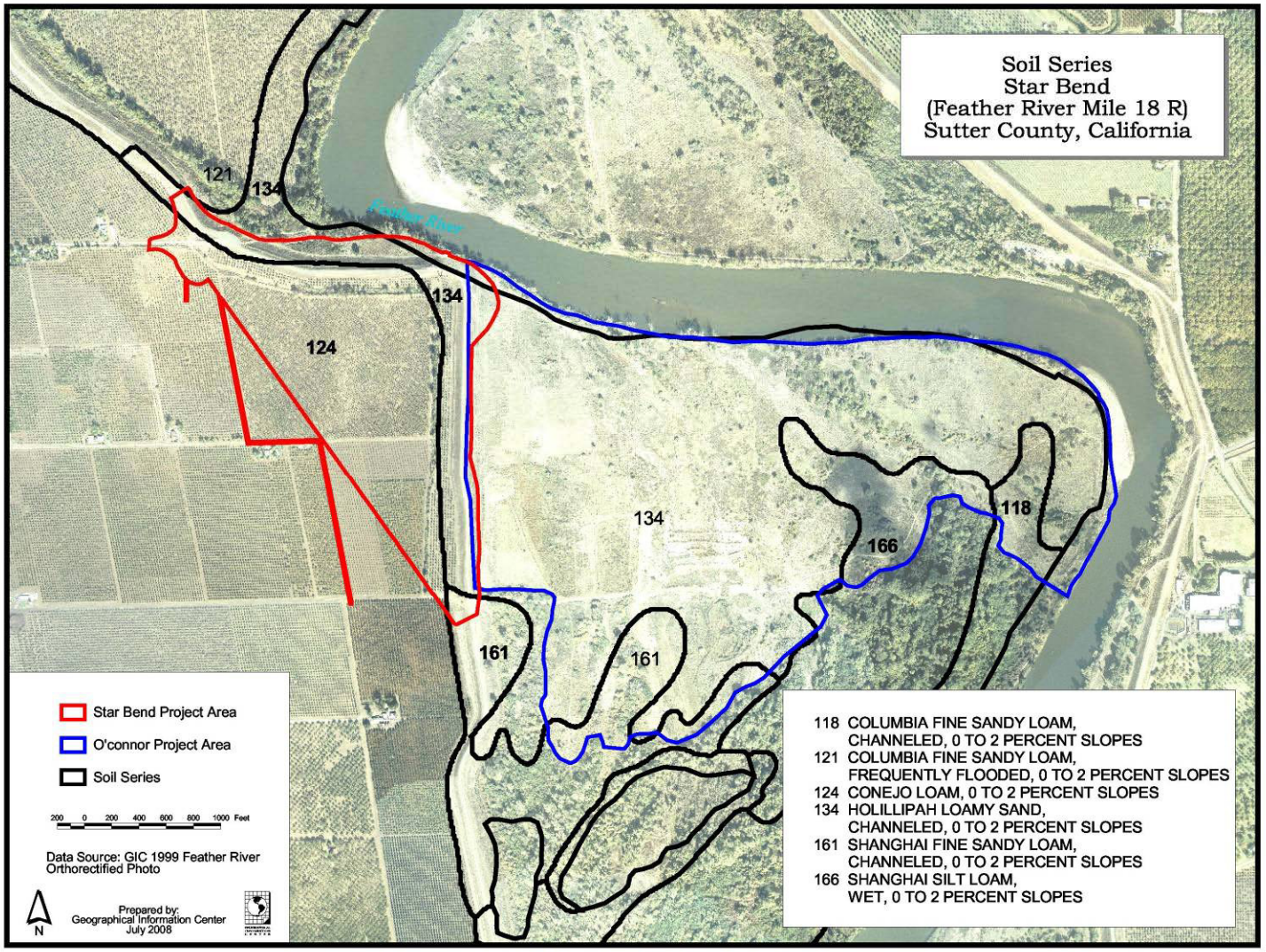


Table 1. Summary of typical soil conditions from the Soil Survey of Sutter County (Lytle 1988, NRCS 2008), California on soils found on the Feather River Setback Levee and Habitat Enhancement Project at Star Bend.

Soil Property	Conejo loam, 0 to 2 percent slopes	Holillipah loamy sand, channeled, 0 to 2 percent slopes	Shanghai silt loam, wet, 0 to 2 percent	Shanghai fine sandy loam, channeled, 0 to 2 percent slopes	Columbia fine sandy loam, channeled, 0 to 2 percent slopes
Mapping unit	124	134	166	161	118
% Slope	0-2	0-2	0-2	0-2	0-2
Texture	Loam	Loamy sand	Silt loam	Fine sandy loam	Fine sandy loam
Depth of soil	Very deep	Very deep	Very deep	Very deep	Very deep
Drainage	Well drained	Somewhat excessively drained	Somewhat poorly drained soil	Somewhat poorly drained soil	Somewhat poorly drained soil
Permeability	Slow to medium	Rapid	Moderate	Moderate	Moderately rapid
Available water capacity		Low	High to very high	High	Moderate
Limitations to plant growth	Some areas subject to flooding.	Runoff is very slow, and the hazard of water erosion is severe. Subject to frequent, long periods of flooding in December through April.	Runoff is slow, and the hazard of water erosion is severe. Subject to frequent, long periods of flooding from December through April.	A seasonal high water table is at a depth of 36 to 60 inches in December through April. Runoff is slow, and the hazard of water erosion is severe. Subject to frequent, long periods of flooding from December through April.	A seasonal high water table is at a depth of 36 to 60 inches in December through April. Runoff is slow, and the hazard of water erosion is severe. Subject to frequent, long periods of flooding from December through April.

C. Hydrology

The project area and the O'Connor Lakes Unit were once part of a dynamic system of meandering channels and oxbow lakes that covered an area much wider than the levees of the Feather River Flood Control Project. Levee construction, beginning in the 1860's, confined the channel to its present location, and dams on the Feather and Yuba rivers regulate flows.

To the north of the Project area, overbank flow from the Feather River periodically (i.e., modeled stage of the 2.5- to 3-year recurrence interval flow [approximately 60,000 cfs]) fills the drainage feature and depressions left by dredger mining (Wood Rodgers, Inc. 2007). In the O'Connor Lakes unit, scour channels, debris accumulations in trees and shrubs, and deposits of sand are evidence of periodic overbank flow. Periodic maintenance on the O'Connor Lakes Unit is conducted by the Department of Water Resources (DWR) to increase the conveyance of flood flows and transport sediment.

On the land-side of the existing levee system, rain, flood irrigation and seepage under the levee are the primary sources of surface water. Flooding is used to irrigate the orchard crops, occasionally leaving standing water behind for short periods of time following irrigation. The levee ditch was constructed to contain any water seeping under the toe of the levee, but was only inundated in 1986 and 1997, years in which extremely large flood events occurred (B. Hampton, Manager, LD1, pers. comm., 2007). During those events, water remained for a couple of weeks, generally percolating into soil after flood flows had receded (B. Hampton, Manager, LD1, pers. comm., 2007). In 2006, which had a relatively large flood event, there was no water in the levee ditch (B. Hampton, Manager, LD1, pers. comm., 2007).

D. Vegetation

The majority of the primary Project area is a plum orchard that is flood irrigated. The orchard is bisected across the north and eastern edges by the levee ditch; the orchard continues immediately adjacent to the levee ditch on the north and east sides. Annual grass and weedy forb species occur between the rows of trees, but the sparse distribution and short stature of the forbs indicate they are sprayed with herbicides or otherwise controlled on a regular basis.

Vegetation types in the project and borrow areas were assessed during a September 13, 2006 field survey by EIP Associates (EIP Associates 2007a) and were mapped and described during wetland delineation surveys conducted in September 2007 and January 2008 by Stillwater Sciences (Stillwater Sciences 2008b).

Plant species observed during a September 13, 2006 field survey by EIP Associates included wild oats (*Avena fatua*), ripgut brome (*Bromus diandrus*), soft brome (*Bromus hordeaceus*), turkey mullein (*Eremocarpus setigerus*), wild mustard (*Brassica* sp.), and prickly lettuce (*Lactuca serriola*) (EIP Associates 2007a).

Riparian forest habitat occurs north of the existing levee, throughout much of the levee ditch, and across much of the O'Connor Lakes unit. The area north of the existing levee in the primary Project Area has a dense canopy of native riparian tree species

(approximately one acre), including Fremont cottonwood (*Populus fremontii*), Goodding's black willow (*Salix gooddingii*), northern California black walnut (*Juglans californica* var. *hindsii*), Oregon ash (*Fraxinus latifolia*), and valley oak (*Quercus lobata*) (Figures 4a and 5g in Appendix F). There is a sparse to moderately dense shrub layer with arroyo willow (*Salix lasiolepis*), box elder (*Acer negundo*), California button willow (*Cephalanthus occidentalis*), California rose, and narrowleaf willow (*Salix exigua*). The vine layer is thin, containing predominantly California wild grape (*Vitis californica*) and poison oak (*Toxicodendron diversilobum*). The herb layer is generally absent, with small clearings containing black mustard (*Brassica nigra*), oat (*Avena* sp.), perennial pepperweed (*Lepidium latifolium*), seashore vervain (*Verbena littoralis*), and soft brome.

Portions of the levee ditch (approximately three acres) are predominantly comprised of a mature canopy of valley oak, occasionally shared with blue elderberry (*Sambucus mexicana*). The understory is fairly sparse, with blue wildrye (*Elymus glaucus*), California blackberry, California rose, California wild grape, Goodding's black willow, narrowleaf willow, and poison oak.

E. Wildlife

The project area is part of 2,142-acre block of contiguous wildlife habitat on the Feather River. Game birds include pheasant, quail, dove, and wild turkey. Other game includes deer and rabbit. A Great blue heron rookery has been present at just south of the O'Connor Lakes for many years (Dale Whitmore, Wildlife Biologist, CDFG, personal communication). Special status species known to occur in the vicinity of the site include Yellow-billed cuckoo, Swainson's hawk, Chinook salmon, winter steelhead and river otter (California Department of Fish and Game 1988). The site and O'Connor Lakes Unit also contains habitat for the valley longhorn elderberry beetle.

The Feather River Setback Levee and Habitat Enhancement Project at Star Bend will increase the amount of floodplain potentially exposed to inundating flows by approximately 49 acres. Floodplain restoration will allow for higher quality floodplain habitat (better water quality, food inputs, and shelter) for juvenile salmonids and other native species such as Sacramento splittail and steelhead. Organic material produced by native deciduous species restored within the floodplain provides an increased nutrient load for the aquatic environment. This influx of nutrients provides for a greater invertebrate population, thereby creating an abundant food source for fish.

Table 2. Federal and State-listed Endangered, Threatened, and Candidate Species occurring or potentially occurring at the Feather River Setback Levee and Habitat Enhancement Project.

Name	Scientific Name	Status
Least Bell's Vireo (extirpated)	*Vireo bellii pusillus*	FE, CE
Chinook Salmon, Sacramento River winter-run ESU	*Oncorhynchus tshawytscha*	FE. CE
Chinook Salmon, Central Valley spring-run ESU	*Oncorhynchus tshawytscha*	FT, CT
Chinook Salmon, Central Valley Fall-run and late fall-run ESU	*Oncorhynchus tshawytscha*	FC, CSC
Steelhead, Central Valley ESU	*Oncorhynchus mykiss*	FT
Green sturgeon SDP	*Ascipenser medirostris*	FC[1], CSC
Valley Elderberry Longhorn Beetle	*Desmocerus californicus diamorphus*	FT
Western Yellow-billed Cuckoo	*Coccyzus americanus occidentalis*	FC, CE
Willow Flycatcher	*Empidonax trailii*	FSC, CE
Swainson's Hawk	*Buteo swainsoni*	FSC, CT

ESU – Evolutionary Significant Unit
FE – Federal-listed Endangered Species
FT – Federal-listed Threatened Species
FC – Federal Candidate Species
FSC – Federal Species of Concern
CE – California State-listed Endangered Species
CT – California State-listed Threatened Species
CSC – California Species of Concern
[1]FT effective June 6, 2006

III. ENHANCEMENT PLANTING AND IMPLEMENTATION

Riparian areas harbor the most diverse assemblage of wildlife species of all habitat types in California. Restoration and mitigation activities on the Feather River Setback Levee and Habitat Enhancement Project at Star Bend will have a number of ecological and biological benefits in both the short and long term. These activities will:

- Enlarge and connect habitat (diminish fragmentation) along the lower Feather River,
- Reduce the potential for invasion of non-native plant species, and
- Improve the habitat for a variety of wildlife species that are dependent on riparian habitat.

A. Planting Design

1. Purpose of Planting Design

The plant design is an important component of the adaptive management framework and provides a testable hypothesis of site understanding. The plant design is intended to:

- Communicate project layout to the restoration contractor, regulatory agencies, and project stakeholders;
- Decrease cost while maintaining integrity of the plant design;
- Match plant placement to site conditions, management objectives, and wildlife habitat requirements;
- Estimate plant material so that appropriate numbers can be cultivated; and
- Provide a framework to document and analyze plant survivorship, and make adaptive management decisions regarding replanting, if necessary.

2. Procedure

The plant design will be translated to the field through the use of a labeling system that identifies a woody plant for each planting location. This system allows for the rapid implementation of the site-specific design and monitors survival patterns across a field. The procedure consists of the following steps:

- Review site assessment information.
- List design considerations (based on the physical setting, wildlife objectives, or management issues).
- Match vegetation to site conditions and project goals:
    - identify appropriate vegetation associations,
    - express plant arrangement for particular vegetation associations (a “tile”),
    - provide a rationale for selection, and
    - assign vegetation associations to project areas.
- Estimate plant numbers and develop a plant design map.
- Enter data into a database, print labels, and modify database based on new information.

3. Notable Site Conditions and Design Characteristics

Physical and biological features influence long-term survivorship and the selection of vegetation. When considering design, site condition is one important factor, but wildlife requirements and management practices are also critical elements. Based on the available information, the most influential factors on the design are:

- Wildlife objectives and the strategy to produce immediate habitat benefits,
- Hydraulic considerations,
- Mitigation needs,
- Site access, and
- Management practices

Specific design considerations are presented in Table 3.

B. Sensitive Species

The design approach focuses on the habitat requirements of multiple sensitive species known to utilize riparian communities, including Valley elderberry longhorn beetle, Swainson’s hawk, Sacramento splittail, Central Valley spring-run Chinook salmon, Central Valley fall-run Chinook salmon, and Central Valley steelhead. These species and their specific habitat needs are listed in Table 4 and are discussed in greater detail below. Habitat requirements are compiled in the California Wildlife Habitat Relationship System, CWHR 8.0 (California Department of Fish and Game 2003) and Inland Fishes of California (Moyle, 2002).

1. Habitat Requirements for Sensitive Species

a) Valley Elderberry Longhorn Beetle (VELB)

VELB rely on blue elderberry shrubs for the completion of their lifecycle. The females lay eggs directly on the stem of the blue elderberry. Once hatched, the larvae bore into the pith of the tree and move down toward the base. Larvae reside in the stems of blue elderberry shrubs for one to two years before emerging as adults in early spring (mid-March to early June) to feed on the host plant's stem, leaves, and flowers. The presence of blue elderberry within and around the project area indicates the potential for VELB inhabitance. VELB habitat is provided in this plan.

b) Swainson's Hawk

The current distribution and nesting habitat of the Swainson's hawk is not confined to riparian areas but is directly affiliated with such habitat. Over 90% of these birds are found to nest in cottonwoods and valley oaks that provide excellent cover near treetops, the prime look-out location for foraging (Josselyn et al., 1988). Preferred nesting trees are typically within 300 feet of a major valley stream, creek, or slough. Grasslands with abundant populations of small mammals are the preferred foraging habitat for Swainson's hawk. In the Central Valley, these hawks generally nest in riparian areas that are adjacent to grassland and pastures. The habitat requirements for Swainson's hawk, dense native riparian cover adjacent to grassland, are consistent with goals of this habitat enhancement plan.

Table 3. Key Plant Design Considerations of the Feather River Setback Levee and Habitat Enhancement Project at Star Bend, Sutter County, California.

Objective/Factor	Example of Project Design Considerations
Maintain general flood flow conveyance patterns	Orient rows parallel to general flow direction and do not direct flows toward the newly constructed setback levee. A combination of shrub and mixed riparian forest near the setback levee will aid in dissipating wave energy and protect the levee from surface erosion when overbank flows cross the site.
Provide immediate (< 3 years) habitat benefits and high probability of long-term survivorship	In the short term, relatively transient species (cottonwood and willows) will provide several generations of targeted bird species with nesting and foraging habitat. Planting a mixed riparian forest, maximizes quality habitat as the slow growing, but shade tolerant oaks mature.
Minimize sources of weeds, provide habitat along project edges	Use native plants to displace weeds in areas outside the main plantable area. We will use spreading plants (e.g., native blackberry) and native understory species will be used to outcompete black mustard, yellow starthistle, perennial pepperweed and other invasive species that currently grow on site.
Maintain high plant species and vegetative structural diversity	PRBO data suggests that bird diversity is highest in areas with 5-7 shrub species over a 50-m^2 area. Design considerations include varying density across the site to allow light gaps and create structural differences (grouping trees together will create pockets of shade and light gaps), creating vegetation patches (grouping small shrubs together will mimic larger plants and may attract desirable wildlife species faster than if they were grown apart), and considering herbaceous plantings between plant rows.
Provide valley elderberry longhorn beetle (VELB) habitat	Plant elderberry clusters across the site. A 100-foot buffer excludes elderberry from areas that are subject to future maintenance activities next to roads and levees.
Provide foraging and nesting sites for Swainson's hawk	Tall riparian trees will provide nesting and perching areas. Perennial grassland (RHJV 2000) provides consistent access to prey and good availability of prey.
Enhance floodplain habitat for anadromous fish species (spring-run Chinook, fall-run Chinook, steelhead).	Native trees, shrubs and understory will support the aquatic food web through increased food inputs by attracting invertebrate populations and providing shelter for juvenile fish species when the floodplain is inundated for a period of time.
Minimize disturbance to wildlife	Use vegetation as a screen by planting trees in curved rows and planting perimeter areas with grass and herbaceous plants such as mugwort and gumplant in the second year.
Minimize future impacts to maintenance areas.	No woody species will be planted within 50 feet of the setback levee. No elderberry or California blackberry will be planted within 100 feet of the setback levee.

Table 4. Matrix of Targeted Species Habitat Needs, Feather River Setback Levee and Habitat Enhancement Project at Star Bend, Sutter County, California.

Species	Habitats	Habitat Elements								Notable Habitat Features
		Substrate	Tree layer	Riparian Inclusions	Herbaceous layer	Shrub layer	Hardwood	Invertebrates	Terrestrial insects	
Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)	Valley foothill riparian forest Valley oak woodland					E				Host plant is Mexican elderberry (*Sambucus mexicana*)
Swainson's hawk *(Buteo swainsoni*)	Valley foothill riparian forest Valley oak woodland Herbaceous		S	S		S				Nests in open riparian habitat, open grasslands with scattered large trees or groves.
Sacramento splittail (*Pogonichthys macrolepidotus*)	Slough Floodplain				E	E		E		Found in slower moving sections of large rivers and in sloughs. Requires flooded vegetation such as terrestrial shrubs and herbs for spawning and rearing.
Central Valley fall-run Chinook salmon (*Oncorhynchus tshawytscha)*	Main stem of large rivers Open ocean Estuary	E						E		Requires suitable conditions in the main stem of large rivers (gravel composition, water depth, and velocity) for spawning. Young fish survival is dependant on food source abundance (aquatic invertebrates and detritus) and available refugia. Emigrate to saltwater within 3 months to 2 years after emergence. Peak migration to freshwater occurs in September and October and spawning takes place in October and November.
Central Valley spring-run Chinook salmon (*Oncorhynchus tshawytscha)*	Main stem of large rivers Open ocean Estuary	E						E		Same as Fall-fun Chinook except this species enters the river as immature fish in May and June and spawn after reaching maturity, typically in mid-September.
Central Valley steelhead (*Oncorhynchus mykiss*)	Main stem of large rivers Open ocean Estuary	E						E		Spend the first 1-3 years of life in freshwater streams then emigrates to salt or brackish waters for adult life stage. Spawns in main stem of large river systems in gravel substrate.

Notes: E = essential habitat element, S = secondary habitat element, Valley Oak Woodland = Valley Oak Series.
Sources: California Wildlife Habitat Relations Database (CWHR 2002) and Inland Fishes of California (Moyle, 2002).

c) Central Valley Salmon

(1) Spring-run Chinook

Spring-run Chinook salmon enter freshwater rivers as immature fish in spring and early summer. They hold in deep pools in upstream reaches for several months and spawn in areas with adequate gravel composition in early fall. Juvenile salmon require low water temperatures (13-18 degrees C) and refugia from predation (Moyle, 2002). Such conditions are typically made available by the presence of SRA habitat and LWD. Much of the former spring-run Chinook habitat has been eliminated by dams. The lower Feather River is among some of the few remaining spawning areas for spring-run Chinook salmon. Enhancing the floodplain habitat so that it can benefit spring-run Chinook salmon is consistent with the goals of this plan.

(2) Fall-run Chinook

Fall-run Chinook salmon begin migration to natal freshwater streams in late summer and early fall. These fish migrate as mature adult fish and spawn in gravel redds within a few days or weeks after arrival at spawning grounds. While the duration of juvenile freshwater inhabitance is significantly shorter (only 1-7 months) than that of spring-run Chinook (3 to 15 months), the habitat requirements are very similar (Moyle, 2002). The fall-run Chinook are the most abundant of the Central Valley Chinook salmon, yet their habitat range is also dwindling due to migration barriers. Enhancing the floodplain habitat so that it can benefit fall-run Chinook salmon is consistent with the goals of this plan.

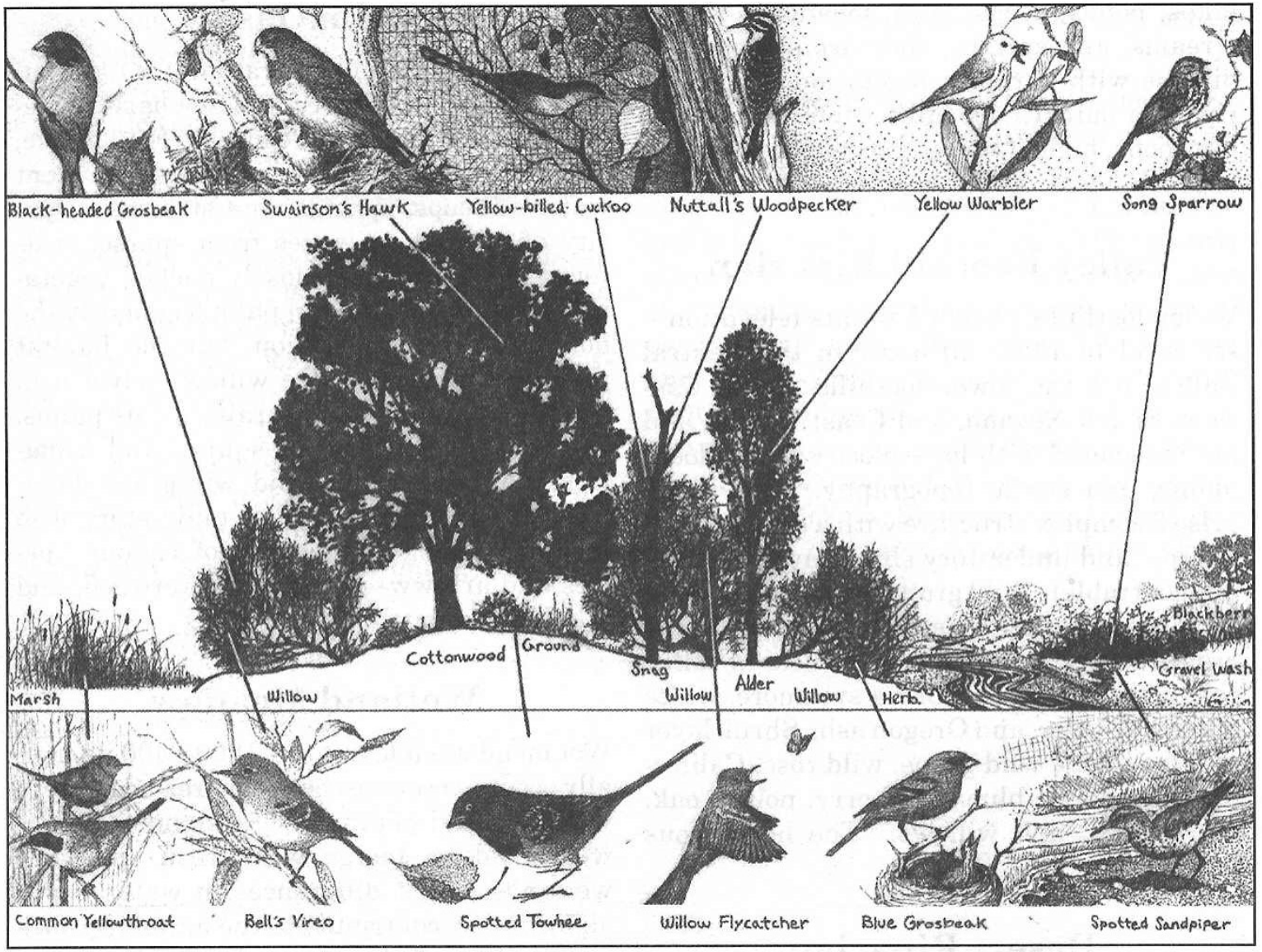
d) Steelhead

Dams have also separated Central Valley steelhead from much of its former range. One of the documented remaining populations is found in the lower Yuba River, a major tributary to the Feather River. Central Valley steelhead is a cold water species that requires adequate gravel composition for spawning. Central Valley steelhead spend about half their lives in freshwater streams, which may account for the dramatic effect river regulation and habitat loss have had on this fish species. Enhancing the floodplain habitat so that it can benefit steelhead is consistent with the goals of this plan.

C. Targeted Avian Species

Riparian ecosystems harbor the most diverse bird communities in the arid and semi-arid portions of the western United States (Knopf et al. 1988, Dobkin 1994, Saab et al. 1995), and may also provide the most important avian habitat in California (Manley and Davidson 1993). Therefore, a restored site will provide vital habitat and conditions for neo-tropical migratory birds, western yellow billed cuckoos, and other riparian dependent avian species (Figure 4). The benefits to terrestrial species are realized relatively quickly. Increases in species richness and numbers of neo-tropical migratory birds may be seen within three years of restoration (Geupel et al., 1997; RHJV, 2004).

Figure 4. Habitat Value of Native Riparian Plants (RHJV 2004)



D. Mitigation

Although 14.9 acres are required, 20 acres are designed to mitigate impacts to elderberry shrubs during the construction of the setback levee. Table 5 summarizes the number of stems likely to be impacted by the project and describes the specific replacement ratios and conservation measures required by USFWS (1999a). Accidental damage or removal of blue elderberry plants at O'Connor Lakes will be covered under the pre-existing 2005 USFWS Biological Opinion and Incidental Take Statement Memorandum of Understanding (2005 MOU) (USFWS 2009). The 2005 MOU allows CDFG and CDWR to remove elderberry shrubs for the purposes of flood control projects as long as a baseline of 130 plants is maintained (CDFG and CDWR 2005).

Table 5. Elderberry Mitigation Requirements[1,2] for Feather River Setback Levee and Habitat Enhancement Project at Star Bend (Stillwater Sciences 2008), Sutter County, California.

Stem size	Number of Stems[3]	Exit hole?	Seedling ratio	Number of replacement elderberries	Associate native ratio	Number of associate seedlings
1"-3"	202	Yes	4:1	808	2:1	1608
3"-5"	50	Yes	6:1	300	2:1	600
>5"	1	No	4:1	4	1:1	4
>5"	12	Yes	8:1	96	2:1	192
TOTAL	265			1,208		2,404

Source: USFWS 2009

E. Primary Project Area

Although the planting will be done in phases, the description of plant communities will be discussed here as a whole. Based on varying biological conditions of the site and hydraulic objectives, three plant communities are proposed. We suggest planting a combination of Great Valley Mixed Riparian Forest, Riparian Scrub Shrub and grassland communities (Figure 5, Table 6). Tree and shrub densities and compositions (Tables 7-12) will vary across the site to address mitigation and wildlife habitat goals and complement the vegetation communities designed and implemented within the O'Connor Lakes Unit. An integral component of the design is a native grass understory which is incorporated into the woody species plantings on 84% of the site.

Figure 5 shows the locations of the proposed vegetation associations. To translate the vegetation associations to the field, the project area is to be made up of smaller planting units (a 5-row by 10-plant area), referred to as "tiles." The project area can be divided into a grid overlaying the site, with each square on the grid representing a tile (Appendix II). Vegetation is assigned for each area of the grid, based on site conditions, mitigation requirements, or wildlife needs. The Holland/CNDDB classification system (Holland 1986) was used to communicate the vegetation composition for each area. The tiles describe plant composition (what plants are included in an area) and arrangement (how the plants are located relative to each other). Arrangements allow development of habitat features (for example, grouping trees to create dense groves for western yellow-billed cuckoos, or grouping small shrubs together to mimic a large shrub, for cover-

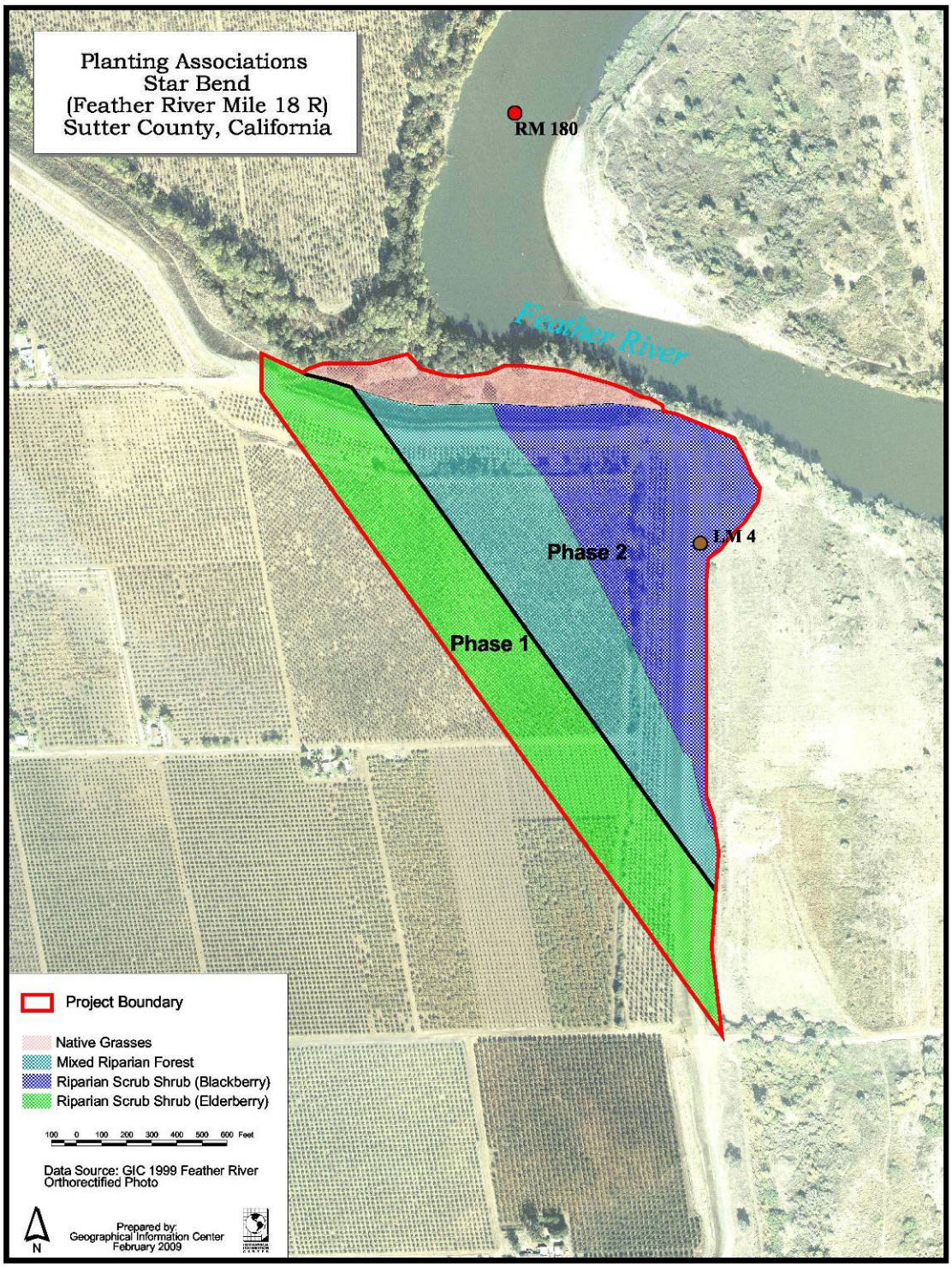
dependent wildlife). Conventional ecological theory holds that high plant species diversity and structural diversity translates to high wildlife diversity. Thus, alternative vegetation associations will be embedded into the design.

Table 6. Summary of Overall Proposed Plant Species at the Feather River Setback Levee and Habitat Enhancement Project at Star Bend, Sutter County, California.

Total Acres: 53.4

Common name	Scientific name	Species composition (%)	Density (plant/acre)	Total Number
Arroyo willow	*Salix lasiolepis* Benth.	6.6	16.0	859
Box elder	*Acer negundo* L.	0.5	1.3	68
Buttonbush	*Cephalanthus occidentalis*	5.7	14.0	751
California blackberry	*Rubus ursinus* Chain. & Schldl.	25.9	63.0	3,391
Coyote brush	*Baccharis pilularis* DC.	5.4	13.2	712
Elderberry	*Sambucus mexicana*	15.9	38.7	2,082
Fremont cottonwood	*Populus fremontii* S.Watson ssp. *fremontii*	0.5	1.3	68
Gooding's black willow	*Salix gooddingii* C.R. Ball	0.3	0.6	34
Mule fat	*Baccharis salicifolia*	4.4	10.8	580
Oregon ash	*Fraxinus latifolia Benth*	0.8	1.9	102
Sandbar (narrow-leaf) willow	*Salix exigua* Nutt.	2.5	6.0	325
Valley oak	*Quercus lobata* Nee	1.3	3.2	171
Western sycamore	*Platanus racemosa* Nutt.	1.3	3.2	171
Wild rose	*Rosa californica* Cham. & Schldl.	28.8	69.9	3,763
TOTAL		**100.0**	**243.1**	**13,077**

Figure 5. Planting Associations for the Feather River Setback Levee and Habitat Enhancement Project at Star Bend, Sutter County, California.



1. Riparian Scrub Shrub (Elderberry)

The habitat enhancement project will incorporate approximately 20 acres of mitigation habitat for VELB, which is designed with a Riparian Scrub Shrub (Elderberry) association (RSE) (Table 7) that is dominated by blue elderberry and will contain large shrubs of blue elderberry that have been excavated from construction impact areas and transplanted in accordance with guidelines previously established by the U.S. Fish and Wildlife Service (USFWS) (Appendix III). The purpose of transplanting is to transfer healthy, mature, blue elderberry individuals to the mitigation area to facilitate the recolonization of VELB to the project site. In addition, the area will be planted with elderberry seedlings and associates (other woody species) in accordance with USFWS guidance. All elderberry shrubs will be planted a sufficient distance from project levees to ensure that elderberries will not be disturbed by, or interfere with, levee maintenance activities.

This community is designed with a 100-foot wide buffer zone that will not include California blackberry or elderberry seedlings. This is intended to prevent the spread of these shrubs onto the levee thereby reducing future maintenance costs. A native grass understory will be planted between the planting rows over the entire 20 acres.

Table 7. Proposed Composition of Riparian Scrub Shrub (Elderberry) at the Feather River Setback Levee and Habitat Enhancement Project, Sutter County, California.

Estimated Acres: **20.0**[1]

Common name	Scientific name	Species comp. (%)	Density (plant/acre)	Total Number
Arroyo willow	*Salix lasiolepis* Benth.	5.4	10.9	217
Buttonbush	*Cephalanthus occidentalis*	5.5	11.1	222
California blackberry	*Rubus ursinus* Chain. & Schldl.	7.8	15.8	316
Coyote brush	*Baccharis pilularis* DC.	13.0	26.2	524
Elderberry	*Sambucus mexicana*	36.5	73.8	1,475
Mule fat	*Baccharis salicifolia*	8.9	17.9	358
Sandbar (narrow-leaf) willow	*Salix exigua* Nutt.	3.4	6.9	137
Wild rose	*Rosa californica* Cham. & Schldl.	19.6	39.6	791
TOTAL		**100.0**	**202.2**	**4,040**

The total number of plantings is designed to meet the required 3,612 elderberry and associated species mitigation plantings, plus additional plantings to ensure adequate survival rates.

2. Great Valley Mixed Riparian Forest

The Great Valley Mixed Riparian Forest (MRF) (Table 8) will be planted primarily in the proposed borrow area within the setback project and will complement the existing mixed riparian forest dominated by cottonwoods in the levee toe ditch. This community will be comprised of a mixture of fast-growing species (cottonwood and willows) and slow-growing species (sycamore and oak), which provide short-term and long-term wildlife habitat. The MRF community will be planted with an open design to enhance the edge effect for wildlife. It will be planted in hedgerows, which consist of five planting rows twenty feet apart with breaks of one hundred feet between each hedgerow. The open spaces and all row centers will be planted with native grasses.

Table 8. Proposed Composition of Great Valley Mixed Riparian Forest at the Feather River Setback Levee and Habitat Enhancement Project, Sutter County, California.

Estimated Acres: 15.5

Common name	Scientific name	Species comp. (%)	Density (plant/acre)	Estimated Number
Arroyo willow	*Salix lasiolepis Benth.*	6.0	6.6	102
Box elder	*Acer negundo L.*	4.0	4.4	68
Buttonbush	*Cephalanthus occidentalis*	4.0	4.4	68
California blackberry	*Rubus ursinus Chain. & Schldl.*	24.0	26.4	409
Coyote bush	*Baccharis pilularis DC.*	2.0	2.2	34
Elderberry	*Sambucus mexicana*	4.0	4.4	68
Fremont cottonwood	*Populus fremontii S.Watson ssp. fremontii*	4.0	4.4	68
Gooding's black willow	*Salix goodingii C.R. Ball*	2.0	2.2	34
Mule fat	*Baccharis salicifolia*	4.0	4.4	68
Oregon ash	*Fraxinus latifolia Benth*	6.0	6.6	102
Sandbar (narrow-leaf) willow	*Salix exigua Nutt.*	2.0	2.2	34
Valley oak	*Quercus lobata Nee*	10.0	11.0	171
Western sycamore	*Platanus racemosa Nutt.*	10.0	11.0	171
Wild rose	*Rosa californica Cham. & Schldl.*	18.0	19.8	307
	TOTAL	**100.0**	**110.0**	**1,705**

3. Riparian Scrub Shrub (Blackberry)

The Riparian Scrub Shrub (Blackberry) association, dominated by densely planted California blackberry and California rose (Table 9), will serve as a transition from native grasses to mixed riparian forest. The shrubs that comprise this plant association provide year round shrubby cover, produce high quantities of fruit and seeds, and attract insects. Moreover, this plant community will serve to protect the project area from erosive overbank flow; especially aiding in protecting cultural resources from disturbance. The open spaces and all row centers will be planted with native grasses.

A separate design within this community is planned for a cultural resources area located in the project area. California rose and California blackberry will be planted at a very high density (Table 10). Shrubs planted at this density should close in on themselves within a year and protect the area from disturbance.

Table 9. Proposed Composition of Riparian Scrub Shrub (Blackberry) at the Feather River Setback Levee and Habitat Enhancement Project, Sutter County, California

Estimated Acres: 15.9

Common name	Scientific name	Species Comp. (%)	Density (plant/acre)	Estimated Number
Arroyo willow	*Salix lasiolepis* Benth.	14.0	33.9	539
Buttonbush	*Cephalanthus occidentalis*	12.0	29.0	462
California blackberry	*Rubus ursinus* Chain. & Schldl.	24.0	58.1	923
Coyote bush	*Baccharis pilularis* DC.	4.0	9.7	154
Elderberry	*Sambucus mexicana*	14.0	33.9	539
Mule fat	*Baccharis salicifolia*	4.0	9.7	154
Sandbar (narrow-leaf) willow	*Salix exigua* Nutt.	4.0	9.7	154
Wild rose	*Rosa californica* Cham. & Schldl.	24.0	58.1	923
	TOTAL	**100.0**	**242.0**	**3,847**

Table 10. Proposed Composition of Riparian Scrub Shrub (Blackberry) (Closed) at the Feather River Setback Levee and Habitat Enhancement Project, Sutter County, California

Estimated Acres: 2.0

Common name	Scientific name	Species Comp. (%)	Density (plant/acre)	Estimated Number
California blackberry	*Rubus ursinus* Chain. & Schldl.	50.0	871.2	1,742
Wild rose	*Rosa californica* Cham. & Schldl.	50.0	871.2	1,742
	TOTAL	**100.0**	**1,742.4**	**3,484**

4. Native Grasses

The planting of native grass minimizes the invasion of non-native species, enhances wildlife habitat, limits erosion, and provides less hazardous fire conditions. Soil conditions indicate that native grasses will do well on the project site. A native grassland will be planted in the area just north of the existing levee (Figure 5). Along with the benefits listed above, the grassland will also provide foraging habitat for Swainson's hawk. Grasses will also be planted as understory between the planting rows and hedgerows in all of the plant communities. The mosaic of grasses and woody species will provide nesting and cover areas as well as foraging areas for wildlife, maximizing the edge effect. Grasses will be planted over a total of approximately 42 acres which amounts to approximately 84% of the total project area.

Seed will be purchased from stock collected from the same ecoregion as the restoration project. The seeding rate will be approximately 13 pounds pure live seed (lbs pls) per acre, and seed will be planted with a no-till drill (Table 11). Native grass seeding will be applied in November or December after the first rains.

Table 11. Proposed Composition of Native Grass Mix at the Feather River Setback Levee and Habitat Enhancement Project, Sutter County, California.
Estimated Acres: 47.3

Common Name	Scientific Name	Rate (lbs pls/acre)	Estimated Amount[1] (lbs)
Blue wildrye	*Elymus glaucus*	3	126
Creeping wildrye	*Leymus triticoides*	4	168
Meadow barley	*Hordeum branchyantherum*	2	84
Purple needlegrass	*Nasella pulchra*	4	168
Total		**13**	**546**

[1]Total pounds to purchase will be dependent upon purity of seed and percent germination. Consult with nursery for amount to order.

F. O'Connor Lakes Unit Borrow Areas

After borrow areas are filled with material from the decommissioned levee and graded to pre-project elevations (approximately 41–45 ft), the three borrow areas at the O'Connor Lakes Unit will be revegetated with a similar design specified in the O'Connor Lakes Restoration Plan (River Partners 2006). The planting palette includes native grasses and an herbaceous understory.

1. Native Grasses

Disturbed areas in Borrow Area 2 will be revegetated with creeping wildrye (*Leymus triticoides*) plugs. This area carries the greatest quantity of overbank flows within the O'Connor Lakes Unit. Creeping wildrye is rhizomatous and well-suited to sandy soils. This area will be planted at a density of 2,720 plugs/acre (Table 12). To increase species and structural diversity, deer grass (*Muhlenbergia rigens*) plugs will be planted at a density of 2,500 plugs/acre. The total amount of creeping wildrye and deer grass plugs will depend on the amount of area disturbed.

Table 12. Proposed Composition of Native Grasses for Borrow Areas, Feather River Setback Levee and Habitat Enhancement Project at Star Bend, Sutter County, California.

Common name	Scientific name	Location	Density plugs/acre
Creeping wildrye	*Leymus triticoides*	Borrow Area 2	2,720
Deer grass	*Muhlenbergia rigens*	Borrow Area 2	2,500

2. Herbaceous Understory

Borrow Area 1, where vegetation is annually cleared by DWR for flow conveyance, and Borrow Area 3, where material was previously removed, will be revegetated with mugwort at a rate of 2 lbs pls/acre. The total amount of mugwort seed needed will depend on the amount of area disturbed.

G. Implementation of Phase I

The 20-acre Phase I planting consists entirely of elderberry mitigation plantings, including transplants, and the RSE community. This community includes a buffer zone planting that excludes California blackberry and elderberry. It will be planted in a strip 100 feet wide running the length of the setback levee. These communities provide the native associate plants required with the on-site mitigation for impacted elderberry

shrubs. The borrow areas on the O'Connor Lakes Unit will be revegetated with native grasses and other herbaceous species.

1. Pre-Construction Activities

a) Orchard Removal

The existing plum orchard will be removed prior to onset of levee degradation and construction activities. The ecological benefits provided by the current plum orchards are expected to be surpassed by the rapid wildlife responses observed after the first year of restoration.

b) Elderberry Transplanting

Prior to the initiation of any levee setback construction activities, all blue elderberry plants with one or more stems measuring ≥ 1.0 inch in diameter at ground level that can not be avoided will be transplanted to a predetermined site that is acceptable to USFWS. LD1 proposes to transplant all unavoidable shrubs to an on-site location, as depicted in Figure 2. Blue elderberry transplants will be planted in rows oriented parallel to the setback levee; rows will be spaced 20 feet apart with 11 feet spacing within each planting row. These transplanted individuals, as well as all other blue elderberry plants within 100 feet of Project activities, will be protected as described in the Conservation Guidelines (USFWS 1999). At USFWS discretion, a plant that is unlikely to survive transplantation because of poor condition or location, or a plant that will be extremely difficult to move because of access problems, may be exempted from transplantation. In cases where transplantation is not possible, mitigation ratios may be increased.

If possible, plants will be transplanted during their dormant season (approximately November through the first two weeks in February, after they have lost their leaves). This will reduce shock to the plant and increase transplantation success. If transplantation occurs during the growing season, increased mitigation ratios may apply. A qualified biologist (monitor) will be on site during transplantation to ensure that no unauthorized take of valley elderberry longhorn beetle occurs. If unauthorized take occurs, the monitor will have the authority to stop work until corrective measures have been completed. The monitor will immediately report any unauthorized take of the beetle or its habitat to USFWS and CDFG.

Transplanting Procedure

- The plant will be cut back 3 to 6 feet from the ground or to 50% of its height (whichever is taller) by removing branches and stems above this height. The trunk and all stems with diameters measuring 1 inch or greater at ground level will be replanted. Any leaves remaining on the plant should be removed. A hole will be excavated of adequate size to receive the transplant.
- The plant will be excavated using backhoe, excavator, front end loader, or other suitable equipment, taking as much of the root ball as possible, and replanting immediately at the designated area. If the plant is to be transplanted off site, the root ball will be secured with wire and wrapped with burlap. Care will be taken to ensure that the root ball remains moist. The root ball will be planted so that its top is level with the existing ground. The soil will be compacted sufficiently so that settlement does no occur.

- A basin will be constructed around the transplant and irrigated after planting.
- The planting area will be at least 1,800 ft^2 for each elderberry transplant. As many as five additional blue elderberry plantings (cuttings or seedlings) and up to five associated native species plantings will also be planted within the 1,800 ft^2 area with the transplant. Up to twenty stems greater than one inch are permitted per basin, forming a cluster design. These clusters will require large basins and will be oriented in the rows mentioned above. Water basins will have a continuous berm measuring approximately 8 inches wide at the base and 6 inches high.
- Soil should be saturated with water. Fertilizers and other potentially deleterious substances will not be used on or around the plants.
- Monitoring of the plants will occur to ascertain whether additional watering is necessary.

2. Post-Construction Site Preparation

Elderberry transplanting will occur prior to the setback levee construction. The remaining associate plantings of Phase I will not be installed until setback levee construction is complete. The transplanted elderberries will be fenced with construction fencing. Once the setback levee construction is completed, the entire project area will be disked and floated to smooth the surface for irrigation and tractor operations (mowing and spraying). Existing native plants will be protected with fencing to minimize potential damage from machine operation. Prior to these activities, operations will be initiated to begin eradication of non-native species.

3. Row Orientation and Plant Spacing

The Feather River channel flows north to south along the northern edge of the project, but then makes a 90-degree turn and flows east to west. All woody trees and shrubs will be planted in rows that will be oriented approximately parallel to flood flows and parallel to the newly constructed setback levee.
Details of plant orientation and spacing are as follows:

- Most of the planting areas will be 20 feet apart; with in-row plant spacing at 11 feet. Rows will be curved and generally follow a northwest-southeast orientation, paralleling the new setback levee.
- The density of the site will be 198 plants per acre. In addition, to allow flood conveyance, a high proportion of the plant communities will be comprised of flexible species such as California blackberry and California wild rose.

4. Plant Material Collection and Propagation

To preserve any ecotype differences, plant material will be collected from vegetation as near as possible to the project site. Table 13 summarizes the types of plant propagation material to be used for woody species. Field cuttings of cottonwood and willows will be collected in January or February when the trees are dormant. A lead time of 12 to 18 months is required from time of seed collection to transplant maturity for plants grown in containers at a nursery. Seeds for the herbaceous understory will be bought at local nurseries or collected from sources near the project site.

Table 13. Standard planting materials and times for woody species

Species	Nursery Grown		Direct Planting		Standard Planting Time (primary method)
	Seeds	Cuttings	Seeds	Cuttings	
Arroyo willow	2	2		1	Feb-Mar
Black willow	2	2		1	Feb-Mar
Box elder	1				Oct-Apr
Buttonbush	1	2			Oct-Apr
California blackberry	1	2		2	Oct-Apr
Coyote bush	1	1		2	Oct-Apr
Dutchman's pipevine	1	2			Oct-Apr
Elderberry	1				Oct-Apr
Fremont cottonwood	2	2		1	Feb-Mar
Oregon ash	1				Oct-Apr
Red willow	2	2		1	Feb-Mar
Sandbar willow	2	2		1	Feb-Mar
Western sycamore	2	1			Oct-Apr
Wild rose	1	2		2	Oct-Apr
Valley oak	2		1		Nov-Dec
White alder	1	2			Oct-Apr

1 – primary method, 2 – secondary method.

5. Plant Installation

A computer database system provides the link between the design and field implementation. Each planting location receives a computer-generated vinyl label that lists its row and plant number, location, and species name and number code. This system connects the vegetation series to specific field conditions (e.g., flood-tolerant species in wet areas) or management objectives (e.g., dense vegetation to serve as a wildlife screen). The labels are installed on stakes in the field prior to planting, which communicates the plan to the planting crew. All plants are number coded and workers can match plants with the proper label.

Any deviations will be recorded and updated in the database. Plant deviations from the original design (e.g., planting an elderberry shrub at a valley oak location) can be recorded during the first census.

Planting efforts will focus on the woody plants in the first year with the native herbaceous understory planted in year 2. Table 14 provides a timeline for implementation of native woody and herbaceous species planting for Phase I.

Table 14. Calendar of planting implementation for Phase I of the Feather River Setback Levee and Habitat Enhancement Project at Star Bend, Sutter County, California.

Date	Trigger	Action
Spring Year 1	Weed germination, soil moisture for field activities.	Maintain complete weed control and prepare a seed bed through mowing, spraying, and disking when weeds are young.
Fall Year 1	Planting of woody species.	
Fall Year 2 (typically November)	After about an inch of rain, when the winter weeds "flush" (germinate).	Spray weeds (Roundup) to give the natives a good start. Broadcast native understory seeds. Due to size of the seeds, mix with an inert carrier (i.e. rice hulls) to distribute the seeds across the field.
Early Spring Year 3	Assessment of weed pressure in previous year, appearance of annual weeds.	Control annual weeds with Roundup if weather conditions allow.
Spring Year 3 to end of project	Weeds taller than 8", or if weeds threaten to shade natives.	The objective is to increase germination and vegetative growth (and not necessarily seed production) of the native understory. Well-timed mowing will reduce the competition with non-native weeds.

a) Woody species

Plant protectors (one-quart milk cartons) should be installed with about 2 inches of wood shavings applied as mulch to hold soil moisture and minimize weed growth. These help protect the plant from desiccation, herbivory, and drift from herbicide applications.

Once site preparation is complete and the irrigation systems are in place, plant installation can begin. The planting of woody species begins with the staking and labeling of each plant location. The location of woody species is expressed by the planting tiles (Appendix V).

Approximately 4,000 woody plants will be planted within the Phase II project area (Table 7). Additional details for the planting of woody species include the following:

- **Initial planting:** Initial planting will occur in the fall (oaks and nursery stock) and will continue through winter and spring (direct cuttings). By spring, the initial planting should be complete.
- **Replanting:** A replant of any missing or dead plants will occur after survivorship is calculated from the census completed in year 1. The plant design approach (over-planting) will minimize future replanting efforts in years 2 and 3.

Acorns will be planted directly into the field during the fall. Cottonwood and willow cuttings will be planted in February and March. Nursery material will be planted in the spring or fall when weather conditions are cool and moist.

H. Implementation of Phase II

Phase II, an additional 32.1 acres, will be implemented for further restoration and expansion of riparian habitat that may be applied as mitigation for the future regional levee improvement projects and/or the Sutter County Habitat Conservation Plan.

1. Site Preparation

The project area will be disked and floated to smooth the surface for irrigation and tractor operations (mowing and spraying). Existing native plants will be protected with fencing to minimize potential damage from machine operation. Prior to these activities, operations will be initiated to begin eradication of non-native species.

2. Row Orientation and Plant Spacing

The Feather River channel flows north to south along the northern edge of the project, but then makes a 90-degree turn and flows east to west. All woody trees and shrubs will be planted in rows that will be oriented approximately parallel to flood flows and parallel to the newly constructed setback levee.

Details of plant orientation and spacing are as follows:

- The planting rows will be 20 feet apart; with in-row plant spacing at 11 feet, with the exception of the Riparian Scrub Shrub (Blackberry) association, where in-row plant spacing will be 5 feet. Rows will be curved and generally follow a northwest-southeast orientation, paralleling the new setback levee.
- A significant portion of the site will be planted in hedgerows which will consist of five rows spaced 20 feet apart. There will be a 100 foot break between each hedgerow.
- Plant densities will vary across the project area to accommodate physical and biological parameters. The density of the site will range from 110 plants per acre in the MRF Open community to 1,742 plants per acre in the high-density planting in the cultural resource area, with an overall density of 267 plants per acre. In addition, to allow flood conveyance, a high proportion of the plant communities will be comprised of flexible species such as California blackberry and California wild rose.

3. Plant Installation

A computer database system provides the link between the design and field implementation. Each planting location receives a computer-generated vinyl label that lists its row and plant number, location, and species name and number code. This system connects the vegetation series to specific field conditions (e.g., flood-tolerant species in wet areas) or management objectives (e.g., dense vegetation to serve as a wildlife screen). The labels are installed on stakes in the field prior to planting, which communicates the plan to the planting crew. All plants are number coded and workers can match plants with the proper label.

Any deviations will be recorded and updated in the database. Plant deviations from the original design (e.g., planting an elderberry shrub at a valley oak location) can be recorded during the first census.

Planting efforts will focus on the woody plants in the first year with the native herbaceous understory and native grasses planted in year 2. Table 16 provides a timeline for implementation of native woody and herbaceous species planting for Phase II.

Table 16. Calendar of planting implementation for Phase II of the Feather River Setback Levee and Habitat Enhancement Project at Star Bend, Sutter County, California.

Date	Trigger	Action
Spring Year 1	Weed germination, soil moisture for field activities.	• Maintain complete weed control and prepare a seed bed through mowing, spraying, and disking when weeds are young.
Fall Year 1	Planting of woody species.	
Fall Year 2 (typically November)	After about an inch of rain, when the winter weeds "flush" (germinate).	• Spray weeds (Roundup) to give the natives a good start. Directly seed native grass using a no till drill. Mix the seed prior to planting (no observed difference between mixed and separate seeding). Apply 30 pounds/acre of 16-20-0 fertilizer (no observed difference, but fertilizer may benefit new seedlings under extremely cold weather). • Broadcast native understory seeds. Due to size of the seeds, mix with an inert carrier (i.e. rice hulls) to distribute the seeds across the field.
Early Spring Year 3	Assessment of weeds in previous year, appearance of broadleaf plants.	• Control broadleaf plants (2,4-D) in native grass area if woody plants are dormant and weather conditions comply. • Control annual weeds with Roundup in areas broadcasted with native understory.
Spring Year 3 to end of project	Weeds taller than 8", or if weeds threaten to shade natives.	• The objective is to increase germination and vegetative growth (and not necessarily seed production) of native grasses and native understory. Well-timed mowing will reduce the competition with non-native weeds, and may encourage vegetative growth (such as tillering) of the native grass.

a) Woody species

Plant protectors (one-quart milk cartons) should be installed with about 2 inches of wood shavings applied as mulch to hold soil moisture and minimize weed growth. These help protect the plant from desiccation, herbivory, and drift from herbicide applications.

Once site preparation is complete and the irrigation systems are in place, plant installation can begin. The planting of woody species begins with the staking and labeling of each plant location. The location of woody species is expressed by the planting tiles (Appendix V).

Approximately 9,300 woody plants will be planted within the Phase II project area (Tables 8-10). Additional details for the planting of woody species include the following:

- **Initial planting:** Initial planting will occur in the fall (oaks and nursery stock) and will continue through winter and spring (direct cuttings). By spring, the initial planting should be complete.
- **Replanting:** A replant of any missing or dead plants will occur after survivorship is calculated from the census completed in year 1. The plant design approach (over-planting) will minimize future replanting efforts in years 2 and 3.

Acorns will be planted directly into the field during the fall. Cottonwood and willow cuttings will be planted in February and March. Nursery material will be planted in the spring or fall when weather conditions are cool and moist.

4. Native Grasses

Seed will be purchased from stock collected from the same ecoregion as the restoration project. The seeding rate (Table 11) will be approximately 13 pounds pure live seed (lbs pls) per acre, applied with 30 pounds/acre of 16-20-0 fertilizer, and planted with a no-till drill. Native grass seeding will be applied in November or December before the first rains.

In addition to native grass seeding, plugs of native grasses will be planted. Plugs are an especially important method for cultivating plants that do not reproduce well by seed (e.g. deer grass). Deer grass is a more drought-tolerant species that will be planted in Borrow Area 2 to increase species richness. Table 17 shows the recommendations for plug planting within the project.

Table 17. Summary of Native grass Plug-Planting for Borrow Areas of the Feather River Setback Levee and Habitat Enhancement Project at Star Bend, Sutter County, California.

Common name	Scientific name	Location	Density plugs/acre	Spacing
Creeping wildrye	*Leymus triticoides*	Borrow Area 2	2,720	4 ft x 4 ft
Deer grass	*Muhlenbergia rigens*	Borrow Area 2	2,500	Scattered clumps

IV. MAINTENANCE

This section provides field managers with technical details needed to implement the plant design. The subsections describe field layout and an approximate sequence of activities that will be carried out over the three-year term of the habitat enhancement project.

A. Weed Control

Weed control is necessary for the successful establishment of native plants and improvement of habitat. The weeds of greatest concern at the site are black mustard, yellow starthistle and pepperweed.

During the growing season, weeds along the planting rows should primarily be controlled by the timely spraying of Roundup® or a generic herbicide brand with glyphosate as the active ingredient. Rows will also be mowed with side mower and weed eater as needed. The aisles between the planted rows (centers) should be mowed or disked to minimize weed growth and propagation. Spraying and/or mowing

should be implemented every 3-6 weeks during the growing season for at least the first two years.

In areas to be planted with herbaceous species, spraying and mowing for an entire season before planting is recommended. Once the herbaceous species are planted, weed control methods will be mowing, possibly applying 2,4-D to control broad leaf pressure.

The restoration contractor will abide by county and state herbicide permitting and reporting requirements. Roundup® (glyphosate) and 2,4-D (for broad-leaf control in native grass planting) are likely to be the most commonly used herbicides on the project. Rodeo® (for areas adjacent to water bodies), Telar® (for pepperweed control), Poast® (for post-emergence control of annual grasses in herbaceous understory planting) and Garlon™ (for woody species control) may also be used.

B. Irrigation

Because of the dry summers typical of the climate in the area, irrigation will be required for plant establishment and survival. Irrigation should be applied with the goal that plants will become self-sufficient by the end of the third growing season.

In the first growing season, the rapidly growing seedlings have roots only in the surface (the top 1-2 feet) of the soil profile. The rooting zone must be kept moist through the season to ensure optimum growth and survival. Because of the sandy soils at the site and water table depths of over 20 feet, the soil moisture of the fields planted with woody species will need to be closely monitored. The intervals between irrigations are dependent upon soil texture, depth to water table, the weather conditions, and plant water stress. Because a mixture of species with different water demands is proposed, the plants must be carefully observed to maintain a balance of soil moisture that is acceptable for xeric species like valley oak and elderberry as well as more mesic species like cottonwood and willow.
Prior to project implementation, a more detailed irrigation design will be developed. All irrigation water will be provided by an existing well located in the O'Connor Lakes Unit, near the midpoint of the eastern edge of the project area. The mainline will run west from the well.

Based on knowledge of the site and plant design, the following are expected to be the requirements for the system:

- The plant spacing throughout most of the restoration and mitigation areas will be 20-foot-wide rows with a 11-foot distance down the planting rows, and rows planted in an approximate east-west direction. Shrub clusters will be planted with 20-foot-wide rows with a 5-foot distance down the rows. Levee remnants will be planted with 10-foot-wide rows with a 5-foot distance down the rows.
- Planting rows will curve and run parallel to flood flows. The irrigation system will utilize existing wells as water sources.

- The drip-line emitters will be spaced, with three emitters per plant 12 inches apart. The design flow will be 0.6 gallons per hour per emitter (1.8 gallons per plant per hour).

Within selected areas, soil-moisture sensors will be placed 1) near the Bear and Feather Rivers, 2) in the middle of the setback levee area, 3) in the middle of the grassland, 4) in the middle of the removed orchard, and 5) on top of the levee remnants. Sensors will be installed at depths of 12 and 36 inches.

In conjunction with these measurements, plant stress observations before and after irrigation periods will be necessary to critically judge the timeliness and effectiveness of irrigation. Measurements provide the most direct assessment of soil moisture. Table 18 provides the irrigation goals of the project.

Table 18. Irrigation goals for the Feather River Setback Levee and Habitat Enhancement Project at Star Bend, Sutter County, California.

Year	Goal	Frequency
1	Keep the shallow roots (1-2 feet) of young plants moist to ensure optimum growth and survival.	Utilize soil moisture probes to monitor and maintain moisture throughout the soil column.
2	Encourage deep rooting and enhance field access to facilitate weed control.	Deliver less frequent but longer irrigations.
3	Encourage deep rooting and enhance field access to facilitate weed control.	Continue with long irrigations and extend the period between irrigations.

The strategy for the second and third year is to train the roots to grow deep. Roots at depth (5-15 feet) will need less water and may be able to tap into the water table on the site and outcompete more shallow-rooted weeds. Less frequent, deep watering will encourage roots to grow deeper, well below the roots of the weeds, allowing the tree exclusive use of this deep moisture. As the tree's roots grow deeper, the times between irrigations become longer; this allows the soil surface layers to dry, thereby reducing weed vigor.

We anticipate that the well-drained, sandy soils, and relatively deep groundwater present on the site, will require frequent irrigations and careful observation of water stress. These areas may dictate the frequency of watering on the site. Field managers should use a combination of methods including evapotranspiration estimates, soil probes, gypsum blocks, and plant water stress signs to assess soil moisture and alter the irrigation regime.

C. Herbivore Control

A number of measures can help control or minimize the effects of herbivores on young plants (Table 19). Cultural practices such as mowing or spraying can discourage most of these herbivores. One of the advantages of active restoration is that more plants are planted than the herbivores can eat. Some damage by herbivores is tolerable and should not impact the success of the planting.

D. Flood and Fire Contingencies

All stockpiled material, cleared trees and brush, and equipment should be removed from the site during the flood season (November 1 to April 15). In the event of a flood, flood debris will be cleared from the site following the flood season.

Throughout the implementation of the project, the restoration contractor should periodically mow between rows and clusters, and along the perimeter of project areas, to reduce potential fire hazards.

Table 19. Summary of Herbivore Control Methods at the Feather River Setback Levee and Habitat Enhancement Project at Star Bend, Sutter County, California.

Herbivore	Type of Damage	Comment on measure(s) or plant response
Beaver	Cut down woody species to build dams	Dismantle dams or, if damage becomes severe, herbivore removal
		Woody species can stump sprout
Deer	Browsing sapling	Install heavy-gauge metal hoops and garlic capsules or other deterrent.
	Use trees to rub velvet off antlers	Saplings can resprout
Ground Squirrels (*Otospermophilus beecheyi*)	Dig up and shred plants and protectors.	Flooding or disking can reduce populations.
	Eat the bark of willow and cottonwood saplings and limbs.	
Pocket Gophers (*Thomomys bottae)*	Eat root systems (probably killing more saplings than any other vertebrate pest).	Control of weed cover allows predators to hunt gophers. However, gophers can persist in an open, weed-free field.
		Frequent disking, weed mulch control, or flooding reduces populations.
		A variety of birds will prey on gophers if given the opportunity. Raptor perches and owl boxes may increase predation.
Rabbits and Hares	Browse early spring growth.	Most seedlings resprout.
Voles (*Microtus*)	Eat bark and cambium at the base of sapling, usually girdling the entire stem.	Saplings resprout, unless vole population is high.
	Dig-up and eat recently planted acorns.	Voles live only in dense herbaceous (weed) cover and never stop moving when in the open to avoid predators. Remove dense weed cover through herbicides or mowing.

V. MONITORING AND REPORTING

Mitigation and riparian vegetation enhancement activities at the Project site will be monitored by LD1 and/or CDFG (or the restoration contractor) to determine if mitigation requirements and habitat enhancement goals and performance standards are being met. Annual monitoring of riparian vegetation establishment including natural native plant recruitment, nonnative plant recruitment, and plant development, will provide

guidance to LD1 and/or CDFG (or the restoration contractor) to determine if remedial actions are needed. Annual monitoring reports will be submitted in the fall of each year. If monitoring reveals that performance standards are not being met, remedial activities may be implemented.

Monitoring of the Phase I elderberry transplants and mitigation plantings (20 acres) will be conducted twice annually for ten consecutive years or for seven years over a fifteen year period following project completion, per USFWS (1999) mitigation monitoring requirements. Annual monitoring of the O'Connor Lakes component of Phase I as well as Phase II will be conducted for up to three years following planting. Details of both the elderberry and general riparian vegetation monitoring are detailed in the following sections.

A. Monitoring and Reporting of VELB Mitigation Area

A biologist will monitor elderberry transplants and associated native plants within the VELB mitigation area. The population of VELB, the general condition of the mitigation area, and the condition of the elderberry and associated native plantings in the conservation area will be monitored over 10 consecutive years following the survey and monitoring procedures listed in the Conservation Guidelines for the Valley Elderberry Longhorn Beetle (USFWS 1999). The monitoring and reporting requirements are summarized in Table 20 at the end of this section.

1. Annual Surveys

Each year during the 10-year monitoring period, a minimum of two site visits between February 14 and June 30 will be made by a qualified biologist. According to the guidelines, the surveys must include the following:

- A population census of the adult beetles, including the number of beetles observed, their condition, behavior, and their precise locations. Visual counts must be used; mark-recapture or other methods involving handling or harassment must not be used.
- A census of beetle exit holes in elderberry stems, noting their precise locations and estimated ages.
- An evaluation of the elderberry plants and associated native plants on the site, and on the conservation area, if disjunct, including the number of plants, their size and condition.
- An evaluation of the adequacy of the signs and weed control efforts in the avoidance and conservation areas.
- A general assessment of the habitat, including any real or potential threats to the beetle and its host plants, such as erosion, fire, excessive grazing, off-road vehicle use, vandalism, excessive growth, etc.

A minimum survival rate of at least 60 percent of the elderberry plants and 60 percent of the associated native plants must be maintained throughout the monitoring period. Within 1 year of discovery that survival has dropped below 60 percent, failed plantings will be replaced to bring survivorship above the success criteria.

2. Reporting Requirements

Monitoring reports will be submitted annually by December 31 to USFWS and DFG. Copies of the report should be sent to:

- Chief of Endangered Species, Sacramento Fish and Wildlife Office, 2800 Cottage Way, W-2605, Sacramento, CA 95825
- Supervisor, Environmental Services, Department of Fish and Game, 1416 Ninth Street, Sacramento, CA 95814
- Staff Zoologist, California Natural Diversity Data Base, Department of Fish and Game, 1220 S Street, Sacramento, CA 95814.

Table 20. VELB Mitigation Monitoring and Reporting, Feather River Setback Levee and Habitat Enhancement Project.

Activity	Approximate Date or Frequency	Details
Qualitative Monitoring	Annually	• Evaluate the adequacy of the signs and weed control in the avoidance and mitigation areas. • Assess the habitat, including any real or potential threats to the beetle and its host plants, such as erosion, fire, excessive grazing, off-road vehicle use, vandalism, excessive growth, etc.
Quantitative Monitoring	Annually, minimum two surveys between February 14 and June 30.	• A population census of the adult beetles, including the number of beetles observed, their condition, behavior, and their locations. Visual counts must be used; mark-recapture or other methods involving handling or harassment must not be used. • A census of beetle exit holes in elderberry stems, noting their locations and estimated ages. • An evaluation of the elderberry plants and associated native plants in the mitigation area, including the number of plants, their size and condition.
Reporting	December 31	• Submit monitoring reports annually to USFWS and DFG.

B. Monitoring and Reporting of Riparian Vegetation Areas

Given the presence of good soils and potential exposure to frequent flooding, the project area should sustain rapid growth of restored riparian species throughout the life of the project implementation (approximately 3 years). An “over-planting” approach is used to rapidly establish native riparian species. Over-planting the project site will eliminate the need for any additional replanting efforts. The ultimate ecological objective for over-planting is that in time the area will thin out and create a complex of open canopy, dense forest, and dead snags, all of which provide benefits to wildlife.

It is anticipated that at the end of the 3-year establishment period, 70% survivorship of woody species will be attained. Over time, mortality based on differences of soil textures and water table depths will create areas of complex, open canopy, dense forest, and dead snags, all of which create habitat for wildlife.

1. Annual Surveys

At the end of the first growing season, the restoration contractor will conduct a complete census of all woody species planted. The data are best analyzed using a database to calculate survivorship, and to determine any changes to or omissions from the original

planting design. During years two and three, woody species plantings will be sampled to determine survivorship, growth, and coverage. Sampling of native grass and herbaceous understory plantings will also be conducted.

a) Census

At the end of the first growing season, a census noting survivorship for each location (alive, dead, or missing/not planted) will be conducted. The census allows for pattern analysis to examine the effects of soil, hydrology, or other factors affecting survivorship. During implementation, changes in the planting design are possible (or even desirable) and should be noted. Deviations in planting can also be recorded during the census. Results of the census will be used to determine progress towards performance criteria and replanting, if necessary.

b) Permanent Plot Sampling

After the initial census, subsequent monitoring (years 2 and 3) utilizes permanent plots to collect data on overall survivorship, height, and cover. The sampling procedure is modified for a restoration setting from protocol developed by Dr. Dave Wood (CSU, Chico) to establish permanent plots in riparian forests (personal communication). Some of the methods have been adapted from Elzinga *et al.* 1998. Comparison of survivorship between the sampling procedure and census indicates that sampling estimates are within 2% and provide additional information on cover and recruitment (results based on data from field 4 of the Ord Bend Unit, Sacramento River National Wildlife Refuge (River Partners 2003)). The sampling procedure may also be used to compare pre- and post-restoration vegetation, if the permanent plots are installed beforehand.

(1) Plot location and size

All samples are based on 20 m x 50 m (1,000 m^2) plots (quadrats) placed with the long axis oriented in a north-south direction. Permanent plot locations will be selected by stratifying the field and using the grid cell method (overlaying each field with a 20 m x 50 m grid) to select sampled plots. Plots that extend past the plantable area are generally rejected. In addition, we exclude locations that are not characteristic of that particular area. In general, a plot should be established every 5-20 acres. The plots serve as areas to collect information on woody, shrub, and herbaceous species (if desired).

Once each specific plot location is randomly selected, its field location will be permanently recorded at the upstream, inland corner of the plot. The position will be recorded with a GPS unit, and, in subsequent monitoring years, will be reestablished in the same position.

(2) Measurements

At each plot, cover and height measurements of all shrubs and trees inside the 20 m x 50 m plot will be recorded. To assess the survivorship of planted species, we will note their status: alive, dead, or missing (not planted). Because restoration activities often create conditions that favor the survivorship and natural recruitment of native plants, newly recruited native riparian woody species will also be recorded. The estimate of aerial cover of both trees and shrubs will be based on the longest diameter through the

horizontal plane of the plant's drip line, a thin line at which a drop of water would fall from the outward most oriented leaf.

c) Photo Points

In addition to quantitative surveys, the restoration contractor will take pre- and post-planting photographs to provide qualitative information on vegetation changes at the restoration site. The photographs will be taken annually at established photo points late in the growing season.

d) Herbaceous Species Monitoring

(1) Visual Plots

Native grass (monitored in May) and native forb (monitored in August) cover will be measured from visual estimates of 0.5m square plots randomly selected along a permanent transect. Ocular estimates of cover by native herbaceous understory species, general weeds, weeds of concern, and bare ground/litter will be recorded.

e) Annual Report

Annual reports will document the monitoring data, review site activities and recommend future management actions. Reports will also document observations related to natural processes related to flooding (erosion, sedimentation, and debris deposition).

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Appendix I
Excerpts from the Sutter County Soil Survey

LOCATION CONEJO CA
Established Series
Rev. SBJ/DJL/DJE/SBS/DWB
03/2006

CONEJO SERIES

The Conejo series consists of very deep, well drained soils that formed in alluvium from basic igneous or sedimentary rocks. Conejo soils are on alluvial fans and stream terraces. Slopes range from 0 to 9 percent. The mean annual precipitation is about 20 inches, (508 mm) and the mean annual air temperature is about 62 degrees F, (17 degrees C).

TAXONOMIC CLASS: Fine-loamy, mixed, superactive, thermic Pachic Haploxerolls

TYPICAL PEDON: Conejo clay loam under a cover of milo at an elevation of 135 feet, (41 m). Re-described on 7/20/1993. (Colors are for dry soil unless otherwise noted).

Ap--0 to 5 inches, (0 to 13 cm); dark gray (10YR 4/1) clay loam, very dark gray (10YR 3/1) moist; 31 percent clay, moderate medium and coarse subangular blocky and strong medium granular structure; very hard, friable, moderately sticky and moderately plastic; many fine and medium irregular pores; slightly alkaline, pH 7.5 by Hellige-Truog; abrupt wavy boundary. (3 to 8 inches, (8 to 20 cm) thick)

A1--5 to 19 inches, (13 to 48 cm); very dark grayish brown (10YR 3/2) clay loam, very dark brown (10YR 2/2) moist; 31 percent clay, moderate coarse subangular blocky structure; very hard, friable, moderately sticky and moderately plastic; common very fine roots; many very fine and fine tubular and many fine irregular pores; slightly alkaline, pH 7.5 by Hellige-Truog; clear wavy boundary. (10 to 17 inches, (25 to 43 cm) thick)

A2--19 to 30 inches, (48 to 76 cm); very dark grayish brown (10YR 3/2) clay loam, very dark grayish brown (10YR 3/2) moist; 31 percent clay, moderate medium subangular blocky structure; very hard, friable, moderately sticky and moderately plastic; common very fine roots; many very fine and few fine tubular pores; few pressure faces; common fine iron-manganese nodules about l mm diameter; 1 percent gravel; slightly alkaline, pH 7.5 by Hellige-Truog; gradual wavy boundary. (10 to 15 inches, (25 to 38 cm) thick)

Bw1--30 to 48 inches, (76 to 122 cm); dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; 29 percent clay; moderate coarse subangular blocky structure; very hard, friable, moderately sticky and moderately plastic; common very fine roots; many very fine and fine tubular and many fine irregular pores; many pressure faces; few fine iron-manganese nodules about 1 mm diameter; 2 percent gravel; slightly alkaline, pH 7.5 by Hellige-Truog; clear wavy boundary. (13 to 20 inches, (33 to 51 cm) thick)

Bw2--48 to 70 inches, (122 to 178 cm); brown (10YR 5/3) loam, dark yellowish brown (10YR 4/4) moist; 19 percent clay, weak fine and medium subangular blocky structure; slightly hard, weakly brittle but friable, nonsticky and slightly plastic; common very fine roots; many very fine and few fine and medium tubular pores; slightly effervescent in seams; common medium oxidized iron masses; 1 percent gravel; moderately alkaline, pH 8.0 by Hellige-Truog.

TYPE LOCATION: Butte County, California; about 6 miles south of Chico on west side of Aquas Frias Road; 800 feet south of northeast corner of Section 33, Township 21 N., Range 1 E., 39 degrees, 38 minutes, 10 seconds North latitude; 121 degrees, 51 minutes, 40 seconds West longitude, NAD27 - U.S.G.S. Quad: Chico, California.

RANGE IN CHARACTERISTICS: Depth is greater than 80 inches, (203 cm). The mean annual soil temperature is 59 to 66 degrees F, (15 to 19 degrees C). The soil moisture control section is dry in all parts from about May through October (about 140 to 160 days). The particle-size control section has about 20 to 35 percent clay and some gravel is present.

Some pedons have fine sandy loam or loam overwash less than 20 inches (51cm) thick. These pedons have clay loam or loam Ab and upper Bw horizons, have 0 to 5 percent gravel and average 18 to 35 percent clay in the particle-size control section. The extent of this overwash phase is 600 to 700 acres and is the result of hydraulic mine deposits splaying out of the early levees on Butte Creek, north of Durham.

The Ap and A horizons have dry colors of 10YR 3/2, 4/1, 4/2, 4/3, 4/4, 5/2 or 5/3. Moist color is 10YR 3/1, 3/2, 2/2, 3/3, 4/2 or 7.5YR 3/2. In some pedons, it has weak to strong granular structure; in others, all or part has moderate to strong subangular blocky structure. Texture is clay loam. Clay content ranges from 27 to 35 percent. Organic matter ranges from 1.5 to 6 percent. Rock fragments range from 0 to 2 percent gravel. Reaction ranges from slightly acid to slightly alkaline.

The upper Bw horizon has dry colors of 10YR 4/2, 4/3, 4/4, 5/2, 5/3, 5/4, 6/2, 6/3, 6/4, 7/3, 7.5YR 4/2, 4/4, 5/4 or 6/4. Moist color is 10YR 2/2, 3/2, 3/3, 3/4, 4/2, 4/3, 4/4, 5/2, 7.5YR 3/2, 3/4, 4/2 or 4/4. Texture is loam or clay loam. Clay content ranges from 27 to 35 percent. Rock fragments range from 0 to 2 percent gravel. Reaction ranges from slightly acid to slightly alkaline.

The lower Bw horizon has dry colors of 10YR 3/4, 4/2, 4/3, 4/4, 5/3, 5/4, 6/2, 6/3, 6/4, 7.5YR 4/2, 4/4, 5/2 or 5/4. Moist color is 10YR 4/2, 4/3, 4/4, 5/3 or 5/4. Texture is sandy loam, fine sandy loam, loam or clay loam. Clay content ranges from 15 to 35 percent. Rock fragments range from 0 to 2 percent gravel. Reaction ranges from neutral to moderately alkaline, but some pedons are slightly acid. Segregated or secondary lime is in some pedons at depths greater than 48 inches, (76 cm). Some pedons have redoximorphic features within 40 inches, (102 cm) of the surface, a few pedons have redoximorphic features within 30 inches, (76 cm) of the surface. Some pedons have siltstone at depths of 40 to 60 inches, (102 to 152 cm).

COMPETING SERIES: These are the Agueda, Almendra, Anaheim, Carranza, Gazos, Reward, Salinas and Westfan series. Agueda soils are calcareous throughout. Almendra soils

have 18 to 27 percent clay in the particle-size control section. Anaheim soils are moderately deep to a paralithic contact. Gazos soils have a lithic contact within 40 inches, (102 cm) of the surface. Carranza soils have extremely gravelly sandy clay loam C horizons within a depth of 40 inches, (102 cm). Reward soils are effervescent and have a lithic contact at 40 to 60 inches, (102 to 152 cm). Salinas soils have secondary carbonate accumulations in the C horizons. Westfan soils have Btk and Ck horizons that are strongly effervescent and have disseminated carbonates or concretions, have solum thickness of 25 to 60 inches, (64 to 152 cm), and have a water table between 36 to 60 inches, (91 to 152 cm) from November through April.

GEOGRAPHIC SETTING: Conejo soils are on alluvial fans and stream terraces at elevations of 30 to 2,000 feet, (9 to 610 m). Slopes range from 0 to 9 percent. The soil formed in alluvium from basic igneous and sedimentary rocks. The climate has hot dry summers and cool moist winters. Mean annual precipitation is 14 to 26 inches, (356 to 660 mm). Mean annual temperature is about 59 to 64 degrees F, (15 to 18 degrees C), average January temperature varies from 45 to 50 degrees F, (7 to 10 degrees C), and average July temperature varies from 70 to 80 degrees F, (21 to 26 degrees C). Frost free period is about 260 to 330 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Cibo, Clear Lake and Trimmer soils. Cibo and Trimmer soils occur on upland areas and have lithic and paralithic contacts respectively. Clear Lake soils are of clay texture and occupy basins.

DRAINAGE AND PERMEABILITY: Well drained; slow to medium runoff, moderately slow saturated hydraulic conductivity in the A and upper Bw horizons and moderately slow to moderately rapid in the lower Bw horizon. Some areas are subject to occasional flooding.

USE AND VEGETATION: Used for irrigated row crops, orchard, hay and pasture and grain. Vegetation is annual grasses and forbs with few scattered oaks.

DISTRIBUTION AND EXTENT: Valley areas in northern and central California and the Coast Range of California. The soils are of small extent

MLRA OFFICE RESPONSIBLE: Davis, California

SERIES ESTABLISHED: Siskiyou County (Shasta Valley Area, California 1919).

REMARKS: The Conejo series was established in Siskiyou County in 1919. The type location was moved to Butte County some time prior to 1989. It is mapped in multiple MLRA's in Butte, Contra Costa, Los Angeles, San Benito, Santa Cruz, Solano, Sutter and Yuba Counties.

The official description from Butte County was written prior to modern soil survey mapping and does not adequately represent conditions in Butte County. The type location was revisited on 7/93 and the description revised. The range of characteristics has been left as is. The use of Conejo in other areas should be reviewed during MLRA updates. In Butte County, to reflect actual conditions, the range of characteristics in the taxonomic unit description is narrowed down. (Average clay in the particle-size control section is 27 to 35 percent).

Additional Data: Clay determined by particle-size analysis at local survey office.

National Cooperative Soil Survey
U.S.A.

LOCATION HOLILLIPAH CA
Established Series
Rev:DJL/WBS/TDC/DJE
8/98

HOLILLIPAH SERIES

The Holillipah series consists of stratified very deep, somewhat excessively drained soils that formed in alluvium from mixed sources. Holillipah soils are on flood plains and alluvial fans and have slopes of O to 2 percent. The mean annual precipitation is 18 inches and the mean annual temperature is 62 degrees F.

TAXONOMIC CLASS: Sandy, mixed, thermic Typic Xerofluvents

TYPICAL PEDON: Holillipah loamy sand - on a level flood plain of about 2 percent slope under annual grasses at 50 feet elevation. (Colors are for dry soil unless otherwise stated. When described on June 1, 1978, the soil was dry to 35 inches and slightly moist below.)

A--O to 8 inches; pale brown (lOYR 6/3) loamy sand, brown (lOYR 4/3) moist; weak coarse granular structure; soft, loose, nonsticky and nonplastic; many very fine and fine and common medium roots; many very fine and fine interstitial pores; slightly acid (pH 6.5); clear smooth boundary. (5 to 10 inches thick)

C1--8 to 32 inches; white (lOYR 8/1) sand, light gray (lOYR 7/1) moist; massive; loose, nonsticky and nonplastic; many very fine and fine and common medium roots; many very fine and fine interstitial pores; neutral (pH 7.0); abrupt wavy boundary. (20 to 40 inches thick)

C2--32 to 35 inches; light yellowish brown (lOYR 6/4) loamy sand, dark yellowish brown (lOYR 4/4) moist; common medium distinct strong brown (7.5YR 4/6) mottles; massive; soft, very friable, nonsticky and nonplastic; common very fine tubular pores; neutral (pH 7.0); abrupt wavy boundary. (3 to 20 inches thick)

C3--35 to 47 inches; brown (lOYR 5/3) fine sandy loam, dark brown (lOYR 3/3) moist; many medium distinct brown (7.5YR 5/4) mottles; massive; slightly hard, friable, nonsticky and nonplastic; common very fine tubular pores; neutral (pH 7.0); gradual irregular boundary. (O to 15 inches thick)

C4--47 to 61 inches; pale brown (lOYR 6/3) loamy fine sand, dark brown (lOYR 3/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine tubular pores; neutral (pH 7.0).

TYPE LOCATION: Sutter County, California; approximately 5.6 miles south of Yuba City on Garden Highway then east 0.56 miles to about 400 feet from Feather River; 2,100 feet north and 3,000 feet east of the intersection of O'Banion Road and Garden Highway in the New Helvetia land grant, T. 14 N., R. 3 E. Olivehurst Quadrangle.

RANGE IN CHARACTERISTICS: The mean annual soil temperature is 60 degrees to 65 degrees F. The soil temperature is above 47 degrees F the entire year. The soil between depths of 14 and 43 inches is dry in all parts from May through October, and is moist in some or all parts from November through April unless irrigated. The difference between average July and average January soil temperature is 30 degrees to 33 degrees F. The soil is stratified with thick Layers of sand, loamy fine sand or loamy sand and thin layers of fine sandy loam, sandy loam and silt loam. The particle-size control section averages loamy sand or coarser. Strata of sandy loam, fine sandy loam or silt loam 1/2 1 cm thick occur above 40 inches in depth. Organic carbon content decreases irregularly with depth. It is slightly acid to neutral.

The A horizon has dry color of lOYR 6/4, 6/3, or 6/2 and moist color of lOYR 4/4, 4/3, 4/2, or 3/3. It is sandy loam or loamy sand.

The C horizon has dry color of lOYR 8/1, 7/1, 7/2, 7/3, 7/4, 6/3, 6/4 or 5/3 and moist color of lOYR 7/1, 7/2, 6/2, 5/2, 5/3, 5/4, 4/2, 4/3, 4/4 or 3/3. Mottles may be relic from initial deposition and are associated with the finer textured stratified layers and not indicative of an intermittent high water table. Gravel content ranges from O to 5 percent.

COMPETING SERIES: These are the Metz series. Metz soils are neutral to moderately alkaline, are calcareous below the A horizon, and have a difference between mean summer and mean winter soil temperature of about 20 degrees F.

GEOGRAPHIC SETTING: Holillipah soils are on alluvial fans and flood plains. Slopes are O to 2 percent. The soils formed in stratified alluvium from mixed sources. Elevations are 20 to 150 feet. The climate is subhumid with hot dry summers and cool moist winters. Mean annual precipitation is 17 to 22 inches. January temperature is 45 degrees F., mean July temperature is 77 degrees F., and mean annual temperature varies from 60 degrees to 64 degrees F. Frost- free season is 260 to 280 days.

GEOGRAPHICALLY ASSOCIATED SOILS: Theses are the Columbia and Shanghai soils. Columbia and Shanghai soils are on similar flood plain positions, but usually are slightly lower in the landscape.

DRAINAGE AND PERMEABILITY: Somewhat excessively drained; very slow runoff; moderately rapid permeability. The soils are flooded unless protected by levees.

USE AND VEGETATION: This soil is used for irrigated orchards and row crops. In some areas next to rivers, the natural vegetation is valley oak, cottonwood and shrubs.

DISTRIBUTION AND EXTENT: Southeastern part of the Sacramento Valley. Soils are not extensive.

MLRA OFFICE RESPONSIBLE: Davis, California

SERIES ESTABLISHED: Sutter County, California 1984. Series name is from a tribe of native Americans in the area who have now vanished.

OSED scanned by SSQA. Last revised by state on 2/87.

National Cooperative Soil Survey
U.S.A.

LOCATION SHANGHAI CA
Established Series
Rev. ENV/DJL/TDC/CEJ/ET
03/2003

SHANGHAI SERIES

The Shanghai series consists of very deep, somewhat poorly drained soils that formed in alluvium from mixed sources. Shanghai soils are on flood plains and have slopes of 0 to 2 percent. The annual temperature is about 62 degrees F. and the annual precipitation is about 18 inches.

TAXONOMIC CLASS: Fine-silty, mixed, superactive, nonacid, thermic Aquic Xerofluvents

TYPICAL PEDON: Shanghai silt loam - on a nearly level slope of less than l percent in an irrigated prune orchard at 30 feet elevation. (Colors are for dry soil unless otherwise stated. When described on April 9, 1979, the soil was moist throughout.)

Ap--0 to 11 inches; very pale brown (10YR 7/4) silt loam, brown (10YR 4/3) moist; common medium distinct yellowish brown (10YR 5/6) mottles, yellowish brown (10YR 5/8) moist; moderate very fine subangular blocky structure; slightly hard, friable, slightly sticky and plastic; common very fine roots; common very fine tubular pores; neutral (pH 7.0); clear smooth boundary. (7 to 14 inches thick)

A--11 to 21 inches; very pale brown (10YR 7/3) silt loam, brown (10YR 4/3) moist; common large distinct strong brown (7.5YR 5/6) mottles, dark yellowish brown (10YR 4/6) moist; massive; slightly hard, friable, slightly sticky and plastic; common very fine roots; common very fine tubular pores; neutral (pH 7.0); gradual wavy boundary. (3 to 10 inches thick)

C1--21 to 27 inches; pale brown (10YR 6/3) silt loam, yellowish brown (10YR 5/4) moist; many medium prominent yellowish brown (10YR 5/8) and many large prominent strong brown (7.5YR 4/6) mottles, dark yellowish brown (10YR 3/6) and dark reddish brown (2.5YR 3/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common very fine and few fine roots; common very fine tubular pores; neutral (pH 7.0); gradual wavy boundary. (6 to 18 inches thick)

C2--27 to 36 inches; pale brown (10YR 6/3) silt loam, dark yellowish brown (10YR 4/4) moist; many medium prominent yellowish brown (10YR 5/8) and many large prominent strong brown (7.5YR 4/6) mottles, dark yellowish brown (10YR 3/6) and dark reddish brown (2.5YR 3/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; very fine tubular pores; neutral (pH 7.0); gradual wavy boundary. (9 to 16 inches thick)

C3--36 to 54 inches; very pale brown (10YR 7/3) silt loam, dark yellowish brown (10YR 4/4) moist; common medium distinct strong brown (7.5YR 5/8) mottles, dark brown (7.5YR 4/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine tubular pores; neutral (pH 7.0); gradual wavy boundary. (8 to 18 inches thick)

C4--54 to 62 inches; pale brown (10YR 6/3) silt loam, dark brown (10YR 3/3) moist; many medium distinct yellowish red (5YR 5/8) mottles; massive; soft, friable, slightly sticky and slightly plastic; few very fine roots; common very fine pores; neutral (pH 7.0).

TYPE LOCATION: Sutter County, California; approximately 1.2 miles north of Yuba City on Live Oak Highway, then east on Rednall Road to levee; 2,000 feet north and 900 feet east of the intersection of Rednall Road and the western levee of the Feather River, approximately 800 feet from river, in the New Helvetia land grant T.15 N., R.3 E. Yuba City Quadrangle.

RANGE IN CHARACTERISTICS: The mean annual soil temperature is 60 degrees to 65 degrees F. The soil temperature is above 47 degrees F. the entire year. The soil between depths of 6 and 18 inches is dry in all parts from June through October and is moist in some or all parts from November through May unless irrigated. The difference between average July and average January soil temperature is 30 degrees to 33 degrees F.

The 10 to 40 inches control section is stratified layers of silt loam to fine sandy loam and silty clay loam, but is dominantly silt loam with less than 15 percent coarser than very fine sand. Clay content ranges from 20 to 35 percent. Content of organic matter decreases irregularly with depth. Reaction is slightly acid to moderately alkaline.

The A horizon has dry color of 10YR 7/4, 7/3, 6/4, 6/3, 5/4; 2.5Y 6/2 or 7/2 and moist color of 10YR 4/4, 4/3; 2.5Y 4/2, 3/2 or 3/3 with mottled colors dry and moist of 10YR 4/6, 5/6, 5/8; 7.5YR 5/6, 7/6 and 5YR 6/8. It is silty clay loam, silt loam or fine sandy loam.

The C horizon has dry colors of 10YR 8/4, 7/4, 6/4, 8/3, 7/3, 6/3; 2.5Y 6/2 or 7/2 and moist color of 10YR 6/6, 6/4, 6/3, 5/6, 5/3, 3/3, 5/4, 4/4; 2.5Y 5/2, 4/2, or 5Y 6/3 with prominent or distinct mottles. Some pedons have a clay layer at 40 to 60 inches.

COMPETING SERIES: There are no other series in this family.

GEOGRAPHIC SETTING: Shanghai soils are on flood plains with slopes of 0 to 2 percent. They formed in alluvium from mixed sources. Elevations are 20 to 150 feet. The climate has hot dry summers and cool moist winters. Mean annual precipitation is 14 to 22 inches. Average January temperature is about 45 degrees F., the average July temperature is about 77 degrees F.,

and the mean annual temperature is 60 degrees to 64 degrees F. The frost-free season is about 260 to 290 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Columbia and Holillipah soils. Columbia soils are on similar flood plain positions. Holillipah soils are on similar but slightly higher flood plain positions in areas adjacent to rivers.

DRAINAGE AND PERMEABILITY: Somewhat poorly drained; runoff is very slow; permeability is moderate, but may be slow below 40 inches. Unless protected, these soils are subject to flooding. Unless drained, in low lying areas and areas adjacent to levees, a water table is present at a depth of 30 to 60 inches in December through April and below a depth of 48 inches in May to November. In other areas, the water table is at 36 to 60 inches in December through April.

USE AND VEGETATION: This soil is used for irrigated orchards, small grains and row crops.

DISTRIBUTION AND EXTENT: Southeastern part of Sacramento Valley. Soils are moderately extensive.

MLRA OFFICE RESPONSIBLE: Davis, California

SERIES ESTABLISHED: Sutter County, California 1984.

REMARKS: The activity class was added to the classification in February of 2003. Competing series were not checked at that time. - ET

Last revised by the state on 2/91.

National Cooperative Soil Survey
U.S.A.

LOCATION COLUMBIA CA
Established Series
Rev. DJL/CAF/MAV/SBS/DWB
05/2006

COLUMBIA SERIES

The Columbia series consists of very deep, moderately well drained soils formed in alluvium from mixed sources. These soils are on flood plains and natural levees and have slopes of 0 to 8 percent. The mean annual precipitation is 12 to 25 inches, (305 to 635 mm) and the mean annual temperature is about 61 degrees F, (16 degrees C).

TAXONOMIC CLASS: Coarse-loamy, mixed, superactive, nonacid, thermic Oxyaquic Xerofluvents

TYPICAL PEDON: Columbia fine sandy loam, on a nearly level plowed field. (Colors are for dry soil unless otherwise stated.)

Ap--0 to 11 inches, (0 to 28 cm); pale brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; slightly hard, very friable, nonsticky and nonplastic; common very fine roots; few very fine tubular and many very fine interstitial pores; slightly acid (pH 6.4); clear smooth boundary. (7 to 12 inches, (18 to 31 cm) thick)

A--11 to 16 inches, (28 to 41 cm); pale brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; many very fine roots; common very fine tubular pores, slightly acid (pH 6.4); clear wavy boundary. (4 to 8 inches, (10 to 20 cm) thick)

C1--16 to 23 inches, (41 to 58 cm): pale brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine roots; many very fine interstitial pores; common fine prominent yellowish brown (10YR 5/6) masses of iron accumulations, strong brown (7.5YR 5/6) moist; slightly acid (pH 6.5); clear wavy boundary. (4 to 8 inches, (10 to 20 cm) thick)

C2--23 to 26 inches, (58 to 66 cm); pale brown (10YR 6/3) sand, dark brown (10YR 3/3) moist; single grained; loose, nonsticky and nonplastic; many very fine roots; many very fine interstitial pores; slightly acid (pH 6.5); clear smooth boundary. (0 to 5 inches, (0 to 13 cm) thick)

C3--26 to 31 inches, (66 to 79 cm); very pale brown (10YR 7/3) and reddish yellow (7.5YR 6/6) fine sandy loam; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine roots; many very fine tubular pores; common fine prominent yellowish brown (10YR 5/4) and strong brown (7.5YR 5/6) masses of iron accumulations moist; neutral (pH 7.0); clear smooth boundary. (2 to 8 inches, (5 to 20 cm) thick)

C4--31 to 34 inches, (79 to 86 cm); very pale brown (10YR 7/3) silt loam, brown (10YR 5/3) moist; moderate medium prismatic structure; hard, friable, slightly sticky and slightly plastic; very few very fine roots; many very fine and fine tubular pores; many medium distinct reddish yellow (7.5YR 6/6), strong brown (7.5YR 5/6) masses of iron accumulations moist; slightly alkaline (pH 7.5); clear smooth boundary. (0 to 5 inches, (0 to 13 cm) thick)

C5--34 to 38 inches, (86 to 97 cm); very pale brown (10YR 7/3) fine sandy loam, brown (10YR 5/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; very few very fine roots; many fine tubular and common very fine interstitial pores; many medium distinct reddish yellow (7.5YR 6/6), strong brown (7.5YR 5/6) masses of iron accumulation; slightly alkaline (pH 7.7); clear smooth boundary. (2 to 10 inches, (5 to 25 cm) thick)

C6--38 to 41 inches, (97 to 104 cm); pale brown (10YR 6/3) sand, dark brown (10YR 3/3) moist; single grained; loose, nonsticky and nonplastic; common very fine roots; common very fine tubular and many very fine interstitial pores; neutral (pH 7.0); abrupt smooth boundary. (1 to 5 inches, (2.5 to 13 cm) thick)

C7--41 to 55 inches, (104 to 140 cm); pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; massive; slightly hard, very friable, slightly sticky and nonplastic; few very fine roots; many very fine, medium and coarse tubular pores; many medium distinct reddish yellow (7.5YR 6/6) and strong brown (7.5YR 5/6) masses of iron accumulation moist; moderately alkaline (pH 8.0); clear smooth boundary. (0 to 15 inches, (0 to 38 cm) thick)

Ab--55 to 59 inches, (140 to 150 cm); gray (10YR 6/1) silty clay loam, dark gray (10YR 4/1) moist; massive; hard, friable, sticky and slightly plastic; very few very fine roots; many very fine, fine and medium tubular pores; common fine distinct strong brown (7.5YR 5/6), dark brown (7.5YR 3/2) masses of iron accumulation moist; moderately alkaline (pH 8.0).

TYPE LOCATION: Solano County, California; 400 feet south of the south end of the bridge at the north end of Ryer Island. Not sectionalized, T.5 N., R.3 E.

RANGE IN CHARACTERISTICS: The mean annual soil temperature is 60 to 65 degrees F, (16 to 18 degrees C). The soil between depths of 8 and 25 inches, (20 to 64 cm) is moist in some or all parts from late October to late May or June and is dry in all parts the remainder of the year, unless irrigated. The 10 to 40 inches, (25 to 102 cm) particle-size control section is stratified fine sandy loam, very fine sandy loam, silt loam, loam, loamy sand, loamy fine sand, fine sand or sand and averages 10 to 18 percent clay, when mixed, and has greater than 15 percent fine sand or coarser. Up to 35 percent gravel may occur below a depth of 40 inches, (102 cm). Redoximorphic features occur between 10 and 48 inches, (25 to 122 cm). Content of organic matter decreases irregularly with depth.

The A horizon is 10YR 7/2, 6/4, 6/3, 6/2, 5/4, 5/3 or 5/2 and moist color of 10YR 5/4, 4/4, 4/3 or 4/2. Texture is sandy loam, sand, loamy sand, loamy fine sand, fine sandy loam, loam or silt loam and commonly is stratified. Reaction is slightly acid to slightly alkaline.

The C horizon is 10YR 8/4, 8/1, 7/4, 7/3, 7/2, 7/1, 6/4, 6/3, 6/2 6/1, 5/4 or 5/3 and moist color of 10YR 7/4, 7/3, 7/2, 6/2, 6/4, 5/4, 5/3, 5/2, 4/4, 4/3, 4/2, 4/1, 3/3, or 3/4. Redoximorphic features have hues of 10YR, 7.5YR, 5YR or 2.5YR with chroma of 3, 4 or 6. Texture is stratified sand to silty clay loam. Finer textures occur below 40 inches, (102 cm). Reaction is slightly acid to slightly alkaline but may be moderately alkaline in horizons underlain by an Ab horizon.

The Ab horizon is 10YR 6/1, 5/1, 4/1, 4/2, 3/1 or 2/1; 2.5Y 6/2. Moist colors are 10YR 5/1, 4/1, 3/1, 2/1; N 2/0; 2.5Y 3/2. Texture is mucky clay loam, clay loam, silty clay loam, silty clay or clay. Depth to a buried horizon ranges from 40 to 60 inches, (102 to 152 cm). Some pedons lack a buried horizon and some pedons are calcareous at 40 inches, (102 cm) or more. Reaction is neutral to moderately alkaline.

COMPETING SERIES: There are no other series in this family.

GEOGRAPHIC SETTING: Columbia soils are on flood plains with bar and channel topography in some natural areas or are on natural levees. These soils formed in alluvium from mixed sources. Elevations are 10 feet below sea level to 155 feet above sea level (47 m). The climate is subhumid with hot dry summers and cool moist winters. Mean annual precipitation is

12 to 25 inches, (304 to 635 mm). Mean January temperature is 45 degrees F, (7 degrees C), mean July temperature is 80 degrees F, (27 degrees C). Mean annual temperature varies from 58 to 63 degrees F, (14 to 17 degrees C). Frost-free period is 230 to 340 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Arvin, Clear Lake, Sacramento, Shanghai and Sycamore soils. Arvin soils are not saturated with water within 60 inches, (152 cm) of the surface and are in similar or slightly higher flood plain positions. Clear Lake and Sacramento soils have clay textures and are in basins. Sycamore soils have less than 15 percent fine or coarser sand and are in similar flood plain positions.

DRAINAGE AND PERMEABILITY: Moderately well drained; negligible to medium runoff; moderately rapid permeability. Clay substratum phase has slow permeability below a depth of 40 inches, (102 cm). Sandy substratum phase has rapid permeability below a depth of 40 inches, (102 cm). Except where drained, these soils are saturated at 20 to 48 inches, (51 to 122 cm) for several months in the period from November to April. In areas not protected by levees or other flood control structures these soils are subject to occasional to frequent, brief to long periods of flooding in November to May. Rare flooding occurs in partly protected areas.

USE AND VEGETATION: These soils are used for irrigated hay, small grain, and orchard and row crops. Vegetation consists of a fairly dense cover of oaks, cottonwoods, willows, vines, shrubs and grasses near stream channels, but more open away from the channels.

DISTRIBUTION AND EXTENT: These soils occur in the central valley of California. The soils are moderately extensive in MLRA-16, 17.

MLRA OFFICE RESPONSIBLE: Davis, California

SERIES ESTABLISHED: Reconnaissance Survey of Southwest Washington 1911.

REMARKS: The series was redefined in the Chico area of Butte County, California in 1925. The type location was moved to Madera County, Californian 1959. The type location was then moved to Solano County, California 1970.

Diagnostic horizons and features recognized in this pedon are:

Ochric epipedon - the zone from the surface to a depth of 16 inches, (41 cm) (Ap, A)

Oxyaquic subgroup - the zone from 20 to 48 inches, (51 to 122 cm) is saturated for several months.

CEC/Clay ratio estimated from similar soils with laboratory data in the W. Stanislaus Soil Survey Area and University Laboratory data.

Edit log: Runoff terminology adjusted 4/96 to adjective criteria of the Soil Survey Manual (10/93). 5/2003 Proposed edits for use in Butte County; Range in Characteristics: expand allowed gravel from 5 to 35 percent below a depth of 40 inches. A horizon: add textures sand,

loamy sand, loamy fine sand, and add: commonly is stratified. C horizon: add colors moist 10YR 6/2 and 3/4. Geographic setting: expand elevation from 150 to 155 feet. In remarks added history of type location moves.

ADDITIONAL DATA: NO: 50-CAL-20-39-1-1 to 3 University of California, Madera County, Tehama County, and UC Berkley, 58-52-48.

National Cooperative Soil Survey
U.S.A.

Appendix II
Vegetation Association Tiles

Mixed Riparian Forest
Total area: 15.5

Common name	Code	Scientific name	Species comp. (%)	Density (plant/acre)	Estimated Number
Arroyo willow	AW	*Salix lasiolepis Benth.*	6.0	6.6	102
Box elder	BE	*Acer negundo L.*	4.0	4.4	68
Buttonbush	BU	*Cephalanthus occidentalis*	4.0	4.4	68
California blackberry	BB	*Rubus ursinus Chain. & Schldl.*	24.0	26.4	409
Coyote bush	CB	*Baccharis pilularis DC.*	2.0	2.2	34
Elderberry	EB	*Sambucus mexicana*	4.0	4.4	68
Fremont cottonwood	CO	*Populus fremontii S.Watson ssp. fremontii*	4.0	4.4	68
Gooding's black willow	BW	*Salix goodingii C.R. Ball*	2.0	2.2	34
Mule fat	MF	*Baccharis salicifolia*	4.0	4.4	68
Oregon ash	AS	*Fraxinus latifolia Benth*	6.0	6.6	102
Sandbar (narrow-leaf) willow	SW	*Salix exigua Nutt.*	2.0	2.2	34
Valley oak	OK	*Quercus lobata Nee*	10.0	11.0	171
Western sycamore	SY	*Platanus racemosa Nutt.*	10.0	11.0	171
Wild rose	RO	*Rosa californica Cham. & Schldl.*	18.0	19.8	307
		TOTAL	**100.0**	**110.0**	**1,705**

MRF

Plant#\row	1	2	3	4	5
1	OK	CO	RO	AS	BW
2	CO	SY	BB	BB	AS
3	SW	RO	BU	MF	BB
4	BB	BB	RO	RO	BB
5	SY	EB	RO	AW	OK
6	EB	RO	OK	BE	RO
7	BB	BB	RO	BE	RO
8	CB	BB	BU	AW	OK
9	AW	SY	BB	MF	BB
10	SY	OK	BB	AS	SY

Riparian Scrub Shrub (Elderberry)
Total area: 20.0

Common name	Code	Scientific name	Species comp. (%)	Density (plant/acre)	Estimated Number
Arroyo willow	AW	*Salix lasiolepis* Benth.	5.4	10.9	217
Buttonbush	BU	*Cephalanthus occidentalis*	5.5	11.1	222
California blackberry	BB	*Rubus ursinus* Chain. & Schldl.	7.8	15.8	316
Coyote brush	CB	*Baccharis pilularis* DC.	13.0	26.2	524
Elderberry	EB	*Sambucus mexicana*	36.5	73.8	1,475
Mule fat	MF	*Baccharis salicifolia*	8.9	17.9	358
Sandbar (narrow-leaf) willow	SW	*Salix exigua* Nutt.	3.4	6.9	137
Wild rose	RO	*Rosa californica* Cham. & Schldl.	19.6	39.6	791
		TOTAL	**100.0**	**202.2**	**4,040**

RSE

Plant#\row	1	2	3	4	5
1	EB	EB	RO	EB	EB
2	EB	EB	SW	EB	EB
3	CB	CB	MF	BB	BB
4	BB	EB	EB	EB	BB
5	EB	EB	BU	EB	EB
6	EB	AW	EB	BB	AW
7	RO	RO	EB	EB	MF
8	RO	CB	EB	RO	RO
9	EB	EB	BB	EB	EB
10	EB	EB	RO	EB	EB

RSE Buffer

Plant#\row	1	2	3	4	5
1	BU	CB	RO	CB	AW
2	BU	CB	SW	CB	MF
3	CB	CB	MF	RO	RO
4	CB	RO	MF	CB	RO
5	MF	MF	BU	MF	MF
6	CB	AW	RO	RO	AW
7	RO	RO	RO	AW	MF
8	RO	CB	CB	RO	RO
9	BU	SW	MF	BU	CB
10	RO	SW	RO	BU	CB

Riparian Scrub Shrub (Blackberry)
Total area: 15.9

Common name	Code	Scientific name	Species comp. (%)	Density (plant/acre)	Estimated Number
Arroyo willow	AW	*Salix lasiolepis* Benth.	14.0	33.9	539
Buttonbush	BU	*Cephalanthus occidentalis*	12.0	29.0	462
California blackberry	BB	*Rubus ursinus* Chain. & Schldl.	24.0	58.1	923
Coyote bush	CB	*Baccharis pilularis* DC.	4.0	9.7	154
Elderberry	EB	*Sambucus mexicana*	14.0	33.9	539
Mule fat	MF	*Baccharis salicifolia*	4.0	9.7	154
Sandbar (narrow-leaf) willow	SW	*Salix exigua* Nutt.	4.0	9.7	154
Wild rose	RO	*Rosa californica* Cham. & Schldl.	24.0	58.1	923
		TOTAL	**100.0**	**242.0**	**3,847**

RSB

Plant#\row	1	2	3	4	5
1	BB	BB	RO	RO	RO
2	BB	BB	RO	RO	RO
3	BB	BB	CB	RO	RO
4	RO	BU	CB	EB	EB
5	RO	BU	AW	AW	BU
6	BU	AW	AW	AW	BU
7	BB	MF	SW	BB	BB
8	BB	BU	MF	BB	BB
9	AW	RO	EB	EB	AW
10	EB	RO	EB	SW	EB

Riparian Scrub Shrub (Blackberry) Closed
Total area: 2.0

Common name	Code	Scientific name	Species comp. (%)	Density (plant/acre)	Estimated Number
California blackberry	BB	*Rubus ursinus* Chain. & Schldl.	50.0	871.2	1,742
Wild rose	RO	*Rosa californica* Cham. & Schldl.	50.0	871.2	1,742
		TOTAL	**100.0**	**1,742.4**	**3,484**

RSB Closed

Plant#\row	1	2	3	4	5
1	BB	RO	BB	RO	BB
2	RO	BB	RO	BB	RO
3	BB	RO	BB	RO	BB
4	RO	BB	RO	BB	RO
5	BB	RO	BB	RO	BB
6	RO	BB	RO	BB	RO
7	BB	RO	BB	RO	BB
8	RO	BB	RO	BB	RO
9	BB	RO	BB	RO	BB
10	RO	BB	RO	BB	RO

Appendix III
1999 U.S. Fish and Wildlife Service Elderberry Conservation Guidelines

Attachment G

United States Department of the Interior

Fish and Wildlife Service

Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825

Conservation Guidelines for the Valley Elderberry Longhorn Beetle

Revised July 9, 1999

The following guidelines have been issued by the U.S. Fish and Wildlife Service (Service) to assist Federal agencies and non-federal project applicants needing incidental take authorization through a section 7 consultation or a section 10(a)(1)(B) permit in developing measures to avoid and minimize adverse effects on the valley elderberry longhorn beetle. The Service will revise these guidelines as needed in the future. The most recently issued version of these guidelines should be used in developing all projects and habitat restoration plans. The survey and monitoring procedures described below are designed to avoid any adverse effects to the valley elderberry longhorn beetle. Thus a recovery permit is not needed to survey for the beetle or its habitat or to monitor conservation areas. If you are interested in a recovery permit for research purposes please call the Service's Regional Office at (503) 231-2063.

Background Information

The valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), was listed as a threatened species on August 8, 1980 (Federal Register 45: 52803-52807). This animal is fully protected under the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.). The valley elderberry longhorn beetle (beetle) is completely dependent on its host plant, elderberry (Sambucus species), which is a common component of the remaining riparian forests and adjacent upland habitats of California's Central Valley. Use of the elderberry by the beetle, a wood borer, is rarely apparent. Frequently, the only exterior evidence of the elderberry's use by the beetle is an exit hole created by the larva just prior to the pupal stage. The life cycle takes one or two years to complete. The animal spends most of its life in the larval stage, living within the stems of an elderberry plant. Adult emergence is from late March through June, about the same time the elderberry produces flowers. The adult stage is short-lived. Further information on the life history, ecology, behavior, and distribution of the beetle can be found in a report by Barr (1991) and the recovery plan for the beetle (USFWS 1984).

Surveys

Proposed project sites within the range of the valley elderberry longhorn beetle should be surveyed for the presence of the beetle and its elderberry host plant by a qualified biologist. The beetle's range extends throughout California's Central Valley and associated foothills from about the 3,000-foot elevation contour on the east and the watershed of the Central Valley on the west (Figure 1). All or portions of 31 counties are included: Alameda, Amador, Butte, Calaveras, Colusa, Contra Costa, El Dorado, Fresno, Glenn, Kern, Kings, Lake, Madera, Mariposa, Merced, Napa, Nevada, Placer, Sacramento, San Benito, San Joaquin, San Luis Obispo, Shasta, Solano, Stanislaus, Sutter, Tehama, Tulare, Tuolumne, Yolo, Yuba.

If elderberry plants with one or more stems measuring 1.0 inch or greater in diameter at ground level occur on or adjacent to the proposed project site, or are otherwise located where they may be directly or indirectly affected by the proposed action, minimization measures which include planting replacement habitat (conservation planting) are required (Table 1).

All elderberry shrubs with one or more stems measuring 1.0 inch or greater in diameter at ground level that occur on or adjacent to a proposed project site must be thoroughly searched

for beetle exit holes (external evidence of beetle presence). In addition, all elderberry stems one inch or greater in diameter at ground level must be tallied by diameter size class (Table 1). As outlined in Table 1, the numbers of elderberry seedlings/cuttings and associated riparian native trees/shrubs to be planted as replacement habitat are determined by stem size class of affected elderberry shrubs, presence or absence of exit holes, and whether a proposed project lies in a riparian or non-riparian area.

Elderberry plants with no stems measuring 1.0 inch or greater in diameter at ground level are unlikely to be habitat for the beetle because of their small size and/or immaturity. Therefore, no minimization measures are required for removal of elderberry plants with no stems measuring 1.0 inch or greater in diameter at ground level with no exit holes. Surveys are valid for a period of two years.

Avoid and Protect Habitat Whenever Possible

Project sites that do not contain beetle habitat are preferred. If suitable habitat for the beetle occurs on the project site, or within close proximity where beetles will be affected by the project, these areas must be designated as avoidance areas and must be protected from disturbance during the construction and operation of the project. When possible, projects should be designed such that avoidance areas are connected with adjacent habitat to prevent fragmentation and isolation of beetle populations. Any beetle habitat that cannot be avoided as described below should be considered impacted and appropriate minimization measures should be proposed as described below.

Avoidance: Establishment and Maintenance of a Buffer Zone

Complete avoidance (i.e., no adverse effects) may be assumed when a 100-foot (or wider) buffer is established and maintained around elderberry plants containing stems measuring 1.0 inch or greater in diameter at ground level. Firebreaks may not be included in the buffer zone. In buffer areas construction-related disturbance should be minimized, and any damaged area should be promptly restored following construction. The Service must be consulted before any disturbances within the buffer area are considered. In addition, the Service must be provided with a map identifying the avoidance area and written details describing avoidance measures.

Protective Measures

1. Fence and flag all areas to be avoided during construction activities. In areas where encroachment on the 100-foot buffer has been approved by the Service, provide a minimum setback of at least 20 feet from the dripline of each elderberry plant.

2. Brief contractors on the need to avoid damaging the elderberry plants and the possible penalties for not complying with these requirements.

3. Erect signs every 50 feet along the edge of the avoidance area with the following information: "This area is habitat of the valley elderberry longhorn beetle, a threatened species, and must not be disturbed. This species is protected by the Endangered Species Act of 1973, as amended. Violators are subject to prosecution, fines, and imprisonment." The signs should be clearly readable from a distance of 20 feet, and must be maintained for the duration of construction.

4. Instruct work crews about the status of the beetle and the need to protect its elderberry host plant.

Restoration and Maintenance

Restore any damage done to the buffer area (area within 100 feet of elderberry

plants) during construction. Provide erosion control and re-vegetate with appropriate native plants.

Buffer areas must continue to be protected after construction from adverse effects of the project. Measures such as fencing, signs, weeding, and trash removal are usually appropriate.

No insecticides, herbicides, fertilizers, or other chemicals that might harm the beetle or its host plant should be used in the buffer areas, or within 100 feet of any elderberry plant with one or more stems measuring 1.0 inch or greater in diameter at ground level.

The applicant must provide a written description of how the buffer areas are to be restored, protected, and maintained after construction is completed.

Mowing of grasses/ground cover may occur from July through April to reduce fire hazard. No mowing should occur within five (5) feet of elderberry plant stems. Mowing must be done in a manner that avoids damaging plants (e.g., stripping away bark through careless use of mowing/trimming equipment).

Transplant Elderberry Plants That Cannot Be Avoided

Elderberry plants must be transplanted if they can not be avoided by the proposed project. All elderberry plants with one or more stems measuring 1.0 inch or greater in diameter at ground level must be transplanted to a conservation area (see below). At the Service's discretion, a plant that is unlikely to survive transplantation because of poor condition or location, or a plant that would be extremely difficult to move because of access problems, may be exempted from transplantation. In cases where transplantation is not possible the minimization ratios in Table 1 may be increased to offset the additional habitat loss.

Trimming of elderberry plants (e.g., pruning along roadways, bike paths, or trails) with one or more stems 1.0 inch or greater in diameter at ground level, may result in take of beetles. Therefore, trimming is subject to appropriate minimization measures as outlined in Table 1.

1. Monitor. A qualified biologist (monitor) must be on-site for the duration of the transplanting of the elderberry plants to insure that no unauthorized take of the valley elderberry longhorn beetle occurs. If unauthorized take occurs, the monitor must have the authority to stop work until corrective measures have been completed. The monitor must immediately report any unauthorized take of the beetle or its habitat to the Service and to the California Department of Fish and Game.

2. Timing. Transplant elderberry plants when the plants are dormant, approximately November through the first two weeks in February, after they have lost their leaves. Transplanting during the non-growing season will reduce shock to the plant and increase transplantation success.

3. Transplanting Procedure.

a. Cut the plant back 3 to 6 feet from the ground or to 50 percent of its height (whichever is taller) by removing branches and stems above this height. The trunk and all stems measuring 1.0 inch or greater in diameter at ground level should be replanted. Any leaves remaining on the plant should be removed.

b. Excavate a hole of adequate size to receive the transplant.

c. Excavate the plant using a Vemeer spade, backhoe, front end

loader, or other suitable equipment, taking as much of the root ball as possible, and replant immediately at the conservation area. Move the plant only by the root ball. If the plant is to be moved and transplanted off site, secure the root ball with wire and wrap it with burlap. Dampen the burlap with water, as necessary, to keep the root ball wet. Do not let the roots dry out. Care should be taken to ensure that the soil is not dislodged from around the roots of the transplant. If the site receiving the transplant does not have adequate soil moisture, pre-wet the soil a day or two before transplantation.

d. The planting area must be at least 1,800 square feet for each elderberry transplant. The root ball should be planted so that its top is level with the existing ground. Compact the soil sufficiently so that settlement does not occur. As many as five (5) additional elderberry plantings (cuttings or seedlings) and up to five (5) associated native species plantings (see below) may also be planted within the 1,800 square foot area with the transplant. The transplant and each new planting should have its own watering basin measuring at least three (3) feet in diameter. Watering basins should have a continuous berm measuring approximately eight (8) inches wide at the base and six (6) inches high.

e. Saturate the soil with water. Do not use fertilizers or other supplements or paint the tips of stems with pruning substances, as the effects of these compounds on the beetle are unknown.

f. Monitor to ascertain if additional watering is necessary. If the soil is sandy and well-drained, plants may need to be watered weekly or twice monthly. If the soil is clayey and poorly-drained, it may not be necessary to water after the initial saturation. However, most transplants require watering through the first summer. A drip watering system and timer is ideal. However, in situations where this is not possible, a water truck or other apparatus may be used.

Plant Additional Seedlings or Cuttings

Each elderberry stem measuring 1.0 inch or greater in diameter at ground level that is adversely affected (i.e., transplanted or destroyed) must be replaced, in the conservation area, with elderberry seedlings or cuttings at a ratio ranging from 1:1 to 8:1 (new plantings to affected stems). Minimization ratios are listed and explained in Table 1. Stock of either seedlings or cuttings should be obtained from local sources. Cuttings may be obtained from the plants to be transplanted if the project site is in the vicinity of the conservation area. If the Service determines that the elderberry plants on the proposed project site are unsuitable candidates for transplanting, the Service may allow the applicant to plant seedlings or cuttings at higher than the stated ratios in Table 1 for each elderberry plant that cannot be transplanted.

Plant Associated Native Species

Studies have found that the beetle is more abundant in dense native plant communities with a mature overstory and a mixed understory. Therefore, a mix of native plants associated with the elderberry plants at the project site or similar sites will be planted at ratios ranging from 1:1 to 2:1 [native tree/plant species to each elderberry seedling or cutting (see Table 1)]. These native plantings must be monitored with the same survival criteria used for the elderberry seedlings (see below). Stock of saplings, cuttings, and seedlings should be obtained from local sources. If the parent stock is obtained from a distance greater than one mile from the conservation area, approval by the Service of the native plant donor sites must be obtained prior to initiation of the revegetation work. Planting or seeding the conservation area with native herbaceous species is encouraged. Establishing native grasses and forbs may discourage unwanted non-native species from becoming established or persisting at the conservation area. Only stock from local sources

should be used.

Examples

Example 1

The project will adversely affect beetle habitat on a vacant lot on the land side of a river levee. This levee now separates beetle habitat on the vacant lot from extant Great Valley Mixed Riparian Forest (Holland 1986) adjacent to the river. However, it is clear that the beetle habitat located on the vacant lot was part of a more extensive mixed riparian forest ecosystem extending farther from the river's edge prior to agricultural development and levee construction. Therefore, the beetle habitat on site is considered riparian. A total of two elderberry plants with at least one stem measuring 1.0 inch or greater in diameter at ground level will be affected by the proposed action. The two plants have a total of 15 stems measuring over 1.0 inch. No exit holes were found on either plant. Ten of the stems are between 1.0 and 3.0 inches in diameter and five of the stems are greater than 5.0 inches in diameter. The conservation area is suited for riparian forest habitat. Associated natives adjacent to the conservation area are box elder (Acer negundo californica), walnut (Juglans californica var. hindsii), sycamore (Platanus racemosa), cottonwood (Populus fremontii), willow (Salix gooddingii and S. laevigata), white alder (Alnus rhombifolia), ash (Fraxinus latifolia), button willow (Cephalanthus occidentalis), and wild grape (Vitis californica).

Minimization (based on ratios in Table 1):

- Transplant the two elderberry plants that will be affected to the conservation area.

- Plant 40 elderberry rooted cuttings (10 affected stems compensated at 2:1 ratio and 5 affected stems compensated at 4:1 ratio, cuttings planted:stems affected)

- Plant 40 associated native species (ratio of associated natives to elderberry plantings is 1:1 in areas with no exit holes):

    5 saplings each of box elder, sycamore, and cottonwood

    5 willow seedlings

    5 white alder seedlings

    5 saplings each of walnut and ash

    3 California button willow

    2 wild grape vines

    Total: 40 associated native species

- Total area required is a minimum of 1,800 sq. ft. for one to five elderberry seedlings and up to 5 associated natives. Since, a total of 80 plants must be planted (40 elderberries and 40 associated natives), a total of 0.33 acre (14,400 square feet) will be required for conservation plantings. The conservation area will be seeded and planted with native grasses and forbs, and closely monitored and maintained throughout the monitoring period.

Example 2

The project will adversely affect beetle habitat in Blue Oak Woodland (Holland 1986). One elderberry plant with at least one stem measuring 1.0 inch or greater in diameter at ground level will be affected by the proposed action. The plant has a total of 10 stems measuring over 1.0 inch. Exit holes were found on the plant. Five of the stems are between 1.0 and 3.0 inches in diameter and five of the stems are between 3.0 and 5.0 inches in diameter. The conservation area is suited for elderberry savanna (non-riparian habitat). Associated natives adjacent to the conservation area are willow (Salix species), blue oak (Quercus douglasii), interior live oak (Q. wislizenii), sycamore, poison oak (Toxicodendron diversilobum), and wild grape.

Minimization (based on ratios in Table 1):

• Transplant the one elderberry plant that will be affected to the conservation area.

• Plant 30 elderberry seedlings (5 affected stems compensated at 2:1 ratio and 5 affected stems compensated at 4:1 ratio, cuttings planted:stems affected)

• Plant 60 associated native species (ratio of associated natives to elderberry plantings is 2:1 in areas with exit holes):

20 saplings of blue oak, 20 saplings of sycamore, and 20 saplings of willow, and seed and plant with a mixture of native grasses and forbs

• Total area required is a minimum of 1,800 sq. ft. for one to five elderberry seedlings and up to 5 associated natives. Since, a total of 90 plants must be planted (30 elderberries and 60 associated natives), a total of 0.37 acre (16,200 square feet) will be required for conservation plantings. The conservation area will be seeded and planted with native grasses and forbs, and closely monitored and maintained throughout the monitoring period.

Conservation Area—Provide Habitat for the Beetle in Perpetuity

The conservation area is distinct from the avoidance area (though the two may adjoin), and serves to receive and protect the transplanted elderberry plants and the elderberry and other native plantings. The Service may accept proposals for off-site conservation areas where appropriate.

1. Size. The conservation area must provide at least 1,800 square feet for each transplanted elderberry plant. As many as 10 conservation plantings (i.e., elderberry cuttings or seedlings and/or associated native plants) may be planted within the 1800 square foot area with each transplanted elderberry. An additional 1,800 square feet shall be provided for every additional 10 conservation plants. Each planting should have its own watering basin measuring approximately three feet in diameter. Watering basins should be constructed with a continuous berm measuring approximately eight inches wide at the base and six inches high.

The planting density specified above is primarily for riparian forest habitats or other habitats with naturally dense cover. If the conservation area is an open habitat (i.e., elderberry savanna, oak woodland) more area may be needed for the required plantings. Contact the Service for assistance if the above planting recommendations are not appropriate for the proposed conservation area.

No area to be maintained as a firebreak may be counted as conservation area. Like the avoidance area, the conservation area should connect with adjacent habitat wherever possible, to prevent isolation of beetle populations.

Depending on adjacent land use, a buffer area may also be needed between the

conservation area and the adjacent lands. For example, herbicides and pesticides are often used on orchards or vineyards. These chemicals may drift or runoff onto the conservation area if an adequate buffer area is not provided.

2. Long-Term Protection. The conservation area must be protected in perpetuity as habitat for the valley elderberry longhorn beetle. A conservation easement or deed restrictions to protect the conservation area must be arranged. Conservation areas may be transferred to a resource agency or appropriate private organization for long-term management. The Service must be provided with a map and written details identifying the conservation area; and the applicant must receive approval from the Service that the conservation area is acceptable prior to initiating the conservation program. A true, recorded copy of the deed transfer, conservation easement, or deed restrictions protecting the conservation area in perpetuity must be provided to the Service before project implementation.

Adequate funds must be provided to ensure that the conservation area is managed in perpetuity. The applicant must dedicate an endowment fund for this purpose, and designate the party or entity that will be responsible for long-term management of the conservation area. The Service must be provided with written documentation that funding and management of the conservation area (items 3-8 above) will be provided in perpetuity.

3. Weed Control. Weeds and other plants that are not native to the conservation area must be removed at least once a year, or at the discretion of the Service and the California Department of Fish and Game. Mechanical means should be used; herbicides are prohibited unless approved by the Service.

4. Pesticide and Toxicant Control. Measures must be taken to insure that no pesticides, herbicides, fertilizers, or other chemical agents enter the conservation area. No spraying of these agents must be done within one 100 feet of the area, or if they have the potential to drift, flow, or be washed into the area in the opinion of biologists or law enforcement personnel from the Service or the California Department of Fish and Game.

5. Litter Control. No dumping of trash or other material may occur within the conservation area. Any trash or other foreign material found deposited within the conservation area must be removed within 10 working days of discovery.

6. Fencing. Permanent fencing must be placed completely around the conservation area to prevent unauthorized entry by off-road vehicles, equestrians, and other parties that might damage or destroy the habitat of the beetle, unless approved by the Service. The applicant must receive written approval from the Service that the fencing is acceptable prior to initiation of the conservation program. The fence must be maintained in perpetuity, and must be repaired/replaced within 10 working days if it is found to be damaged. Some conservation areas may be made available to the public for appropriate recreational and educational opportunities with written approval from the Service. In these cases appropriate fencing and signs informing the public of the beetle's threatened status and its natural history and ecology should be used and maintained in perpetuity.

7. Signs. A minimum of two prominent signs must be placed and maintained in perpetuity at the conservation area, unless otherwise approved by the Service. The signs should note that the site is habitat of the federally threatened valley elderberry longhorn beetle and, if appropriate, include information on the beetle's natural history and ecology. The signs must be approved by the Service. The signs must be repaired or replaced within 10 working days if they are found to be damaged or destroyed.

Monitoring

The population of valley elderberry longhorn beetles, the general condition of the conservation area, and the condition of the elderberry and associated native plantings in the conservation area must be monitored over a period of either ten (10) consecutive years or for seven (7) years over a 15-year period. The applicant may elect either 10 years of monitoring, with surveys and reports every year; or 15 years of monitoring, with surveys and reports on years 1, 2, 3, 5, 7, 10, and 15. The conservation plan provided by the applicant must state which monitoring schedule will be followed. No change in monitoring schedule will be accepted after the project is initiated. If conservation planting is done in stages (i.e., not all planting is implemented in the same time period), each stage of conservation planting will have a different start date for the required monitoring time.

Surveys. In any survey year, a minimum of two site visits between February 14 and June 30 of each year must be made by a qualified biologist. Surveys must include:

1. A population census of the adult beetles, including the number of beetles observed, their condition, behavior, and their precise locations. Visual counts must be used; mark-recapture or other methods involving handling or harassment must not be used.

2. A census of beetle exit holes in elderberry stems, noting their precise locations and estimated ages.

3. An evaluation of the elderberry plants and associated native plants on the site, and on the conservation area, if disjunct, including the number of plants, their size and condition.

4. An evaluation of the adequacy of the fencing, signs, and weed control efforts in the avoidance and conservation areas.

5. A general assessment of the habitat, including any real or potential threats to the beetle and its host plants, such as erosion, fire, excessive grazing, off-road vehicle use, vandalism, excessive weed growth, etc.

The materials and methods to be used in the monitoring studies must be reviewed and approved by the Service. All appropriate Federal permits must be obtained prior to initiating the field studies.

Reports. A written report, presenting and analyzing the data from the project monitoring, must be prepared by a qualified biologist in each of the years in which a monitoring survey is required. Copies of the report must be submitted by December 31 of the same year to the Service (Chief of Endangered Species, Sacramento Fish and Wildlife Office), and the Department of Fish and Game (Supervisor, Environmental Services, Department of Fish and Game, 1416 Ninth Street, Sacramento, California 95814; and Staff Zoologist, California Natural Diversity Data Base, Department of Fish and Game, 1220 S Street, Sacramento, California 95814). The report must explicitly address the status and progress of the transplanted and planted elderberry and associated native plants and trees, as well as any failings of the conservation plan and the steps taken to correct them. Any observations of beetles or fresh exit holes must be noted. Copies of original field notes, raw data, and photographs of the conservation area must be included with the report. A vicinity map of the site and maps showing where the individual adult beetles and exit holes were observed must be included. For the elderberry and associated native plants, the survival rate, condition, and size of the plants must be analyzed. Real and likely future threats must be addressed along with suggested remedies and preventative measures (e.g. limiting public access, more frequent removal of invasive non-native vegetation, etc.).

A copy of each monitoring report, along with the original field notes, photographs, correspondence, and all other pertinent material, should be deposited at the California Academy of Sciences (Librarian, California Academy of Sciences, Golden Gate Park, San Francisco, CA 94118) by December 31 of the year that monitoring is done and the report is prepared. The Service's Sacramento Fish and Wildlife Office should be provided with a copy of the receipt from

the Academy library acknowledging receipt of the material, or the library catalog number assigned to it.

Access. Biologists and law enforcement personnel from the California Department of Fish and Game and the Service must be given complete access to the project site to monitor transplanting activities. Personnel from both these agencies must be given complete access to the project and the conservation area to monitor the beetle and its habitat in perpetuity.

Success Criteria

A minimum survival rate of at least 60 percent of the elderberry plants and 60 percent of the associated native plants must be maintained throughout the monitoring period. Within one year of discovery that survival has dropped below 60 percent, the applicant must replace failed plantings to bring survival above this level. The Service will make any determination as to the applicant's replacement responsibilities arising from circumstances beyond its control, such as plants damaged or killed as a result of severe flooding or vandalism.

Service Contact

These guidelines were prepared by the Endangered Species Division of the Service's Sacramento Fish and Wildlife Office. If you have questions regarding these guidelines or to request a copy of the most recent guidelines, telephone (916) 414-6600, or write to:

U.S. Fish and Wildlife Service
Ecological Services
2800 Cottage Way, W-2605
Sacramento, CA 95825

Literature Cited

Barr, C. B. 1991. The distribution, habitat, and status of the valley elderberry longhorn beetle *Desmocerus californicus dimorphus*. U.S. Fish and Wildlife Service; Sacramento, California.

Holland, R.F. 1986. Preliminary descriptions of the terrestrial natural communities of California. Unpublished Report. State of California, The Resources Agency, Department of Fish and Game, Natural Heritage Division, Sacramento, California.

USFWS. 1980. Listing the valley elderberry longhorn beetle as a threatened species with critical habitat. Federal Register 45:52803-52807.

USFWS. 1984. Recovery plan for the valley elderberry longhorn beetle. U.S. Fish and Wildlife Service, Endangered Species Program; Portland, Oregon.

Table 1: Minimization ratios based on location (riparian vs. non-riparian), stem diameter of affected elderberry plants at ground level, and presence or absence of exit holes.

Location	Stems (maximum diameter at ground level)	Exit Holes on Shrub Y/N (quantify) [1]	Elderberry Seedling Ratio[2]	Associated Native Plant Ratio[3]
non-riparian	stems >=1" & =<3"	No:	1:1	1:1
		Yes:	2:1	2:1

non-riparian	stems >3" & <5"	No:	2:1	1:1
		Yes:	4:1	2:1
non-riparian	stems >=5"	No:	3:1	1:1
		Yes:	6:1	2:1
riparian	stems >=1" & <=3"	No:	2:1	1:1
		Yes:	4:1	2:1
riparian	stems > 3" & < 5"	No:	3:1	1:1
		Yes:	6:1	2:1
riparian	stems >=5"	No:	4:1	1:1
		Yes:	8:1	2:1

[1] All stems measuring one inch or greater in diameter at ground level on a single shrub are considered occupied when exit holes are present anywhere on the shrub.

[2] Ratios in the Elderberry Seedling Ratio column correspond to the number of cuttings or seedlings to be planted per elderberry stem (one inch or greater in diameter at ground level) affected by a project.

[3] Ratios in the Associated Native Plant Ratio column correspond to the number of associated native species to be planted per elderberry (seedling or cutting) planted.

Click for range map

Endangered Species Div., Sacramento Fish & Wildlife Office, U.S. Fish & Wildlife Service

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825-1846

In reply refer to:
81420-2009-F-0372-1

FEB 6 2009

Frank Piccola
Chief, Planning Division
U.S. Army Corps of Engineers
1325 J Street, Room 1480
Sacramento, California 95814

Subject: Review of the Feather River Levee Setback and Habitat Enhancement Project at Star Bend, Sutter County, California, for Inclusion with the *Programmatic Formal Consultation Permitting Projects with Relatively Small Effects on the Valley Elderberry Longhorn Beetle Within the Jurisdiction of the Sacramento Field Office* (Corps File No. 199600065, Service File No. 1-1-96-F-66)

Dear Mr. Piccola:

This letter is in response to your January 29, 2009, letter requesting to initiate formal consultation for the Feather River Levee Setback and Habitat Enhancement Project at Star Bend, Sutter County, California (project). The U.S. Fish and Wildlife Service (Service) received your request on January 29, 2009. At issue are the effects of the project on the federally-listed as threatened valley elderberry longhorn beetle (*Desmocerus californicus dimorphus)* (beetle). The project is not located in proposed or designated critical habitat for any federally-listed species; therefore, no critical habitat would be affected. This response is in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*).

The Service has determined that it is appropriate to append the proposed project to the September 19, 1996, *Programmatic Formal Consultation Permitting Projects with Relatively Small Effects on the Valley Elderberry Longhorn Beetle Within the Jurisdiction of the Sacramento Field Office* (1-1-96-F-66) (Programmatic Consultation).

This consultation is based on the following: (1) Stillwater Sciences July 2008, draft Biological Assessment; (2) the Corps' January 29, 2009, letter requesting initiation of section 7 consultation; (3) email and phone conversations between Jennifer Hobbs of the Service and John Suazo of the Corps; and (4) other information available to the Service.

BIOLOGICAL OPINION

Project Description

The project would construct a setback levee on the west bank of the Feather River at Star Bend to replace portions of the existing levee that currently exhibit seepage and underseepage problems, constrict the channel, and present an unacceptably high risk for levee failure. Construction of the setback levee would reduce channel constriction at Star Bend, which would substantially reduce the risk of failure of the levee at Star Bend. The proposed setback levee would be consistent with local and state flood control objectives, including reducing the risk of flooding in Sutter and Yuba counties.

Native riparian and floodplain habitat would be restored within the O'Connor Lakes unit of the California Department of Fish and Game's (CDFG) Feather River Wildlife Area and the setback levee would connect O'Connor Lakes unit with the Abbott Lake unit. Borrow/spoil sites within O'Connor Lakes unit will be filled and revegetated. As part of the project about 50 acres of new floodplain will be created and Levee District (LD) 1 will revegetate 20 acres for habitat enhancement. The remaining acreage will be hydroseeded with native herbaceous plant species. Borrow/spoil sites at the O'Connor Lakes unit will be hydroseeded with native herbaceous plant species.

Nine elderberry shrubs (*Sambucus* sp.) would be transplanted due to construction of the setback levee. These shrubs would be transplanted to the area within the new setback that will be revegetated with riparian species including elderberry shrubs. Elderberries present within the O'Connor Lakes unit will be avoided by at least a 20 foot buffer. Work around all but 3 elderberry shrubs shall not occur within 100 feet during the beetles' flight season (March 15 to June 15). Additional elderberry and riparian plantings will be done within the restoration area to compensate for working up to 20 feet from elderberry shrubs located along the proposed haul route between March 15 and June 15. These shrubs will be fenced, a speed limit of 5 miles per hour will be enforced when vehicles are within 100 feet of the three shrubs during the flight season, and dust suppression measures as described in the environmental assessment.

On September 9, 2005, the Service signed a biological opinion (1-1-05-F-0016) on the Memorandum of Understanding between the Service, CDFG, and California Department of Parks and Recreation. The project description allows for the restoration of 228 acres of the O'Connor Lakes unit to include 1,366 elderberry seedlings. Because LD 1 and the California Department of Water Resources (DWR) need to maintain flood capacity within this section of the Feather River, an agreement was made which allows either entity to transplant any elderberries which are an impediment to flood control and/or maintenance activities. Elderberry shrubs numbers 8 and 9 are located within the O'Connor Lakes unit in an area that may be used as borrow for the flood control project. Therefore, if elderberry shrubs numbers 8 and 9 need to be transplanted as part of this project, any incidental take associated with the transplantation of these shrubs was covered in the September 9, 2005, biological opinion.

Proposed Conservation Measures for the Valley Elderberry Longhorn Beetle

The Corps has proposed to compensate for effects to 9 elderberry shrubs by creating 20 acres of valley elderberry longhorn beetle habitat within the new setback area. Table 1 shows the stems that would be affected by transplantation. The project will include planting an additional 5 acres of valley elderberry longhorn beetle habitat to compensate for working during the flight season of three shrubs within the O'Connor Lakes unit. This project will increase the extent, connectivity, and quality of riparian habitat along the Feather River. Upon completion of construction DWR will annex the land to CDFG to become part of their Feather River Wildlife Area and ensure that maintenance and monitoring of the valley elderberry longhorn beetle compensation site is completed.

Table 1: Description of elderberry shrub indirectly affected and proposed compensation.

Stem size	Number of Stems	Exit hole	Seedling ratio	Number of replacement elderberries	Assoc. native ratios	Number of assoc. seedlings	Required acreage
1"-3"	201	Yes	4:1	804	2:1	1608	
3" -5"	50	Yes	6:1	300	2:1	600	
> 5"	1	No	4:1	4	1:1	4	
> 5"	12	Yes	8:1	96	2:1	192	
Total	**264**			**1204**		**2404**	**14.9**

This concludes the Service's review of the Feather River Levee Setback and Habitat Enhancement Project at Star Bend. As provided in 50 CFR 402.16, re-initiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operation causing such take must cease pending reinitiation.

If you have any questions regarding this biological opinion for Feather River Levee Setback and Habitat Enhancement Project at Star Bend, please contact Jennifer Hobbs, of my staff at (916) 414-6645.

Sincerely,

Peter A. Gross

for Kenneth D. Sanchez
Assistant Field Supervisor

cc:
John Suazo, Corps of Engineers, Sacramento, California
Zooey Diggory, Stillwater Sciences, Santa Cruz, California

United States Department of the Interior

Fish and Wildlife Service

Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825

Conservation Guidelines for the Valley Elderberry Longhorn Beetle

Revised July 9, 1999

The following guidelines have been issued by the U.S. Fish and Wildlife Service (Service) to assist Federal agencies and non-federal project applicants needing incidental take authorization through a section 7 consultation or a section 10(a)(1)(B) permit in developing measures to avoid and minimize adverse effects on the valley elderberry longhorn beetle. The Service will revise these guidelines as needed in the future. The most recently issued version of these guidelines should be used in developing all projects and habitat restoration plans. The survey and monitoring procedures described below are designed to avoid any adverse effects to the valley elderberry longhorn beetle. Thus a recovery permit is not needed to survey for the beetle or its habitat or to monitor conservation areas. If you are interested in a recovery permit for research purposes please call the Service's Regional Office at (503) 231-2063.

Background Information

The valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), was listed as a threatened species on August 8, 1980 (Federal Register 45: 52803-52807). This animal is fully protected under the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.). The valley elderberry longhorn beetle (beetle) is completely dependent on its host plant, elderberry (Sambucus species), which is a common component of the remaining riparian forests and adjacent upland habitats of California's Central Valley. Use of the elderberry by the beetle, a wood borer, is rarely apparent. Frequently, the only exterior evidence of the elderberry's use by the beetle is an exit hole created by the larva just prior to the pupal stage. The life cycle takes one or two years to complete. The animal spends most of its life in the larval stage, living within the stems of an elderberry plant. Adult emergence is from late March through June, about the same time the elderberry produces flowers. The adult stage is short-lived. Further information on the life history, ecology, behavior, and distribution of the beetle can be found in a report by Barr (1991) and the recovery plan for the beetle (USFWS 1984).

Surveys

Proposed project sites within the range of the valley elderberry longhorn beetle should be surveyed for the presence of the beetle and its elderberry host plant by a qualified biologist. The beetle's range extends throughout California's Central Valley and associated foothills from about the 3,000-foot elevation contour on the east and the watershed of the Central Valley on the west (Figure 1). All or portions of 31 counties are included: Alameda, Amador, Butte, Calaveras, Colusa, Contra Costa, El Dorado, Fresno, Glenn, Kern, Kings, Lake, Madera, Mariposa, Merced, Napa, Nevada, Placer, Sacramento, San Benito, San Joaquin, San Luis Obispo, Shasta, Solano, Stanislaus, Sutter, Tehama, Tulare, Tuolumne, Yolo, Yuba.

If elderberry plants with one or more stems measuring 1.0 inch or greater in diameter at ground level occur on or adjacent to the proposed project site, or are otherwise located where they may be directly or indirectly affected by the proposed action, minimization measures which include planting replacement habitat (conservation planting) are required (Table 1).

All elderberry shrubs with one or more stems measuring 1.0 inch or greater in diameter at ground level that occur on or adjacent to a proposed project site must be thoroughly searched

for beetle exit holes (external evidence of beetle presence). In addition, all elderberry stems one inch or greater in diameter at ground level must be tallied by diameter size class (Table 1). As outlined in Table 1, the numbers of elderberry seedlings/cuttings and associated riparian native trees/shrubs to be planted as replacement habitat are determined by stem size class of affected elderberry shrubs, presence or absence of exit holes, and whether a proposed project lies in a riparian or non-riparian area.

Elderberry plants with no stems measuring 1.0 inch or greater in diameter at ground level are unlikely to be habitat for the beetle because of their small size and/or immaturity. Therefore, no minimization measures are required for removal of elderberry plants with no stems measuring 1.0 inch or greater in diameter at ground level with no exit holes. Surveys are valid for a period of two years.

Avoid and Protect Habitat Whenever Possible

Project sites that do not contain beetle habitat are preferred. If suitable habitat for the beetle occurs on the project site, or within close proximity where beetles will be affected by the project, these areas must be designated as avoidance areas and must be protected from disturbance during the construction and operation of the project. When possible, projects should be designed such that avoidance areas are connected with adjacent habitat to prevent fragmentation and isolation of beetle populations. Any beetle habitat that cannot be avoided as described below should be considered impacted and appropriate minimization measures should be proposed as described below.

Avoidance: Establishment and Maintenance of a Buffer Zone

Complete avoidance (i.e., no adverse effects) may be assumed when a 100-foot (or wider) buffer is established and maintained around elderberry plants containing stems measuring 1.0 inch or greater in diameter at ground level. Firebreaks may not be included in the buffer zone. In buffer areas construction-related disturbance should be minimized, and any damaged area should be promptly restored following construction. The Service must be consulted before any disturbances within the buffer area are considered. In addition, the Service must be provided with a map identifying the avoidance area and written details describing avoidance measures.

Protective Measures

1. Fence and flag all areas to be avoided during construction activities. In areas where encroachment on the 100-foot buffer has been approved by the Service, provide a minimum setback of at least 20 feet from the dripline of each elderberry plant.

2. Brief contractors on the need to avoid damaging the elderberry plants and the possible penalties for not complying with these requirements.

3. Erect signs every 50 feet along the edge of the avoidance area with the following information: "This area is habitat of the valley elderberry longhorn beetle, a threatened species, and must not be disturbed. This species is protected by the Endangered Species Act of 1973, as amended. Violators are subject to prosecution, fines, and imprisonment." The signs should be clearly readable from a distance of 20 feet, and must be maintained for the duration of construction.

4. Instruct work crews about the status of the beetle and the need to protect its elderberry host plant.

Restoration and Maintenance

Restore any damage done to the buffer area (area within 100 feet of elderberry

plants) during construction. Provide erosion control and re-vegetate with appropriate native plants.

Buffer areas must continue to be protected after construction from adverse effects of the project. Measures such as fencing, signs, weeding, and trash removal are usually appropriate.

No insecticides, herbicides, fertilizers, or other chemicals that might harm the beetle or its host plant should be used in the buffer areas, or within 100 feet of any elderberry plant with one or more stems measuring 1.0 inch or greater in diameter at ground level.

The applicant must provide a written description of how the buffer areas are to be restored, protected, and maintained after construction is completed.

Mowing of grasses/ground cover may occur from July through April to reduce fire hazard. No mowing should occur within five (5) feet of elderberry plant stems. Mowing must be done in a manner that avoids damaging plants (e.g., stripping away bark through careless use of mowing/trimming equipment).

Transplant Elderberry Plants That Cannot Be Avoided

Elderberry plants must be transplanted if they can not be avoided by the proposed project. All elderberry plants with one or more stems measuring 1.0 inch or greater in diameter at ground level must be transplanted to a conservation area (see below). At the Service's discretion, a plant that is unlikely to survive transplantation because of poor condition or location, or a plant that would be extremely difficult to move because of access problems, may be exempted from transplantation. In cases where transplantation is not possible the minimization ratios in Table 1 may be increased to offset the additional habitat loss.

Trimming of elderberry plants (e.g., pruning along roadways, bike paths, or trails) with one or more stems 1.0 inch or greater in diameter at ground level, may result in take of beetles. Therefore, trimming is subject to appropriate minimization measures as outlined in Table 1.

1. Monitor. A qualified biologist (monitor) must be on-site for the duration of the transplanting of the elderberry plants to insure that no unauthorized take of the valley elderberry longhorn beetle occurs. If unauthorized take occurs, the monitor must have the authority to stop work until corrective measures have been completed. The monitor must immediately report any unauthorized take of the beetle or its habitat to the Service and to the California Department of Fish and Game.

2. Timing. Transplant elderberry plants when the plants are dormant, approximately November through the first two weeks in February, after they have lost their leaves. Transplanting during the non-growing season will reduce shock to the plant and increase transplantation success.

3. Transplanting Procedure.

a. Cut the plant back 3 to 6 feet from the ground or to 50 percent of its height (whichever is taller) by removing branches and stems above this height. The trunk and all stems measuring 1.0 inch or greater in diameter at ground level should be replanted. Any leaves remaining on the plant should be removed.

b. Excavate a hole of adequate size to receive the transplant.

c. Excavate the plant using a Vemeer spade, backhoe, front end

loader, or other suitable equipment, taking as much of the root ball as possible, and replant immediately at the conservation area. Move the plant only by the root ball. If the plant is to be moved and transplanted off site, secure the root ball with wire and wrap it with burlap. Dampen the burlap with water, as necessary, to keep the root ball wet. Do not let the roots dry out. Care should be taken to ensure that the soil is not dislodged from around the roots of the transplant. If the site receiving the transplant does not have adequate soil moisture, pre-wet the soil a day or two before transplantation.

d. The planting area must be at least 1,800 square feet for each elderberry transplant. The root ball should be planted so that its top is level with the existing ground. Compact the soil sufficiently so that settlement does not occur. As many as five (5) additional elderberry plantings (cuttings or seedlings) and up to five (5) associated native species plantings (see below) may also be planted within the 1,800 square foot area with the transplant. The transplant and each new planting should have its own watering basin measuring at least three (3) feet in diameter. Watering basins should have a continuous berm measuring approximately eight (8) inches wide at the base and six (6) inches high.

e. Saturate the soil with water. Do not use fertilizers or other supplements or paint the tips of stems with pruning substances, as the effects of these compounds on the beetle are unknown.

f. Monitor to ascertain if additional watering is necessary. If the soil is sandy and well-drained, plants may need to be watered weekly or twice monthly. If the soil is clayey and poorly-drained, it may not be necessary to water after the initial saturation. However, most transplants require watering through the first summer. A drip watering system and timer is ideal. However, in situations where this is not possible, a water truck or other apparatus may be used.

Plant Additional Seedlings or Cuttings

Each elderberry stem measuring 1.0 inch or greater in diameter at ground level that is adversely affected (i.e., transplanted or destroyed) must be replaced, in the conservation area, with elderberry seedlings or cuttings at a ratio ranging from 1:1 to 8:1 (new plantings to affected stems). Minimization ratios are listed and explained in Table 1. Stock of either seedlings or cuttings should be obtained from local sources. Cuttings may be obtained from the plants to be transplanted if the project site is in the vicinity of the conservation area. If the Service determines that the elderberry plants on the proposed project site are unsuitable candidates for transplanting, the Service may allow the applicant to plant seedlings or cuttings at higher than the stated ratios in Table 1 for each elderberry plant that cannot be transplanted.

Plant Associated Native Species

Studies have found that the beetle is more abundant in dense native plant communities with a mature overstory and a mixed understory. Therefore, a mix of native plants associated with the elderberry plants at the project site or similar sites will be planted at ratios ranging from 1:1 to 2:1 [native tree/plant species to each elderberry seedling or cutting (see Table 1)]. These native plantings must be monitored with the same survival criteria used for the elderberry seedlings (see below). Stock of saplings, cuttings, and seedlings should be obtained from local sources. If the parent stock is obtained from a distance greater than one mile from the conservation area, approval by the Service of the native plant donor sites must be obtained prior to initiation of the revegetation work. Planting or seeding the conservation area with native herbaceous species is encouraged. Establishing native grasses and forbs may discourage unwanted non-native species from becoming established or persisting at the conservation area. Only stock from local sources

should be used.

Examples

Example 1

The project will adversely affect beetle habitat on a vacant lot on the land side of a river levee. This levee now separates beetle habitat on the vacant lot from extant Great Valley Mixed Riparian Forest (Holland 1986) adjacent to the river. However, it is clear that the beetle habitat located on the vacant lot was part of a more extensive mixed riparian forest ecosystem extending farther from the river's edge prior to agricultural development and levee construction. Therefore, the beetle habitat on site is considered riparian. A total of two elderberry plants with at least one stem measuring 1.0 inch or greater in diameter at ground level will be affected by the proposed action. The two plants have a total of 15 stems measuring over 1.0 inch. No exit holes were found on either plant. Ten of the stems are between 1.0 and 3.0 inches in diameter and five of the stems are greater than 5.0 inches in diameter. The conservation area is suited for riparian forest habitat. Associated natives adjacent to the conservation area are box elder (Acer negundo californica), walnut (Juglans californica var. hindsii), sycamore (Platanus racemosa), cottonwood (Populus fremontii), willow (Salix gooddingii and S. laevigata), white alder (Alnus rhombifolia), ash (Fraxinus latifolia), button willow (Cephalanthus occidentalis), and wild grape (Vitis californica).

Minimization (based on ratios in Table 1):

- Transplant the two elderberry plants that will be affected to the conservation area.

- Plant 40 elderberry rooted cuttings (10 affected stems compensated at 2:1 ratio and 5 affected stems compensated at 4:1 ratio, cuttings planted:stems affected)

- Plant 40 associated native species (ratio of associated natives to elderberry plantings is 1:1 in areas with no exit holes):

  5 saplings each of box elder, sycamore, and cottonwood

  5 willow seedlings

  5 white alder seedlings

  5 saplings each of walnut and ash

  3 California button willow

  2 wild grape vines

  Total: 40 associated native species

- Total area required is a minimum of 1,800 sq. ft. for one to five elderberry seedlings and up to 5 associated natives. Since, a total of 80 plants must be planted (40 elderberries and 40 associated natives), a total of 0.33 acre (14,400 square feet) will be required for conservation plantings. The conservation area will be seeded and planted with native grasses and forbs, and closely monitored and maintained throughout the monitoring period.

Example 2

The project will adversely affect beetle habitat in Blue Oak Woodland (Holland 1986). One elderberry plant with at least one stem measuring 1.0 inch or greater in diameter at ground level will be affected by the proposed action. The plant has a total of 10 stems measuring over 1.0 inch. Exit holes were found on the plant. Five of the stems are between 1.0 and 3.0 inches in diameter and five of the stems are between 3.0 and 5.0 inches in diameter. The conservation area is suited for elderberry savanna (non-riparian habitat). Associated natives adjacent to the conservation area are willow (Salix species), blue oak (Quercus douglasii), interior live oak (Q. wislizenii), sycamore, poison oak (Toxicodendron diversilobum), and wild grape.

Minimization (based on ratios in Table 1):

- Transplant the one elderberry plant that will be affected to the conservation area.

- Plant 30 elderberry seedlings (5 affected stems compensated at 2:1 ratio and 5 affected stems compensated at 4:1 ratio, cuttings planted:stems affected)

- Plant 60 associated native species (ratio of associated natives to elderberry plantings is 2:1 in areas with exit holes):

  20 saplings of blue oak, 20 saplings of sycamore, and 20 saplings of willow, and seed and plant with a mixture of native grasses and forbs

- Total area required is a minimum of 1,800 sq. ft. for one to five elderberry seedlings and up to 5 associated natives. Since, a total of 90 plants must be planted (30 elderberries and 60 associated natives), a total of 0.37 acre (16,200 square feet) will be required for conservation plantings. The conservation area will be seeded and planted with native grasses and forbs, and closely monitored and maintained throughout the monitoring period.

Conservation Area—Provide Habitat for the Beetle in Perpetuity

The conservation area is distinct from the avoidance area (though the two may adjoin), and serves to receive and protect the transplanted elderberry plants and the elderberry and other native plantings. The Service may accept proposals for off-site conservation areas where appropriate.

1. Size. The conservation area must provide at least 1,800 square feet for each transplanted elderberry plant. As many as 10 conservation plantings (i.e., elderberry cuttings or seedlings and/or associated native plants) may be planted within the 1800 square foot area with each transplanted elderberry. An additional 1,800 square feet shall be provided for every additional 10 conservation plants. Each planting should have its own watering basin measuring approximately three feet in diameter. Watering basins should be constructed with a continuous berm measuring approximately eight inches wide at the base and six inches high.

The planting density specified above is primarily for riparian forest habitats or other habitats with naturally dense cover. If the conservation area is an open habitat (i.e., elderberry savanna, oak woodland) more area may be needed for the required plantings. Contact the Service for assistance if the above planting recommendations are not appropriate for the proposed conservation area.

No area to be maintained as a firebreak may be counted as conservation area. Like the avoidance area, the conservation area should connect with adjacent habitat wherever possible, to prevent isolation of beetle populations.

Depending on adjacent land use, a buffer area may also be needed between the

conservation area and the adjacent lands. For example, herbicides and pesticides are often used on orchards or vineyards. These chemicals may drift or runoff onto the conservation area if an adequate buffer area is not provided.

2. Long-Term Protection. The conservation area must be protected in perpetuity as habitat for the valley elderberry longhorn beetle. A conservation easement or deed restrictions to protect the conservation area must be arranged. Conservation areas may be transferred to a resource agency or appropriate private organization for long-term management. The Service must be provided with a map and written details identifying the conservation area; and the applicant must receive approval from the Service that the conservation area is acceptable prior to initiating the conservation program. A true, recorded copy of the deed transfer, conservation easement, or deed restrictions protecting the conservation area in perpetuity must be provided to the Service before project implementation.

Adequate funds must be provided to ensure that the conservation area is managed in perpetuity. The applicant must dedicate an endowment fund for this purpose, and designate the party or entity that will be responsible for long-term management of the conservation area. The Service must be provided with written documentation that funding and management of the conservation area (items 3-8 above) will be provided in perpetuity.

3. Weed Control. Weeds and other plants that are not native to the conservation area must be removed at least once a year, or at the discretion of the Service and the California Department of Fish and Game. Mechanical means should be used; herbicides are prohibited unless approved by the Service.

4. Pesticide and Toxicant Control. Measures must be taken to insure that no pesticides, herbicides, fertilizers, or other chemical agents enter the conservation area. No spraying of these agents must be done within one 100 feet of the area, or if they have the potential to drift, flow, or be washed into the area in the opinion of biologists or law enforcement personnel from the Service or the California Department of Fish and Game.

5. Litter Control. No dumping of trash or other material may occur within the conservation area. Any trash or other foreign material found deposited within the conservation area must be removed within 10 working days of discovery.

6. Fencing. Permanent fencing must be placed completely around the conservation area to prevent unauthorized entry by off-road vehicles, equestrians, and other parties that might damage or destroy the habitat of the beetle, unless approved by the Service. The applicant must receive written approval from the Service that the fencing is acceptable prior to initiation of the conservation program. The fence must be maintained in perpetuity, and must be repaired/replaced within 10 working days if it is found to be damaged. Some conservation areas may be made available to the public for appropriate recreational and educational opportunities with written approval from the Service. In these cases appropriate fencing and signs informing the public of the beetle's threatened status and its natural history and ecology should be used and maintained in perpetuity.

7. Signs. A minimum of two prominent signs must be placed and maintained in perpetuity at the conservation area, unless otherwise approved by the Service. The signs should note that the site is habitat of the federally threatened valley elderberry longhorn beetle and, if appropriate, include information on the beetle's natural history and ecology. The signs must be approved by the Service. The signs must be repaired or replaced within 10 working days if they are found to be damaged or destroyed.

Monitoring

The population of valley elderberry longhorn beetles, the general condition of the conservation area, and the condition of the elderberry and associated native plantings in the conservation area must be monitored over a period of either ten (10) consecutive years or for seven (7) years over a 15-year period. The applicant may elect either 10 years of monitoring, with surveys and reports every year; or 15 years of monitoring, with surveys and reports on years 1, 2, 3, 5, 7, 10, and 15. The conservation plan provided by the applicant must state which monitoring schedule will be followed. No change in monitoring schedule will be accepted after the project is initiated. If conservation planting is done in stages (i.e., not all planting is implemented in the same time period), each stage of conservation planting will have a different start date for the required monitoring time.

Surveys. In any survey year, a minimum of two site visits between February 14 and June 30 of each year must be made by a qualified biologist. Surveys must include:

1. A population census of the adult beetles, including the number of beetles observed, their condition, behavior, and their precise locations. Visual counts must be used; mark-recapture or other methods involving handling or harassment must not be used.

2. A census of beetle exit holes in elderberry stems, noting their precise locations and estimated ages.

3. An evaluation of the elderberry plants and associated native plants on the site, and on the conservation area, if disjunct, including the number of plants, their size and condition.

4. An evaluation of the adequacy of the fencing, signs, and weed control efforts in the avoidance and conservation areas.

5. A general assessment of the habitat, including any real or potential threats to the beetle and its host plants, such as erosion, fire, excessive grazing, off-road vehicle use, vandalism, excessive weed growth, etc.

The materials and methods to be used in the monitoring studies must be reviewed and approved by the Service. All appropriate Federal permits must be obtained prior to initiating the field studies.

Reports. A written report, presenting and analyzing the data from the project monitoring, must be prepared by a qualified biologist in each of the years in which a monitoring survey is required. Copies of the report must be submitted by December 31 of the same year to the Service (Chief of Endangered Species, Sacramento Fish and Wildlife Office), and the Department of Fish and Game (Supervisor, Environmental Services, Department of Fish and Game, 1416 Ninth Street, Sacramento, California 95814; and Staff Zoologist, California Natural Diversity Data Base, Department of Fish and Game, 1220 S Street, Sacramento, California 95814). The report must explicitly address the status and progress of the transplanted and planted elderberry and associated native plants and trees, as well as any failings of the conservation plan and the steps taken to correct them. Any observations of beetles or fresh exit holes must be noted. Copies of original field notes, raw data, and photographs of the conservation area must be included with the report. A vicinity map of the site and maps showing where the individual adult beetles and exit holes were observed must be included. For the elderberry and associated native plants, the survival rate, condition, and size of the plants must be analyzed. Real and likely future threats must be addressed along with suggested remedies and preventative measures (e.g. limiting public access, more frequent removal of invasive non-native vegetation, etc.).

A copy of each monitoring report, along with the original field notes, photographs, correspondence, and all other pertinent material, should be deposited at the California Academy of Sciences (Librarian, California Academy of Sciences, Golden Gate Park, San Francisco, CA 94118) by December 31 of the year that monitoring is done and the report is prepared. The Service's Sacramento Fish and Wildlife Office should be provided with a copy of the receipt from

the Academy library acknowledging receipt of the material, or the library catalog number assigned to it.

Access. Biologists and law enforcement personnel from the California Department of Fish and Game and the Service must be given complete access to the project site to monitor transplanting activities. Personnel from both these agencies must be given complete access to the project and the conservation area to monitor the beetle and its habitat in perpetuity.

Success Criteria

A minimum survival rate of at least 60 percent of the elderberry plants and 60 percent of the associated native plants must be maintained throughout the monitoring period. Within one year of discovery that survival has dropped below 60 percent, the applicant must replace failed plantings to bring survival above this level. The Service will make any determination as to the applicant's replacement responsibilities arising from circumstances beyond its control, such as plants damaged or killed as a result of severe flooding or vandalism.

Service Contact

These guidelines were prepared by the Endangered Species Division of the Service's Sacramento Fish and Wildlife Office. If you have questions regarding these guidelines or to request a copy of the most recent guidelines, telephone (916) 414-6600, or write to:

U.S. Fish and Wildlife Service
Ecological Services
2800 Cottage Way, W-2605
Sacramento, CA 95825

Literature Cited

Barr, C. B. 1991. The distribution, habitat, and status of the valley elderberry longhorn beetle *Desmocerus californicus dimorphus*. U.S. Fish and Wildlife Service; Sacramento, California.

Holland, R.F. 1986. Preliminary descriptions of the terrestrial natural communities of California. Unpublished Report. State of California, The Resources Agency, Department of Fish and Game, Natural Heritage Division, Sacramento, California.

USFWS. 1980. Listing the valley elderberry longhorn beetle as a threatened species with critical habitat. Federal Register 45:52803-52807.

USFWS. 1984. Recovery plan for the valley elderberry longhorn beetle. U.S. Fish and Wildlife Service, Endangered Species Program; Portland, Oregon.

Table 1: Minimization ratios based on location (riparian vs. non-riparian), stem diameter of affected elderberry plants at ground level, and presence or absence of exit holes.

Location	Stems (maximum diameter at ground level)	Exit Holes on Shrub Y/N (quantify) [1]	Elderberry Seedling Ratio[2]	Associated Native Plant Ratio[3]
non-riparian	stems >=1" & =<3"	No:	1:1	1:1
		Yes:	2:1	2:1

non-riparian	stems >3" & <5"	No:	2:1	1:1
		Yes:	4:1	2:1
non-riparian	stems >=5"	No:	3:1	1:1
		Yes:	6:1	2:1
riparian	stems >=1" & <=3"	No:	2:1	1:1
		Yes:	4:1	2:1
riparian	stems > 3" & < 5"	No:	3:1	1:1
		Yes:	6:1	2:1
riparian	stems >=5"	No:	4:1	1:1
		Yes:	8:1	2:1

[1] All stems measuring one inch or greater in diameter at ground level on a single shrub are considered occupied when exit holes are present anywhere on the shrub.

[2] Ratios in the Elderberry Seedling Ratio column correspond to the number of cuttings or seedlings to be planted per elderberry stem (one inch or greater in diameter at ground level) affected by a project.

[3] Ratios in the Associated Native Plant Ratio column correspond to the number of associated native species to be planted per elderberry (seedling or cutting) planted.

Click for range map

Endangered Species Div., Sacramento Fish & Wildlife Office, U.S. Fish & Wildlife Service

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825-1846

In reply refer to:
1-1-05-F-0016

SEP 09 2005

To: Refuge Manager, Sacramento National Wildlife Refuge Complex
Willows, California

From: Acting Field Supervisor, Sacramento Fish and Wildlife Office
Sacramento, California

Subject: Intra-Agency Formal Consultation on the Memorandum of Understanding between the U.S. Fish and Wildlife Service, California Department of Fish and Game, and California Department of Parks and Recreation for Riparian Restoration and Management in Glenn, Tehama, Butte, and Colusa Counties, California

This document has been prepared in response to your October 8, 2004, request to initiate formal consultation with the U.S. Fish and Wildlife Service (Service) on the effects on federally-listed species from the proposed updating of the Memorandum of Understanding (MOU) between the Service, the California Department of Fish and Game (CDFG), and the California Department of Parks and Recreation (State Parks). The updating would include the addition of specific language covering limits of liabilities covered by the MOU. In addition, this biological opinion analyzes effects of projects that are covered by the MOU, including the Sacramento River and Feather River Wildlife Areas, and the O'Connor Lakes Unit Riparian Restoration Project (proposed project) within the Feather River Wildlife Area in Sutter County, California. At issue are adverse effects of the proposed project on the threatened valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) (beetle). Your request was received by the Sacramento Fish and Wildlife Office on October 8, 2004. This document is in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act) and in accordance with the regulations governing intra-agency consultation (50 CFR §402).

This consultation is based on: (1) the October 8, 2004, draft *Memorandum of Understanding between the U.S. Fish and Wildlife Service Regarding the Sacramento River National Wildlife Refuge, the California Department of Fish and Game Regarding the Sacramento River Wildlife Area and Feather River Wildlife Area, and the California Department of Parks and Recreation, Northern Buttes District, regarding the Sacramento River State Parks*; (2) the August 18, 2004, draft *O'Connor Lakes Unit Riparian Restoration Plan, Feather River Wildlife Area, Sutter County, California*, prepared by River Partners for the CDFG; (3) the July 2004 *Hydraulic*

Analysis of the O'Connor Lakes Restoration Project, prepared by MBK Engineers; (4) the December 13, 2004, *O'Connor Lakes Unit of the Feather River Wildlife Area Elderberry Shrub Survey*, prepared by CDFG; (5) the December 9, 2004, and January 19, 2005, electronic mail correspondences from Michele Ng of the California Department of Water Resources (DWR) to Rick Kuyper of the Service regarding proposed conservation measures and maintenance activities; (6) the 2004 *Description of Proposed Work, Riparian Restoration Project, Feather River Wildlife Area, O'Connor Lakes Unit*, prepared by River Partners; (7) elderberry shrub survey information from the O'Connor Lakes area provided by CDFG to the Service on January 11, 2005; (8) the April 13, 2005, electronic mail correspondence from Armand Gonzales of CDFG to Rick Kuyper of the Service regarding the proposed project description and comments from DWR, the Reclamation Board, and River Partners; (9) the June 2005 *Hydraulic Analysis of the O'Connor Lakes Restoration Project*, prepared by MBK Engineers; (10) the August 30, 2005, electronic mail correspondence from Michele Ng of DWR to Rick Kuyper of the Service which provided final comments regarding the draft biological opinion and a request for the Service to issue the biological opinion; and (10) other information available to the Service.

Based on our analysis, the Service has determined the proposed project will result in the establishment of a significant amount of habitat for the valley elderberry longhorn beetle that will be of long-term benefit to this listed animal, and any adverse effects will be temporary and relatively minor in nature.

Consultation History

October 8, 2004. The Service's Sacramento Office received the request for formal section 7 consultation from the Sacramento National Wildlife Refuge.

December 9, 2004. Michele Ng of DWR sent an electronic mail correspondence to Rick Kuyper of the Service regarding proposed maintenance activities for the proposed project.

January 11, 2005. A meeting was attended by Chris Nagano and Rick Kuyper of the Service, Michele Ng, Armand Gonzales and Dale Whitman of CDFG, and John Carlon of River Partners.

January 19, 2005. Michele Ng sent an electronic mail correspondence to Rick Kuyper regarding proposed conservation measures for the proposed project.

February 7, 2005. John Carlon provided the July 2004 *Hydraulic Analysis of the O'Connor Lakes Restoration Project* to the Service.

February 23, 2005. Rick Kuyper sent a draft copy of the project description via electronic mail correspondence to Armand Gonzales, Michele Ng, and John Carlon and requested comments and edits.

April 1 and April 8, 2005. Two meetings via telephone conference call was attended by Rick Kuyper, Armand Gonzales, Michele Ng, Stephen Bradley of the Reclamation Board, and John Carlon.

April 13, 2005. Armand Gonzales sent an electronic mail correspondence to Rick Kuyper with the compiled comments and edits of the project description from himself, Michele Ng, Stephen Bradley, and John Carlon.

May 16, 2005. Rick Kuyper sent a draft copy of the this biological opinion for review to Armand Gonzales, Michele Ng, Stephen Bradley, and John Carlon.

August 30, 2005. Michele Ng provided final comments on the draft biological opinion to Rick Kuyper and requested that the biological opinion be issued.

Project Description

Memorandum of Understanding

A memorandum of understanding (MOU) was issued in 2004 between the Service, CDFG, and State Parks regarding land management issues at selected locations including all lands owned and managed as the Sacramento River National Wildlife Refuge, Sacramento River Wildlife Area, Feather River Wildlife Area, and State Parks located along the Sacramento and Feather Rivers in Tehama, Butte, Glenn, Colusa Sutter and Yuba counties, California. The purpose of the MOU is to formally document an agreement to mutually manage, monitor, restore, and enhance lands managed for fish, wildlife, and plants along the Sacramento and Feather River, and to enhance communication between the agencies to prevent duplicating or prescribing conflicting land management and acquisition efforts. This BO applies to activities undertaken directly by the agencies that are signatories to the MOU and by their agents, that is, individuals, agencies, or organizations such as DWR and Levee District 1 that are engaged in site management or maintenance activities on behalf of and/or under the jurisdiction of one of the signatory agencies.

If this BO terminates, or if consultation related to this BO is reinitiated, DWR shall have the right to restore the site to baseline elderberry (*Sambucus* sp.) population reflective of pre-project conditions within one year of MOU termination or modification, or BO termination or reinitiation; 130 elderberry shrubs with stems greater than 1 inch in diameter that do not interfere with the flood conveyance capacity would be identified and allowed to remain. All other elderberries may be removed from the project site.

O'Connor Lakes Unit Restoration Project

The proposed 471-acre project site is located along the Feather River at river mile 18, approximately six miles south of Yuba City in Sutter County. It is directly south of the Star Bend section of the Feather River and north of the O'Connor Lakes section. The proposed project site is part of the Feather River Wildlife Area and is currently owned and managed by CDFG. Currently, there are approximately 130 elderberry shrubs (*Sambucus* sp.) within the

proposed project site. The majority of the shrubs are located along both sides of the road along the Feather River. Elderberry shrubs are the sole host plant for the beetle, and stems 1.0 inch or greater in diameter at ground level are required for the beetle to complete its life cycle. The proposed-project site has been disturbed by human activities for the past 100 years, and currently contains large amounts of non-native and invasive plants. The CDFG has identified the site as a high priority for restoration because it would link two adjacent tracks of existing riparian habitat, thus creating a 2,142 acre-block of contiguous riparian habitat. The goals of the proposed project include: (1) the maintenance of general flood conveyance patterns across the proposed project site; (2) removal of existing non-native invasive plant species; (3) planting of appropriate native riparian vegetation using local seed sources; and (4) preservation of existing wildlife habitat.

Description of Proposed Maintenance and Routine Flood Control Maintenance Activities Within the Feather River Wildlife Area

Periodic maintenance is conducted by DWR on and adjacent to the site, in the Lake of the Woods and O 'Conner Lake Areas. In the Lake of the Woods area, routine maintenance consists of selectively clearing vegetation and debris in a 330 acre area. Maintenance is performed by hand crews in densely vegetated areas, and maintenance using heavy equipment is used to manage grasses, woody growth, shrubs, and select trees. Mowing is a preferred maintenance activity; however, periodically sites require leveling achieved through disking and/or dozing. Cleared areas are also sometimes sprayed as part of ongoing management. Non-native vegetation (e.g. giant reed, false bamboo, Chinese tallow, red sesbania, Spanish bloom, tree-of-heaven, black locust, tree tobacco, castor bean, pampas grass, eucalyptus, tamarisk, and acacia) would be removed. In all areas, routine maintenance includes removing vegetative material, living and dead, which interferes with the successful execution, functioning maintenance, or operation of the adopted plan of flood control. Floodwater conveyance capacity must meet the minimum flows specified in the U.S. Army Corps of Engineers (Corps) Operation and Maintenance Manual, which at this location is specified to be 300,000 cubic feet per second (cfs) with three feet of freeboard. Cleared trees, debris, brush, and trimmings are to be completely burned or removed from the floodway prior to flood season that extends from November 1 to April 15.

Routine maintenance in the O'Conner Lake area consists of clearing access and perimeter roads by clearing brush and small trees, and re-grading the roads. For the O'Connor Lakes area, a minimum 400-foot wide strip would be converted to and maintained as grasslands. This strip would be established parallel to the river as much as possible and would be cleared of woody vegetation to facilitate floodwater conveyance. Again, minimum conveyance capacity as specified in the Corps Operation and Maintenance Manual would be met as currently specified or as the Manual might be modified in the future, to protect public safety.

The Reclamation District performs levee maintenance, which includes mowing, cutting, burning, or spraying herbicides on weeds, grasses, shrubs and woody growth on levees as required to conduct levee safety inspections. Other maintenance activities include grading levee slopes to smooth surface irregularities, repair of the levee toe road, extermination of rodents (e.g. ground squirrels) burrowing in the levees, and filling of burrows with earthen materials or grout.

Description of Riparian Restoration of the O'Connor Lakes Unit

River Partners has identified a 228-acre portion of the proposed project area as an appropriate location for the planting of native riparian species, including elderberry shrubs. When elderberries are allowed by The Reclamation Board, elderberry shrubs would comprise 10 percent of the planted species composition. Elderberry shrubs would be planted at a density of 20 plants per acre, totaling approximately 1,366 planted elderberry shrubs within the 228-acre site. All of the woody trees and shrubs would be planted in rows that would be oriented approximately north-northwest to south-southeast, which would be parallel to flood flows. This orientation would serve to direct flood flows away from the west project levee. All rows would be spaced 20 feet apart.

The restoration area would be monitored and monitoring reports would be prepared by River Partners staff, who would make monthly activity reports throughout the year, and an annual quantitative survey would be performed between June and August. Towards the end of the growing season, monthly reports and the annual monitoring results would be summarized and reviewed at a meeting on the project site. Recommendations for changes in field management would be reported in a memo prepared at the end of the growing season. In addition, pre-and-post-planting photographs would be taken annually to provide qualitative information on vegetation changes at the restoration site. A final field report would be submitted to the Service in 2007.

Conservation Measures for the O'Connor Lakes Unit

The following measures would be taken by DWR to minimize adverse effects to the valley elderberry longhorn beetle during flood control and maintenance activities:

1. Prior to beginning maintenance work in an area where the beetle might occur, DWR maintenance supervisors and crews would be trained by a qualified biologist to identify and avoid harm to the species and its habitat.

2. Vegetation control through selective herbicide spraying in areas excluding levee slopes would be restricted to glycoposphate (Roundup) herbicide. The glycophosphate applications would occur only during appropriate weather conditions and with spray equipment that minimizes drift. Every effort would be made to insure that no glycophosphate herbicide is applied to elderberry shrub foliage.

3. Vegetation control under the dripline would be done using mowers and using hand crews July 1 through March 1.

4. Vegetation control using heavy equipment would occur up to the dripline of elderberry shrubs. Heavy equipment work would be further restricted to periods of dry weather, and DWR would suspend any ongoing maintenance work and would implement erosion control measures prior to any storm event to avoid adverse effects to elderberry shrubs.

5. Elderberry shrubs may be removed if they are located within the minimum 400-foot wide strip to be maintained free of woody vegetation needed to improve the hydraulic capacity of the area; or if the shrub interferes with flow and sediment transport, or flood control maintenance practices. Elderberry shrubs may also be removed if the floodwater conveyance capacity of the site falls below the minimum specified in the Corps Operation and Maintenance Manual as such manual exists on the date of this biological opinion or as it may be modified in the future to ensure public safety from flooding. In such cases, every effort would be made to implement recommendations from resource agency personnel regarding methods used to achieve public safety (adequate floodwater conveyance capacity) goals. The intent of this cooperation is to collaboratively address issues related to species recovery and public safety in a balanced fashion.

6. If transplanting an elderberry shrub becomes necessary because it is an impediment to flood control and/or maintenance activities, DWR would notify the Service and transplant the shrub(s) between November 1 and February 14. If removal of the shrub is required outside of these dates, it would be done in a manner to optimize survivorship of the shrub in consultation with the Service. In order to create dispersal corridors for the beetle, elderberry shrubs would be transplanted to a location that is within 50 feet of another elderberry shrub with stems measuring greater than 1.0 inch in diameter at ground level.

Status of the Species

The beetle was listed as a threatened species under the Act on August 8, 1980 (45 **FR** 52803). Critical habitat for the species was designated and published at 50 CFR §17.95. Two areas along the American River in the Sacramento metropolitan area have been designated as critical habitat for the beetle. Critical habitat for this species has been designated along the lower American River at Goethe and Ancil Hoffman parks (American River Parkway Zone) and at the Sacramento Zone, an area about a half mile from the American River downstream from the American River Parkway Zone. In addition, an area along Putah Creek, Solano County, and the area west of Nimbus Dam along the American River Parkway, Sacramento County, are considered essential habitat, according to the Valley Elderberry Longhorn Beetle Recovery Plan (Service 1984). These critical habitat and essential habitat areas within the American River parkway and Putah Creek support large numbers of mature elderberry shrubs with extensive evidence of use by the beetle.

The beetle is dependent on the elderberry, its host plant, which is a locally common component of the remaining riparian forests and savannah areas and, to a lesser extent, the mixed chaparral-foothill woodlands of the Central Valley. Use of the elderberry shrubs by the animal, a wood borer, is rarely apparent. In most cases, the only exterior evidence of the shrub's use by the beetle is an exit hole created by the larva just prior to the pupal stage. Observations made within elderberry shrubs along the Cosumnes River, in the Folsom Lake area, and near Blue Ravine in Folsom indicate that larval galleries can be found in elderberry stems with no evidence of exit holes; the larvae either succumb prior to constructing an exit hole or are not far enough along in

the developmental process to construct an exit hole. Beetle larvae appear to be distributed in stems which are 1.0 inch or greater in diameter at ground level. The Valley Elderberry Longhorn Beetle Recovery Plan (Service 1984) and Barr (1991) contain further details on the valley elderberry longhorn beetle's life history.

Population densities of the beetle are probably naturally low (Service 1984). It has been suggested, based on the spatial distribution of occupied shrubs (Barr 1991), that the beetle is a poor disperser (Collinge *et al.* 2001). Low density and limited dispersal capability cause the beetle to be vulnerable to the negative effects of the isolation of small subpopulations due to habitat fragmentation.

When the beetle was listed as threatened in 1980, the species was known from less than ten localities along the American River, the Merced River, and Putah Creek. By the time the Valley Elderberry Longhorn Beetle Recovery Plan was prepared in 1984, additional occupied localities had been found along the American River and Putah Creek. As of 2005, the California Natural Diversity Database (CNDDB 2005) contained 190 occurrences for this species in 44 drainages throughout the Central Valley, from a location along the Sacramento River in Shasta County, southward to an area along Caliente Creek in Kern County (CNDDB 2005). The beetle continues to be threatened by habitat loss and fragmentation, predation by the non-native Argentine ants (*Linepithema humile*) (Holway 1998; Huxel 2000; Huxel and Hastings 1999; Ward 1987), and possibly other factors such as pesticide drift, non-native plant invasion, improper burning regimes, off-road vehicle use, rip-rap bank protection projects, wood cutting, and over-grazing by livestock (CNDDB 2005).

Environmental Baseline

Riparian forests, the primary habitat for the beetle, have been severely depleted throughout the Central Valley over the last two centuries as a result of expansive agricultural and urban development (Katibah 1984; Roberts *et al.* 1977; Thompson 1961). Since colonization, these forests have been "...modified with a rapidity and completeness matched in few parts of the United States" (Thompson 1961). As of 1849, the rivers and larger streams of the Central Valley were largely undisturbed. They supported continuous bands of riparian woodland four to five miles in width along some major drainages such as the lower Sacramento River, and generally about two miles wide along the lesser streams (Thompson 1961). Most of the riverine floodplains supported riparian vegetation to about the 100-year flood line (Katibah 1984). A large human population influx occurred after 1849, however, and much of the Central Valley riparian habitat was rapidly converted to agriculture and used as a source of wood for fuel and construction to serve a wide area (Thompson 1961). By as early as 1868, riparian woodland had been severely affected in the Central Valley, as evidenced by the following excerpt:

> "This fine growth of timber which once graced our river [Sacramento], tempered the atmosphere, and gave protection to the adjoining plains from the sweeping winds, has entirely disappeared - the woodchopper's axe has stripped the river farms of nearly all the hard wood timber, and the owners are now obliged to rely upon the growth of willows for firewood" (Cronise 1868, in Thompson 1961).

The clearing of riparian forests for fuel and construction made land available for agriculture (Thompson 1977). Natural levees bordering the rivers, once supporting vast tracts of riparian habitat, became prime agricultural land (Thompson 1961). As agriculture expanded in the Central Valley, needs for increased water supply and flood protection spurred water development and reclamation projects. Artificial levees, river channelization, dam building, water diversion, and heavy groundwater pumping further reduced riparian habitat to small, isolated fragments (Katibah 1984). In recent decades, these riparian areas have continued to decline as a result of ongoing agricultural conversion as well and urban development and stream channelization. As of 1989, there were over 100 dams within the Central Valley drainage basin, as well as thousands of miles of water delivery canals and streambank flood control projects for irrigation, municipal and industrial water supplies, hydroelectic power, flood control, navigation, and recreation (Frayer *et al.* 1989). Riparian forests in the Central Valley have dwindled to discontinuous strips of widths currently measurable in yards rather than miles.

Some accounts state that the Sacramento Valley supported approximately 775,000 to 800,000 acres of riparian forest as of approximately 1848, just prior to statehood (Smith 1977; Katibah 1984). No comparable estimates are available for the San Joaquin Valley. Based on early soil maps, however, more than 921,000 acres of riparian habitat are believed to have been present throughout the Central Valley under pre-settlement conditions (Katibah 1984). Another source estimates that of approximately five million acres of wetlands in the Central Valley in the 1850s, approximately 1,600,000 acres were riparian wetlands (Warner and Hendrix 1985; Frayer *et al.* 1989).

Based on a California Department of Fish and Game riparian vegetation distribution map, by 1979, there were approximately 102,000 acres of riparian vegetation remaining in the Central Valley. This represents a decline in acreage of approximately 89 percent (Katibah 1984). More extreme figures were given by Frayer *et al.* (1989), who reported that woody riparian forests in the Central Valley had declined to 34,600 acres by the mid-1980s (from 65,400 acres in 1939). Although these studies have differing findings in terms of the number of acres lost (most likely explained by differing methodologies), they attest to a dramatic historic loss of riparian habitat in the Central Valley. As there is no reason to believe that riparian habitat suitable to the beetle (elderberry shrubs) would be destroyed at a different rate than other riparian habitat, we can assume that the rate of loss for beetle habitat in riparian areas has been equally dramatic.

A number of studies have focused on riparian vegetation losses along the Sacramento River, which supports some of the densest known populations of the beetle. Approximately 98 percent of the middle Sacramento River's historic riparian vegetation was believed to have been extirpated by 1977 (DWR 1979). The State Department of Water Resources estimated that native riparian habitat along the Sacramento River from Redding to Colusa decreased from

27,720 acres to 18,360 acres (34 percent) between 1952 and 1972 (McGill 1975; Conrad *et al.* 1977). The average rate of riparian loss on the middle Sacramento River was 430 acres per year from 1952 to 1972, and 410 acres per year from 1972 to 1977. In 1987, riparian areas as large as 180 acres were observed converted to orchards along this River (McCarten and Patterson 1987).

Barr (1991) examined 79 sites in the Central Valley supporting valley elderberry longhorn beetle habitat. When 72 of these sites were re-examined by researchers in 1997, seven no longer supported valley elderberry longhorn beetle habitat. This loss represents a decrease in the number of sites with valley elderberry longhorn beetle habitat by approximately nine percent in six years.

No comparable information exists on the historic loss of non-riparian valley elderberry longhorn beetle habitat such as elderberry savanna and other vegetation communities where elderberry shrubs also occur (oak or mixed chaparral-woodland, or grasslands adjacent to riparian habitat). However, all natural habitats throughout the Central Valley have been heavily adversely affected within the last 200 years (Thompson 1961), and we can therefore assume that non-riparian beetle habitat also has suffered a widespread decline. This analysis focuses on loss of riparian habitat because the beetle is primarily dependent upon riparian habitat. Adjacent upland areas are also likely to be important for the species, but this upland habitat typically consists of oak woodland or elderberry savanna bordering willow riparian habitat (Barr 1991). The riparian acreage figures given by Frayer *et al.* (1989) and Katibah (1984) included oak woodlands concentrated along major drainages in the Central Valley, and therefore probably included lands we would classify as upland habitat for the beetle adjacent to riparian drainages.

Between 1980 and 1995, the human population in the Central Valley grew by 50 percent, while the rest of California grew by 37 percent . The Central Valley's population was 4.7 million by 1999, and it is expected to more than double by 2040. The American Farmland Trust estimates that by 2040, more than 1 million cultivated acres will be lost and 2.5 million more put at risk (Ritter 2000). With this growing population in the Central Valley, increased development pressure is likely to result in continuing loss of riparian habitat.

While habitat loss is clearly a large factor leading to the species' decline, other factors are likely to pose significant threats to the long term survival of the beetle. Only approximately 20 percent of riparian sites with elderberry observed by Barr (1991) and Collinge *et al.* (2001) support beetle populations (Barr 1991, Collinge *et al.* 2001). Jones and Stokes (1988) found 65 percent of 4,800 riparian acres on the Sacramento River have evidence of beetle presence. The fact that a large percentage of apparently suitable habitat is unoccupied suggests that the beetle is limited by factors other than habitat availability, such as habitat quality or limited dispersal ability.

Destruction of riparian habitat in central California has resulted not only in a significant acreage loss, but also has resulted in beetle habitat fragmentation. Fahrig (1997) states that habitat fragmentation is only important for habitats that have suffered greater than 80 percent loss. Riparian habitat in the Central Valley, which has experienced greater than 90 percent loss by most estimates, would meet this criterion as habitat vulnerable to effects of fragmentation.

Existing data suggests that beetle populations, specifically, are affected by habitat fragmentation. Barr (1991) found that small, isolated habitat remnants were less likely to be occupied by beetles than larger patches, indicating that valley elderberry longhorn beetle subpopulations are extirpated from small habitat fragments. Barr (1991) and Collinge *et al.* (2001) consistently found valley elderberry longhorn beetle exit holes occurring in clumps of elderberry bushes rather than isolated bushes, suggesting that isolated shrubs do not typically provide long-term viable habitat for this species. Local populations of organisms often undergo periodic colonization and extinction, while the metapopulation (set of spatially separated groups of a species) may persist (Collinge 1996).

Habitat fragmentation can be an important factor contributing to species declines because: (1) it divides a large population into two or more small populations that become more vulnerable to direct loss, inbreeding depression, genetic drift, and other problems associated with small populations; (2) it limits a species' potential for dispersal and colonization; and (3) it makes habitat more vulnerable to outside influences by increasing the edge:interior ratio (Primack 1998).

Small, isolated subpopulations are susceptible to extirpation from random demographic, environmental, and/or genetic events (Shaffer 1981; Lande 1988; Lande 1993; Primack 1998). While a large area may support a single large population, the smaller subpopulations that result from habitat fragmentation may not be large enough to persist over a long time period. As a population becomes smaller, it tends to lose genetic variability through genetic drift, leading to inbreeding depression and a lack of adaptive flexibility. Smaller populations also become more vulnerable to random fluctuations in reproductive and mortality rates, and are more likely to be extirpated by random environmental factors.

The beetle is a specialist on elderberry plants, and tends to have small population sizes and occurs in low densities (Barr 1991; Collinge *et al.* 2001). Collinge *et al.* (2001) compared resource use and density of exit holes between the beetle and a related subspecies, the California elderberry longhorn beetle (*Desmocerus californicus californicus*). The valley elderberry longhorn beetle tended to occur in areas with higher elderberry densities, but had lower exit hole densities than the California elderberry longhorn beetle. With extensive riparian habitat loss and fragmentation, these naturally-small valley elderberry longhorn beetle populations are broken into even smaller, isolated populations. Once a small valley elderberry longhorn beetle population has been extirpated from an isolated habitat patch, the species may be unable to re-colonize this patch if it is unable to disperse from nearby occupied habitat. Insects with limited dispersal and colonization abilities may persist better in large habitat patches than small patches because small fragments may be insufficient to maintain viable populations and the insects may be unable to disperse to more suitable habitat (Collinge 1996).

Studies suggest that the beetle is unable to re-colonize drainages where the species has been extirpated, because of its limited dispersal ability (Barr 1991; Collinge *et al.* 2001). Huxel and Hastings (1999) used computer simulations of colonization and extinction patterns based on differing dispersal distances, and found that the short dispersal simulations best matched the 1997 census data in terms of site occupancy. This suggests that dispersal and colonization are

limited to nearby sites. At spatial scales greater than 6.2 miles, such as across drainages, valley elderberry longhorn beetle occupancy appears to be strongly influenced by regional extinction and colonization processes, and colonization is constrained by limited dispersal (Collinge *et al.* 2001; Huxel and Hastings 1999). Except for one occasion, drainages examined by Barr that were occupied in 1991 remained occupied in 1997 (Collinge *et al.* 2001; Huxel and Hastings 1999). The one exception was Stoney Creek, which was occupied in 1991 but not in 1997. All drainages found by Barr (1991) to be unoccupied in 1991 were also unoccupied in 1997. This data suggests that drainages unoccupied by the valley elderberry longhorn beetle remain so. Habitat fragmentation not only isolates small populations, but also increases the interface between habitat and urban or agricultural land, increasing negative edge effects such as the invasion of non-native species and pesticide contamination (Barr 1991). Several edge effect-related factors may be related to the decline of the valley elderberry longhorn beetle.

Evidence of the beetle in the form of exit holes have been found within the proposed action area. Elderberry shrubs with stems one inch or greater in diameter that provide suitable habitat are found in and adjacent to the action area. The action area contains components that can be used by the listed animal for feeding, resting, mating, and other essential behaviors. Therefore, the Service believes that the valley elderberry longhorn beetle is reasonably certain to occur within the action area because of the biology and ecology of the animal, the presence of suitable habitat in and adjacent to the action area, as well as recent evidence of this listed species.

Project-Related Effects to the Valley Elderberry Longhorn Beetle

The overall effect of this project will result in long-term beneficial effects to the valley elderberry longhorn beetle. The project will restore 228 acres of habitat for the imperiled animal. This addition of habitat in the area will benefit the listed beetle by increasing population numbers and improving the dispersal abilities of the species. The proposed project may result in short-term adverse effects to the valley elderberry longhorn beetle. Maintenance and operations activities and potential flood-fighting activities may remove elderberry shrubs from the proposed action area.

Indirect effects may occur if maintenance and flood-fighting activities alter the terrain, such as driplines, which may adversely affect elderberry bushes. Vehicles and construction equipment may leak hazardous substances such as motor oil and antifreeze. Although the quantity leaked by a given vehicle or engine may be minute, these substances can accumulate on roads or in parking lots and then get washed into the adjacent environment by runoff during rain storms. A variety of substances could be introduced during accidental spills of materials.

Based on our analysis, the Service has determined the proposed project will result in the establishment of a significant amount of habitat for the valley elderberry longhorn beetle that will be of long-term benefit to this listed animal, and any adverse effects will be temporary and relatively minor in nature.

Cumulative Effects

Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed project are not considered in this section, because they require separate consultation pursuant to section 7 of the Act. An undetermined number of future land use conversions and routine agricultural practices are not subject to Federal authorization or funding and may alter the habitat or increase incidental take of the beetle and are, therefore, cumulative to the proposed project. Most of these future non-Federal projects are considered indirect effects of the proposed action and effects are addressed through an interim process of project approval and habitat conservation plan development.

Many activities affecting the beetle involve effects to elderberry shrubs located within riparian ecosystems adjoining or within jurisdictional wetlands. These projects will be evaluated via formal consultation between the Service and the Corps via the Federal nexus provided by section 404 of the Clean Water Act. However, a number of projects exist for which there is no need to discharge dredged or fill material into waters of the U.S. These projects, for which no section 404 permit is required, may lack a Federal nexus and thus, move forward absent formal consultation. These projects pose a significant threat to the recovery of the valley elderberry longhorn beetle. This loss of habitat negatively affects the environmental baseline and is difficult to quantify.

Conclusion

After reviewing the current status of the beetle, the environmental baseline for the action area, the effects of the proposed project, and the cumulative effects, it is the Service's biological opinion that the project, as proposed, is not likely to jeopardize the continued existence of the beetle. Critical habitat has been designated for the beetle. However, this action does not directly or indirectly affect these areas, and therefore, no destruction or adverse modification of critical habitat is anticipated.

Incidental Take Statement

Section 9(a)(1) of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened fish and wildlife species, respectively, without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harass is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to a listed species by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm is defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by impairing behavioral patterns including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an

otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with this Incidental Take Statement.

The measures described below are non-discretionary, and must be implemented by the Service so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, in order for the exemption in section 7(o)(2) to apply. The Service has a continuing duty to regulate the activity covered by this incidental take statement. If the Service (1) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, and/or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

Amount or Extent of Take

The Service anticipates incidental take of the valley elderberry longhorn beetle will be difficult to detect or quantify. The cryptic nature of these species and their relatively small body size make the finding of a dead specimen unlikely. The species occur in habitats that make them difficult to detect. Due to the difficulty in quantifying the number of beetles that will be taken as a result of the proposed action, the Service is quantifying take in terms of the number of elderberry shrubs with stems one inch or greater in diameter that will become unsuitable for beetles due to direct or indirect effects as a result of the action. The Service anticipates that all valley elderberry longhorn beetles inhabiting elderberry bushes within the 471 acre project site will be taken as a result of the proposed project.

Upon implementation of the following reasonable and prudent measures, incidental take associated with the project on the listed valley elderberry longhorn beetle, in the form of harm, harassment, injury, or mortality from habitat loss or direct mortality will become exempt from the prohibitions described under section 9 of the Act for direct and indirect effects. In addition, incidental take in the form of harm, harassment, or mortality associated with the proposed project will be exempt from the prohibitions described under section 9 of the Act.

Effect of the Take

The Service has determined that this level of anticipated take is not likely to result in jeopardy to the valley elderberry longhorn beetle or result in destruction or adverse modification of critical habitat for the valley elderberry longhorn beetle.

Reasonable and Prudent Measure

The proposed action contains all of the measures needed to adequately minimize the effects of anticipated take on the beetle. For that reason, the Service has no Reasonable and Prudent Measures.

Reporting Requirements

The Sacramento Fish and Wildlife Office is to be notified within one working day of the finding of any listed species or any unanticipated take of species addressed in this biological opinion. The Service contact persons for this are the Deputy Assistant Field Supervisor of the Endangered Species program at (916) 414-6600, and the Resident Agent-in-Charge of the Service's Law Enforcement Division at (916) 414-6660.

Any dead or severely injured beetles found (adults, pupae, or larvae) shall be given to the Service's Law Enforcement Division. All observations of valley elderberry longhorn beetles - live, injured, or dead - or fresh beetle exit holes shall be recorded on California Natural Diversity Data Base (CNDDB) field sheets and sent to California Department of Fish and Game, Wildlife Habitat Data Analysis Branch, 1807 13th Street Room 2002, Sacramento, California 95814.

Conservation Recommendations

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities that can be implemented to further the purposes of the Act, such as preservation of endangered species habitat, implementation of recovery actions, or development of information and data bases.

1. The Sacramento River National Wildlife Refuge should continue to protect and restore riparian and wetland habitats in the Sacramento River basin to increase habitat for the valley elderberry longhorn beetle.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting federally-listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

Reinitiation – Closing Statement

This concludes formal consultation on the proposed Sacramento River Wildlife Area and the Feather River Wildlife Area and O'Connor Lakes Unit Riparian Restoration Plan Project. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

Please contact Rick Kuyper or Chris Nagano at (916) 414-6645 if you have any questions or comments regarding this intra-agency biological opinion on the Sacramento River Wildlife Area and the Feather River Wildlife Area and O'Connor Lakes Unit Riparian Restoration Plan Project.

cc:

Armand Gonzales, California Department of Fish and Game, Rancho Cordova, California
David Walker, California Department of Fish and Game, Red Bluff, California
Michele Ng, California Department of Water Resources, Sacramento, California
Woody Elliot, California Department of Parks and Recreation, Oroville, California
Stephen Bradley, The Reclamation Board, Sacramento, California
John Carlon, River Partners, Chico, California

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APPENDIX C

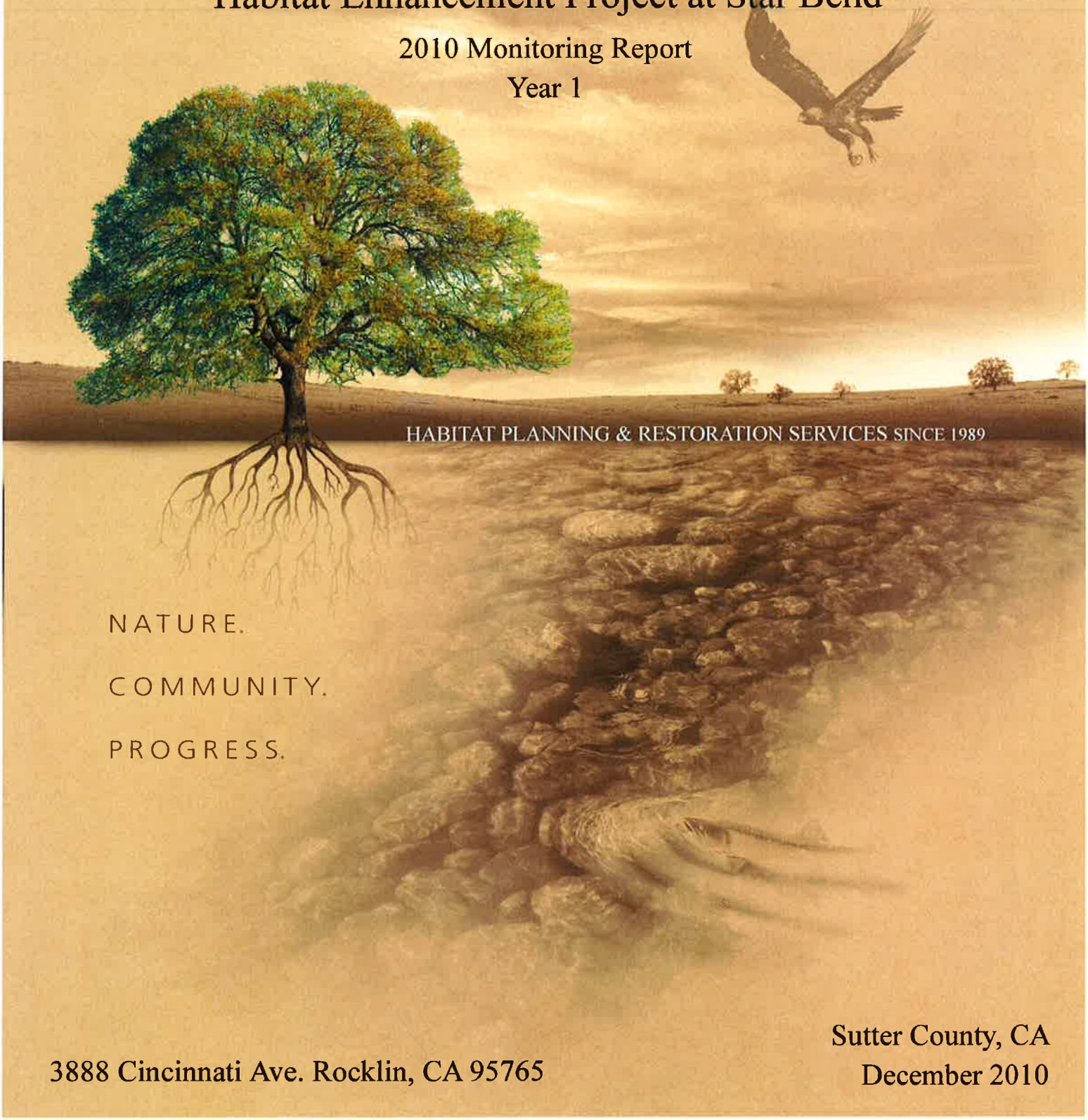
Feather River Setback Levee and Phase 1 Habitat Enhancement Project at Star Bend 2010 Initial Monitoring Report - Year 1, prepared by Restoration Resources, inclusive of Appendix A Planting As-Builts:

As-Built Planting and Irrigation Plan, Sheet 1 of 3
As-Built Planning Plan, Sheet 2 of 3
Sample Planting Matrix, Sheet 1 of 3

RESTORATION RESOURCES

Amended Feather River Setback Levee and Phase 1 Habitat Enhancement Project at Star Bend

2010 Monitoring Report
Year 1



3888 Cincinnati Ave. Rocklin, CA 95765

Sutter County, CA
December 2010

Feather River Setback Levee and Phase 1 Habitat Enhancement Project at Star Bend

Sutter County, CA

July 2010
Amended December 2010

Submitted to:
U.S. Fish and Wildlife Service
2800 Cottage Way
Sacramento, CA 95825

Levee District One of Sutter County
243 Second St.
Yuba City, CA 95991

Submitted by:
Restoration Resources
3888 Cincinnati Avenue
Rocklin, CA 95765

RESTORATION
RESOURCES

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Appendices

1.0 Introduction

1.1 Permit Numbers

USFWS Biological Opinion Reference No. 81420-2009-F-0372-1; February 6, 2009.
CDFG Streambed Alteration Agreement Notification No. 1600-2007-0217-R2.
CVFPB Encroachment Permit No. 18191, May 11, 2009.

1.2 Background

The Feather River Setback Levee and Habitat Enhancement Project at Star Bend is located on the Feather River, approximately six miles south of Yuba City, Sutter County. The project site is located just east of State Highway 99 and Garden Highway, off of Star Bend Road.

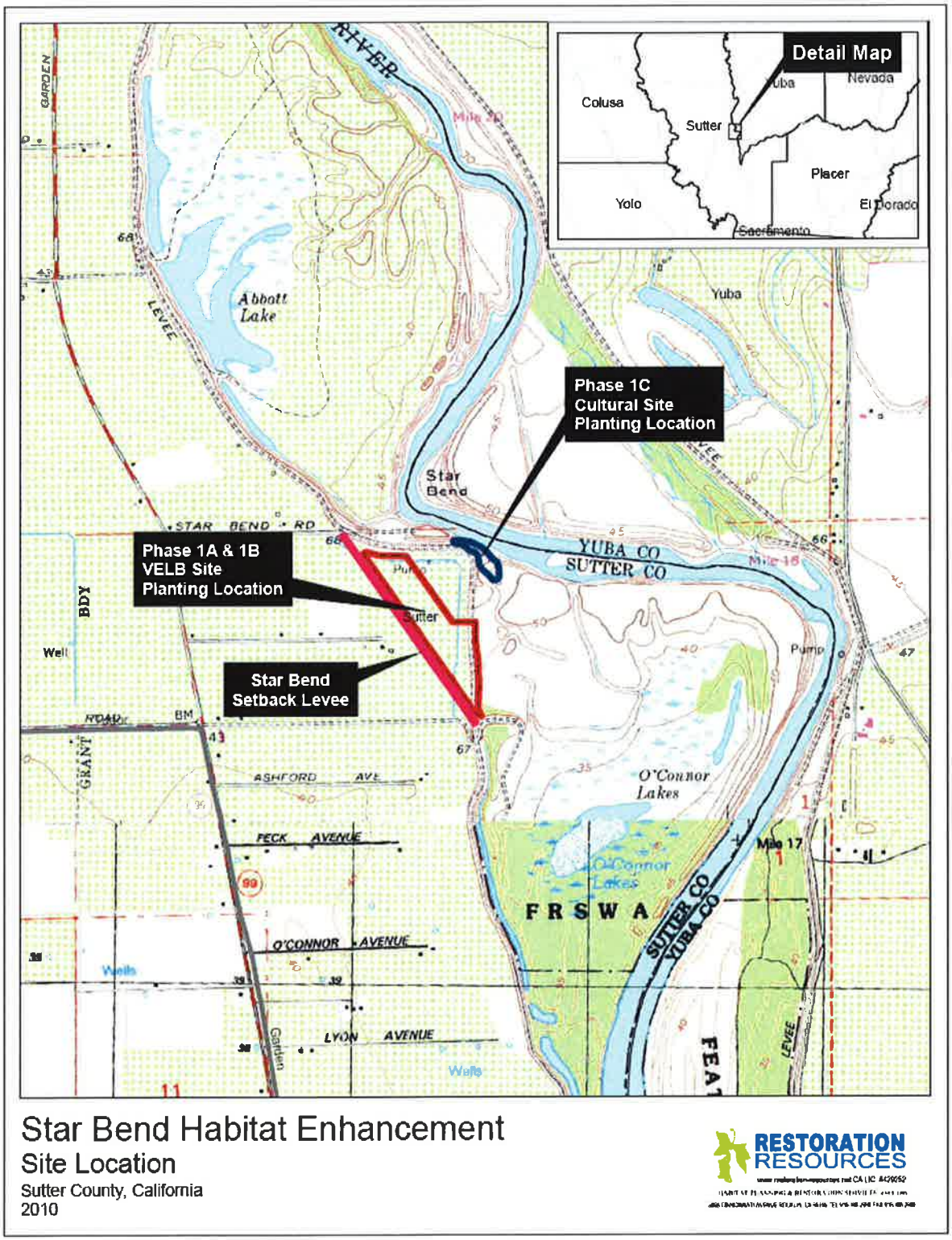
In 2009 a setback levee was constructed on the west bank of the Feather River at River Mile 18.0 and converted approximately 55 acres of former orchard and levee into floodplain habitat. The new setback levee has replaced an existing levee that posed a high risk of failure and will decrease the flood stage, velocity, and scour potential of the Feather River. Figure 1 shows the general location of the project area.

The overall project is broken into several phases. Phase 1A required 37 existing elderberry shrubs to be transplanted to a nearby location within the project area prior to construction of the setback levee at Star Bend. Phase 1B required 20 acres of elderberry and native associate plants to be installed to enhance habitat for the valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), herein referred to as VELB, a listed threatened species under the federal Endangered Species Act. Phase 1C required the planting of approximately 2.46 acres of California blackberry (*Rubus ursinus*) and California rose (*Rosa californica*) to protect an area of cultural significance. This document serves as an amended report for the Year 1 Feather River Setback Levee and Phase 1 Habitat Enhancement Project at Star Bend report submitted in July 2010. Since July, additional site maintenance had occurred that is documented in this report. The submittal of this report will establish December 31st as the end of one establishment year. The following establishment year will begin on January 1st. Henceforth, monitoring reports will be submitted by December 31st for that congruent establishment year.

1.3 Summary of Results

A total of two exit hole surveys were performed between February 14th and June 30th, 2010. During those visits a total of three potential VELB exit holes were observed on elderberry transplant number SB-37 and a total of 102 that looked more than one year old were observed over all the elderberry transplants (SB-01 through SB-37). No adult VELB were observed during the site visits. A complete count of all installed elderberries and native associate plantings was performed prior to June 30th. A total of 4,048 plants were installed in Phase 1B and by June 30th, 2010; 3,921 individuals were alive for an overall survivorship of 97.1 percent. A total of 2,544 native associates were alive out of 2,573 installed and a total of 1,377 elderberries were alive out of 1,475 installed, with a percent survivorship of 98.9 percent and 93.4 percent survivorship respectively.

Figure 1. Project Location Map



2.0 Summary of Project Installation

Native plant species were planted within the project area to mitigate for impacts caused by the construction of the Feather River Setback Levee at Star Bend. Phase 1A transplanting took place between February 9 and February 20, 2009 by River Partners. They transplanted 37 elderberry clusters containing 210 or more stems greater than 1-inch in diameter. Phase 1B plant installation began on February 8, 2010 beginning with equipment mobilization and site preparation and ended on February 26, 2010. Prior to the Phase 1B plant installation, the irrigation mainline valves and lateral lines were installed. The irrigation system was functional by May 11, 2010 with the rehabilitation of a former agricultural well. As-built drawings for plant and irrigation installation are available in Appendix A.

2.1 Plant Installation

Planting rows were created in the elderberry enhancement area prior to plant installation using a tractor with disc attachment and GPS equipment. A total of 32 rows were created for planting installation and were spaced approximately 20 feet on center. Planting rows were made so they do not come within 20 feet of the elderberry transplants installed during Phase 1A work by River Partners. Planting rows were identified using GPS equipment and are identified in the as-built drawings in Appendix A

Plant flag layout was performed in the field by restoration ecologists and provided each plant to be spaced 11 feet on center. Restoration ecologists took micro-site conditions into account when performing plant flag layout to provide beneficial growing conditions for the native plants. Following plant flag layout, planting holes were created using a T-200 bobcat tractor with an auger attachment. Each hole was over-excavated and then backfilled with the remaining soil, creating a more friable soil medium that facilitates root development. Plants were installed at each plant flag and supplemented with endo/ecto mycorrhizal inoculum from Mycorrhizae Applications to support beneficial microbial activity during root development. Following plant installation each plant was fitted with a 12-inch paper tree box supported by a wood stake. Each installed plant was then fitted with drip irrigation tubing containing three drip line emitters spaced 12-inches apart.

The cultural site was enhanced by installing 1,020 California blackberry (*Rubus ursinus*) and 1,020 California rose (*Roca californica*) cuttings. The planting rows for the cultural site were spaced approximately 10 feet on center and individuals were installed 5 feet on center. Table 1 and 2 identifies the total amount of plantings that were installed at each site.

Table 1. Phase 1B VELB Habitat Installed Riparian Scrub Shrub Plantings

Common Name	Scientific Name	Installed
coyote brush	*Baccharis pilularis*	524
mule fat	*Baccharis salicifolia*	358
buttonbush	*Cephalnathus occidentalis*	222
California rose	*Rosa californica*	791
California blackberry	*Rubus ursinus*	316
sandbar willow	*Salix exigua*	137
Arroyo willow	*Salix lasiolepis*	225
	Associates Total	**2573**
blue elderberry	*Sambucus mexicana*	1475
	Overall Total	**4048**

Table 2. Phase 1C Cultural Site Installed Riparian Scrub Shrub Plantings

Common Name	Scientific Name	Installed
California rose	*Rosa californica*	1,020
California blackberry	*Rubus ursinus*	1,020
	Total	**2,040**

2.2 Irrigation Installation

Irrigation to woody plant species is provided through a drip irrigation system. The system is connected to a sub-grade 4-inch PVC main line that begins at a rehabilitated agricultural well located along an access road at the north edge of the project between the elderberry planting site and the cultural site. The system utilizes three valves to irrigate the different portions of the site. Valve 1 irrigates the new elderberries and native associate plantings (Phase 1B), Valve 2 irrigates the elderberry transplants (Phase 1A) and Valve 3 irrigates the cultural site (Phase 1C). All three valves are operated by an electric programmable irrigation controller.

Drip tubing was placed along the planting rows ensuring that the three drip emitters were placed at each individual plant. Drip line "T" assemblies were used to connect each line of drip tubing to a lateral PVC pipe, stemming off of Valve 1. Air relief valves were installed at the end of each lateral line to flush the system during irrigation operations. Each Phase 1A elderberry transplant is fitted with an 18-foot drip tubing ring located around the drip line. This drip tubing is connected to a 1-inch on-grade lateral PVC line that connects to Valve 2. A 2½-inch lateral PVC pipe extends from Valve 3 to the cultural site (Phase 1C) where drip line "T" assemblies are used to connect drip tubing. Drip tubing was placed along each planting row in the cultural site ensuring that the three drip emitters were placed at each individual cutting.

Although planting was completed on February 26, 2010, irrigation installation was not operational until May 11, 2010 due to favorable weather conditions and delays in well

rehabilitation. The irrigation system became operational on May 11, 2010 using a powered generator. On June 11, 2010, permanent electrical power from Pacific Gas and Electric (PG&E) was provided to the pump making it fully automated. Although plants were installed prior to the irrigation system being fully operational, above average rainfall in the regional area provided the plantings with adequate water. Between February and May 2010 the area received approximately 7-inches of rain. Frequent site visits were made to monitor soil conditions and plant stress. During this period soils were found to have fair to good moisture and warranted no action.

2.3 Signs and Fences

Permanent VELB protection signs were installed around the project area (Phases 1A and 1B) every 300 feet indicating the purpose of the habitat site. Fencing is not warranted and was not installed as part of this project.

3.0 Summary of Maintenance Activities

This report summarizes maintenance activities from May 2010 to October 2010. Maintenance activities consisted of non-native weed control, irrigation activities, and replanting.

3.1 Irrigation

The irrigation system was operated from May through October 2010 by manual and automatic operation. During irrigation operations the electronic timer been has been set to operate each valve individually for 4 hours, twice per week. This regime would provide each plant with approximately 6.0 gallons per irrigation day or 12.0 gallons per week. This is based on the drip tube emitters having an emission rate of 0.5 gallons per hour (GPH) and each plant receiving 1.5 GPH.

In June, restoration technicians flushed the system and checked the irrigation system for leaks. In several areas the tubing had expanded and/or contracted likely due to heat and had slightly offset the emitters from the plantings. The tubing in these areas were cut, aligned properly and reattached. Other areas that had demonstrated leaks were repaired using Teflon tape to seal threads or by re-applying glue to connection points.

In September, restoration technicians manually operated each irrigation valve to inspect the operability of the system. Repairs were made to the ½-inch drip tubing where necessary. In late October the irrigation system was winterized by draining each valve, turning off the electronic timer and shutting down the power to the system. It was noted by the restoration technicians that the power pole at the pump station was leaning in a precarious position and may need to be realigned in an upright position in the future.

3.2 Weed Control

Two major weed control events occurred in April and in June 2010. Weed control included mechanical and manual methods to reduce non-native weeds around the new elderberries and native associate plantings. During each event, a tractor with a mowing attachment was used to mow tall vegetation in the center of each row. String trimmers were used to mow the areas around each planting to prevent competition for water and

sunlight. During site visits weeds were hand pulled from within the plant boxes where string trimmers were not accessible.

Weed control continued in August 2010. All areas within the site were the focus of mechanical implementation. Areas between the plant rows were, once again, mowed using a tractor and mowing attachment, while the plant rows themselves were string trimmed. Some weeds, primarily Johnson grass (*Sorghum halepense*) and thistle species, were the targeted for hand removal, especially when found growing within the milk carton tree protectors.

3.3 Replanting

During the August weed control event, the cultural site was subjected to mechanical weed control. Mechanical weed control was performed using string trimmers fitted with a flexible plastic trimmer line due to the amount of cobble on-site and potential fire hazard. Restoration Resources enhanced the area by replanting California rose and California blackberry with nursery grown container plants. Prior to plant installation restration technicians walked the cultural site are and placed planting flags at emitter locations that had dead individuals from the original plant installation. A total of 200 blackberries and 100 rose were installed as tree band sized container plants.

4.0 Monitoring

4.1 Performance Criteria

A minimum survival rate of at least 60 percent of the elderberry plants and 60 percent of the associated native plants for Phase 1B must be maintained throughout the monitoring period. If within one year of discovery the survival has dropped below 60 percent, failed plantings will be replaced to bring survivorship above the success criteria. In August 2010 the performance criteria of a minimum survival rate of at least 10 percent of the cultural site plantings was established for Phase 1C. There are no performance criteria for the elderberry transplants.

4.2 Monitoring Methods

Although the timing and schedule for the Adult Beetle and Exit Hole Surveys will not change, the Woody Plant Survivorship monitoring timing will change in subsequent years and as a result this change will require future monitoring reports to be submitted by December 31st of that establishment year.

4.2.1. Adult Beetle and Exit Hole Surveys

Surveys were conducted by closely examining the stems of all transplanted elderberries subject to monitoring for the presence of adult beetles and exit holes. Once exit holes were found, data was recorded on stem size, hole-height on stem, and whether the hole looked new or old. All exit holes below eight feet and in live elderberry stems larger than one inch were assumed to be made by VELB.

4.2.2. Plant Survivorship

Woody container plantings and cuttings within the project area were evaluated for survivorship and were given a health rating. Plants with leaves and/or greenish bud scales were considered alive. If live leaves and greenish bud scales were not present, monitors created a small (<4mm long) scratch on a main stem of the plant, to a depth just under the bark. If the tissue under the bark was moist and/or greenish, the plant was considered alive. A spot on the ground next to each tree was marked with non-toxic ground marking paint in order to prevent double counting. Survivorship percentage was calculated by dividing the number of live plants by the total number of plants installed. Each woody planting was located in the field in June 2010, and its health was evaluated according to the nine point scale summarized in Table 3. In subsequent establishment years woody plant survivorship will be conducted later in the year (September) in order to have a better evaluation on the success of the woody plantings survivorship through the full summer season. Since performance criteria for Phase 1C were established in August 2010, only a qualitative analysis was performed for the cultural site plantings. At the time of the qualitative analysis it was determined that more than 10 percent of the cultural site plantings have survived, but more than 30 percent have died due to competition with non-native weed species. To ensure that there were a minimum of 10 percent of the cultural site plantings, replants were installed to exceed the minimum 10 percent performance criteria.

Table 3. Plant Health and Vigor Rating System

Numerical Index	Rating	Characteristics
1-3	Good	Free of any signs of stress, disease, nutrients, or parasite. 100-67% healthy foliage cover. Leaves dark green, appropriate size for tree species and development. Thick canopy cover, proportional height to DBH ratio.
4-6	Fair	Evidence of stress, disease, nutrient deficiency, or parasites. Minor leaf loss or deformity. 66-34% healthy foliage cover. Leave green to yellow, a little smaller than average.
7-9	Poor	Clear evidence of widespread stress, disease, nutrient deficiency, or parasites. 33-0% foliage cover. Substantial leaf loss or yellowing, bud death. No canopy cover. High potential of tree mortality.

4.2.3. Photo Documentation

Photos were taken during the monitoring events that show a representative of plant growth at the site in random locations. Permanent photo stations were not established, but will be installed at the end of Year 1 in order to make comparisons of plant growth, health, and site conditions over subsequent years in the fall of each year. Photos of each elderberry transplant were taken from the same location during each exit hole survey. Representative photos are provided in Appendix B.

4.3 Results and Discussion

4.3.1. Adult Beetle and Exit Hole Surveys

A total of two exit hole surveys were performed on March 22nd and June 30th, 2010. During the June visit a total of three new potential VELB exit holes were identified on transplant number SB-37. One of the new potential exit holes were located approximately 3 feet high on a stem measuring 5-inches in diameter. The other two new potential exit holes were located approximately 6 feet high on branches that were 3-inches and 5-inches in diameter. A total of 102 potential VELB exit holes that looked more than one year old were observed over all the elderberry transplants. No adult VELB were observed during the site visits.

4.3.2. Plant Survivorship

There were eight (8) species comprised of 4,048 individual woody plants assessed for survivorship. Of the 4,048 individuals, 3,912 plants were found to be in to be in good or fair health, 9 plants were considered to be in poor health and 127 plants were dead, with an overall survivorship of 97.1 percent. The total survivorship for associate plant species is 98.9 percent. Average height of the native associates is 2.42 feet and the average health and vigor score is 1.64. The total survivorship for blue elderberry is 93.4 percent. Average height of the blue elderberries is 2.04 feet and the average health and vigor score is 2.38. Table 4 summarizes the results from plant survivorship monitoring.
During exit hole surveys each elderberry transplant was assessed for survivorship, health and vigor. Out of the 37 elderberry transplants three (3) plants had all dead stems and no new regenerating or budding stems. These elderberries were assumed to have been dead during the exit hole surveys. The total percent survivorship of the elderberry transplants is 91.9 percent and the average health and vigor score is 4.16. The elderberry transplants that are assumed to be dead are SB-01, SB-16 and SB-19.

Table 4. Plant Survivorship, Average Height and Average Health

Common Name	Scientific Name	Installed	Alive	Dead	Percent Survivorship (%)	Average Height (ft)	Average Health
coyote brush	*Baccharis pilularis*	524	518	6	98.85	2.65	2.28
mule fat	*Baccharis salicifolia*	358	352	6	98.32	3.20	1.45
buttonbush	*Cephalnathus occidentalis*	222	220	2	99.10	1.08	1.76
California rose	*Rosa californica*	791	780	11	98.61	1.70	1.84
California blackberry	*Rubus ursinus*	316	312	4	98.73	1.44	1.37
sandbar willow	*Salix exigua*	137	137	0	100	3.66	1.37
arroyo willow	*Salix lasiolepis*	225	225	0	100	3.21	1.45
Associates Total		**2573**	**2544**	**29**	**98.87**	**2.42**	**1.64**
blue elderberry	*Sambucus mexicana*	1475	1377	98	93.36	2.04	2.38
Overall Total		**4048**	**3921**	**127**	**97.05**	**2.23**	**2.01**

4.3.3. General Site Conditions

Surface water was present within the 20 acre habitat area in March due to low depressions that do not provide sufficient drainage, but began to dry out into April. These areas were avoided as best as possible during plant flag layout so that more xeric species like elderberry do not sit in saturated soils. These areas may have stayed inundated due to the more than average rain received in the regional area during the winter and early spring season. All roads and signs show no signs of damage or vandalism. Pedestrians, vehicles, and horses have been observed walking on the top of the newly created setback levee and occasionally on the floodplain side at the toe of the levee slope, but have not been observed within or show no signs of disturbing the planting areas. Weeds have been kept mowed early in the season and demonstrate no significant threats to the plantings. In June, the levee district performed a controlled burn on the levee slope to assist in levee inspections. There are no signs of adverse affects or threats from performing the burn.

5.0 Conclusion

Post construction monitoring results show that the VELB habitat is meeting performance criteria. Although irrigation installation was completed later in the spring season with the construction of the water well pump the native woody plantings have demonstrated good vegetative development. Some plantings may have benefited from being placed in areas that demonstrated ponding early in the season (e.g. willow species). Three elderberry transplants are assumed to be dead and have no living vegetative growth. Three potential VELB exit holes were found on transplant number SB-37, but no VELB individuals were observed during exit hole surveys.

Construction began in February 2010 and was completed with the installation of the water well pump in May 2010. All plantings were installed by February 26, 2010. Maintenance activities included irrigation and weed management. During maintenance site visits the irrigation system was flushed and inspected for functionality and operability. Drip lines were walked and checked for damage. The irrigation was being operated using an automatic timer and was programmed to operate for 4 hours per valve twice per week. With the onset of natural precipitation restoration technicians winterized the irrigation system by draining the valves and shutting down the power to the system. Weeds were mowed in between rows and string trimmed between plants. No vandalism was observed on-site. Signs and infrastructure was in good condition during site visits. Pedestrians, vehicles, and horses were observed using the road at the top of the levee and the road at the base of the levee, but have had no significant impacts to the new plantings or the elderberry transplants. The levee district had performed a controlled burn on the levee slope in June to remove vegetation for levee inspections and maintenance. The native plantings or elderberry transplants did not appear to have been adversely affected by the controlled burn.

6.0 References

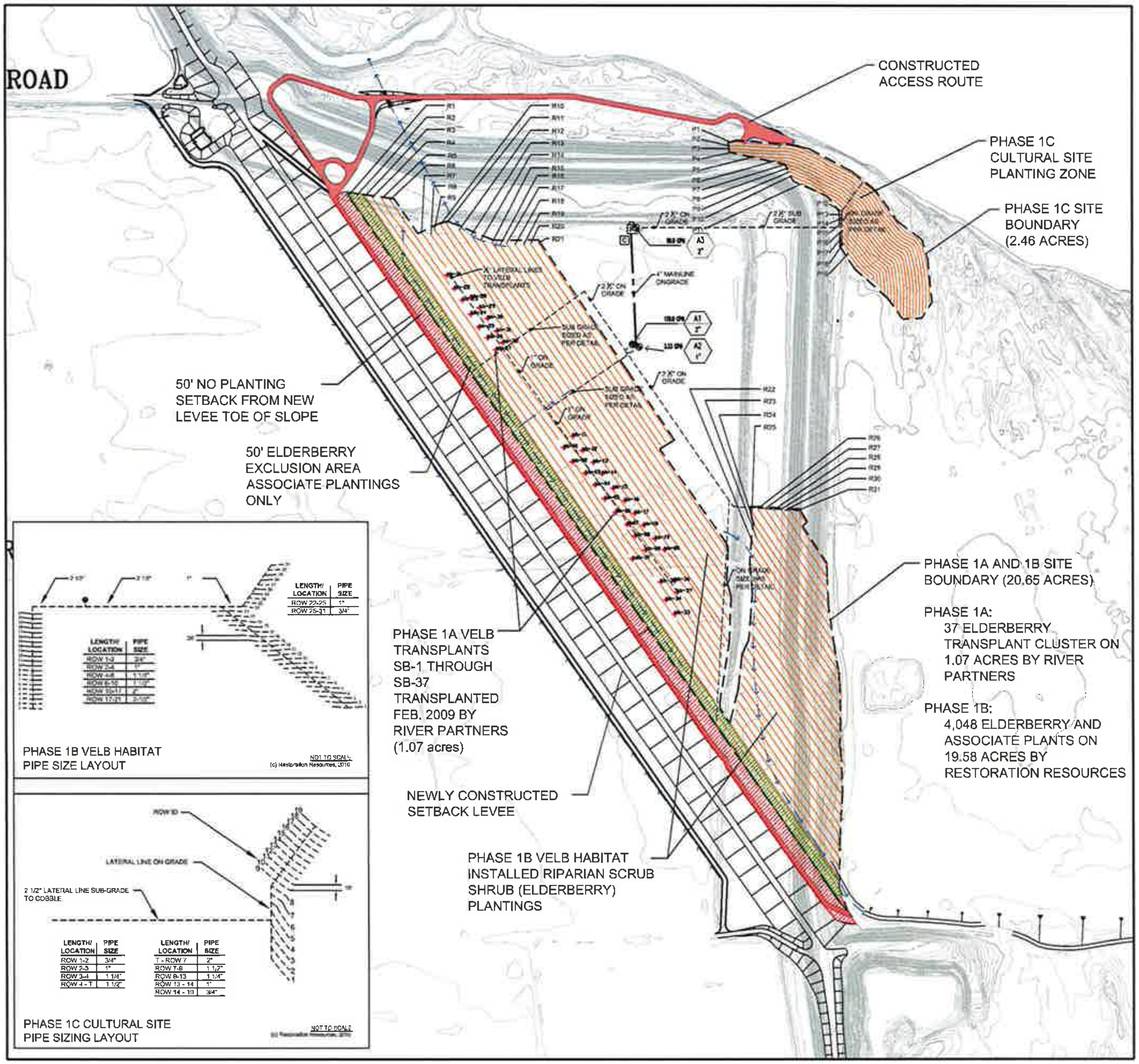
River Partners. 2009. Elderberry Transplant Report Star Bend Setback Levee Project. Prepared for the U.S. Fish and Wildlife Service and Levee District One. Sutter County, CA.

River Partners, Stillwater Sciences. 2009. Habitat Enhancement Plan for the Feather River Setback Levee and Habitat Enhancement Project at Star Bend. Prepared for Levee District One and Wood Rodgers. Sutter County, CA.

U.S. Fish and Wildlife Service. Revised 1999. Conservation Guidelines for the Valley Elderberry Longhorn Beetle. Sacramento, CA.

Appendix A
As-Built Drawings

Attachment G



SYMBOLS LEGEND

SYM.	DESCRIPTION	DETAIL
	LIMIT OF WORK (20.65 ACRES) & (2.46 ACRES)	--
	CONTOUR LINES PRIOR TO NEW LEVEE CONSTRUCTION	--
	50' ELDERBERRY EXCLUSION AREA (2 Rows with in this area are planted with associates only)	--
	50' VEGETATION PLANTING EXCLUSION AREA (50' buffer from toe of constructed levee slope)	--
	PREVIOUSLY CONSTRUCTED ACCESS ROUTE	--
	PREVIOUSLY CONSTRUCTED SWALE WATER FLOW DIRECTION	--
	PLANTING ROWS (rows 20' apart, plantings 11' on center running the length of the rows)	--
P	IRRIGATION WELL PUMP LOCATION	--

Phase 1A Riparian Scrub Shrub (Elderberry) Transplanted Clusters			
Common Name	Scientific Name	Installed	Density (plants per acre over 1.07 acres)
blue elderberry	Sambucus mexicana	37	34.6

Phase 1B VELB Habitat Installed Riparian Scrub Shrub (Elderberry) Plantings				
Common Name	Scientific Name	Installed	Percent of Total Installed	Density (plants per acre over 19.58 acres)
coyote brush	Baccharis pilularis	524	12.9%	26.8
mule fat	Baccharis salicifolia	359	8.9%	18.3
buttonbush	Cephalanthus occidentalis	222	5.5%	11.3
California rose	Rosa californica	791	19.5%	40.4
California blackberry	Rubus ursinus	316	7.8%	16.1
sandbar willow	Salix exigua	137	3.4%	7.0
Arroyo willow	Salix lasiolepis	225	5.6%	11.5
	Associates Total	2,573	63.6%	131.4
blue elderberry	Sambucus mexicana	1,475	36.4%	75.3
	Overall Total	4,048	100.0%	206.7

Phase 1C Cultural Site Installed Riparian Scrub Shrub (Blackberry) Plantings				
Common Name	Scientific Name	Installed	Percent of Total Installed	Density (plants per acre over 2.46 acres)
California rose	Rosa californica	1,020	50.0%	414.6
California blackberry	Rubus ursinus	1,020	50.0%	414.6
	Overall Total	2,040	100.0%	829.3

PLANTING NOTES:

1. Phase 1C Cultural site Plantings are cuttings planted along rows 10-foot apart and installed 5-foot on center.

2. Phase 1B VELB Habitat Installed Woody Plantings are planted along rows 20-foot apart and installed 11-foot on center.

IRRIGATION LEGEND

SYMBOL	DESCRIPTION	MANUFACTURER / MODEL	DETAIL	REMARKS
P	WELL PUMP W/ FILTER	[illegible]	-	[illegible]
	CONTROL VALVE	[illegible]	-	[illegible]
[illegible]	DRIP LINE 1	ASSEMBLED IN FIELD	-	VERIFY LOCATION IN FIELD
[illegible]	DRIP TUBING END CAP	AS APPROVED	-	VERIFY LOCATION IN FIELD
[illegible]	[illegible]	ASSEMBLED IN FIELD	-	[illegible] AT EACH ELDERBERRY TRANSPLANT
C	CONTROLLER	[illegible] CONTROLLER	-	[illegible]
	PVC MAINLINE PIPE [illegible]	AS APPROVED	-	[illegible]
	PVC LATERAL LINE PIPE	AS APPROVED	-	[illegible]
[illegible]	DRIP TUBING	[illegible]	-	[illegible] CLUSTER OF 3 @ 11' ON CENTER - ELDERBERRY AREA; CLUSTER OF 3 @ 5' ON CENTER - CULTURAL SITE

A20 / 1" / 20 — VALVE NUMBER, G.P.M., VALVE SIZE

0 75 150 300

PREPARED BY: RESTORATION RESOURCES
3868 CINCINNATI AVENUE
ROCKLIN CA 95765
TEL 916.408.2990
FAX 916.408.2999
www.restorationresources.net
CA LIC. [redacted]

APPENDIX A

SHEET 1 OF 3

CLIENT: Levee District No. 1
of Sutter Co.
243 Second St.
Yuba City, CA 95991
Phone: (530) 673-2151
Email: ld1@hpl.com

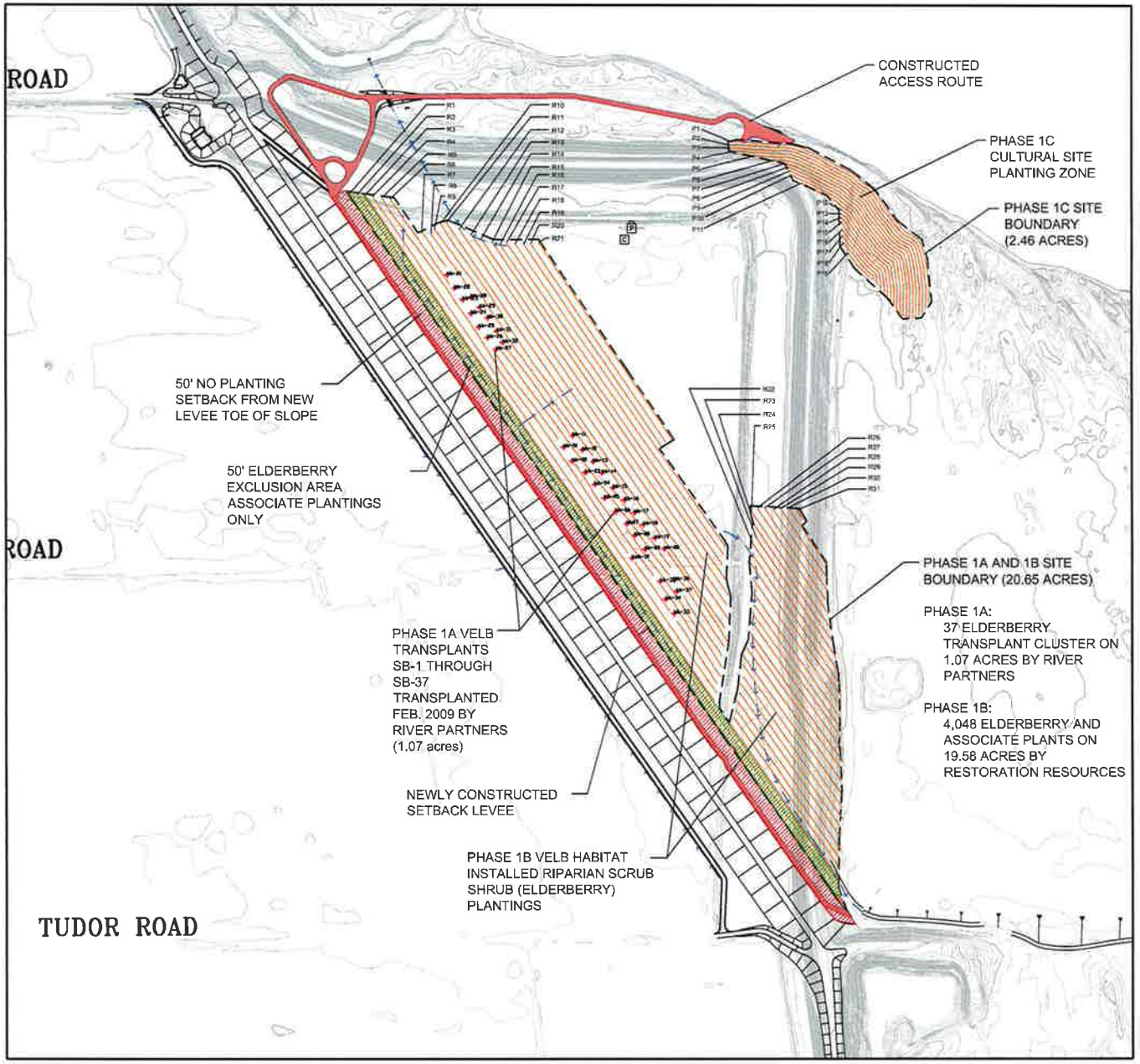
SHEET TITLE: STAR BEND PHASE 1 HABITAT ENHANCEMENT
As-Built Records
AS-BUILT PLANTING & IRRIGATION PLAN

NORTH

SCALE 1" = 150'

SHEET NO: L1.1

1 of 3



SYMBOLS LEGEND

SYM.	DESCRIPTION	TOTAL
	LIMIT OF WORK (20.65 ACRES) & (3.46 ACRES)	--
	CONTOUR LINES PRIOR TO NEW LEVEE CONSTRUCTION	--
	50' ELDERBERRY EXCLUSION AREA (3 Rows with in this area are planted with associates only)	--
	50' VEGETATION PLANTING EXCLUSION AREA (50' buffer from toe of constructed levee slope)	--
	PREVIOUSLY CONSTRUCTED ACCESS ROUTE	--
	PREVIOUSLY CONSTRUCTED SWALE W/ WATER FLOW DIRECTION	--
	PLANTING ROWS (rows 20' apart, plantings 1' on center running the length of the rows)	--
P	IRRIGATION WELL PUMP LOCATION	--

ROW ID	LENGTH (FT.)
P1	903
P2	912
P3	909
P4	897
P5	809
P6	731
P7	683
P8	653
P9	627
P10	599
P11	535
P12	362
P13	333
P14	303
P15	271
P16	229
P17	190
P18	150
P19	101
TOTAL	10197

ROW ID	LENGTH (FT.)
R1	2722
R2	2656
R3	2519
R4	2467
R5	2350
R6	2001
R7	1497
R8	1631
R9	1965
R10	1925
R11	2078
R12	2002
R13	1901
R14	1864
R15	1709
R16	1694
R17	1656
R18	1629
R19	1256
R20	1256
R21	1239
R22	496
R23	451
R24	440
R25	441
R26	397
R27	354
R28	310
R29	266
R30	221
R31	46
TOTAL	43445

PLANTING NOTES:

1. Please refer to "Planting Matrix" attachment for species planting pattern per row (Sheet 3 of 3).

2. Planting rows with 'Row ID' beginning with "P" are pole or cuttings planted along rows 10-foot apart and installed 5-foot on center.

3. Plantings rows with 'Row ID' beginning with "R" are planted along rows 20-foot apart and installed 11-foot on center.

4. All rows are to be verified in the field by the project restoration ecologist. All additional planting locations in the elderberry transplant area and existing vegetation areas shall be determined in the field by the project restoration ecologist and planted by hand.

0 75 150 300

PREPARED BY: RESTORATION RESOURCES

APPENDIX A
SHEET 2 OF 3

CLIENT: Levee District No. 1

SHEET TITLE: STAR BEND PHASE 1 HABITAT ENHANCEMENT
As-Built Records
AS-BUILT PLANTING PLAN

NORTH

SCALE 1" = 150'

SHEET NO: L1.2

2 of 3

Attachment G

Phase 1B Habitat Installed Riparian Scrub Shrub (Elderberry) Plantings Matrix As-Built (Example)

Buffer Row Buffer Row

Plant/Row	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	ROCA	CEOC	ROCA	SAEX	SAEX	ROCA	SAEX	ROCA	SAEX	SAEX	SAEX	RUUR	SAEX	ROCA	BASA
2	ROCA	ROCA	ROCA	ROCA	SAEX	SAEX	SAEX	ROCA	SAEX	ROCA	ROCA	RUUR	SAEX	SAEX	BASA
3	BAPI	ROCA	BAPI	ROCA	ROCA	SAEX	ROCA	SAEX	ROCA	ROCA	ROCA	BASA	ROCA	SAEX	BASA
4	BAPI	BAPI	BAPI	BAPI	ROCA	ROCA	ROCA	SAEX	ROCA	BAPI	RUUR	BASA	ROCA	ROCA	RUUR
5	ROCA	BAPI	SAME	BAPI	BAPI	ROCA	BAPI	ROCA	BAPI	BAPI	RUUR	BASA	SALA	ROCA	RUUR
6	ROCA	ROCA	SAME	SAME	BAPI	BAPI	BAPI	ROCA	BAPI	SAME	BASA	SAME	SALA	BAPI	SAME
7	ROCA	ROCA	SAME	SAME	SAME	BAPI	SAME	BAPI	SAME	SAME	BASA	SAME	CEOC	BAPI	SAME
8	BAPI	ROCA	SAME	SAME	SAME	SAME	SAME	BAPI	SAME	SAME	CEOC	SAME	CEOC	SAME	SAME
9	BAPI	BAPI	CEOC	SAME	SAME	SAME	SAME	SAME	SAME	SAME	CEOC	ROCA	SAME	SAME	ROCA
10	SALA	BAPI	CEOC	CEOC	SAME	SAME	SAME	SAME	SAME	CEOC	SALA	ROCA	SAME	SAME	ROCA
11	SALA	SALA	SALA	CEOC	CEOC	SAME	CEOC	SAME	CEOC	CEOC	SALA	BALA	SAME	SAME	BAPI
12	SALA	SALA	SALA	SALA	CEOC	CEOC	CEOC	SAME	CEOC		ROCA	SAEX	SAME	CEOC	BAPI
13	ROCA	SALA	SAME	SALA	SAME	CEOC		CEOC			ROCA	BAPI	BAPI	CEOC	SAME
14	ROCA	ROCA	SAME	SAME	SAME	SAME		CEOC		SAME	SAME	SAEX	BAPI	SALA	SAME
15	ROCA	ROCA	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME		SAME
16	BASA	ROCA	SAME	SAME	SAME	SALA	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME
17	BASA	BASA	ROCA	SAME	SALA	SALA	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME	ROCA
18	ROCA	BASA	ROCA	ROCA	SALA	SAME	SAME	SAME	SAME	ROCA	SAME	SAME	SAME	SAME	ROCA
19	ROCA	ROCA	SAME	ROCA	RUUR	SAME	ROCA	ROCA	ROCA	ROCA	SAME	RUUR	ROCA	SAME	SALA
20	BAPI	ROCA	SAME	SAME	RUUR	ROCA	ROCA	ROCA	ROCA	SAME	SAME	RUUR	ROCA	ROCA	SALA
21	BAPI	BAPI	SAME	SAME	SAME	RUUR	SAME	SAME	SAME	SAME	BASA	BAPI	SAME	ROCA	BAPI
22	BAPI	BAPI	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME	BASA	BAPI	SAME	SAME	BAPI
23	SAEX	BAPI	BASA	SAME	SAME	SAME	SAME	SAME	SAME	SAME	BASA	ROCA	SAME	SAME	SAME
24	SAEX	SAEX	BASA	BASA	SAME	SAME	SAME	BAPI	SAME	BASA	RUUR	ROCA	SAME	SAME	SAME
25	ROCA	SAEX	BASA	BASA	BASA	SAME	BASA	BAPI	BASA	BASA	RUUR	SAME		SAME	SAME
26	ROCA	ROCA	RUUR	BASA	BASA	BASA	BASA	ROCA	BASA	BASA	SAME	SAME			SAME
27	BAPI	ROCA	RUUR	RUUR	BASA	BASA	BASA	ROCA	BASA	RUUR	SAME	SAME	BASA	BASA	RUUR
28	BAPI	BAPI	SAME	RUUR	RUUR	BASA	RUUR	SAME	RUUR	RUUR	SAME	SAME	RUUR	BASA	RUUR
29	BASA	BAPI	SAME	SAME	RUUR	RUUR	RUUR	SAME	RUUR	SAME	SAME	SAME	RUUR	RUUR	BAPI
30	BASA	BASA	SAME	SAME	SAME	RUUR	SAME	SAME	SAME	SAME	BASA	CEOC	SAME	RUUR	BAPI
31	BASA	BASA	ROCA	SAME	SAME	SAME	SAME	SALA	SAME	SAME	BASA	CEOC	SAME	SAME	ROCA
32	ROCA	BASA	ROCA	ROCA	SAME	SAME	SAME	SALA	SAME	ROCA	ROCA	RUUR	SAME	SAME	ROCA
33	ROCA	ROCA	BAPI	ROCA	ROCA	SAME	ROCA	BASA	ROCA	ROCA	ROCA	RUUR	ROCA	SAME	SAME
34	CEOC	ROCA	BAPI	BAPI	ROCA	ROCA	ROCA	BASA	ROCA	BAPI	BASA	SAME	ROCA	ROCA	SAME
35	CEOC	CEOC	SAME	BAPI	BAPI	ROCA	BAPI	BASA	BAPI	BAPI	BASA	SAME	BAPI	ROCA	SAME
36	CEOC	CEOC	SAME	SAME	BAPI	BAPI	BAPI	RUUR	BAPI	SAME	CEOC	SAME	BAPI	BAPI	SAME
37	ROCA	CEOC	SAME	SAME	SAME	BAPI	SAME	RUUR	SAME	SAME	CEOC	SAME	SAME	BAPI	CEOC
38	ROCA	ROCA	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME	BASA	SAME	SAME	CEOC
39	BAPI	ROCA	ROCA	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME	BASA	SAME	SAME	RUUR
40	BAPI	BAPI	ROCA	ROCA	SAME	SAME	SAME	SAME	SAME	ROCA	SAME	ROCA	SAME	SAME	RUUR
41	ROCA	BAPI	SALA	ROCA	ROCA	SAME	ROCA	SAME	ROCA	ROCA	ROCA	ROCA	ROCA	SAME	SAME
42	ROCA	ROCA	SALA	SALA	ROCA	ROCA	ROCA	ROCA	ROCA	SALA	ROCA	SAEX	ROCA	ROCA	SAME
43	ROCA	ROCA	BAPI	SALA	SALA	ROCA	SALA	ROCA	SALA	SALA	SALA	SAEX	SALA	ROCA	SAME
44	BAPI	ROCA	BAPI	BAPI	SALA	SALA	SALA	SALA	SALA	BAPI	SALA	ROCA	SALA	SALA	SAME
45	BAPI	BAPI	SAME	BAPI	BAPI	SALA	BAPI	SALA	BAPI	BAPI	SALA	ROCA	BAPI	SALA	BASA
46	SALA	BAPI	SAME	SAME	BAPI	BAPI	BAPI	BAPI	BAPI	SAME	BASA	BAPI	BAPI	BAPI	BASA
47	SALA	SALA	SAME	SAME	SAME	BAPI	SAME	BAPI	SAME	SAME	BASA	BAPI	SAME	BAPI	ROCA
48	SALA	SALA	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME	BASA	SAME	SAME	SAME	ROCA
49	ROCA	SALA	RUUR	SAME	SAME	SAME	SAME	SAME	SAME	SAME	RUUR	SAME	SAME	SAME	SAEX
50	ROCA	ROCA	RUUR	RUUR	SAME	RUUR	SAME	SAME	SAME	RUUR	RUUR	SAME	SAME	SAME	SAEX

Plant Flag Code	Common Name	Scientific Name	Project Totals
BAPI	coyote brush	*Baccharis pilularis*	524
BASA	mule fat	*Baccharis salicifolia*	358
CEOC	bottun bush	*Cephalanthus occidentalis*	222
ROCA	California rose	*Rosa californica*	791
RUUR	California blackberry	*Rubus ursinus*	316
SAEX	sandbar willow	*Salix exigua*	137
SALA	arroyo willow	*Salix lasiolepis*	225
SAME	blue elderberry	*Sambucus mexicana*	1,475
		Total	4,048

0 75 150 300

RESTORATION RESOURCES

APPENDIX A
SHEET 3 OF 3

CLIENT: Levee District No. 1

STAR BEND PHASE 1 HABITAT ENHANCEMENT
As-Built Records
SAMPLE PLANTING MATRIX

NORTH

SCALE

SHEET NO. L1.3

3 OF 3

Attachment G

Appendix B
Photo Documentation

Elderberry Transplants SB-01 and SB-02; June 30, 2010.

Elderberry Transplants SB-03 and SB-04; June 30, 2010.

Elderberry Transplants SB-05 and SB-06; June 30, 2010.

Elderberry Transplants SB-07 and SB-08; June 30, 2010.

Elderberry Transplants SB-09 and SB-10; June 30, 2010.

Elderberry Transplants SB-11 and 12; June 30, 2010.

Elderberry Transplants SB-13 and SB-14; June 30, 2010.

Elderberry Transplants SB-15 and SB-16; June 30, 2010.

Elderberry Transplants SB-17 and SB-18; June 30, 2010.

Elderberry Transplants SB-19 and SB-20; June 30, 2010.

Elderberry Transplants SB-21 and SB-22; June 30, 2010.

Elderberry Transplants SB-23 and SB-24; June 30, 2010.

Elderberry Transplants SB-25 and SB-26; June 30, 2010.

Elderberry Transplants SB-27 and SB-28; June 30, 2010.

Elderberry Transplants SB-29 and SB-30; June 30, 2010.

Elderberry Transplants SB-31 and SB-32; June 30, 2010.

Elderberry Transplants SB-33 and SB-34; June 30, 2010.

Elderberry Transplants SB-35 and SB-36; June 30, 2010.

Elderberry Transplant SB-37; Potential VELB exit hole on elderberry transplant SB-37; June 30, 2010.

Potential VELB exit hole on elderberry transplant SB-37; Installed blue elderberry (*Sambucus mexicana*); June 30, 2010.

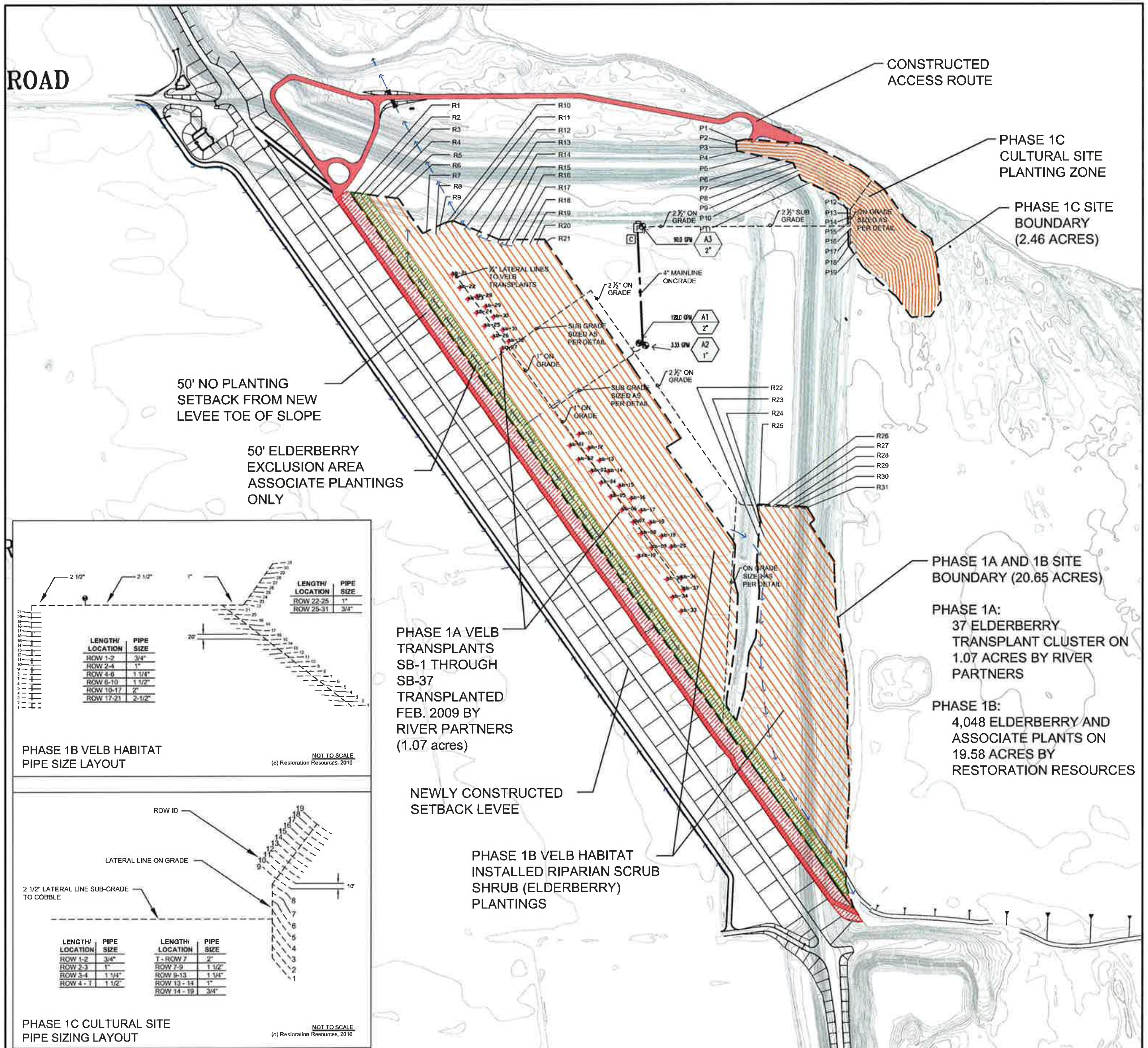
Installed coyote brush (*Baccharis pilularis*) and mule fat (*Baccharis salicifolia*); June 30, 2010.

Installed California rose (*Rosa californica*) and California blackberry (*Rubus ursinus*); June 30, 2010.

Installed arroyo willow (*Salix lasiolepis*) and sandbar willow (*Salix exigua*); June 30, 2010.

Installed buttonbush (*Cepholanthus occidentalis*) and VELB habitat protection sign; June 30, 2010.

Attachment G



SYMBOLS LEGEND

SYM.	DESCRIPTION	DETAIL
(heavy dashed line)	LIMIT OF WORK (20.65 ACRES) & (2.46 ACRES)	--
(light line)	CONTOUR LINES PRIOR TO NEW LEVEE CONSTRUCTION	--
(green hatch)	50' ELDERBERRY EXCLUSION AREA (2 Rows with in this area are planted with associates only)	--
(red hatch)	50' VEGETATION PLANTING EXCLUSION AREA (50' buffer from toe of constructed levee slope)	--
(red band)	PREVIOUSLY CONSTRUCTED ACCESS ROUTE	--
(blue arrow)	PREVIOUSLY CONSTRUCTED SWALE WATER FLOW DIRECTION	--
(orange line)	PLANTING ROWS (rows 20' apart, plantings 11' on center running the length of the rows)	--
P	IRRIGATION WELL PUMP LOCATION	--

Phase 1A Riparian Scrub Shrub (Elderberry) Transplanted Clusters			
Common Name	Scientific Name	Installed	Density (plants per acre over 1.07 acres)
blue elderberry	*Sambucus mexicana*	37	34.6

Phase 1B VELB Habitat Installed Riparian Scrub Shrub (Elderberry) Plantings				
Common Name	Scientific Name	Installed	Percent of Total Installed	Density (plants per acre over 19.58 acres)
coyote brush	*Baccharis pilularis*	524	12.9%	26.8
mule fat	*Baccharis salicifolia*	358	8.8%	18.3
buttonbush	*Cephalanthus occidentalis*	222	5.5%	11.3
California rose	*Rosa californica*	791	19.5%	40.4
California blackberry	*Rubus ursinus*	316	7.8%	16.1
sandbar willow	*Salix exigua*	137	3.4%	7.0
Arroyo willow	*Salix lasiolepis*	225	5.6%	11.5
	Associates Total	2,573	63.6%	131.4
blue elderberry	*Sambucus mexicana*	1,475	36.4%	75.3
	Overall Total	4,048	100.0%	206.7

Phase 1C Cultural Site Installed Riparian Scrub Shrub (Blackberry) Plantings				
Common Name	Scientific Name	Installed	Percent of Total Installed	Density (plants per acre over 2.46 acres)
California rose	*Rosa californica*	1,020	50.0%	414.6
California blackberry	*Rubus ursinus*	1,020	50.0%	414.6
	Overall Total	2,040	100.0%	829.3

PLANTING NOTES:

1. Phase 1C Cultural site Plantings are cuttings planted along rows 10-foot apart and installed 5-foot on center.

2. Phase 1B VELB Habitat Installed Woody Plantings are planted along rows 20-foot apart and installed 11-foot on center.

IRRIGATION LEGEND

SYMBOL	DESCRIPTION	MANUFACTURER / MODEL	DETAIL	REMARKS
P	WELL PUMP W/ FILTER	6CLC 2 STAGE GOULDS PUMP 7.5HP 230 VOLT 3 PHASE MOTOR SMARTFLOW 7.5 HP VFD WITH 900 SERIES TORNADO FILTER	-	6" STD LIFT PUMP BY WELL CONTRACTOR
(control valve symbol)	CONTROL VALVE	RAINBIRD 100 PEB	-	VALVE INSTALLED IN 14" X 19" BOLT DOWN BOX, TYP. LOCATION AS SHOWN
At Intersection of Rows & Lateral Lines	DRIP LINE T	ASSEMBLED IN FIELD	-	VERIFY LOCATION IN FIELD
At end of Rows	DRIP TUBING END CAP	AS APPROVED	-	VERIFY LOCATION IN FIELD
Same as Transplant Locations	TREE RING DRIP EMITTER	ASSEMBLED IN FIELD	-	INSTALL (2GPH) AT EACH ELDERBERRY TRANSPLANT
C	CONTROLLER	HUNTER ACC-1200 CONTROLLER	-	MOUNTED IN LOCKABLE BOX ADJACENT TO ELECTRIC SUB-PANAL
(dashed line)	PVC MAINLINE PIPE (SIZE AS INDICATED)	AS APPROVED	-	4" PVC SCH 40
(fine dashed line)	PVC LATERAL LINE PIPE	AS APPROVED	-	SIZE SHOWN ON DETAIL - PVC SCH 40, TYP.
Same as Rows	DRIP TUBING	DRIPNET PC HEAVYWALL DRIPPERLINE 0.61 GPH, 16MM	-	EACH SECTION NOT TO EXCEED 675' IN LENGTH CLUSTER OF 3 @ 11' ON CENTER - ELDERBERRY AREA CLUSTER OF 3 @ 5' ON CENTER - CULTURAL SITE

VALVE NUMBER
A20 20 G.P.M.
1"
VALVE SIZE

0 75 150 300

PREPARED BY:
RESTORATION RESOURCES
3868 CINCINNATI AVENUE
ROCKLIN, CA 95765
TEL 916.408.2990
FAX 916.408.2999
www.restoration-resources.net
CA LIC. #[illegible]

APPENDIX A
SHEET 1 OF 3

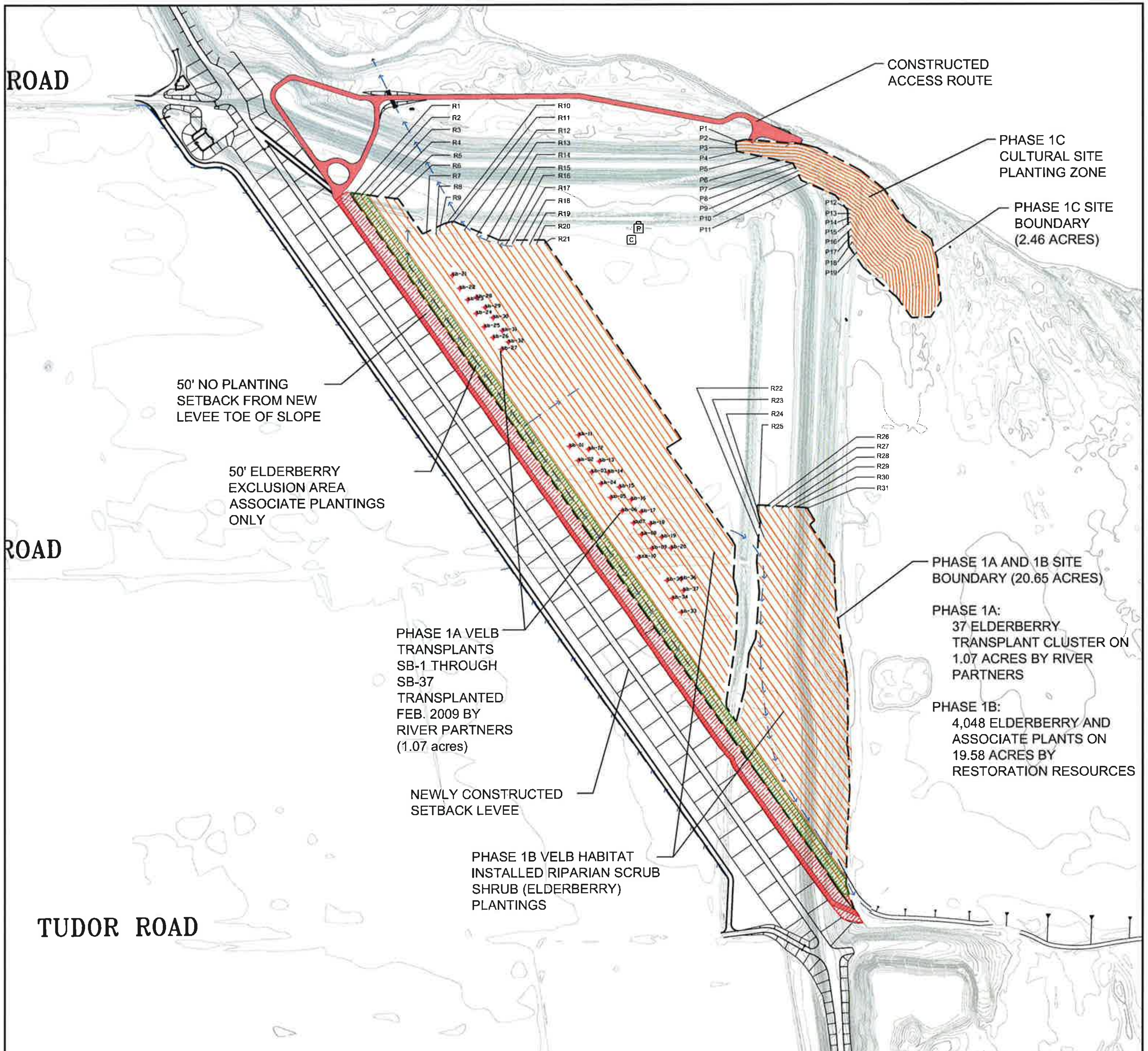
CLIENT:
Levee District No. 1
of Sutter Co.
243 Second St.
Yuba City, CA 95991
Phone: (530) 673-2454
Email: ld1@sylx.com

SHEET TITLE:
STAR BEND PHASE 1 HABITAT ENHANCEMENT
As-Built Records
AS-BUILT PLANTING & IRRIGATION PLAN

NORTH
SCALE 1" = 150'

CHECKED BY: | DATE:
ORIGINAL DATE: 7-8-10 | DRAWN BY: | JOB NUMBER: 25065
REVISION: | DATE: | BY:

SHEET NO: L1.1
1 of 3



SYMBOLS LEGEND

SYM.	DESCRIPTION	DETAIL
	LIMIT OF WORK (20.65 ACRES) & (2.46 ACRES)	--
	CONTOUR LINES PRIOR TO NEW LEVEE CONSTRUCTION	--
	50' ELDERBERRY EXCLUSION AREA (2 Rows with in this area are planted with associates only)	--
	50' VEGETATION PLANTING EXCLUSION AREA (50' buffer from toe of constructed levee slope)	--
	PREVIOUSLY CONSTRUCTED ACCESS ROUTE	--
	PREVIOUSLY CONSTRUCTED SWALE WATER FLOW DIRECTION	--
	PLANTING ROWS (rows 20' apart, plantings 11' on center running the length of the rows)	--
P	IRRIGATION WELL PUMP LOCATION	--

ROW ID	LENGTH (FT.)
P1	906
P2	912
P3	909
P4	897
P5	808
P6	731
P7	683
P8	653
P9	627
P10	598
P11	535
P12	362
P13	333
P14	303
P15	271
P16	228
P17	190
P18	150
P19	101
TOTAL	10197

ROW ID	LENGTH (FT.)
R1	2722
R2	2656
R3	2519
R4	2467
R5	2350
R6	2001
R7	1497
R8	1631
R9	1965
R10	1925
R11	2078
R12	2002
R13	1901
R14	1864
R15	1709
R16	1694
R17	1658
R18	1629
R19	1258
R20	1258
R21	1239
R22	496
R23	451
R24	440
R25	441
R26	397
R27	354
R28	310
R29	266
R30	221
R31	46
TOTAL	43445

PLANTING NOTES:

1. Please refer to "Planting Matrix" attachment for species planting pattern per row (Sheet 3 of 3).

2. Planting rows with 'Row ID' beginning with "P" are pole or cuttings planted along rows 10-foot apart and installed 5-foot on center.

3. Plantings rows with 'Row ID' beginning with "R" are planted along rows 20-foot apart and installed 11-foot on center.

4. All rows are to be verified in the field by the project restoration ecologist. All additional planting locations in the elderberry transplant area and existing vegetation areas shall be determined in the field by the project restoration ecologist and planted by hand.

0 75 150 300

PREPARED BY:
RESTORATION RESOURCES
3868 CINCINNATI AVENUE
ROCKLIN, CA 95765
TEL 916.408.2990
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CA LIC. #

APPENDIX A
SHEET 2 OF 3

CLIENT:
Levee District No. 1
of Sutter Co.
243 Second St.
Yuba City, CA 95991
Phone: (530) 673-2454
Email: ld1@sytx.com

SHEET TITLE:
STAR BEND PHASE 1 HABITAT ENHANCEMENT
As-Built Records
AS-BUILT PLANTING PLAN

NORTH
SCALE 1" = 150'

CHECKED BY: DATE:
ORIGINAL DATE: 7-9-10
DRAWN BY:
JOB NUMBER: 29085
REVISION: DATE:

SHEET NO: L1.2
2 of 3

Phase 1B Habitat Installed Riparian Scrub Shrub (Elderberry) Plantings Matrix As-Built (Example)

Plant/Row	1 (Buffer Row)	2 (Buffer Row)	3	4	5	6	7	8	9	10	11	12	13	14	15
1	ROCA	CEOC	ROCA	SAEX	SAEX	ROCA	SAEX	ROCA	SAEX	SAEX	SAEX	RUUR	SAEX	ROCA	BASA
2	ROCA	ROCA	ROCA	ROCA	SAEX	SAEX	SAEX	ROCA	SAEX	ROCA	ROCA	RUUR	SAEX	SAEX	BASA
3	BAPI	ROCA	BAPI	ROCA	ROCA	SAEX	ROCA	SAEX	ROCA	ROCA	ROCA	BASA	ROCA	SAEX	BASA
4	BAPI	BAPI	BAPI	BAPI	ROCA	ROCA	ROCA	SAEX	ROCA	BAPI	RUUR	BASA	ROCA	ROCA	RUUR
5	ROCA	BAPI	SAME	BAPI	BAPI	ROCA	BAPI	ROCA	BAPI	BAPI	RUUR	BASA	SALA	ROCA	RUUR
6	ROCA	ROCA	SAME	SAME	BAPI	BAPI	BAPI	ROCA	BAPI	SAME	BASA	SAME	SALA	BAPI	SAME
7	ROCA	ROCA	SAME	SAME	SAME	BAPI	SAME	BAPI	SAME	SAME	BASA	SAME	CEOC	BAPI	SAME
8	BAPI	ROCA	SAME	SAME	SAME	SAME	SAME	BAPI	SAME	SAME	CEOC	SAME	CEOC	SAME	SAME
9	BAPI	BAPI	CEOC	SAME	SAME	SAME	SAME	SAME	SAME	SAME	CEOC	ROCA	SAME	SAME	ROCA
10	SALA	BAPI	CEOC	CEOC	SAME	SAME	SAME	SAME	SAME	CEOC	SALA	ROCA	SAME	SAME	ROCA
11	SALA	SALA	SALA	CEOC	CEOC	SAME	CEOC	SAME	CEOC	CEOC	SALA	SALA	SAME	SAME	BAPI
12	SALA	SALA	SALA	SALA	CEOC	CEOC	CEOC	SAME	CEOC	SALA	ROCA	SAEX	SAME	CEOC	BAPI
13	ROCA	SALA	SAME	SALA	SAME	CEOC	SALA	CEOC	SALA	SALA	ROCA	BAPI	BAPI	CEOC	SAME
14	ROCA	ROCA	SAME	SAME	SAME	SAME	SALA	CEOC	SALA	SAME	SAME	SAEX	BAPI	SALA	SAME
15	ROCA	ROCA	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SALA	SAME
16	BASA	ROCA	SAME	SAME	SAME	SALA	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME
17	BASA	BASA	ROCA	SAME	SALA	SALA	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME	ROCA
18	ROCA	BASA	ROCA	ROCA	SALA	SAME	SAME	SAME	SAME	ROCA	SAME	SAME	SAME	SAME	ROCA
19	ROCA	ROCA	SAME	ROCA	RUUR	SAME	ROCA	ROCA	ROCA	ROCA	SAME	RUUR	ROCA	SAME	SALA
20	BAPI	ROCA	SAME	SAME	RUUR	ROCA	ROCA	ROCA	ROCA	SAME	SAME	RUUR	ROCA	ROCA	SALA
21	BAPI	BAPI	SAME	SAME	SAME	RUUR	SAME	SAME	SAME	SAME	BASA	BAPI	SAME	ROCA	BAPI
22	BAPI	BAPI	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME	BASA	BAPI	SAME	SAME	BAPI
23	SAEX	BAPI	BASA	SAME	SAME	SAME	SAME	SAME	SAME	SAME	BASA	ROCA	SAME	SAME	SAME
24	SAEX	SAEX	BASA	BASA	SAME	SAME	SAME	BAPI	SAME	BASA	RUUR	ROCA	SAME	SAME	SAME
25	ROCA	SAEX	BASA	BASA	BASA	SAME	BASA	BAPI	BASA	BASA	RUUR	SAME	BASA	SAME	SAME
26	ROCA	ROCA	RUUR	BASA	BASA	BASA	BASA	ROCA	BASA	BASA	SAME	SAME	BASA	BASA	SAME
27	BAPI	ROCA	RUUR	RUUR	BASA	BASA	BASA	ROCA	BASA	RUUR	SAME	SAME	BASA	BASA	RUUR
28	BAPI	BAPI	SAME	RUUR	RUUR	BASA	RUUR	SAME	RUUR	RUUR	SAME	SAME	RUUR	BASA	RUUR
29	BASA	BAPI	SAME	SAME	RUUR	RUUR	RUUR	SAME	RUUR	SAME	SAME	SAME	RUUR	RUUR	BAPI
30	BASA	BASA	SAME	SAME	SAME	RUUR	SAME	SAME	SAME	SAME	BASA	CEOC	SAME	RUUR	BAPI
31	BASA	BASA	ROCA	SAME	SAME	SAME	SAME	SALA	SAME	SAME	BASA	CEOC	SAME	SAME	ROCA
32	ROCA	BASA	ROCA	ROCA	SAME	SAME	SAME	SALA	SAME	ROCA	ROCA	RUUR	SAME	SAME	ROCA
33	ROCA	ROCA	BAPI	ROCA	ROCA	SAME	ROCA	BASA	ROCA	ROCA	ROCA	RUUR	ROCA	SAME	SAME
34	CEOC	ROCA	BAPI	BAPI	ROCA	ROCA	ROCA	BASA	ROCA	BAPI	BASA	SAME	ROCA	ROCA	SAME
35	CEOC	CEOC	SAME	BAPI	BAPI	ROCA	BAPI	BASA	BAPI	BAPI	BASA	SAME	BAPI	ROCA	SAME
36	CEOC	CEOC	SAME	SAME	BAPI	BAPI	BAPI	RUUR	BAPI	SAME	CEOC	SAME	BAPI	BAPI	SAME
37	ROCA	CEOC	SAME	SAME	SAME	BAPI	SAME	RUUR	SAME	SAME	CEOC	SAME	SAME	BAPI	CEOC
38	ROCA	ROCA	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME	BASA	SAME	SAME	CEOC
39	BAPI	ROCA	ROCA	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME	BASA	SAME	SAME	RUUR
40	BAPI	BAPI	ROCA	ROCA	SAME	SAME	SAME	SAME	SAME	ROCA	SAME	ROCA	SAME	SAME	RUUR
41	ROCA	BAPI	SALA	ROCA	ROCA	SAME	ROCA	SAME	ROCA	ROCA	ROCA	ROCA	ROCA	SAME	SAME
42	ROCA	ROCA	SALA	SALA	ROCA	ROCA	ROCA	ROCA	ROCA	SALA	ROCA	SAEX	ROCA	ROCA	SAME
43	ROCA	ROCA	BAPI	SALA	SALA	ROCA	SALA	ROCA	SALA	SALA	SALA	SAEX	SALA	ROCA	SAME
44	BAPI	ROCA	BAPI	BAPI	SALA	SALA	SALA	SALA	SALA	BAPI	SALA	ROCA	SALA	SALA	SAME
45	BAPI	BAPI	SAME	BAPI	BAPI	SALA	BAPI	SALA	BAPI	BAPI	SALA	ROCA	BAPI	SALA	BASA
46	SALA	BAPI	SAME	SAME	BAPI	BAPI	BAPI	BAPI	BAPI	SAME	BASA	BAPI	BAPI	BAPI	BASA
47	SALA	SALA	SAME	SAME	SAME	BAPI	SAME	BAPI	SAME	SAME	BASA	BAPI	SAME	BAPI	ROCA
48	SALA	SALA	SAME	SAME	SAME	SAME	SAME	SAME	SAME	SAME	BASA	SAME	SAME	SAME	ROCA
49	ROCA	SALA	RUUR	SAME	SAME	SAME	SAME	SAME	SAME	SAME	RUUR	SAME	SAME	SAME	SAEX
50	ROCA	ROCA	RUUR	RUUR	SAME	RUUR	SAME	SAME	SAME	RUUR	RUUR	SAME	SAME	SAME	SAEX

Plant Flag Code	Common Name	Scientific Name	Project Totals
BAPI	coyote brush	*Baccharis pilularis*	524
BASA	mule fat	*Baccharis salicifolia*	358
CEOC	bottun bush	*Cepholanthus occidentalis*	222
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SAME	blue elderberry	*Sambucus mexicana*	1,475
		Total	**4,048**

0 75 150 300

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APPENDIX A
SHEET 3 OF 3

CLIENT:
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of Sutter Co.
243 Second St.
Yuba City, CA 95991
Phone: (530) 673-2454
Email: ld1@syix.com

SHEET TITLE:
STAR BEND PHASE 1 HABITAT ENHANCEMENT
As-Built Records
SAMPLE PLANTING MATRIX

NORTH
SCALE

CHECKED BY: DATE:
ORIGINAL DATE: 7-6-10
DRAWN BY: MAH
JOB NUMBER: 29085
REVISION DATE: BY:

SHEET NO:
L1.3
3 of 3

APPENDIX D

Photographs of Star Bend and O'Conner Lakes VELB Mitigation and Restoration Areas with Representative Roughness "n" Values from 0.025 to 0.070

February 19, 2010 Photo of O'Conner Lakes “n” value of 07 or less

February 19, 2010 Photo of O'Conner Lakes Vegetation ”n” value of 07

April 13, 2011 Photo of O'Conner Lakes Area (Star Bend Borrow Area 2) “n” value 025

April 13, 2011 Photo of Star Bend and O'Conner Lakes “n” values of 035 to 070

Prepared by
GEI Consultants, Inc.

C E R T I F I C A T I O N of GEI Consultants, Project Manager for Lower Feather River Setback Levee at Star Bend as of June 4, 2013

GEI Consultants hereby certifies that the Lower Feather River Setback Levee at Star Bend Project by Levee District One of Sutter County (LD1 Contract No. 09-02), inclusive of the Irrigation System Relocation (LD1 Contract No. 09-01) has been completed in accordance with: (a) the submitted final plans and specifications and approved modifications thereto; (b) the Central Valley Flood Protection Board (CVFPB) Permit Nos. 18191BD *(pending final recordings of applicable easements required in CVFPB Permit No 18191BD),* 18437BD, 18438BD, and a portion of 17936-Rev GM; and (c) the DWR Funding Agreement (DWR Contract No. 4600008139) and its approved work plan and the approved time extensions and modifications thereto, *excluding (i) closure of final conveyances of easements with the Sacramento San Joaquin Drainage District (SSJDD), including a VELB conservation easement and others with the California Department of Fish and Wildlife (CDFW), and irrigation/access easements with local interests in accordance with DWR's Land Acquisition Process Requirements, (ii) final acceptance of the O&M Addendum for Levee Unit No. 144 by the U S Army Corps of Engineers (USACE), and (iii) acceptance by the CVFPB of a Vegetation Management Plan for the planting area within the enlarged floodplain at Star Bend as conditioned by the CVFPB while executing the project Operation, Maintenance, Repair, Replacement, and Rehabilitation (OMRR&R) Agreement on December 3, 2012.*

This Project Certification is based upon the certifications received from: (1) MHM Engineers, the Project Construction Manager for the Lower Feather River Setback Levee at Star Bend Construction Contract (LD1 Contract No. 09-02) certifying that the Star Bend Setback Levee between Levee Miles 3.75 and 4.50 of Unit No. 144 of the Sacramento River Flood Control Project was constructed in accordance with the Contract Plans and Specifications with field modifications, construction observations and test record results that show the as-built embankments and cutoff walls constructed under this Project meet or exceed the design requirements for the Project, dated 12-31-2010; (2) Wood Rodgers, the Project Engineer and Construction Manager for the Lower Feather River Setback Levee at Star Bend Irrigation System Relocation Project (LD1 Contract No. 09-01) certifying that the Star Bend Irrigation System Relocation Project features and elements were constructed in accordance with the Contract Plans and Specifications with field modifications, construction observations and test record results that show the above- and below-grade irrigation system relocation improvements for the Irrigation System Relocation at Star Bend meet or exceed the design and construction requirements approved by the CVFPB and the Corps of Engineers for the Project, dated 3-20-2013; (3) Wood Rodgers, the Project Design Engineer (for LD1 Contract Nos. 09-02 and 09-01), certifying on 3-20-2013, the applicable Project Elements and Features were designed and are consistent with the level of protection to be provided for the remaining segments of the Sutter Butte Flood Control Agency (SBFCA) Feather River West Levee Project (FRWLP) and identified in the locals' preferred plan of the USACE Sutter Basin Feasibility Study (SBFS); (4) Blackburn Consultants,

Geotechnical Design Engineers for LD1 Contract No. 09-02, certified on 3-20-2013, the geotechnical analyses for the Star Bend Setback Levee were completed in substantial conformance with applicable geotechnical criteria established for the Star Bend Project by the USACE, DWR and the CVFPB; and (5) the CVFPB's letter of October 23, 2012, to the USACE indicating completion of the project being built in compliance with the California Code of Regulations Title 23, DWR's Urban Levee Design Criteria (May 2012), USACE Engineering Regulations, and in accordance with CVFPB general and special permit conditions specified within CVFPB Permit Nos. 18191BD, 18437BD, 18438BD, and a portion of 17936-Rev GM.

Jeffrey E. Twitchell, RCE 33653

June 4, 2013

(See attached MHM Certification on following page)

6 Conclusion

Based on the observations, testing program, and surveys conducted for the Project, the Feather River Setback Levee at Star Bend Project was constructed in accordance with the Contract Plans and Specifications with few field modifications. Construction observations and test record results show that the as built embankments and cutoff walls constructed under this Project meet or exceed the design requirements engineered for the Project. With continued proper maintenance, the setback levee improvements at Star Bend should provide Levee District No. 1 with increased stability and reduced through and/or under seepage for the extended future at Star Bend between Levee Miles 3.75 and 4.50 of Unit No. 144 of the Sacramento River Flood Control Project.

12-31-10

Sean M. Minard, P.E., P.L.S.

REGISTERED PROFESSIONAL ENGINEER
SEAN M. MINARD
No. C52593
EXP. 12/31/12
CIVIL
STATE OF CALIFORNIA

John Michael Smith, P.E., G.E.

Roger K. Hanlin, P.L.S.

CERTIFICATION of Wood Rodgers, Project Engineer for Lower Feather River Setback Levee at Star Bend Irrigation System Relocations

Wood Rodgers, the Project Design Engineer (for LD1 Contract Nos. 09-02 and 09-01), hereby certifies that Project Elements and Features of the Lower Feather River Setback Levee Irrigation System Relocations were designed consistent with the Basis of Design Report for the Star Bend Setback Levee and Habitat Enhancement Project prepared by Wood Rodgers dated February 2009. In addition, the irrigation facilities constructed through the top of levee prism conform to the levee design standards as outlined in Wood Rodgers' hydraulic analysis and civil design certification, and are consistent with the design criteria included in Sections 2 and 3.6 of Wood Rodgers' February 2009 Basis of Design Report for the Star Bend Setback Levee and Habitat Enhancement Project . The level of protection relating to the facilities crossing the levee is consistent with the level of protection to be provided for the remaining segments of Sutter Butte Flood Control Agency's Feather River West Levee Project FRWLP).

RCE Seal No. 59538

Expiration Date: 12-31-2013

REGISTERED PROFESSIONAL ENGINEER JONATHAN L. KORS C59538 EXP. 12-31-13 CIVIL STATE OF CALIFORNIA

Jonathan L. Kors, RCE 59538 — Date: 3-20-2013

CERTIFICATION of Wood Rodgers, the Project Construction Manager for the Lower Feather River Setback Levee at Star Bend Irrigation Relocation

Wood Rodgers hereby certifies that the Lower Feather River Setback Levee at Star Bend Irrigation System Relocation Project (LD1 Contract No. 09-01) features and elements were constructed in accordance with the Contract Plans and Specifications with field modifications, construction observations and test record as reflected in the As-Built Specifications and Plans dated December 13, 2010. The results that show the above- and below-grade irrigation system relocation improvements for the Irrigation System Relocation at Star Bend meet or exceed the design requirements of the Project, including elements conditioned in CVFPB Permit Nos. 18191BD, 18437BD, and 18438BD.

RCE Seal No. 50398

Expiration Date: 06-30-2013

REGISTERED PROFESSIONAL ENGINEER DENNIS L. PHILLIPS No. 50398 Exp. 6/30/13 CIVIL STATE OF CALIFORNIA

Dennis Phillips, RCE 50398 — Date: 3/20/13

C E R T I F I C A T I O N of Wood Rodgers, Inc., Project Engineer for Lower Feather River Setback Levee at Star Bend.

Wood Rodgers, Inc. hereby certifies that the Hydraulic Analyses and Civil Design for the Lower Feather River Setback Levee (LD1 Contract No. 09-02) were completed consistent with the criteria outlined in Sections 2 and 3 of Wood Rodgers' February 2009 Basis of Design Report for the Star Bend Setback Levee and Habitat Enhancement Project. Specifically, and as further described in Section 2 in the Basis of Design Report, the primary design criteria for the project included the following:

- Reclamation Board Standards (now the Central Valley Flood Protection Board), California Code of Regulations (CCR), Title 23, Division 1, Article 8 (Section 111 through 137).
- General and Special Conditions contained in the Reclamation Board Permit (Permit No. 18191 BD).
- US Army Corps of Engineers (USACE) Engineering Manual EM 1110-2-1913, *Design and Construction of Levees*, 30 April 2000.
- USACE Standard Operating Procedure (SOP) EDG-03, *Geotechnical Levee Practice*, 7 July 2004.
- Federal Emergency Management Agency (FEMA), Title 44 of the Code of Federal Regulations, Section 65.10, Mapping of Areas Protected by Levee Systems (FEMA Section 65.10).
- DWR, Proposed Interim Levee Design Criteria for Urban and Urbanizing Area State-federal Project Levees, August 22, 2008.

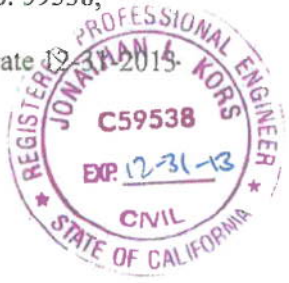
This certification indicates that the Hydraulic Analyses and Civil Designs developed were in substantial conformance with the standards noted above for levees in effect at the time of the design and met the approval of the agencies that provided oversight for this work (the USACE, DWR, and State Reclamation Board). This Certification is limited to the design flood event, which as identified in the Basis of Design as the storm frequency event corresponding to the 1957 water surface profile. For the area of Star Bend, the 1957 water surface profile is approximately equivalent to the 200-year water surface profile. This level of protection is consistent with the level of protection to be provided for the remaining segments of Sutter Butte Flood Control Agency's Feather River West Levee Project (FRWLP). Consistent with current practice, certification is valid for 10 years from the date of certification. Per 44 CFR 65.2 §2(b), "...a certification by a registered professional engineer or other party does not constitute a warranty or guarantee of performance, expressed, or implied."

RCE Seal No. 59538,

Expiration Date 12-31-2015

Jonathan L. Kors, RCE 59538

3-20-2013
Date



C E R T I F I C A T I O N of Blackburn Consulting, Geotechnical Engineer for Lower Feather River Setback Levee at Star Bend.

Blackburn Consulting (BCI), hereby certifies that the Geotechnical Analyses for the Lower Feather River Setback Levee (LD1 Contract No. 09-02) as collectively documented in the October 20, 2006 *"Geotechnical Report for Star Bend Setback Levee, Levee District No. 1 Sutter County, California,"* the November 16, 2007 *"Addendum No. 1 to Geotechnical Report, Star Bend Setback Levee, Levee District No. 1 Sutter County, California"*, the March 18, 2009 *"Geotechnical Memorandum No. 2,"* and the May 1, 2009 *"Geotechnical Memorandum No. 3"* and included in the December 2012 Construction As-Built Specifications Documents Volume 1 of 2 for LD1 Contract No. 09-02, were completed consistent with the geotechnical criteria outlined in the following:

- Reclamation Board Standards (now the Central Valley Flood Protection Board), California Code of Regulations (CCR), Title 23, Division 1, Article 8, Section 120.
- US Army Corps of Engineers (USACE) Engineering Manual EM 1110-2-1913, *Design and Construction of Levees*, 30 April 2000.
- USACE Standard Operating Procedure (SOP) EDG-03, *Geotechnical Levee Practice*, 7 July 2004.

This certification indicates that the Geotechnical analyses were in substantial conformance with the standards noted above for levees in effect at the time of the design and met the approval of the agencies that provided oversight for this work (the USACE, DWR, and State Reclamation Board). This Certification is limited to the design flood event, which as identified in the Basis of Design as the storm frequency event corresponding to the 1957 water surface profile.

Per 44 CFR 65.2 §2(b), "...a certification by a registered professional engineer or other party does not constitute a warranty or guarantee of performance, expressed, or implied..... Certification of analyses is a statement that the analyses have been performed correctly and in accordance with sound engineering practices."

Consistent with current practice and Version September 12, 2007 of the USACE Technical Letter No. 110-2-570 *"Engineering and Design, Certification of levee Systems for the National Flood Insurance Program (NFIP),"* this certification is valid for 10 years from the date of certification.

GE Certification No. 2589,

Expiration Date: 12-31-2013

Robert B. Lokteff, GE 2589

3/20/13
Date