Meeting of the Central Valley Flood Protection Board
March 25, 2016

Staff Report

Westervelt Ecological Services, LLC
Bullock Bend Mitigation Bank, Yolo County

1.0 – ITEM

Consider Central Valley Flood Protection Board (Board) approval of Permit No. 19042 (Attachment B), which will complete the Bullock Bend Mitigation Bank by breaching an existing agricultural berm and restore historical floodplain function to approximately 96 acres along the Sacramento River that existed prior the construction of the federal project (Attachment A).

2.0 – APPLICANT

Westervelt Ecological Services, LLC (Westervelt)

3.0 – PROJECT LOCATION

The project is located along the Sacramento River between Tisdale Bypass and Knights Landing at approximately River Mile 106, and south of Subacco Road, in Yolo County (Attachment A). This reach of the Sacramento River is located in a rural area bounded by State Plan of Flood Control (SPFC) levees downstream of the confluence with the Sutter Bypass. The agricultural berm proposed to be breached is not part of the SPFC.

4.0 – PROJECT DESCRIPTION

The project area contains both a private agricultural berm and a SPFC Levee. The SPFC levee is maintained by the Sacramento River West Side Levee District (SRWSLD) and runs along the west side of the property. The agricultural berm is located along the east side of the property. The property, now owned by Westervelt, was previously used to prevent flooding on the cropped portion of the site (Attachment A), and existed at the time of a survey completed by the U.S. Army Corps of Engineers (USACE) in 1909.

The applicant is proposing to breach the agricultural berm and excavate back-water channels to restore floodplain function to approximately 96 acres of the property.

(Attachment C). The creation of back-water channels will provide a vastly improved habitat from a zero value to a high quality habitat.

Approximately 202,000 cubic yards (CY) of fill, excavated from the project area, will be placed along the existing SPFC levee as a buffer. Approximately 65,000 CY will be used by SRWSLD and Reclamation District 108 to create internal SPFC levee inspection roads and to increase freeboard along irrigation supply canals. The remaining fill material will be placed along the interior side of the agricultural berm. In addition, approximately 5,400 trees and shrubs will be planted within the project area (Attachment D), and maintained in accordance with the Long Term Management Plan (LTMP) or the Interim Management Plan (IMP), (Exhibits B and C to Draft Permit No. 19042, respectively).

5.0 – AUTHORITY OF THE BOARD

California Water Code § 8534, 8590 – 8610.5, and 8700 – 8710

Title 23:

- § 6 – Need for a Permit
- § 112 – Streams Regulated and Nonpermissible Work Periods
- § 116 – Borrow and Excavation Activities – Land and Channel
- § 120 – Levees
- § 121 – Erosion Control
- § 130 – Patrol Roads and Access Ramps
- § 131 – Vegetation

6.0 – AGENCY COMMENTS AND ENDORSEMENTS

The comments and endorsements associated with this project from all pertinent agencies are shown below:

- The USACE 33 USC 408 decision letter has not yet been received for this application. Staff anticipates receipt a letter indicating that the USACE District Engineer has no objections to the project, subject to conditions. Upon receipt of the letter staff will review it for conformity with the draft permit conditions and will incorporate it into the permit as Exhibit A.

- SRWSLD endorsed the project on February 25, 2015 with no conditions.

7.0 – PROJECT ANALYSIS

7.1 – Hydraulic Summary

The Department of Water Resources (DWR) Central Valley Floodplain Evaluation and Delineation Program (CVFED) HEC-RAS one-dimensional model was used to evaluate the proposed project with the area represented as ineffective flow area.

The existing and proposed project conditions were analyzed using two-dimensional ADH software, which analyzed data from the existing federal and State one-dimensional models for the project area (Attachment E). The USACE 1957 design flow and both the 100 and 200-year storm events were used in project design and were respectively, 30,000 cubic feet per second (cfs), 39,500 cfs, and 42,500 cfs.

The crest for the agricultural berm is approximately four feet lower than the SPFC levee at the project location. There is no evidence that the agricultural berm has experienced overtopping since the construction of the federal project and adjacent SPFC levees in the area. Breaching the agricultural berm at the downstream end of the project area would allow backwater from the Sacramento River to flow into the project area and provide both habitat and additional flood storage. The proposed design creates a minor 0.005 foot decrease in Water Surface Elevation (WSE) within the project area with no raise in WSE upstream or downstream of the project area on the river, and results in very minimal impacts to river velocities, which are well below erosive.

Based on review of the submitted project designs and hydraulic analysis staff has determined that the proposed project would provide a minor localized flood risk reduction and is not anticipated to create any adverse hydraulic impacts to the Sacramento River Flood Control Project (SRFCP) and SPFC facilities.

7.2 – Geotechnical Summary

Based on review of the submitted project designs staff concurs with the applicant's assessment, which indicates that the proposed project will not cause any adverse geotechnical impacts to the Sacramento River, the SRFCP, or SPFC facilities because the proposed project creates a soil and vegetation buffer for the existing SPFC levee and is not anticipated to cause erosive velocities within the project area channel.

8.0 – CEQA ANALYSIS

Board staff has prepared the following California Environmental Quality Act (CEQA) determination:

The Board, as a Responsible Agency under CEQA, has reviewed the Initial Study, Mitigated Negative Declaration (IS/MND) and Mitigation Measures (SCH No. 2015072004, July 2015) for the Bullock Bend Mitigation Bank Project, prepared by the lead agency, Yolo County. These documents may be viewed or downloaded from the Central Valley Flood Protection Board website at http://cvfpb.ca.gov/meetings/2016/03-25-2016.cfm under a link for this agenda item. The documents are also available for review in hard copy at the Board and County offices.

Yolo County determined the project would not have a significant effect on the environment and filed a Notice of Determination on November 6, 2015 with the State Clearinghouse. Board staff finds that although the proposed project could have a potentially significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. The project proponent has incorporated mandatory mitigation measures into the project plans to avoid identified impacts or to mitigate such impacts to a point where no significant impacts will occur. These mitigation measures are included in the project proponent's IS/MND and address impacts to agriculture, air quality and biological resources. The description of the mitigation measures are further described in the adopted IS/MND.

9.0 – CALIFORNIA WATER CODE SECTION 8610.5 CONSIDERATIONS

- Evidence that the Board admits into its record from any party, federal, State or local public agency, or nongovernmental organization with expertise in flood or flood plain management:

  The Board has considered all the evidence presented in this matter, including the application for Permit No. 19042, supporting technical documentation provided by Yolo County, as well as all evidence submitted up through the hearing on this matter.

- The best available science related to the scientific issues presented by the executive officer, legal counsel, the Department of Water Resources, or other parties that raise credible scientific issues:

  In making its findings, the Board has used the best available science relating to the issues presented by all parties. On the important issue of hydraulic impacts,

Westervelt used both HEC-RAS one-dimensional models and an ADH two-dimensional hydrodynamic model. These models are considered as some of the best available scientific tools for the purpose of evaluating potential hydraulic impacts on water surface elevation and velocity at a sufficient level of analytical detail.

- Effects of the decision on the facilities of the State Plan of Flood Control (SPFC), and consistency of the proposed project with the Central Valley Flood Protection Plan (CVFPP) as adopted by Board Resolution 2012-25 on June 29, 2012:

  The proposed project is expected to result in no adverse hydraulic or geotechnical impacts on the facilities of the SPFC and is consistent with the CVFPP and current Title 23 standards because the project is anticipated to produce no increases in WSE, significant increases in channel velocities, or adverse geotechnical impacts on SPFC facilities, and is well upstream of any SPFC facilities.

- Effects of reasonable projected future events, including, but not limited to, changes in hydrology, climate, and development within the applicable watershed:

  The proposed project provides a multi-benefit design for this rural area along the Sacramento River by providing additional flood storage and creating much needed habitat in the project area. This project is not anticipated to create any adverse impacts to any surrounding projects because it there are no adverse hydraulic or geotechnical impacts anticipated.

10.0 – STAFF RECOMMENDATION

Staff recommends that the Board:

Adopt: the CEQA findings;

Approve: draft Permit No. 19042, in substantially the form provided, conditioned upon receipt of a USACE 33 USC 408 decision letter indicating that the District Engineer has no objection to the project, subject to conditions; and

Direct: the Executive officer to take the necessary actions to execute the permit and file a Notice of Determination with the State Clearinghouse.

11.0 – LIST OF ATTACHMENTS

A – Project Maps

B – Draft Permit No. 19042

Exhibit A: USACE 33 USC 408 Decision Letter

Exhibit B: Long Term Management Plan

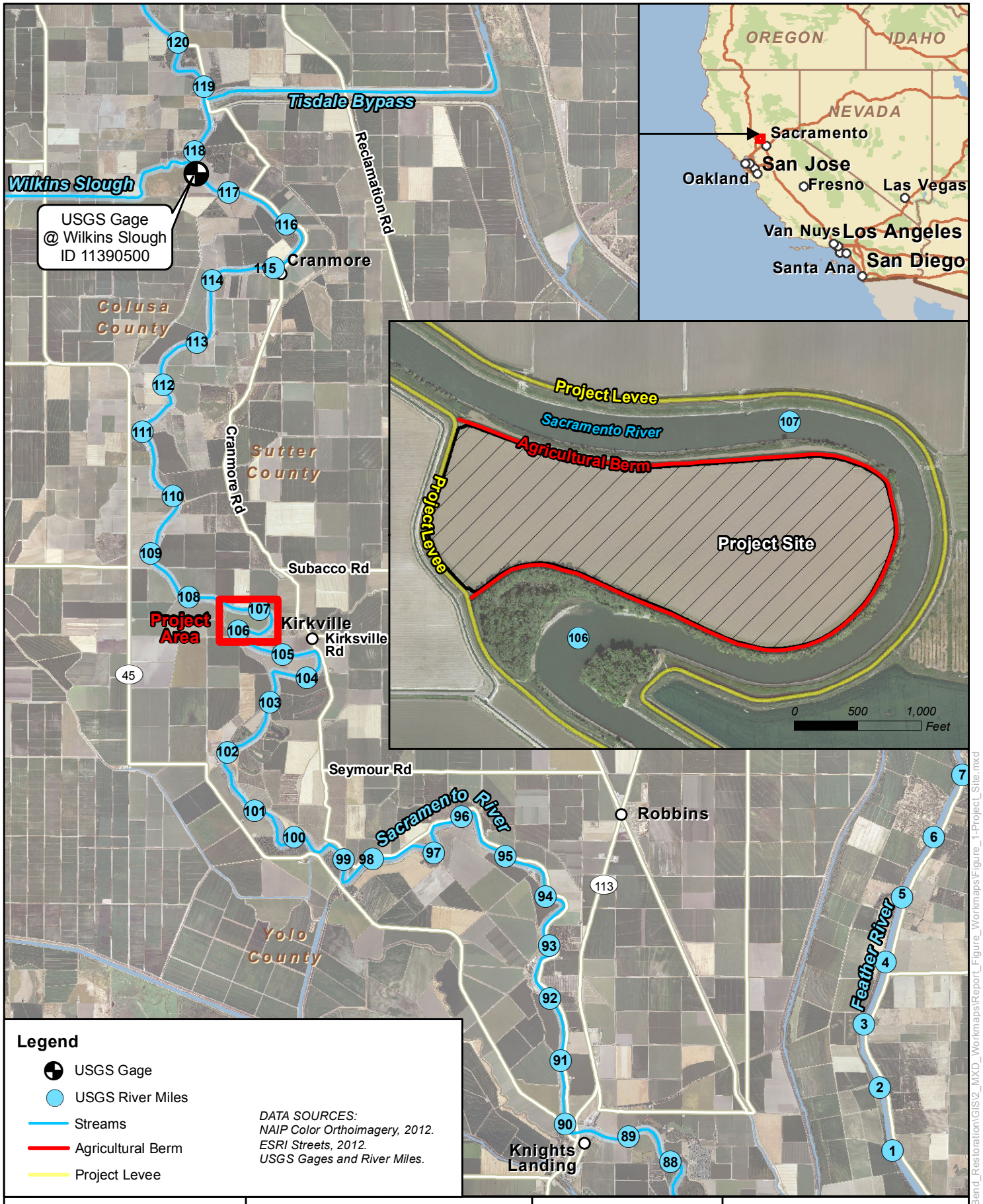
Exhibit C: Interim Management Plan

C – Project Drawings

D – Planting Table

E – Hydraulic Information

Prepared By:	Nancy Moricz, PE, Senior Engineer
Environmental Review:	James Herota, Senior Environmental Scientist
Staff Report Review:	Eric Butler, PE, Supervising Engineer
	Jit Dua, Board Counsel
	Leslie Gallagher, Executive Officer


OREGON
IDAHO
NEVADA
Sacramento
San Jose
Oakland
Fresno
Las Vegas
Van Nuys
Los Angeles
Santa Ana
San Diego
Tisdale Bypass
Reclamation Rd
Wilkins Slough
USGS Gage
@ Wilkins Slough
ID 11390500
Cranmore
Colusa
County
Sutter
County
Cranmore Rd
Subacco Rd
Project
Area
Kirkville
Kirksville
Rd
45
Seymour Rd
Sacramento River
Robbins
113
Yolo
County
Feather River
Knights
Landing
Project Levee
Sacramento River
Agricultural Berm
Project Site
0
500
1,000
Feet
Legend
USGS Gage
USGS River Miles
Streams
Agricultural Berm
Project Levee
DATA SOURCES:
NAIP Color Orthoimagery, 2012.
ESRI Streets, 2012.
USGS Gages and River Miles.
Westervelt
Ecological Services
nhc
northwest hydraulic consultants
SCALE - 1:120,000
0
5,000
10,000
Feet
N
Coordinate System: CA State Plane, Zone 2
Units: NAD83, feet
Job: 500116
Date: JUNE 2014
FIGURE 1
Bullock Bend Restoration
Figure 1
Project Site
ABC, P:\500107-Bullock_Bend_Restoration\GIS\2_MXD_Workmaps\Report_Figure_Workmaps\Figure_1-Project_Site.mxd

Sacramento Sediment - Phase 2

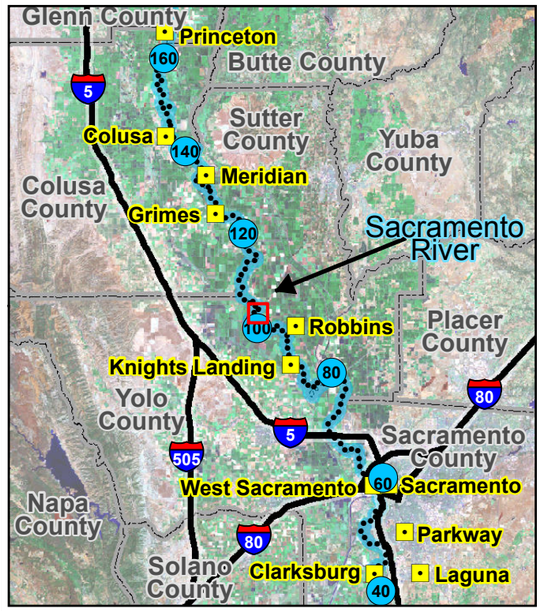
Historical Bankline Shift Map (River Miles 101-108)

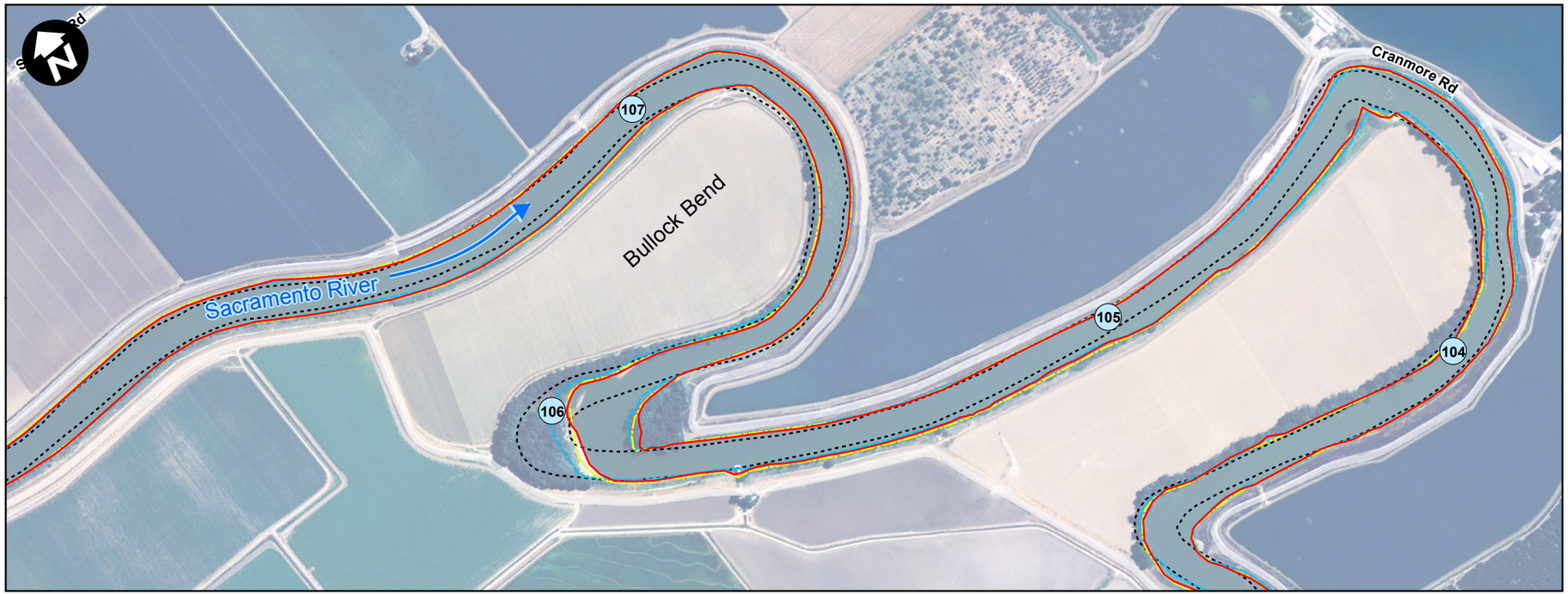
0 500 1,000 2,000 Feet

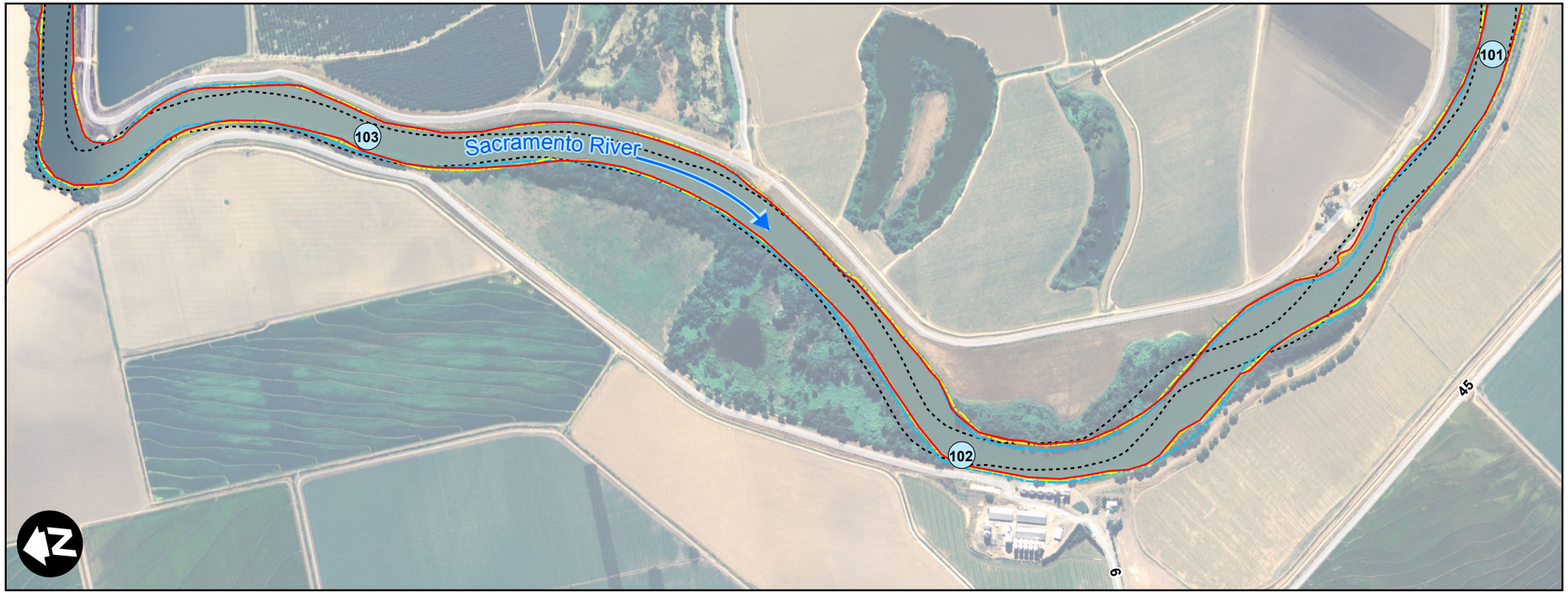
1 inch = 1,000 feet Scale - 1:12,000

CA State Plane, Zone II	NAD 83	units: feet
project no. 50571	May 2010	nhc

REFERENCE MAP







LEGEND

- Cities
- USGS River Miles
- Streets (white)
- 2005 Planform
- 1998-99 Planform
- 1987-89 Planform
- 1950s Planform

Data Sources:
NAIP Color Orthoimagery, 2005.
ESRI Cities, Streets, and Counties, 2008.

Figure 2: Historical Bankline Shift Map (River Miles 101-108)

northwest hydraulic consultants

June 2014

Attachment A - Project Maps

DRAFT

STATE OF CALIFORNIA
THE RESOURCES AGENCY

THE CENTRAL VALLEY FLOOD PROTECTION BOARD

PERMIT NO. 19042 BD

This Permit is issued to:

Westervelt Ecological Services, LLC
600 N. Market Boulevard, Suite 3
Sacramento, California 95834

To breach an existing agricultural berm along the Sacramento River and excavate back-water channels to restore floodplain function to approximately 96 acres. Approximately 202,000 cubic yards (CY) of fill, excavated from the project area, will be placed along the existing State Plan of Flood Control (SPFC) levee as a buffer. Approximately 65,000 CY will be used by Sacramento River West Side Levee District and Reclamation District 108 to create internal SPFC levee inspection roads and to increase freeboard along irrigation supply canals. The remaining fill material will be placed along the interior side of the agricultural berm. In addition, approximately 5,400 trees and shrubs will be planted within the project area.

The project is located along the Sacramento River bewtween the Tisdale Weir and Knights Landing, at roughly River Mile 106, and south of Subacco Road. (Section 1, T12N, R1E, MDB&M, Sacramento River West Side Levee District, Sacramento River, Yolo County).

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

(SEAL)

Dated: _____

_____
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 days' 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. 19042 BD

LIABILITY AND IMDEMNIFICATION

THIRTEEN: The permittee shall defend, indemnify, and hold the Central Valley Flood Protection Board (Board) and the State of California, including its agencies, departments, boards, commissions, and their respective officers, agents, employees, successors and assigns (collectively, the "State"), safe and harmless, of and from all claims and damages related to the Board's approval of this permit, including but not limited to claims filed pursuant to the California Environmental Quality Act. The State expressly reserves the right to supplement or take over its defense, in its sole discretion.

FOURTEEN: The permittee is responsible for all liability associated with construction, operation, and maintenance of the permitted facilities and shall defend, indemnify, and hold the Board and the "State," safe and harmless, of and from all claims and damages arising from the project undertaken pursuant to this permit, all to the extent allowed by law. The State expressly reserves the right to supplement or take over its defense, in its sole discretion.

FIFTEEN: The Board and Department of Water Resources (DWR) shall not be held liable for damages to the permitted project resulting from releases of water from reservoirs, flood fight, operation, maintenance, inspection, or emergency repair.

SIXTEEN: If the permittee does not comply with the conditions of the permit and enforcement by the Board is required, the permittee shall be responsible for bearing all costs associated with the enforcement action, including reasonable attorney's fees. Permittee acknowledges that State law allows the imposition of fines in enforcement matters.

SEVENTEEN: No construction shall begin until all necessary construction-related permits have been acquired by the permittee. The permittee agrees to incur all costs for compliance with local, State, and Federal permitting. If any conditions issued by other agencies conflict with any of the conditions of this permit, then the permittee shall resolve conflicts between any of the terms and conditions that agencies might impose under the laws and regulations it administers and enforces.

EIGHTEEN: The activities permitted by this permit are and forever shall be subordinate to the flowage easements held by the Sacramento and San Joaquin Drainage District (i.e. The Central Valley Flood Protection Board).

NINETEEN: The mitigation measures approved by the CEQA lead agency and the permittee are found in its Mitigation and Monitoring Reporting Program (MMRP) adopted by the CEQA lead agency. The permittee and/or subsequent Conservation Bank Manager shall implement all such mitigation measures.

AGENCY CONDITIONS

TWENTY: The permittee shall comply with all conditions set forth in the letter from the U.S. Army Corps of Engineers (USACE) District Engineer dated April XXXX, 2016, which is attached to this permit as Exhibit A and is incorporated by reference.

PRE-CONSTRUCTION

TWENTY-ONE: The permittee shall contact the Board by telephone at (916) 574-0609, and submit the enclosed postcard to schedule a preconstruction conference. Failure to do so at least 20 working days prior to start of work may result in delay of the project.

TWENTY-TWO: Thirty (30) calendar days prior to start of any demolition and/or construction activities within the floodway, the permittee shall submit to the Chief Engineer two sets of plans, specifications and supporting geotechnical and/ or hydraulic impact analyses, for any and all temporary, in channel cofferdam(s), gravel work pad(s), work trestle(s), scaffolding, piles, and/or other appurtenances that are to remain in the floodway during the flood season from November 1 through April 15. The Board shall acknowledge receipt of this submittal in writing within ten (10) working days of receipt, and shall work with the permittee to review and respond to the request as quickly as possible. Time is of the essence. The Board may request additional information as needed and will seek comment from the USACE and / or local maintaining agency when necessary. The Board will provide written notification to the permittee if the review period is likely to exceed thirty (30) calendar days.

TWENTY-THREE: Prior to commencement of work, the permittee shall create a photo record, including associated descriptions, of the existing site conditions. The photo record shall be certified (signed and stamped) by either a licensed Califronia land surveyor, civil engineer, or landscape architect and submitted to the Board within 30 days of beginning the project.

TWENTY-FOUR: The permittee shall provide supervision and inspection services acceptable to the Board.

CONSTRUCTION

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

TWENTY-SIX: 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 Board.

TWENTY-SEVEN: All addenda or other changes made to the submitted documents by the permittee after issuance of this permit shall be submitted to the Chief Engineer for review and approval prior to incorporation into the permitted project. The submittal shall include supplemental plans, specifications, and supporting geotechnical, hydrology and hydraulics, or other technical analyses. The Board shall acknowledge receipt of the addendum or change submittal in writing within ten (10) working days of receipt, and shall work with the permittee to review and respond to the request as quickly as possible. Time is of the essence. The Board may request additional information as needed and will seek comment from the USACE and / or the local maintaining agency when necessary. The Board will provide written notification to the permittee if the review period is likely to exceed thirty (30) calendar days. Upon approval of the submitted documents the permit shall be revised, if needed, prior to construction related to the proposed changes.

TWENTY-EIGHT: No material stockpiles, temporary buildings, or equipment shall remain in the floodway during the flood season from November 1 to April 15 without prior approval of the Board.

TWENTY-NINE: Temporary access ramps and/or roads shall be removed from the floodway during flood season from November 1 through April 15, and after completion of the project.

THIRTY: All debris generated by this project shall be disposed of outside the floodway.

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

THIRTY-TWO: Fill placed along the existing right (west) bank of the Sacramento River State Plan of Flood Control levee shall be graded to direct drainage away from the toe of the levee.

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

THIRTY-FOUR: Except with respect to the activities expressly allowed under this permit, the work

area shall be restored to the condition that existed prior to start of work.

VEGETATION / ENVIRONMENTAL MITIGATION

THIRTY-FIVE: The permittee will be responsible for securing any necessary permits incidental to habitat manipulation and restoration and will provide any biological surveying, monitoring, and reporting needed to satisfy those permits.

THIRTY-SIX: All of the terms in the Final Interagency Review Team (IRT) Approved Long Term Management Plan (LTMP) will be incorporated by reference into this permit as Exhibit B once final approval is complete. If the IRT Approved LTMP includes any changes to the August 2015 LTMP, the permittee must submit the document to the Board in accordance with Special Condition No. TWENTY-SEVEN and receive approval in writing for any non-substantive changes. Any substantive changes would require future Board action and approval.

THIRTY-SEVEN: All of the terms in the Final IRT Approved Interim Management Plan (IMP) will be incorporated by reference into this permit as Exhibit C once final approval is complete. If the IRT Approved IMP includes any changes to the March 2016 IMP, the permittee must submit the document to the Board in accordance with Special Condition No. TWENTY-SEVEN and receive approval in writing for any non-substantive changes. Any substantive changes would require future Board action and approval.

THIRTY-EIGHT: The permittee or subsequent Mitigation Bank Manager shall not import any State or federally listed, threatened, or endangered species to the project site without prior written approval of the Board.

THIRTY-NINE: No plantings, other than those shown in the approved plans or Board staff approved addenda, shall be planted within the project area without prior approval of the Board unless otherwise specified in the approved LTMP or IMP.

FORTY: Cleared trees and brush (or pruning therefrom) 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 1st to April 15th unless otherwise specified in the approved LTMP or IMP.

FORTY-ONE: A copy of this permit shall be included as an attachment to any LTMP or IMP for the permitted project area.

FORTY-TWO: If the Board, in its sole discretion, determines at any time during the life of this permit that the LTMP is inadequate or that the permitee and/or subsequent Mitigation Bank Manager is not maintaining the project per the Bullock Bend Mitigation Bank LTMP, or is maintaining the project in a way that is creating flood hazard conditions, the Board shall be entitled to order maintenance of the project, in concurrence with the IRT, and access any and all contingency funds from the endowment fund to pay for said maintenance. The Endowment Agreement LTMP must include a provision for Board access of funds.

FORTY-THREE: The permittee and/or subsequent Mitigation Bank Manager shall submit any proposed material amendment to the Conservation Easement, Conservation Bank Agreement, IMP,

LTMP, and Habitat Development Plan, including any "adaptive management" employed by the permittee, to the Board for written approval prior to making any such amendment.

POST-CONSTRUCTION

FORTY-FOUR: Within 120 days of completion of the project, the permittee shall submit to the Board and DWR a copy of as-built drawings and a certification report, stamped and signed by a licensed civil engineer registered in the State of California, certifying the work was performed and inspected in accordance with the Board permit conditions and submitted drawings and specifications.

OPERATIONS AND MAINTENANCE

FORTY-FIVE: The U.S. Army Corps of Engineers, DWR, and the Board or their authorized representatives shall have access to the Bullock Bend Mitigation Bank site at all times.

FORTY-SIX: After each period of high water, debris that accumulates at the site shall be removed from the floodway when reasonably determined as necessary by the Board and in a manner consistent with the LTMP or IMP.

FORTY-SEVEN: The permittee and/or subsequent Mitigation Bank Manager shall be responsible for repair of any damages to the channel, banks, floodway, or any other flood control facilities due to construction, operation, or maintenance of the proposed project and repairs shall be completed in a manner consistent with the LTMP or IMP and Board standards.

FORTY-EIGHT: The permittee and/or subsequent Mitigation Bank Manager shall provide a copy of the Annual Report, defined in Exhibit B, of the LTMP, to the Board for review and comment.

FORTY-NINE: The permitted project shall not interfere with operation and maintenance of the Sacramento River Flood Control Project. If the permitted project is determined by any agency responsible for operation or maintenance of the flood control project to interfere, the permittee and/or subsequent Mitigation Bank Manager shall be required, at permittee's and/or subsequent Mitigation Bank Manager's cost and expense, to modify or remove the project feature(s) or restore the project area to the approved project design conditions, under direction of the Board or DWR, and in a manner that is consistent with the approved LTMP or IMP. If the permittee and/or subsequent Mitigation Bank Manager does not comply, the Board may modify or remove the project feature(s) or restore the project area to the approved project design conditions at the permittee's and/or subsequent Mitigation Bank Manager's expense.

PROJECT ABANDONMENT, CHANGE IN PLAN OF FLOOD CONTROL

FIFTY: If the project land is to be sold, the transfer of interest shall not occur without written notification to the Board, and the permit with all conditions shall be transferred to the new owner and all Mitigation Bank maintenance requirements shall become the responsibility of any subsequent Mitigation Bank Manager.

FIFTY-ONE: If the project or any portion thereof, is to be abandoned in the future, the permittee and/or subsequent Mitigation Bank Manager shall abandon the project under direction of the Board and consistent with the terms of the Bullock Bend Mitigation Bank's Bank Enabling Instrument, at the permittee and/or subsequent Mitigation Bank Manager's cost and expense.

FIFTY-TWO: The permittee and/or subsequent Mitigation Bank Manager may be required, at permittee and/or subsequent Mitigation Bank Manager’s cost and expense, to remove, alter, relocate, or reconstruct, consistent with the terms of the Bank Enabling Instrument and applicable State and federal law, all or any part of the permitted project 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 and/or subsequent Mitigation Bank Manager does not comply, the Board may remove, alter, relocate, or reconstruct the permitted project at the permittee and/or subsequent Mitigation Bank Manger's expense.

END OF CONDITIONS

Long-Term Management Plan

for the

Bullock Bend Mitigation Bank

Photo courtesy of Northwest Hydraulic Consultants

Westervelt Ecological Services, LLC
600 North Market Boulevard, Suite 3
Sacramento, California 95834
Phone: (916) 646-3644
Fax: (916) 646-3675

August 2015

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1 Introduction

1.1 Purpose of Establishment

The Bullock Bend Mitigation Bank ("Bank") was established by the Bank Enabling Instrument ("BEI") to compensate for unavoidable impacts to, and to conserve and to protect other waters of the United States, habitat for salmonid species protected by the California Endangered Species Act (CESA) and federal Endangered Species Act (FESA), nesting habitat for Swainson's hawk (*Buteo swainsoni*) ("SWHA"), and various riparian habitats. The 116.15-acre Bank includes restored and enhanced floodplain riparian and associated habitat features and Salmonid and Swainson's Hawk Nesting Buffer Credits, for a total of 116.15 Bank Credits (**BEI Exhibit F-1** and **Table 1**).

Table 1. Credit Types, Amounts, and Approving Agencies

	Credit Type[1, 2, 4]	Approving Agency			Credits
		USACE	NMFS	CDFW	
I. FLOODPLAIN RESTORATION (RE-ESTABLISHMENT)					
1	Salmonid / Riverine Riparian	X	X	X	33.03 ac.
2	Salmonid / Riverine Riparian/Swainson's Hawk Nesting Buffer	X	X	X	38.15 ac.
3	Salmonid / Floodplain Riparian/Swainson's Hawk Nesting Buffer		X	X	19.77 ac.
II. FLOODPLAIN ENHANCEMENT					
4	Salmonid / Riverine Riparian		X		8.50 ac.
5	Salmonid / Floodplain Riparian/Swainson's Hawk Nesting Buffer		X	X	16.70 ac.
	Bank Total[3]				116.15 ac.
III. DOCUMENTED PRESENCE OF SWAINSON'S HAWK UTILIZATION					
6	Swainson's Hawk Tree Nesting Use (enhancement)				1 - 2 credits
7	Swainson's Hawk Tree Nesting Use (restoration)				1 - 2 credits

[1] *Salmonid species include:*
California Central Valley steelhead (Distinct Population Segment)
Chinook salmon - Central Valley spring run (Evolutionarily Significant Unit)
Chinook salmon - Central Valley fall/late fall run (Evolutionarily Significant Unit)
Chinook salmon - Central Valley winter run (Evolutionarily Significant Unit)

[2] *Riverine Riparian Credits can fulfill USACE Section 404 or CDFW Section 1600 mitigation requirements.*

[3] *Amount of acreage-based Credit types (1-5) allocated to projects cannot exceed Bank acreage total.*

[4] *Swainson's Hawk Tree Nesting Use Credits are not tied to Bank acreage but will be released based upon number of trees documented onsite nest presence during the Success Monitoring period.*

Additional credits may be issued for the presence of individual SWHA nests within the enhancement and restoration areas. The BEI Signatory Agencies are the Sacramento District of the United States Army Corps of Engineers (USACE), Region 9 of the United States Environmental Protection Agency (USEPA), National Marine Fisheries Service (NMFS), the California Department of Fish and Wildlife (CDFW) Region 2, and the Sacramento field office of the U.S. Fish and Wildlife Service (USFWS). These agencies comprise and are referred to jointly as the Interagency Review Team ("IRT"). Terms used in this management plan have the same meaning as defined in the BEI.

1.2 Purpose of this Long-Term Management Plan

The purpose of this Long-Term Management Plan ("Management Plan") is to ensure the Bank is managed, monitored, and maintained in perpetuity. This Management Plan establishes

objectives, priorities, and the tasks to monitor, manage, maintain, and report on the restored habitat on the Bank, and is a binding and enforceable instrument, incorporated by reference into the Conservation Easement covering the Bank.

Specifically:

- The Management Plan serves as a guide for appropriate public and private uses of the Bank
- The Management Plan serves as a descriptive inventory of fish, wildlife, and plants that occur on or use the Bank
- The Management Plan provides an overview of the Bank operation and maintenance requirements, including all actions required of the Bank Manager to achieve the Bank's management goals. It also serves as a budget planning aid for the Long-Term Management Endowment ("Endowment Fund")

The Management Plan provides guidance for Bank stewardship in perpetuity.

1.3 Bank Manager and Responsibilities

The Property Owner, Westervelt Ecological Services ("WES"), will be the Long-Term Land Manager ("Bank Manager"). WES, and any subsequent Bank Manager if transferred, shall implement this Management Plan, managing and monitoring the Bank in perpetuity to preserve its habitat and conservation values in accordance with the BEI and the Conservation Easement. Long-term management tasks shall be funded through the Endowment Fund. The Bank Manager shall be responsible for providing an annual report to the IRT, detailing the time period covered and providing a description of the management tasks accomplished.

The Bank Manager's responsibilities will include but are not limited to:

- Maintaining gates and signage
- Coordinating trash removal
- Maintaining site hydrologic function as designed
- Conducting nonnative invasive plant management when necessary with qualified personnel
- Coordinating vegetation management of the Bank when necessary
- Reviewing monitoring data and recommending to/coordinating with the IRT for any adaptive management actions
- Performing general inspections of the Bank
- Coordinating annual biological inspections by a qualified biologist (the "Monitoring Biologist")
- Arranging for any corrective action necessary to ensure the sustainability of the habitat at the Bank as required by this Management Plan.

The Monitoring Biologist will be a professional botanist, biologist, or restoration ecologist familiar with California flora and fauna, and will have a working knowledge of jurisdictional wetland hydrology and vegetation as well as management of riparian and upland habitats for dependent species. The functions of the Monitoring Biologist will be performed by WES staff or other qualified biologist.

Overall, duties of the Monitoring Biologist may include but are not limited to:

- Monitoring water levels
- Monitoring riparian functions and hydrology
- Evaluating the presence and extent of introduced nonnative (exotic) plant and animal species and recommending management if needed
- Conducting the monthly and annual inspections, collecting data on the Bank and preparing reports required by this Management Plan
- Evaluating site conditions and recommending remedial action to the Bank Manager
- Assisting in the review or planning of restoration or management activities, use of the Bank for education, or other associated tasks associated with Bank management

A change of either Bank Manager or Monitoring Biologist will be made in consultation with the IRT. If the Bank Manager or the Monitoring Biologist is changed, the outgoing and incoming personnel will tour the Bank together, and the former will advise the latter of trends, problem areas, and any administrative difficulties.

2 Property Description

2.1 Setting and Location

Figure 1 shows the 119.65-acre Property location in Yolo County, on the right bank of the Sacramento River at mile 106. The site is located approximately 11 miles north of the unincorporated area of Knights Landing, California. More specifically, the site corresponds to the southern half of Section 1 of Township 12 North and Range 1 East (Mount Diablo Base Meridian) of the "Kirkville, California" 7.5-minute quadrangle (USGS 1973) (**Figure 2**). The approximate center of the Property is latitude 38°54'46.34"N, longitude 121°48'39.74"W. Due to its rural nature and absence of any dwelling, the Property has no street address, and the Yolo County Assessor's parcel number is 053-030-010-000. Only 116.15 acres of the Property are part of the Bank. The residual 3.50 acres cover some of the existing flood control levee and the maintenance area along the toe of the levee.

The Property was historically in agricultural production (e.g., winter wheat, tomatoes), and featured a single, leveled field with a gentle north–south slope that allowed for flood irrigation of crops. The site is accessed by unimproved farm roads from County Road 97 to an access easement road that reaches the Project Levee on the western border of the Property. From the Project Levee, an access road runs along the perimeter of the Property next to the farm berm (**Figure 3**). A fish-screened lift pump on the Sacramento River is located on the northeastern side of the Property and feeds an interior ditch along the inside, north toe of the farm berm.

2.2 History and Land Use

The Bank Property is known to have been in agricultural production since at least 1906; the cultural resources report (**BEI Exhibit J**) indicate that the Property has been in agriculture since the mid-1800s. Current land use includes the planting of row crops such as winter wheat and tomatoes.

Figure 1

Figure 2

Figure 3

2.3 Cultural Resources

The Cultural Resources Survey and Report (**BEI Exhibit J**) indicates that there are no significant cultural resources on the Bank, and that the area was most likely only used by Native Americans for transit and temporary resource use.

2.4 Hydrology and Topography

The Bank is located downstream of Tisdale Weir, which diverts excess flows from the Sacramento River to the Sutter Bypass to the east. The river flows are regulated by upstream dams such as Keswick and Shasta Dams. The property is bordered by the Sacramento River Westside Levee District ("SRWSLD") Project Levee to the west and the Reclamation District (RD) 1500 Project Levee to the east.

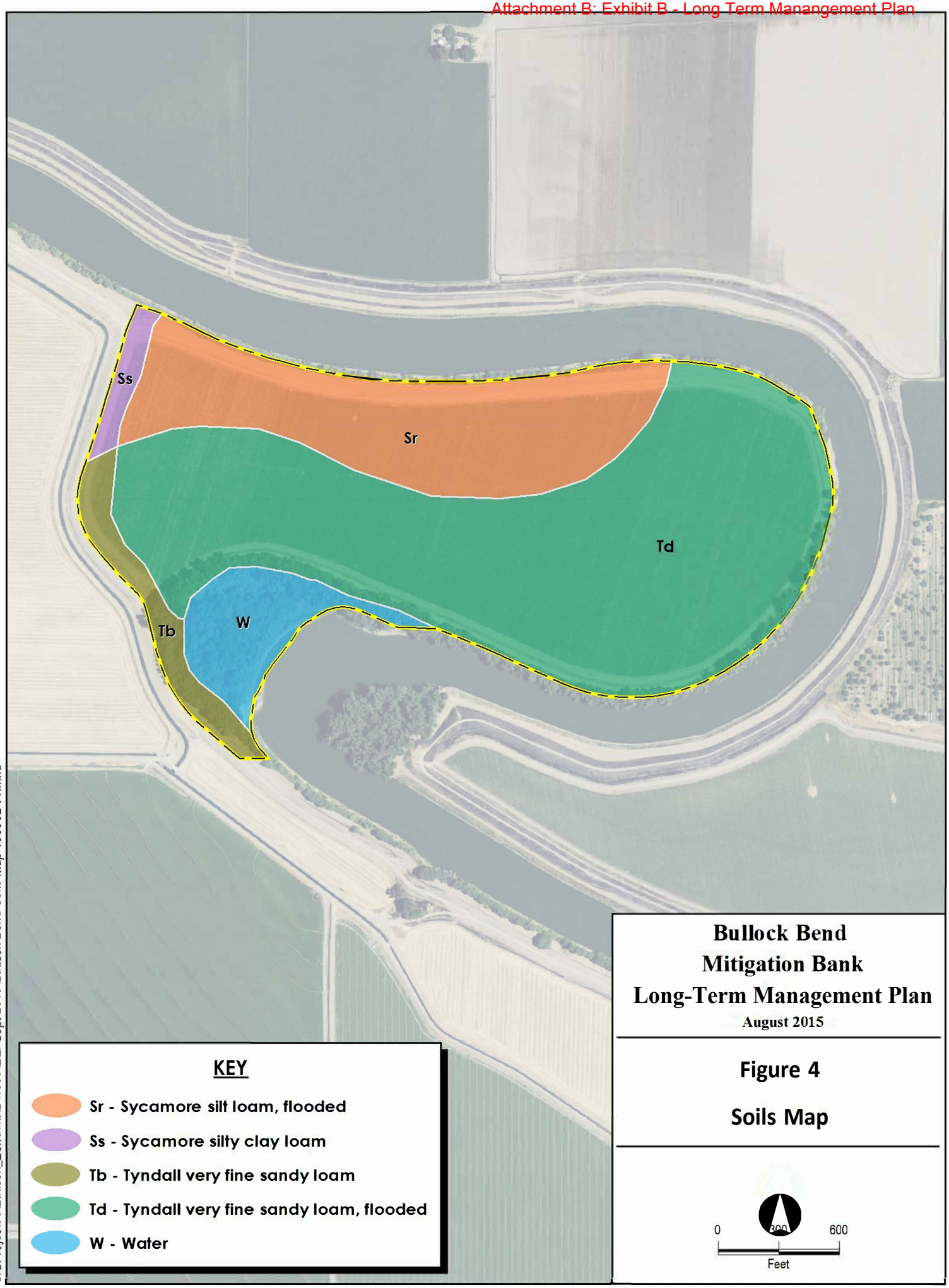
The water conveyance/discharge flow is highly regulated on the Sacramento River with the design flow along the Bullock Bend reach being 30,000 cubic feet per second (cfs). While the flow is highly regulated, the two-year flood event rises up to an elevation of 39.21 feet North American Vertical Datum 1988 (NAVD88), enough to inundate most of the existing riparian forest area. The existing riparian forest area on the southwest corner of the property (outside of the farm berm) consists of mature native riparian vegetation covering an undulating landscape of low (EL 35 feet) to high (EL 42 feet) terraces, backwater channels (EL 30 feet), and shallow-depth alcoves (EL 20 feet) (all in NAVD88 elevations). This undulating mature forested area has been shaped by the forces of the river flows, with the current, stable configuration having been formed in the 1950s, with the southern mature riparian area being stable since the mid-1970s.

The Bank is designed to allow the backwater channels to flood the site through the berm breach on the south side of the Property, following the natural flow and inundation timing of the Sacramento River. The breach allows river water to naturally flood the Property and to flow into the excavated backwater channels and onto the open floodplain. The Bank is designed to allow flooding during the winter months and then completely drain prior to and remain dry during the summer months.

This floodplain restoration project has created off-channel salmonid rearing habitat that will be used during the juvenile salmonid out-migration period of December through May. Breaching the farm berm created approximately 96 acres of land that was opened up to future flooding from the adjacent Sacramento River. Roughly 74 percent of this new floodplain area will become inundated during a two-year flood event (50 percent reoccurrence interval) and 83 percent of this new area will flood during a design flow event (i.e., 30,000 cfs).

2.5 Soils

The *Soil Survey of Yolo County*, published by the United States Department of Agriculture (USDA 1972), lists Sycamore silt loam, flooded (map unit Sr) and Tyndall very fine sandy loam, flooded (map unit Td) as the dominant soil types of the Bank (**Figure 4**). Nondominant soils include Sycamore silty clay loam (map unit Ss) and Tyndall very fine sandy loam (map unit Tb). Both these soils are formed in sedimentary alluvium deposited in basin landforms associated with the Sacramento River and Coast Range drainages. Sycamore series soils are found on nearly



KEY

- Sr - Sycamore silt loam, flooded
- Ss - Sycamore silty clay loam
- Tb - Tyndall very fine sandy loam
- Td - Tyndall very fine sandy loam, flooded
- W - Water

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Figure 4

Soils Map

0 300 600

Feet

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level floodplains, and are formed under poorly drained conditions; with slow to very slow surface runoff and moderate to moderately slow permeability. The characteristic profile of Sycamore soil contains silty clay loam to silt loam to loamy fine sand to a depth of at least 60 inches. The characteristic profile of Tyndall soil contains heavy very fine sandy loam to very fine sandy loam to sandy loam to a depth of at least 52 inches. A complete Soil Survey Report can be found in **Exhibit A** of **BEI Exhibit C-1,** *Bullock Bend Mitigation Bank Habitat Development Plan* ("Habitat Plan"; WES 2015a);

2.6 Existing Easements

Several areas of the 119.65-acre Property will be excluded from the 116.15-acre Conservation Easement area of the Bank. WES owns mineral rights to the Property under fee title.

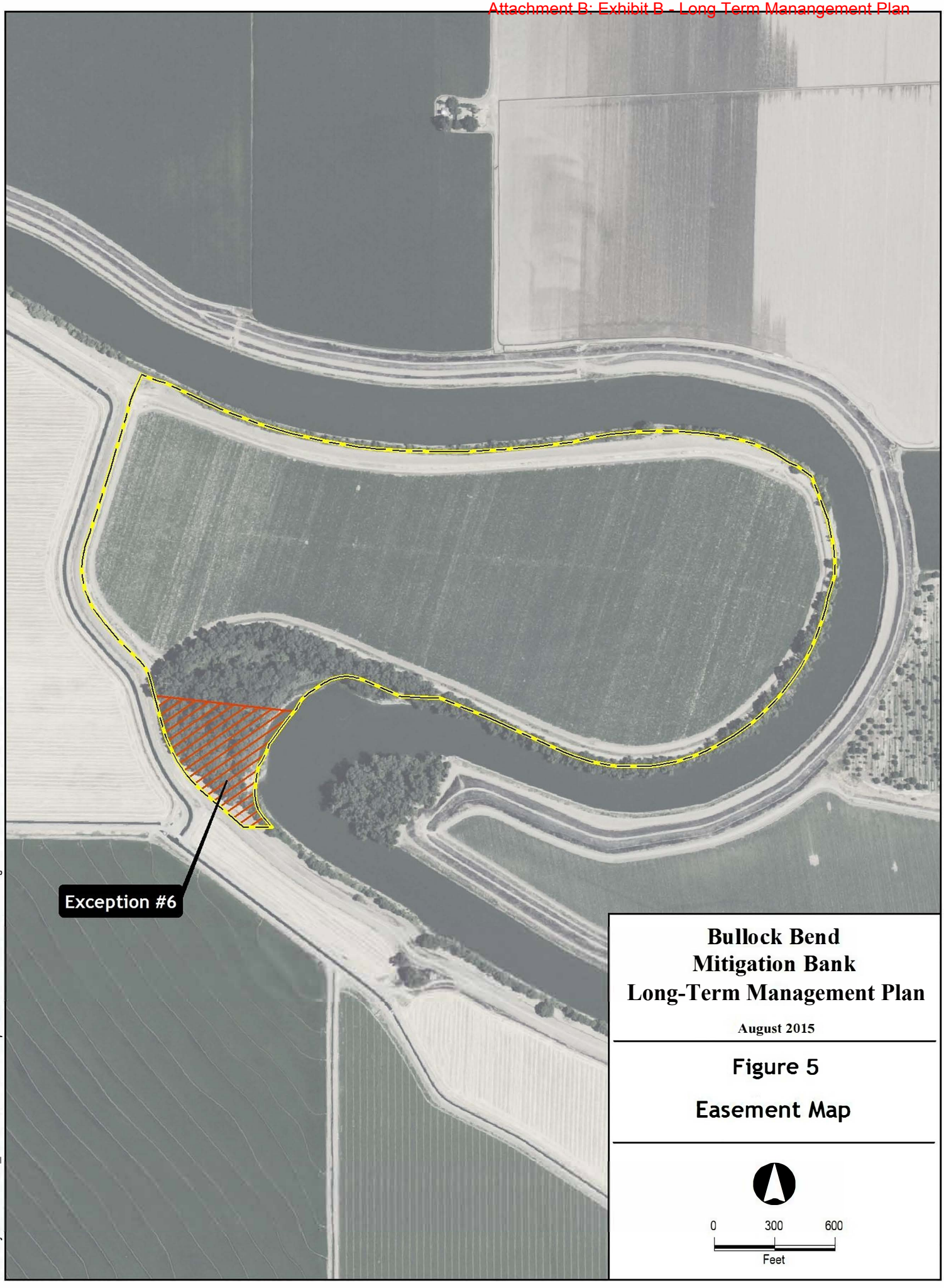
Sacramento-San Joaquin Drainage District holds a 3.50-acre easement on the Property for flood control and water development works. The legal description for this easement encompasses the southwest tip of the Property as shown in **Figure 3**. This easement is intended to allow levee repair and maintenance, which may include repair of flood control and water development works, planting or clearing vegetation, and clearing unwanted debris from the toe of the flood control levee to maintain its integrity. The Project Levee and the associated maintenance area along the toe are excluded from the Conservation Easement and are not part of the Bank.

There is a levee and vegetation maintenance easement associated with the most southerly 5.62-acre portion of the Property (**Figure 5**). This easement is maintained by the Sacramento and San Joaquin Drainage Districts. This easement will not be excluded from the Conservation Easement because maintenance on this easement generally occurs near the toe of the Sacramento River and is likely to continue in this manner, thereby not affecting the mature riparian habitat located within the easement.

The Property title also contains a recorded road access easement from County Road 97 (see **Figure 3**). This easement is for pedestrian and vehicular use of 20 feet of road access along the southwest corner on the western bank of the SRWSLD Project Levee. The Ellis Family Trust entered into this "Agreement Granting Easement" to seek year-round pedestrian and vehicular access to the Property. This agreement applies regardless of the current Property Owner. This access is instrumental to the construction and management of the Bank and has no effect on Bank operations.

2.7 Adjacent Land Uses

The Bank and surrounding parcels are currently zoned Agricultural Preserve ("A-P"). Most of the surrounding lands are planted with row crops, rice, and alfalfa. The Property is bounded on three sides (north, east, and south) by the Sacramento River. The SRWLD Project Levee lies on the western edge of the property, and agricultural fields and irrigation delivery canal are located to the west of the Project Levee, off of the Property.



Bullock Bend Mitigation Bank Long-Term Management Plan

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Figure 5

Easement Map

0 300 600

Feet

GISProject09\Bullock_Bend\MXD\1403\Prospectus March 2014\Draft v2\Figure 7 Easements 140317 v2.mxd

3 Habitat and Species Descriptions

3.1 Biological Resources Survey of Bank

The Bank is adjacent to the Sacramento River, which supports a well-documented distinct population segment (DPS) of California Central Valley steelhead (*Oncorhynchus mykiss),* evolutionarily significant units (ESU) of Sacramento River winter-run and Central Valley spring-run Chinook salmon (*Oncorhynchus tshawytscha*), and populations of fall-run Chinook salmon (*Oncorhynchus tshawytscha*). Furthermore, the Bank is located in designated critical habitat for these species. A few areas downstream of the Bank have recorded conservation easements. Due to development of the flood-protection levee system and land use conversion to agriculture, the acreage of wetlands in the Central Valley and along the Sacramento River has diminished. The Property is encompassed by a farm berm along its northern, eastern, and southern boundaries and a USACE-managed Flood Control Project Levee borders the western edge. A mature riparian forest has developed along portions of the river side of the farm berm and it supports a number of species including songbirds, raptors, small mammals and salmon (during flood events). Riverine and palustrine wetlands and other waters of the United States perform key aquatic functions, including water quality enhancement, sediment deposition, riverbank protection, terrestrial species habitat, water temperature moderation, food web production, and cover/refugia for fish. The project changed an agricultural field, previously identified as upland in the National Wetland Inventory, into riparian habitat classified as floodplain riparian habitat or other waters of the United States.

The topography of the southwestern corner of the Property has been shaped by a variety of features, such as sloughs, backwater channels, and mounds that are typically found with natural fluvial processes. These features include low, midheight, and high terraces, off-channel backwaters, shallow-depth alcoves, verdant riparian forest with lianas of California wild grape (*Vitis californica*) (i.e., Great Valley Cottonwood Riparian Forest, Holland 1986), bands of willow (*Salix* spp.), and overhanging trees and scrubs along the Sacramento River, which create a shaded riverine aquatic condition. This natural riparian area is important to juvenile salmonids migrating downstream during the winter and spring months (i.e., December through May) when natural flooding fills the backwater channels.

3.2 Summary of Bank Development Plan

The goal of the habitat development activities at the Bank was to create a mosaic of riparian forest with associated upland riparian functions and services and aquatic habitat, such as alcoves and backwater channels, for listed fish species and nesting buffer and habitat for SWHA in place of the agricultural field that was located there. The restored features include riparian habitat features and channels that provide shaded riverine aquatic habitat and backwater salmonid rearing and out-migrating habitat. This Management Plan provides all of the necessary habitat requirements for listed salmonids including:

- Freshwater migration corridors free of obstruction and excessive predation with sufficient water quantity and quality, aquatic vegetation, supporting juvenile and adult mobility and survival

- Freshwater rearing sites with sufficient water quantity and floodplain connectivity, water quality, and forage and natural cover such as shade, all essential to conservation because juveniles require them to access and use the areas needed to forage, grow, and develop behaviors (e.g., predator avoidance and competition) that help ensure their survival

Additionally this Management Plan provides all of the necessary nesting buffer and habitat requirements for SWHA including:

- Mature trees along riparian corridors
- Reasonable proximity to suitable foraging grounds, including alfalfa, beets and tomatoes; all potential nesting trees surrounding or in proximity to an identified nesting tree are considered nesting habitat

Habitat types that will be developed on the Bank were defined in the Habitat Plan and include backwater channels and alcoves, floodplain riparian, riverine riparian and associated riparian. To create the proposed habitat features, portions of the existing agricultural field would be de-leveled to create a riparian habitat complex. Backwater channels would be excavated and the cut material placed in undulating shapes across the remaining agricultural field. A breach in the farm berm would be created on the south side of the property; it would allow river water to flood the property and flow into the excavated backwater channels and onto the newly opened-up floodplain. This would be expected to create off-channel salmonid rearing habitat. The breach in the farm berm would also allow for natural drainage of the proposed floodplain habitats back into the river. Breaching the farm berm would open approximately 96 acres of land to future flooding.

For its hydrology, this habitat would rely on direct precipitation and water from the Sacramento River flooding through the breach in the farm berm. Some of the lowest-lying backwater areas may retain enough water to create small patches of floodplain wetland habitat. The gently sloped channels are expected to provide positive drainage toward the Sacramento River after flooding events to prevent fish stranding as floodwaters recede. By matching the bottom elevation of the analog channel, little to no river backwater flows should enter the constructed channels during June to October, so predatory species such as bass would not have a new breeding and rearing area. Roughly 11,000 feet of new backwater channels would be excavated on the proposed Bank. From January to March, the constructed backwater channels could be flooded up to 50 percent of the time, depending on the water year.

3.3 Endangered and Threatened Species

Adjacent to the Bank, the Sacramento River is used seasonally by anadromous fishes designated as threatened or endangered under the FESA or CESA or classified as a Species of Concern by NMFS. These include four runs of Chinook salmon (i.e., fall-run, late-fall-run, winter-run, and spring-run), steelhead, and green sturgeon. But only the ESU of winter-run and spring-run and fall-run Chinook salmon, and the DPS of Central Valley steelhead have been documented as occurring near the Bank. Additionally, SWHA has been documented on the Property as have several possible SWHA nesting trees.

Other special-status wildlife species that may occur on the Bank and are reported nearby in the California Natural Diversity Database include yellow-billed cuckoo (*Coccyzus americanus*), tricolored blackbird (*Agelaius tricolor*), great egret (*Ardea alba*), great blue heron (*Adrea herodias*) rookeries, mountain plover (*Charadrius montanus*), Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), Sacramento Valley tiger beetle (*Cicindela hirticollis abrupta*), woolly rose-mallow (*Hibiscus lasiocarpos* var. *occidentalis*), hoary bat (*Lasiurus cinereus*), and bank swallow (*Riparia riparia*) (CDFW 2014). All of these species may utilize the Property for foraging but none have been documented to breed in habitat present on the Property. A map and table of all special-status species known to occur in the vicinity of the Bank are provided in **BEI Exhibit H**. Prior to implementation of the Habitat Plan, the Bank did not support suitable habitat for any of the special-status plants reported from the region by the California Natural Diversity Database, USFWS, or California Native Plant Society (**BEI Exhibit H**).

3.4 Management and Monitoring

The overall goal of long-term management is to foster the long-term viability of the Bank's waters of the United States, covered species, and covered habitat. Routine monitoring and minor maintenance tasks are intended to ensure the viability of the Bank in perpetuity.

The approach to the long-term management of the Bank's biological resources is to conduct annual site examinations and periodic monitoring of selected elements to determine stability and ongoing trends of the preserved and restored habitats provided for listed salmonids and SHWA. Annual monitoring will assess the Bank's condition, for invasion of exotic or nonnative species, vegetation densities, the condition of the infrastructure, and any other aspects that may warrant management actions. While it is not anticipated that major remedial actions will be needed, an objective of this Management Plan is to create monitoring systems that will identify any issues that arise and indicate the use of adaptive management to determine what actions might be appropriate.

Adaptive management is an approach to natural resource management that incorporates changes to management practices, including corrective actions as determined to be appropriate by the IRT and the Bank Manager, to solve developing problems. Adaptive management includes those activities necessary to address the effects of climate change, fire, flood, other natural events, or unforeseen future changes to the landscape. Before considering any adaptive management changes to the Management Plan, the IRT will consider whether such actions will help ensure the continued viability of Bank's biological resources.

4 Habitat Management and Species Elements

The restored habitat types at Bank include the following:

1) Salmonid/Riverine Riparian (re-establishment)
2) Salmonid/Riverine Riparian/Swainson's Hawk Nesting Buffer (re-establishment)
3) Salmonid/Floodplain Riparian/Swainson's Hawk Nesting Buffer (re-establishment)
4) Salmonid/Riverine Riparian (enhancement)

5) Salmonid/Floodplain Riparian/Swainson's Hawk Nesting Buffer (enhancement)
6) Swainson's Hawk Tree Nesting Use (enhancement)
7) Swainson's Hawk Tree Nesting Use (restoration)

Restoration activities for the Bank habitat types are described in detail in the Habitat Plan. Bank management objectives and tasks to be implemented by the Bank Manager are described below.

4.1 Biological Resources
The Bank Manager shall implement the following.

Element A.1 Covered Species Habitat

Objective: Monitor, conserve, and maintain the Bank's waters of the United States and riparian habitats. Limit any impacts to waters of the United States and riparian habitats from frequent site visits or other adverse impacts.

Task 1: Perform up to four event-based site visits to monitor the conditions of the Bank during the wet season (i.e., when lower elevations inundate), normally November through May. General topographic conditions, hydrology, and erosion will be noted.

Task 2: Perform general monthly site visits and annual walkthrough surveys during the growing season, generally March through October. Monthly site inspections qualitatively assess vegetation cover, composition, and nonnative invasive species.

Task 3: Obtain high-resolution aerial photography to quantify the extent of riparian vegetation on the Bank. Acquire an aerial photograph of the Bank every 10 years. The aerial photos should be taken in late spring, following the end of spring flood events.

Task 4: Establish photo points for monitoring photographs and prepare a site map showing the reference sites for the Bank file. A total of 20 or more sites with views of the overall riparian mosaic will be identified and permanently marked in the field during the Interim Management Period, which is described in **BEI Exhibit D-4**, *Bullock Bend Mitigation Bank Interim Management Plan* ("Interim Management Plan", WES 2015b). routine monthly site visit. Photos will be taken annually during the late spring/early summer.

Element A.2 Backwater Channels (Floodplain Riparian Habitat)

Objective: Monitor, conserve, and maintain the backwater channels to provide suitable floodplain habitat for special-status fish species.

Objective: Maintain function of backwater channels for covered fish species.

Task 1: As part of the annual site walk-through, examine the Bank's covered fish species habitat to determine any needed changes, current condition, and pending needs. While the fish habitat is designed to be self-sustaining, and no active maintenance is projected to be needed, any necessary tasks will be identified, prioritized and implement as funding is available.

Task 2: As part of the annual survey, visit the site in late spring, following seasonal flood events. If channel conditions result in fish stranding or ponding for durations that support predatory fish species, take corrective actions. The Bank Manager will coordinate with the IRT on the appropriate action(s) to take.

Task 3: Every 10 years during flood events, generally December through March, conduct up to two surveys for covered fish species occurring at the Bank .

Task 4: Evaluate and prioritize other tasks that improve habitat quality for listed fish species if funding is available and as needed.

Element A.3 SWHA Nesting Buffer and Trees

Objective: Monitor, conserve, and maintain the riparian habitats to provide suitable mature trees for SWHA nesting sites and buffer habitat.

Objective: Conserve and protect SWHA nesting locations occurring onsite.

Task 1: As part of the annual site walk-through, examine the Bank's covered habitat for any nesting SWHA or any conditions that may affect nesting habitat for SWHA. Any necessary tasks will be identified, prioritized, and implemented as funding is available.

Task 2: Every five years, perform a focused survey for nesting SWHA. Up to three site visits may be necessary to complete the survey.

Task 3: Evaluate and prioritize other tasks that improve SHWA habitat quality if funding is available and as needed.

Element A.4 Breach Location

Objective: Monitor, conserve, and maintain hydrologic function of the breach in the berm and the Bank's covered habitat.

Task 1: As part of the annual site walk-through and high-flow site visits, inspect the breach location to evaluate the hydrology and water flow.

Task 2: If the breach location is obstructed or if the current flow regime is negatively affecting habitat (e.g., incomplete draining of backwater channels), take corrective actions. Corrective actions may include the mechanical removal of debris or sediment

using long-reach excavators or other suitable equipment to restore hydrologic function as designed.

Element A.5 Nonnative Invasive Species

Invasive plant species threaten the diversity or abundance of native species through competition for resources, predation, parasitism, interbreeding with native populations, transmitting diseases, or causing physical or chemical changes to the invaded habitat. For the purposes of this Management Plan, plants native to the Bank will be defined as those plants believed by the scientific community to have been present in northern Sacramento Valley prior to the settlement of Europeans.

The Bank supports numerous native and California endemic plant species. Additionally, the site currently functions with a number of nonnative plant species, many of which have become naturalized. The nature of floodplain communities involves a dynamic open system with periodic flooding from adjacent habitats. The Sacramento River is known to contain over 100 invasive plant species (Sacramento River Watershed Program 2015). Therefore, is likely that some nonnative invasive plant species will occur or be transported onto the Bank from adjacent properties during flood events, and species transported in may become established at the Bank. Although steps will be taken to manage nonnative invasive plant species at the Bank to the extent practicable, because of the open hydrologic system that the Bank will become part of, it is unrealistic to expect the Bank to have a different native and nonnative species composition then that of the surrounding areas.

The Bank Manager shall consult the following sources for guidance on what species may threaten the site and on management of those species: The California Invasive Plant Council (Cal-IPC) *California Invasive Plant Inventory* is updated regularly and currently represents the best available knowledge of nonnative, invasive plant species of California. This list includes nonnative invasive plant species that are considered an ecological threat to the habitat function of public and private lands that support native ecosystems. This Management Plan recommends use of this list for defining nonnative, invasive plant species of concern, with a focus on species identified as “Red Alert” or “High.”

Objective: Monitor and maintain control over nonnative invasive plant species, including, but not limited to, those that diminish the site quality for which the Bank was established.

Task 1: Use baseline mapping of invasive species collected during the Interim Management Period as the baseline for invasive species monitoring.

Task 2: During each year’s annual walk-through survey (or a monthly survey), perform a qualitative assessment (i.e., a visual estimate of cover) of potential or observed nonnative invasive plant species populations, primarily in or around the riparian habitats. These surveys will compare results of the current year’s invasive species survey against the baseline. Evaluate and prioritize additional actions to control invasive species.

Task 3: If necessary, control nonnative invasive plant species by hand removal, mechanical equipment, biological controls, or herbicides. The use of biological control agents other than livestock will require IRT review and approval.

Element A.6 Vegetation Management for Access Needs

Vegetation on the majority of the Bank will be managed by natural processes (e.g., natural recruitment and survival without human intervention). Vegetation management within the covered habitat may be implemented if determined to be beneficial for overall habitat quality or to provide limited access to backwater channels for the purposes of fish monitoring, invasive species control, or channel maintenance. Management actions to prevent the spread of nonnative invasive species at the Bank are described above in **Element A.5**.

Objective: Maintain areas within fifty feet of the toe of the Project Levee and along the farm berm access road for site access.

Task 1: Remove Fremont cottonwood (*Populus fremontii*) or other trees with invasive root structures from the structural toe of the Project Levee, maintaining it in pre-restoration condition.

Task 2: Manage access along the existing farm berm road, including vegetation control and road grading (e.g., level tire ruts).

Element A.7 Grazing Management

Healthy native wildland ecosystems can respond favorably to an ongoing reduction of vegetative biomass to maintain the diversity and density of native plant species or to promote the establishment of target vegetation associations. The accumulation of dead plant material (thatch) in herbaceous plant communities can reduce the habitat value of wild areas for wildlife species, minimize structural diversity (different heights, density, and cover of vegetation), and prevent colonization by target plant species. Historically, vegetation composition within floodplain complexes was maintained though the natural processes of flooding, scour, wildfire, and, to some extent, by the grazing of native ungulates, such as antelope and elk. Active land management, including grazing, can be required to periodically reduce thatch accumulation in herbaceous floodplain plant communities and in some instances minimize encroachment or expansion of nonnative invasive plant species.

Livestock grazing for habitat management requires the proper balancing of animal numbers, type (e.g., goats, sheep, or cattle), seasonal timing, and grazing intensity to achieve the desired effect on the landscape. Elimination of grazing in absence of other disturbance mechanisms (e.g., flooding, fire, mowing) allows the accumulation of thatch, which could lead to a reduction of plant diversity, hinder species movement, and reduce food web support for salmonids. Overgrazing can pose a greater threat to the habitat, and facilitates invasion of nonnative invasive species, and more severe overgrazing can lead to erosion and sedimentation.

Management of California grassland habitats has traditionally relied on grazing on a winter/early spring cycle that can most uniformly remove thatch, mimicking the historical effects of large migrating herds of native ungulates. However, given the primary management objective of

managing the Bank for floodplain habitat, any implemented grazing management program will be altered to more effectively control later-season (i.e., spring to early summer) growth of herbs and perennial grasses (such as Johnson grass, *Sorghum halepense*) than can rapidly overtake the floodplain under certain conditions and in channel habitats.

Grazing on the Bank not expected to occur on a regular basis; it is used for episodic thatch reduction in the event that natural processes are not managing herbaceous buildup. Grazing may also be used to help manage nonnative invasive species. If thatch accumulation or nonnative invasive plant species become a problem, livestock, preferably goats or sheep, may be placed onsite during the appropriate time to manage the target issue (i.e., thatch or nonnative invasive plant species). Stocking rate will vary on livestock type utilized; however, it is likely that goats or sheep will be the preferred livestock, because they are more likely to target summer annual weeds and produce a more random pattern of utilization, resulting in a greater diversity of vegetative cover conditions. Stocking rates and density will be actively managed to meet grazing objectives.

Objective: Utilize a livestock grazing program on the Bank as needed to reduce thatch and manage nonnative invasive plant species. Considerations for the Bank's livestock grazing program include:

- Grazing duration, intensity, and appropriate timing to reduce thatch, control nonnative invasive vegetation, and/or maintain appropriate vegetation height and density for floodplain habitat utilization
- Maintain a mixture of both low-growing and taller and emergent cover in backwater channels when grazing is used to manage vegetation
- Maintain close-growing ground cover in uplands (between three and 12 inches)
- Maintain native plant diversity
- Reduce the presence of nonnative invasive plant species

  Task 1: Implement livestock (e.g., goats, sheep, or cattle) grazing as needed to reduce thatch and manage nonnative invasive plant species.

Annual site monitoring, coupled with focused monitoring of the habitats and sensitive species, will provide feedback as to whether or not the grazing is necessary or if the grazing program is assisting in meeting the goals and objectives for the Bank. This feedback will provide a basis for decision making regarding the grazing management.

4.2 Adaptive Management

Adaptive management is the management philosophy that recognizes the need to constantly monitor restored or created habitats and adapts the management actions if necessary, based on the results of monitoring. Over time, as restored habitats mature and more is learned about how the habitats respond to initial management actions, it is likely that adjustments to management actions will be required. New information from ongoing research on listed species can also lead to changes in management actions. Adaptive management means incorporates changes to management practices, including corrective actions as determined to be appropriate by the IRT in discussion with the Bank Manager. Adaptive management includes those activities necessary to

address the effects of climate change, fire, flood, or other natural events, force majeure, etc. Before considering any adaptive management changes to this Management Plan, the IRT will consider whether such actions will help ensure the continued viability of Bank's biological resources.

With the written consent of the IRT and appropriate permits, remedial earthwork and planting may be undertaken within the Bank to ensure Performance Standards are attained, and to reduce or eliminate the negative effects of past land use practices within the Bank.

Adaptive management changes will be attached to this plan as amendments; the table of contents will be updated accordingly. Each amendment must be approved by the IRT.

Element B.1 Adaptive Management

Objective: Implement adaptive management process to site operations.

Task 1: Document adjustments to management actions.

4.3 Security, Safety, and Access

The Bank will be fenced and shall provide no general public access, nor any regular public or private use. Research and educational programs or efforts may be allowed on the Bank as deemed appropriate by the Bank Manager. These programs are not specifically funded or a part of this Management Plan.

The Bank represents an opportunity to educate and encourage a sense of respect for open space, floodplain value, and wildlife habitat in local students and the community as a whole. Individuals or groups using the Bank for educational purposes will coordinate their use with the Bank Manager. If the educational activities will be passive in nature, such as an occasional walk through the Bank to discuss plants and animals in the Bank habitats, then the consent of the Bank Manger is sufficient. If active use or passive but regular use of the Bank is proposed, review and approval by the IRT is required. To avoid repeated inquiries with these agencies, a use plan could be developed by the interested organization for a one-time approval. Interpretive trails and benches are not proposed on the Bank.

The Property Owner may engage in or allow Property Owner's guess certain occasional recreational activities that will have no potential affect on the sensitive resources protected on the Bank. All recreational activities will follow State and Federal laws and may include birding, hunting, photography, or walking.

Should mosquitoes become a public nuisance, the Bank Manager will coordinate with the Sacramento-Yolo Mosquito and Vector Control District to develop best management practices to minimize mosquito reproduction at the Bank. Several of the recommended management actions for minimizing mosquitos (e.g., preventing trash accumulation onsite, providing good access, and removing silt or sediment that obstruct drainage) are already included in and allowed by this Management Plan. Any physical site alterations recommended by Sacramento-Yolo Mosquito

and Vector Control beyond those maintenance actions described in the Management Plan will require IRT approval.

Element C.1 Trash and Trespass

The Bank should remain free of trash and other debris that harms the aesthetic and ecological value of the Property. Proper site maintenance and site control will limit the amount of trash on Bank. Trash is most likely to occur outside of the Bank's fences and gates.

Objective: Monitor sources of trash and trespass.

Objective: Collect and remove trash, repair vandalized signs, and rectify trespass impacts.

> Task 1: During each site visit, record occurrences of trash or trespass. Record type of incident, location, and management mitigation recommendations to avoid, minimize, or rectify a trash or trespass impact.
>
> Task 2: At least once yearly, collect and remove trash and repair and rectify vandalism and trespass impacts. Maintain no-trespassing signs at a minimum of three per mile around the perimeter of the Bank.

4.4 Infrastructure and Facilities

The only access to the Bank is through the locked gates along the Project Levee roads on the west. Since the Property is bounded by waterways on the east, north, and south sides, the only land access is from the west and thus only the west border of the Bank will be fenced and gated to deter unauthorized public access. Signage will be installed along the external perimeters of the Bank to inform the public of the presence of the Bank. The Bank Manager will be responsible for the maintenance and replacement of the fencing and signage. Temporary fencing may be placed as needed on the Bank to aid in partitioning the property for grazing, but it will be removed prior to the designated flood season.

Element D.1 Gates

Objective: Monitor condition of site access gates.

Objective: Maintain site access gates and signage to prevent casual trespass and allow necessary maintenance access.

> Task 1: During each site visit, record condition of fences and gates. Record locations and types of damage as well as recommendations to implement gate repair or replacement, if applicable.
>
> Task 2: Maintain signage and gates as necessary by replacing posts and wire. Replace signage and gates as necessary and as funding allows.

4.5 Reporting and Administration

Element E.1 Annual Report

Objective: Provide an Annual Report on all management tasks conducted on the Bank and general Bank conditions to IRT and any other appropriate parties.

Task 1: Prepare an Annual Report that includes a summary of the past year's maintenance and monitoring activities. Complete and circulate to the IRT and other parties by November 30 of each year.

Task 2: Make recommendations with regard to:

- Any habitat enhancement measures deemed to be warranted
- Any problems that need immediate and long-term attention (e.g., nonnative invasive plant management, fence repair, erosion control)
- Any changes in the monitoring or management program that appear to be warranted based on monitoring results to date

5 Transfer, Replacement, Amendments, and Notices

5.1 Transfer

Under this Management Plan, any subsequent transfer of responsibilities to a different Bank Manager shall be requested by the Bank Manager in writing to the IRT, shall require written approval by the IRT, and shall be incorporated into this Management Plan by amendment. Any subsequent Property Owner assumes the Bank Manager responsibilities described in this Management Plan and as required in the Conservation Easement, unless otherwise amended in writing by the IRT.

5.2 Replacement

If the Bank Manager fails to implement the tasks described in this Management Plan and is notified of such failure in writing by the IRT, the Bank Manager shall have 90 days to cure such failure. If failure is not cured within 90 days, the Bank Manager shall meet with the IRT to resolve the failure. Such meeting shall occur within 30 days or a longer period if approved by the IRT. Based on the outcome of the meeting, the IRT may request, in writing, a replacement Bank Manager by amendment of this Management Plan. If Bank Manager fails to designate a replacement Bank Manager, then such public or private land or resource management organization acceptable to the IRT and Property Owner may enter onto the Bank in order to fulfill the purposes of this Management Plan.

5.3 Amendments

The Bank Manager, Property Owner, and IRT may meet and confer, upon the request of any one of them, to revise this Management Plan to better meet management objectives and preserve the habitat and conservation values of the Bank. Any proposed changes to this Management Plan

shall be discussed with the IRT and the Bank Manager. Any proposed changes will be designed with input from all parties. Amendments to this Management Plan shall be approved by the IRT in writing, shall become required management components, and shall be implemented by the Bank Manager.

If the CDFW or NMFS specify in writing that continued implementation of this Management Plan would jeopardize the continued existence of a listed species, any written amendment to this Management Plan determined by the CDFW and/or NMFS as necessary to avoid such jeopardy, shall become a required management component and shall be implemented by the Bank Manager.

5.4 Notices

Any notices regarding this Long-Term Management Plan shall be directed as follows:

Bank Manager and Property Owner:

Westervelt Ecological Services, LLC
600 N. Market Boulevard, Suite 3
Sacramento, CA 95834-1257
Telephone: (916) 646-3644
Fax: (916) 646-3675

IRT, BEI Signatory Agencies:

United States Army Corps of Engineers, Sacramento District
1325 J Street, Room 1480
Sacramento, CA 95814
Attn: Chief, Regulatory Section
Telephone: (916) 557-2520
Fax: (916) 557-6877

United States Environmental Protection Agency
Region IX
75 Hawthorne Street
San Francisco, CA 94105
Attn: Director, Water Division
Telephone: (415) 947-8707
Fax: (415) 947-3549

National Marine Fisheries
West Coast Region
650 Capitol Mall
Sacramento, CA 95814
Attn: Sacramento River Branch Manager
Telephone: (916) 930-3608
Fax: (916) 930-3629

California Department of Fish and Wildlife
Region 2 Office
1701 Nimbus Road
Rancho Cordova, CA 95670
Attn: Regional Manager
Telephone: (916) 358-2900
Fax: (916) 358-2912

Conservation Easement Holder:

Wetlands America Trust
One Waterfowl Way
Memphis, TN 38120-2351
Telephone: (901) 758-3700
Fax: (901) 758-3855

6 Funding and Task Prioritization

6.1 Funding

The Endowment analysis conducted for the Bank details the anticipated costs of long-term management for the Bank. These costs include estimates of time and funding needed to conduct the basic monitoring site visits and reporting, trash removal, gate repair, and a prorated calculation of funding needed to conduct focused fish and SWHA surveys in reoccurrence cycles of 10 and five years, respectively. The total annual funding anticipated is $46,694; therefore, with the current annual estimated capitalization rate of 3.5%, the total Endowment Fund amount required will be $743,097.

The National Fish and Wildlife Foundation or other CDFW-approved entity, shall hold the Endowment Principal and interest monies as required by law in a subsequent state-authorized trustee fund, which consists of monies that are paid into it in trust pursuant to law, and is appropriated to fulfill the purposes for which payments into it are made. These interest monies will fund the long-term management, enhancement, and monitoring activities on habitat lands in a manner consistent with this Management Plan.

6.2 Task Prioritization

Due to unforeseen circumstances, prioritization of tasks, including tasks resulting from new requirements, may be necessary if insufficient funding is available to accomplish all tasks. The Bank Manager and the IRT shall discuss task priorities and funding availability to determine which tasks will be implemented. In general, tasks are prioritized in this order:

1) Tasks required by a local, state, or federal agency
2) Tasks necessary to maintain or remediate habitat quality
3) Tasks that involved the monitoring of resources, particularly if past monitoring has not shown downward trends

Equipment and materials necessary to implement priority tasks will also be considered priorities. Final determination of task priorities in any given year of insufficient funding will be determined in consultation with the IRT and as authorized by the IRT in writing.

7 References

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Westervelt Ecological Services (WES) (2015b). Bullock Bend Mitigation Bank Interim Management Plan. Dated August 2015.

Bullock Bend Mitigation Bank
Interim Management Plan

Prepared by:

WESTERVELT
ECOLOGICAL SERVICES
600 North Market Boulevard, Suite 3
Sacramento, California 95834
916-646-3644

Screen Check Draft
March 2016

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1 Introduction

This Interim Management Plan ("Interim Plan") describes the habitat management activities to be conducted within the Bullock Bend Mitigation Bank ("Bank") during the establishment and monitoring period ("Interim Management Period"), which will take place after Bank signature, and will continue until 1) year seven, 2) all Performance Standards have been met, and 3) the Endowment has been fully funded for three years. The long-term management and monitoring activities will begin after those three conditions have been met. Due to an existing agricultural lease, row crops will be grown on the Bank in 2015, depending on water availability, and construction will be completed in 2016. This Interim Plan details the monitoring activities that apply during the Interim Management Period for the habitat features developed at the Bank.

The goal of the Bank development and management during the Interim Management Period is to achieve or exceed the physical and biological Performance Standards that indicate that riparian functions and services, Swainson's hawk (*Buteo swainsoni*) ("SWHA") nesting, and listed salmonid floodplain habitats are on the proper developmental trajectory and are being managed and maintained as proposed in the *Bullock Bend Mitigation Bank Habitat Development Plan* ("Habitat Plan"; WES 2015a). The tasks identified in this Interim Plan outline discrete activities that are required to maintain the vegetation, backwater channels, and farm berm breach location needed for listed species' habitats and to protect the habitats from unauthorized and potentially harmful uses. Standard precautionary measures for species are incorporated into all management activities in order to avoid or minimize their potential impact on individuals. The level and frequency of monitoring occurring during the Interim Management Period is more intensive in Years 1-7, and is designed to assess the progress toward achievement of Performance Standards for the Bank.

1.2 Bank Manager and Responsibilities

The Property Owner, Westervelt Ecological Services ("WES"), will be the Interim and Long-Term Land Manager ("Bank Manager"). WES, and any subsequent Bank Manager if transferred, shall implement this Interim Plan. The Bank Manager shall be responsible for providing an Annual Report to the Interagency Review Team ("IRT"), detailing the time period covered and providing a description of the management tasks accomplished.

2 Habitat Development Plan Monitoring

The following Habitat Plan monitoring methods were taken from the Habitat Plan and will be implemented during the Interim Management Period. Additional information on these items can be found in the Habitat Plan.

2.1 Success Criteria and Performance Standards

As discussed in the Habitat Plan, the success of the Bank is largely dependent on establishment and maintenance of the connection between the floodplain and the Sacramento River (i.e., via the breach in the farm berm) and stability of the de-leveled floodplain and backwater channels to allow the free exchange of flows. Maintenance and stability of the breach and floodplain will ensure that the river and restored floodplain engage and disengage in unison during flood events.

Flood events in the Sacramento River occur during the winter and spring months, while water temperatures are cold. As such, turbidity during flood events is often high due to suspended sediments washing down from the watershed. Ensuring that these cold flood flows on the restored floodplain remain connected to the large body of cold river flows will be important to ameliorate potential localized increases in water temperature or decreases in dissolved oxygen on the restored floodplain. This connectivity is also crucial for access to the restored floodplain by native salmonids. It is anticipated that the breach will evolve over time as natural processes modify the site; however it is not anticipated that this evolution will cause a variance of more than 10% per year. Additionally the breach is narrow to allow "self-cleaning" so water levels may vary inside and outside the breach until equilibrium is created.

The Performance Standards described below are structured to allow evaluation of the ecological function of the Bank for the following factors:

- Physical – physical integrity of the farm berm breach to support appropriate flooding to support natural recruitment of target vegetation and site access by salmonid species
- Hydrological – appropriate inundation or saturation duration to support natural recruitment of target vegetation and site utilization by salmonid species
- Floral – establishment, growth, and natural recruitment of target vegetation
- Faunal – use of the Bank by target species (i.e., Chinook salmon, SWHA) as well as target species' prey.

The following Success Criteria and Performance Standards have been established for the Bank.

2.1.1 Success Criteria for USACE Waters of the United States

Performance Standards for waters of the United States are summarized in **Table 1** and described below.

Table 1. Success Criteria and Performance Standards for USACE Waters of the United States								
Success Criteria	**Performance Standard**	**Interim Performance Standards**						
		Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**
Physical-1	Breach Cross-Sectional Profile: The breach location should not vary by more than 10% between monitoring years, and should not vary by more than 45% from As-Built by Year 7.	<10% change from As-Built	<10% change from Year 1	<10% change from Year 2	<10% change from Year 3	<10% change from Year 4	<10% change from Year 5	<10% change from Year 6 (no greater than 45% from As-Built)
Hydrologic-1	Extent and Duration of Inundation: Extent and duration of inundation of the sample locations within the Bank will be within 10% of predicted stage values based on Wilkins Slough discharge during yearly peak discharge event (i.e., greatest flow event within a year).	No more than ±10% variance from Reference Site #3	No more than ±10% variance from Reference Site #3	No more than ±10% variance from Reference Site #3	No more than ±10% variance from Reference Site #3	No more than ±10% variance from Reference Site #3	No more than ±10% variance from Reference Site #3	No more than ±10% variance from Reference Site #3
Flora-1	Natural Vegetation Recruitment: The backwater channels will support natural recruitment of wetland and riparian plant species and native species will comprise a minimum of 50% of the absolute vegetative cover averaged across sample plots by Year 7.	N/A	≥ 10% absolute cover	≥20% absolute cover	≥ 30% absolute cover	≥ 50% absolute cover	≥ 50% absolute cover	≥ 50% absolute cover
Flora-2	Plant Survivorship: Planted riparian vegetation material (i.e., container plants, acorns, cuttings) will have a minimum survival rate of 50% by Year 7.	N/A	≥75% survival	≥60% survival	≥55% survival	≥50% survival	≥50% survival	≥50% survival
Flora-3	Nonnative Invasive Plant Species: The absolute cover of nonnative invasive plant species will be below 10% in all sample plots by the end of Year 7.	<10% absolute cover by Year 7						

2.1.1.1 Physical-1: Breach Cross-Section Profile

The breach location in the farm berm on the Sacramento River will remain stable and is expected to vary only minimally (±10%) in cross-section from year to year, with no more than a 45% variation from the As-Built condition by Year 7. Some annual variation in cross-section can be expected due to minor sedimentation and/or scour that occur as part of natural processes. This performance standard is not intended to accommodate progressive sedimentation or scour (i.e., overall increases or decreases in breach thalweg over the monitoring period) but is intended to allow for some natural fluctuation as a result of natural processes. The intention of this performance standard is to ensure that the restored floodplain engages, disengages, and drains completely during the flood cycle. As such, this performance standard may be subordinated if the Hydrologic-1 performance standard is attained, indicating that the Bank is hydrologically functioning as intended despite an increase in variation of the breach cross-section beyond what is expected. Any sediment accumulation of >10% will trigger corrective actions to remove sediment and allow unobstructed ingress and egress for juvenile salmonids to the floodplain as outlined in the Long-Term Management Plan's Element A.4.

2.1.1.2 Extent and Duration of Inundation

Water surface data loggers will be installed at the breach and on the north side of the Bank near the lift pump to record water surface elevations within the Sacramento River as well as the interior of the site. These data will be compared to modeled stage discharge curves for the Wilkins Slough gauge station to determine whether or not stage elevation within the Bank is in alignment with that of the river. Natural floodplain inundation events are essential for habitat development and are key drivers of ecological processes within the Bank. These events promote colonization by target herbaceous wetland and woody riparian vegetation and also provide access to the floodplain by out-migrating salmonids while also initiating and supporting key food web dynamic processes.

2.1.1.3 Flora-1: Natural Vegetation Recruitment

The backwater channels will support natural recruitment of wetland and riparian plant species and native species will comprise a minimum of 50% of the absolute vegetative cover averaged across sample plots by Year 7. Natural recruitment is a function of appropriately timed flood flows and the backwater channels are the most likely portion of the restored floodplain to exhibit significant natural recruitment during the monitoring period. Naturally recruited vegetation is also important in sustaining food web dynamics for out-migrating salmonids in that it produces terrestrial invertebrates that are immediately available upon flood up and also provides substrate for periphyton production during longer term inundation events. Naturally recruited vegetation also contributes to the structural heterogeneity of the floodplain which helps provide cover for young salmonids during flood events.

2.1.1.4 Flora-2 Plant Survivorship

Planted riparian vegetation material (i.e., container plants, acorns, cuttings) on the floodplain terrace and within backwater channels should have a minimum survival rate of 50% by Year 7. Naturally recruited native woody riparian trees and shrubs that become established during the monitoring period can be used to offset mortality of installed plantings in evaluating final performance standards (i.e., Year 7). Survivorship of planted riparian vegetation is also

important to out-migrating salmonids for the same reasons as mentioned for naturally recruited vegetative cover above.

2.1.1.5 Flora-3 Nonnative Invasive Plant Species

Nonnative invasive plant species should below 10% absolute cover in all sample plots by the end of Year 7. The Reference Areas (described in the Habitat Plan) support numerous native and California-endemic plant species. Additionally, the sites currently function with a number of nonnative plant species, many of which have become naturalized.

2.1.2 Success Criteria for CDFW Riparian (1600) Habitat

Performance Standards for CDFW Section 1600 riparian habitat are summarized in **Table 2** and described below.

Table 2. Success Criteria and Performance Standards for CDFW Riparian (1600) Habitat

Success Criteria	Performance Standard	Interim Performance Standards						
		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Flora-1	Natural Vegetation Recruitment: The backwater channels will support natural recruitment of wetland and riparian plant species and native species will comprise a minimum of 50% of the absolute vegetative cover averaged across sample plots by Year 7.	N/A	≥ 10% absolute cover	≥20% absolute cover	≥ 30% absolute cover	≥ 50% absolute cover	≥ 50% absolute cover	≥ 50% absolute cover
Flora-2	Plant Survivorship: Planted riparian vegetation material (i.e., container plants, acorns, cuttings) will have a minimum survival rate of 50% by Year 7.	N/A	≥75% survival	≥60% survival	≥55% survival	≥50% survival	≥50% survival	≥50% survival
Flora-3	Nonnative Invasive Plant Species: The absolute cover of nonnative invasive plant species will be below 10% in all sample plots by the end of Year 7.	<10% absolute cover by Year 7						

2.1.2.1 Flora-1: Natural Vegetation Recruitment

The backwater channels will support natural recruitment of wetland and riparian plant species and native species will comprise a minimum of 50% of the absolute vegetative cover averaged across sample plots by Year 7. Natural recruitment is a function of appropriately timed flood flows and the backwater channels are the most likely portion of the restored floodplain to exhibit significant natural recruitment during the monitoring period. Naturally recruited vegetation is also important in sustaining food web dynamics for out-migrating salmonids in that it produces terrestrial invertebrates that are immediately available upon flood up and also provides substrate for periphyton production during longer term inundation events. Naturally recruited vegetation also contributes to the structural heterogeneity of the floodplain which helps provide cover for young salmonids during flood events.

2.1.2.2 Flora-2 Plant Survivorship

Planted riparian vegetation material (i.e., container plants, acorns, cuttings) on the floodplain terrace and within backwater channels should have a minimum survival rate of 50% by Year 7. Naturally recruited native woody riparian trees and shrubs that become established during the monitoring period can be used to offset mortality of installed plantings in evaluating final performance standards (i.e., Year 7). Survivorship of planted riparian vegetation is also important to out-migrating salmonids for the same reasons as mentioned for naturally recruited vegetative cover above.

2.1.2.3 Flora-3 Nonnative Invasive Plant Species

Nonnative invasive plant species should below 10% absolute cover in all sample plots by the end of Year 7. The Reference Areas (described in the Habitat Plan) support numerous native and California-endemic plant species. Additionally, the sites currently function with a number of nonnative plant species, many of which have become naturalized.

2.1.3 Success Criteria for NMFS Salmonid Species

NMFS salmonid species include:

- California Central Valley steelhead (distinct population segment)
- Chinook salmon - Central Valley fall-/late-fall run (evolutionary significant units)
- Chinook salmon - Central Valley spring run (evolutionary significant units)
- Chinook salmon - Central Valley winter run (evolutionary significant units)

Performance Standards for NMFS salmonid species are summarized in **Table 3** and described below.

Table 3. Success Criteria and Performance Standards for NMFS Salmonid Species

Success Criteria	Performance Standard	Interim Performance Standards						
		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Physical-1	Breach Cross-Sectional Profile: The breach location should not vary by more than 10% between monitoring years, and should not vary by more than 45% from As-Built by Year 7.	<10% change from As-Built	<10% change from Year 1	<10% change from Year 2	<10% change from Year 3	<10% change from Year 4	10% change from Year 5	10% change from Year 6 (no greater than 45% from As-Built)
Hydrologic-1	Extent and Duration of Inundation: Extent and duration of inundation of the sample locations within the Bank will be within 10% of predicted stage values based on Wilkins Slough discharge during yearly peak discharge event (i.e., greatest flow event within a year).	No more than ±10% variance from Reference Site #3	No more than ±10% variance from Reference Site #3	No more than ±10% variance from Reference Site #3	No more than ±10% variance from Reference Site #3	No more than ±10% variance from Reference Site #3	No more than ±10% variance from Reference Site #3	No more than ±10% variance from Reference Site #3

Table 3. Success Criteria and Performance Standards for NMFS Salmonid Species (Continued)								
Flora-1	Natural Vegetation Recruitment: The backwater channels will support natural recruitment of wetland and riparian plant species and native species will comprise a minimum of 50% of the absolute vegetative cover averaged across sample plots by Year 7.	N/A	≥ 10%	≥20%	≥ 30%	≥ 50%	≥ 50% absolute cover	≥ 50% absolute cover
Flora-2	Plant Survivorship: Planted riparian vegetation material (i.e., container plants, acorns, cuttings) will have a minimum survival rate of 50% by Year 7.	N/A	≥75% survival	≥60% survival	≥55% survival	≥50% survival	≥50% survival	≥50% survival
Flora-3	Nonnative Invasive Plant Species: The absolute cover of nonnative invasive plant species will be below 10% in all sample plots by the end of Year 7.	<10% absolute cover by Year 7						
Fauna-1	Food Web Support: Relative density (catch/cm3) of invertebrate prey items ("IPI") within the restored floodplain will be ≥ the relative density IPI in the mainstem of the Sacramento River.	≥ of the mainstem of the Sacramento River	N/A	≥ of the mainstem of the Sacramento River	N/A	≥ of the mainstem of the Sacramento River	N/A	≥ of the mainstem of the Sacramento River
Fauna-2	Juvenile Chinook Salmon Utilization: Juvenile Chinook salmon will be detected within the Bank by Year 7.	Presence by Year 7						

2.1.3.1 Physical-1: Breach Cross-Section Profile

The breach location in the farm berm on the Sacramento River will remain stable and is expected to vary only minimally (±10%) in cross-section from year to year, with no more than a 45% variation from the As-Built condition by Year 7. Some annual variation in cross-section can be expected due to minor sedimentation and/or scour that occur as part of natural processes. This performance standard is not intended to accommodate progressive sedimentation or scour (i.e., overall increases or decreases in breach thalweg over the monitoring period) but is intended to allow for some natural fluctuation as a result of natural processes. The intention of this performance standard is to ensure that the restored floodplain engages, disengages, and drains completely during the flood cycle. As such, this performance standard may be subordinated if the Hydrologic-1 performance standard is attained, indicating that the Bank is hydrologically functioning as intended despite an increase in variation of the breach cross-section beyond what is expected. Any sediment accumulation of >10% will trigger corrective actions to remove

sediment and allow unobstructed ingress and egress for juvenile salmonids to the floodplain as outlined in the Long-Term Management Plan's Element A.4.

2.1.3.2 Hydrologic-1: Extent and Duration of Inundation

Water surface data loggers will be installed at the breach and on the north side of the Bank near the lift pump to record water surface elevations within the Sacramento River as well as the interior of the site. These data will be compared to modeled stage discharge curves for the Wilkins Slough gauge station to determine whether or not stage elevation within the Bank is in alignment with that of the river. Natural floodplain inundation events are essential for habitat development and are key drivers of ecological processes within the Bank. These events promote colonization by target herbaceous wetland and woody riparian vegetation and also provide access to the floodplain by out-migrating salmonids while also initiating and supporting key food web dynamic processes.

2.1.3.3 Flora-1: Natural Vegetation Recruitment

The backwater channels will support natural recruitment of wetland and riparian plant species and native species will comprise a minimum of 50% of the absolute vegetative cover averaged across sample plots by Year 7. Natural recruitment is a function of appropriately timed flood flows and the backwater channels are the most likely portion of the restored floodplain to exhibit significant natural recruitment during the monitoring period. Naturally recruited vegetation is also important in sustaining food web dynamics for out-migrating salmonids in that it produces terrestrial invertebrates that are immediately available upon flood up and also provides substrate for periphyton production during longer term inundation events. Naturally recruited vegetation also contributes to the structural heterogeneity of the floodplain which helps provide cover for young salmonids during flood events.

2.1.3.4 Flora-2 Plant Survivorship

Planted riparian vegetation material (i.e., container plants, acorns, cuttings) on the floodplain terrace and within backwater channels should have a minimum survival rate of 50% by Year 7. Naturally recruited native woody riparian trees and shrubs that become established during the monitoring period can be used to offset mortality of installed plantings in evaluating final performance standards (i.e., Year 7). Survivorship of planted riparian vegetation is also important to out-migrating salmonids for the same reasons as mentioned for naturally recruited vegetative cover above.

2.1.3.5 Flora-3 Nonnative Invasive Plant Species

Nonnative invasive plant species should below 10% absolute cover in all sample plots by the end of Year 7. The Reference Areas (described in the Habitat Plan) support numerous native and California-endemic plant species. Additionally, the sites currently function with a number of nonnative plant species, many of which have become naturalized.

2.1.3.6 Fauna-1 Food Web Support

To meet this performance standard, the relative density of invertebrate prey items within the restored floodplain of the Bank will be equal to or greater than the relative density documented within the mainstem of the Sacramento River. In the last two decades, many studies have shown that aquatic and terrestrial organisms benefit from tidal and seasonal connectivity between rivers

and floodplains (Sommer et al. 2001; Jeffres et al. 2008). Further, Jeffres et al. (2008) demonstrate significantly increased growth in juvenile salmon reared on a floodplain relative to those reared in the mainstem river. Sommer et al. (2001) attributes this increased growth to increased temperature and invertebrate production found in floodplains relative to mainstem river habitat. Aquatic invertebrate production in seasonally inundated floodplains typically peaks during the second and third week of inundation (Grosholz and Gallo 2006). However, it has been demonstrated that juvenile fish can directly benefit from short term floodplain inundation by preying on terrestrial invertebrates (O'Connell 2003). Therefore, the presence of an appropriate prey species for salmonid species within the Bank at densities comparable or better than the adjacent river will indicate that the site is providing adequate forage for juvenile salmonids.

2.1.3.7 Fauna-2 Juvenile Chinook Salmon Utilization

Utilization of the Bank by juvenile Chinook salmon will be determined by documenting their presence or absence within the inundated portions of the restored site (i.e., constructed backwater channels, benches, and floodplain habitat). Juvenile Chinook salmon utilization surveys will take place in monitoring Years 1, 3, 5 and 7.

In the event that juvenile Chinook salmon are not detected during surveys, data collected as part of performance standard evaluation as well as supplemental data collected as part of the monitoring program (see **Section 2.2.2**) will be utilized to determine whether or not site conditions are suitable for juvenile Chinook salmon.

2.1.4 Success Criteria for CDFW Salmonid Species

CDFW salmonid species include:

- Chinook salmon - Central Valley spring run (evolutionary significant units)
- Chinook salmon - Central Valley winter run (evolutionary significant units)

Performance Standards for CDFW salmonid species are summarized in **Table 4** and described below.

Table 4. Success Criteria and Performance Standards for CDFW Salmonid Species								
Success Criteria	**Performance Standard**	**Interim Performance Standards**						
		Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**
Physical-1	Breach Cross-Sectional Profile: The breach location should not vary by more than 10% between monitoring years, and should not vary by more than 45% from As-Built by Year 7.	<10% change from As-Built	<10% change from Year 1	<10% change from Year 2	<10% change from Year 3	<10% change from Year 4	<10% change from Year 5	<10% change from Year 6 (no greater than 45% from As-Built)
Hydrologic-1	Extent and Duration of Inundation: Extent and duration of inundation of the sample locations within the Bank will be within 10% of predicted stage values based on Wilkins Slough discharge during yearly peak discharge event (i.e., greatest flow event within a year).	No more than ±10% variance from Reference Sites	No more than ±10% variance from Reference Sites	No more than ±10% variance from Reference Sites	No more than ±10% variance from Reference Sites	No more than ±10% variance from Reference Sites	No more than ±10% variance from Reference Sites #3	No more than ±10% variance from Reference Sites #3
Flora-1	Natural Vegetation Recruitment: The backwater channels will support natural recruitment of wetland and riparian plant species and native species will comprise a minimum of 50% of the absolute vegetative cover averaged across sample plots by Year 7.	N/A	≥ 10%	≥20%	≥ 30%	≥ 50%	≥ 50% absolute cover	≥ 50% absolute cover
Flora-2	Plant Survivorship: Planted riparian vegetation material (i.e., container plants, acorns, cuttings) will have a minimum survival rate of 50% by Year 7.	N/A	≥75% survival	≥60% survival	≥55% survival	≥50% survival	≥50% survival	≥50% survival
Flora-3	Nonnative Invasive Plant Species: The absolute cover of nonnative invasive plant species will be below 10% in all sample plots by the end of Year 7.	<10% absolute cover by Year 5						
Fauna-1	Food Web Support: Relative density (catch/cm3) of invertebrate prey items ("IPI") within the restored floodplain will be ≥ the relative density IPI in the mainstem of the Sacramento River.	≥ of the mainstem of the Sacramento River	N/A	≥ of the mainstem of the Sacramento River	N/A	≥ of the mainstem of the Sacramento River	N/A	≥ of the mainstem of the Sacramento River
Fauna-2	Juvenile Chinook Salmon Utilization: Juvenile	Presence by Year 5						

	Chinook salmon will be detected within the Bank by Year 7.	

2.1.4.1 Physical-1: Breach Cross-Section Profile

The breach location in the farm berm on the Sacramento River will remain stable and is expected to vary only minimally (±10%) in cross-section from year to year, with no more than a 45% variation from the As-Built condition by Year 7. Some annual variation in cross-section can be expected due to minor sedimentation and/or scour that occur as part of natural processes. This performance standard is not intended to accommodate progressive sedimentation or scour (i.e., overall increases or decreases in breach thalweg over the monitoring period) but is intended to allow for some natural fluctuation as a result of natural processes. The intention of this performance standard is to ensure that the restored floodplain engages, disengages, and drains completely during the flood cycle. As such, this performance standard may be subordinated if the Hydrologic-1 performance standard is attained, indicating that the Bank is hydrologically functioning as intended despite an increase in variation of the breach cross-section beyond what is expected. Any sediment accumulation of >10% will trigger corrective actions to remove sediment and allow unobstructed ingress and egress for juvenile salmonids to the floodplain as outlined in the Long-Term Management Plans' Element A.4.

2.1.4.2 Hydrologic-1: Extent and Duration of Inundation

Water surface data loggers will be installed at the breach and on the north side of the Bank near the lift pump to record water surface elevations within the Sacramento River as well as the interior of the site. These data will be compared to modeled stage discharge curves for the Wilkins Slough gauge station to determine whether or not stage elevation within the Bank is in alignment with that of the river. Natural floodplain inundation events are essential for habitat development and are key drivers of ecological processes within the Bank. These events promote colonization by target herbaceous wetland and woody riparian vegetation and also provide access to the floodplain by out-migrating salmonids while also initiating and supporting key food web dynamic processes.

2.1.4.3 Natural Vegetation Recruitment

The backwater channels will support natural recruitment of wetland and riparian plant species and native species will comprise a minimum of 50% of the absolute vegetative cover averaged across sample plots by Year 7. Natural recruitment is a function of appropriately timed flood flows and the backwater channels are the most likely portion of the restored floodplain to exhibit significant natural recruitment during the monitoring period. Naturally recruited vegetation is also important in sustaining food web dynamics for out-migrating salmonids in that it produces terrestrial invertebrates that are immediately available upon flood up and also provides substrate for periphyton production during longer term inundation events. Naturally recruited vegetation also contributes to the structural heterogeneity of the floodplain which helps provide cover for young salmonids during flood events.

2.1.4.4 Flora-2 Plant Survivorship

Planted riparian vegetation material (i.e., container plants, acorns, cuttings) on the floodplain terrace and within backwater channels should have a minimum survival rate of 50% by Year 7.

Naturally recruited native woody riparian trees and shrubs that become established during the monitoring period can be used to offset mortality of installed plantings in evaluating final performance standards (i.e., Year 7). Survivorship of planted riparian vegetation is also important to out-migrating salmonids for the same reasons as mentioned for naturally recruited vegetative cover above.

2.1.4.5 Flora-3 Nonnative Invasive Plant Species

Nonnative invasive plant species should below 10% absolute cover in all sample plots by the end of Year 7. The Reference Areas (described in the Habitat Plan) support numerous native and California-endemic plant species. Additionally, the sites currently function with a number of nonnative plant species, many of which have become naturalized.

2.1.4.6 Fauna-1 Food Web Support

To meet this performance standard, the relative density of invertebrate prey items within the restored floodplain of the Bank will be equal to or greater than the relative density documented within the mainstem of the Sacramento River. In the last two decades, many studies have shown that aquatic and terrestrial organisms benefit from tidal and seasonal connectivity between rivers and floodplains (Sommer et al. 2001; Jeffres et al. 2008). Further, Jeffres et al. (2008) demonstrate significantly increased growth in juvenile salmon reared on a floodplain relative to those reared in the mainstem river. Sommer et al. (2001) attributes this increased growth to increased temperature and invertebrate production found in floodplains relative to mainstem river habitat. Aquatic invertebrate production in seasonally inundated floodplains typically peaks during the second and third week of inundation (Grosholz and Gallo 2006). However, it has been demonstrated that juvenile fish can directly benefit from short term floodplain inundation by preying on terrestrial invertebrates (O'Connell 2003). Therefore, the presence of an appropriate prey species for salmonid species within the Bank at densities comparable or better than the adjacent river will indicate that the site is providing adequate forage for juvenile salmonids.

2.1.4.7 Fauna-2 Juvenile Chinook Salmon Utilization

Utilization of the Bank by juvenile Chinook salmon will be determined by documenting their presence or absence within the inundated portions of the restored site (i.e., constructed backwater channels, benches, and floodplain habitat). Juvenile Chinook salmon utilization surveys will take place in monitoring Years 1, 3, 5 and 7.

In the event that juvenile Chinook salmon are not detected during surveys, data collected as part of performance standard evaluation as well as supplemental data collected as part of the monitoring program (see **Section 2.2.2**) will be utilized to determine whether or not site conditions are suitable for juvenile Chinook salmon.

2.1.5 Success Criteria for CDFW Swainson's Hawk Nesting Buffer

Performance Standards for CDFW Swainson's hawk nesting buffer are identical to those proposed for USACE Waters of the United States and are summarized in **Table 1** and described in **Section 2.1.1**. It should be noted that due to the varying nature of these habitat types, CDFW may allow some flexibility on how these Credits are released and/or approved on a project by project basis.

2.1.6 Success Criteria for CDFW Swainson's Hawk Tree Nesting Use

Performance Standards for CDFW Swainson's hawk tree nesting use are summarized in **Table 5** and described below.

Table 5. Success Criteria and Performance Standards for CDFW SWHA Tree Nesting Use

Success Criteria	Performance Standard	Interim Performance Standards						
		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Fauna-1	Enhancement: Documented usage of up to two trees within the enhancement area by SWHA for nesting purposes.	Presence by Year 5						
Fauna-2	Re-establishment: Documented usage of up to two trees within the re-establishment area by SWHA for nesting purposes.	Presence by Year 5						

2.1.6.1 Swainson's Hawk Tree Nesting Use

Performance standards for SWHA nests will be based on observed presence of individual occupied nests at least once during the seven year monitoring period. Up to two trees per enhanced/re-established area (i.e., up to two trees in enhanced areas and up to two trees in re-established areas) can qualify towards SWHA Tree Nesting Use Credits if occupied. Nesting surveys will be conducted by a qualified biologist and follow-up surveys will be conducted until the young have fledged or the nest is abandoned. Causation for nest abandonment will be determined, if possible. SWHA nesting surveys will take place in monitoring Years 1, 3, 5 and 7.

2.2 Monitoring Methods

2.2.1 Monitoring Schedule

Table 6 provides the Bank's seven year monitoring schedule for Success Criteria monitoring and additional monitoring activities, which are described in **Section 2.2.2** and **Section 2.2.3**.

Table 6. Seven Year Monitoring Schedule							
Monitoring Activity	**Monitoring Year**						
	Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**
Performance Standard Monitoring							
Breach Cross-Sectional Profile	X	X	X	X	X	X	X
Extent and Duration of Inundation	X	X	X	X	X	X	X
Natural Vegetation Recruitment		X	X	X	X	X	X
Plant Survivorship		X	X	X	X	X	X
Nonnative Invasive Species		X	X	X	X	X	X
Food Web Support	X		X		X		X
Juvenile Chinook Salmon Utilization	X		X		X		X
Swainson's Hawk Tree Nesting Use	X		X		X		X
Additional Monitoring							
Water Quality*	X		X		X		X
Predatory Fish	X		X		X		X
Fish Stranding	X	X	X	X	X	X	X
** Includes temperature, pH, dissolved oxygen, electrical conductivity, total dissolved solids, and turbidity.*							

2.2.1 Success Criteria Monitoring Methods

Monitoring methods for the Success Criteria and Performance Standards outlined in **Section 2.1** are provided below.

2.2.1.1 Breach Cross-Section Profile

Upon completion of Bank construction activities, three permanently established cross-section transects across the breach will be measured using a real time kinematic (RTK) system or similar high precision survey equipment (e.g., total station) to assess onsite conditions to subinch accuracy. These same transects will be monitored annually at the end of the winter/spring season each year during the monitoring period. The annual cross-section measurements made at these locations will then be compared to the as-built documentation or the previous year's results, as appropriate, to determine changes in the breach.

2.2.1.2 Extent and Duration of Inundation

Hydrologic monitoring will be conducted through the use of pressure transducing data loggers (e.g., Solinst leveloggers or similar) installed at the Bank's farm berm breach location and within the Sacramento River on the north side of the Bank near the lift pump. The dataloggers will be set to continuously measure water surface elevation and record water temperature at 30-minute intervals throughout the seven year monitoring period. These data will be compared to modeled stage discharge curves for the Wilkins Slough gauge station to determine whether or not stage elevation within the Bank is in alignment with that of the river.

2.2.1.3 Natural Vegetation Recruitment

Natural vegetation recruitment within the backwater channels and floodplain will be measured using a line-intercept method, stratified random plots, or a combination of both. A maximum of 20 sample areas will be monitored annually in Years 2-7. A determination of the percent absolute

cover of native plant species within each sample area will be made, and then averaged to determine the percent absolute cover of native plant species for the overall Bank.

Absolute Cover: Absolute cover is the proportion of an observed area that is covered by the canopy of an individual plant species or a group of plant species.

Native Plant Species: For the purposes of this Plan, native plant species are defined as those plants believed by the scientific community to have been present in the Sacramento Valley prior to the settlement of Europeans. The Jepson Manual (Baldwin et al. 2012) or similar future publication can be a reference for determining if a plant is native or nonnative. However, this reference only gets as specific as subregions. As a result, this reference is not necessarily specific enough, and therefore WES staff can consult with local botanists or the local chapter of the California Native Plant Society to determine if a plant should be considered native to the Bank.

2.2.1.4 Plant Survivorship

Survivorship of the planted riparian vegetation material (i.e., container plants, acorns, cuttings) will be monitored annually in Years 2-7. Monitoring will be conducted by direct counts of surviving planted material; counts will be tallied by species. Naturally recruited native woody riparian trees and shrubs that become established during the monitoring period can be used to offset mortality of installed plantings in evaluating final performance standards (i.e., Year 7). The total number of living counted plantings will be divided by the initial number of plantings installed upon Bank establishment and then multiplied by 100 to provide a percent survival rate for the Bank, as follows:

$$\text{Percent Survivorship} = \frac{\text{Total number of living plantings in monitoring year}}{\text{Initial number of plantings installed}} \text{ X } 100$$

2.2.1.5 Nonnative Invasive Plant Species

Monitoring for nonnative invasive plant will be conducted using the same methods described in **Section 2.2.1.3**. A determination of the percent absolute cover of nonnative invasive plant species within each sample area will be made, and then averaged to determine the percent absolute cover of nonnative invasive plant species for the overall Bank.

Absolute Cover: Absolute cover is the proportion of an observed area that is covered by the canopy of an individual plant species or a group of plant species.

Nonnative Invasive Plant Species: The California Invasive Plant Council's *California Invasive Plant Inventory, Online Database* (Cal-IPC 2015) is updated regularly and currently represents the best available knowledge of nonnative, invasive plant species of California. This list includes nonnative invasive plant species that are considered an ecological threat to the habitat function of public and private lands that support native ecosystems. This Plan recommends use of this list for defining nonnative invasive plant species for the Bank. Therefore, nonnative invasive plant species are those defined as invasive and having a "High" and/or "Red Alert" status in the database. Additionally, WES staff can consult with local botanists or the local chapter of the California Native Plant Society to determine if a plant should be considered invasive to the

Mitigation Area. Other comparable future publications or resources can be utilized as they become available.

2.2.1.6 Food Web Support

This metric will be monitored using the relative distance of invertebrate prey items (catch/cm^3) within the Bank's restored floodplain areas, which will be equivalent to or greater than the relative density of invertebrate prey items in the mainstem river index sites. Invertebrates will be sampled at two index sites in the mainstem Sacramento River and in two sites within the Bank during appropriate inundation event (i.e., Bank floodplain is inundated for at least seven days). Sampling will be conducted after seven days of inundation to allow for an increase in water temperature and productivity on the floodplain. Samples will be collected with a standard Henson plankton net, such that relative densities (catch/cm^3) and composition of invertebrates can be directly compared between sites. Invertebrates will be sorted and identified by family. Food web support surveys will take place in monitoring Years 1, 3, 5 and 7.

2.2.1.7 Juvenile Chinook Salmon Utilization

Presence or absence of juvenile Chinook salmon will be determined by beach seining or other survey methods (e.g., electrofishing), as necessary and authorized, within the inundated portions of the restored site (i.e., constructed backwater channels, benches, and floodplain habitat). Monitoring for juvenile Chinook salmon utilization will be conducted following a period of inundation of seven days to allow for adequate time for fish to locate and inhabit the restored site. During these surveys, fork-length data and length-at-date criteria (Fisher 1992) will be used to identify Chinook (fall/spring/winter). Juvenile Chinook salmon utilization surveys will take place in monitoring Years 1, 3, 5 and 7, but may occur in Years 2 ,4 and 6 to take advantage of appropriate inundation events.

2.2.1.8 Swainson's Hawk Tree Nesting Use

Swainson's hawk tree nesting use monitoring will be conducted by a qualified biologist utilizing the following method:

- Conduct one survey between January 1 and March 31 to identify potential nest locations while nests are visible in trees
- Conduct three surveys between April 1 and April 30 to observe nest building and courtship behavior
- If nest building is observed during the April visits, conduct three surveys between May 1 and May 30 to monitor known nests during the egg laying and incubation phase
- Conduct three surveys during June 1 to July 15 to observe fledging young

Swainson's hawk tree nesting use surveys will take place in monitoring Years 1, 3, 5 and 7.

2.2.2 Additional Monitoring Methods

Additional monitoring activities for the Bank are described below. While these activities are not directly tied to any Success Criteria or Performance Standards, results of these monitoring activities can provide additional data on the ecological functions of the Bank, and may be useful as part of the broader adaptive management of the site.

2.2.2.1 Water Quality

For the purposes of this Plan, water quality includes temperature, pH, dissolved oxygen, electrical conductivity, total dissolved solids, and turbidity. Temperature significantly influences the growth of juvenile Chinook salmon on floodplains and is one of the factors that distinguish floodplain from mainstem river habitat (Sommer et al. 2001). Temperatures from 14°C to 19°C have been shown to provide optimal growing conditions for juvenile Chinook salmon, but they can tolerate temperatures between 0°C and 25.8°C (Marine and Cech 2004). Past studies suggest that juvenile salmonids will continue to grow at temps as high as 25°C if food is not limiting (Jeffres et al. 2008). Abiotic conditions such as temperature and dissolved oxygen have been shown to vary significantly both diurnally and seasonally in inundated floodplains, at times reaching lethal levels (Jeffres et al. 2008). However, floodplains tend to be heterogeneous in terms of water quality, and during stressful conditions, fish will seek out more favorable physical conditions for rearing or leave the floodplain altogether (Matthews and Berg 1997).

Dissolved oxygen within the inundated restored floodplain will be monitored through the deployment of two Hobo U26 DO/TEMP continuous dataloggers. The dataloggers will be used to record dissolved oxygen and temperature in the upper and lower portions of the water column on the floodplain. Additionally, data on dissolved oxygen and water temperature will be taken at the location of each salmonid utilization monitoring sample point.

During the course of juvenile Chinook salmon utilization monitoring in Years 1, 3, 5 and 7, water quality grab samples will be also be collected from each sampling site. Grab samples will be measured for temperature, pH, dissolved oxygen, electrical conductivity, total dissolved solids, and turbidity.

2.2.2.2 Predatory Fish

During the course of juvenile Chinook utilization monitoring in Years 1, 3, 5, and 7, additional data will be collected on predatory fish species. All captured piscivorous fish (e.g., Sacramento pikeminnow (*Ptychocheilus grandis*), largemouth bass (*Micropterus salmoides*), sunfishes (*Lepomis* spp.)) will be recorded by genus/species. Additionally, the stomach contents of the piscivorous fish will be sampled to determine if predation on juvenile anadromous salmonids is occurring.

2.2.2.2 Fish Stranding

Immediately following each flood event (i.e., site inundation), the restored floodplain site will be assessed for stranding potential. If areas of pooled water are located, beach seines will be used to determine if any fishes, including juvenile anadromous salmonids, are stranded.

3 Long-Term Management Plan Monitoring

The following Long-Term Management Plan monitoring methods were taken from the Bullock Bend Mitigation Bank Long-Term Management Plan (“Long-Term Management Plan”; WES 2015b) and will be implemented during the Interim Management Period. Additional information on these items can be found in the Long-Term Management Plan.

3.1 Habitat Management and Species Elements

The restored habitat types at Bank include the following:

1) Salmonid/Riverine Riparian (re-establishment)
2) Salmonid/Riverine Riparian/Swainson's Hawk Nesting Buffer (re-establishment)
3) Salmonid/Floodplain Riparian/Swainson's Hawk Nesting Buffer (re-establishment)
4) Salmonid/Riverine Riparian (enhancement)
5) Salmonid/Floodplain Riparian/Swainson's Hawk Nesting Buffer (enhancement)
6) Swainson's Hawk Tree Nesting Use (enhancement)
7) Swainson's Hawk Tree Nesting Use (restoration)

Restoration activities for the Bank habitat types are described in detail in the Habitat Plan. Bank management objectives and tasks to be implemented by the Bank Manager are described below.

3.1.1 Biological Resources

The Bank Manager shall implement the following during the Interim Management Period.

Element A.1 Covered Species Habitat

Objective: Monitor, conserve, and maintain the Bank's waters of the United States and riparian habitats. Limit any impacts to waters of the United States and riparian habitats from frequent site visits or other adverse impacts.

> Task 1: Perform up to four event-based site visits to monitor the conditions of the Bank during the wet season (i.e., when lower elevations inundate), normally November through May. General topographic conditions, hydrology, and erosion will be noted.
>
> Task 2: Perform general monthly site visits and annual walkthrough surveys during the growing season, generally March through October. Monthly site inspections qualitatively assess vegetation cover, composition, and nonnative invasive species.
>
> Task 3: Establish photo points for monitoring photographs and prepare a site map showing the reference sites for the Bank file. A total of 20 or more sites with views of the overall riparian mosaic will be identified and permanently marked in the field during the Interim Management Period routine monthly site visit. Photos will be taken annually during the late spring/early summer.

Element A.2 Backwater Channels (Floodplain Riparian Habitat)

Objective: Monitor, conserve, and maintain the backwater channels to provide suitable floodplain habitat for special-status fish species.

Objective: Maintain function of backwater channels for covered fish species.

Task 1: As part of the annual site walk-through, examine the Bank's covered fish species habitat to determine any needed changes, current condition, and pending needs. While the fish habitat is designed to be self-sustaining, and no active maintenance is projected to be needed, any necessary tasks will be identified, prioritized and implement as funding is available.

Task 2: As part of the annual survey, visit the site in late spring, following seasonal flood events. If channel conditions result in fish stranding or ponding for durations that support predatory fish species, take corrective actions. The Bank Manager will coordinate with the IRT on the appropriate action(s) to take.

Task 3: Evaluate and prioritize other tasks that improve habitat quality for listed fish species if funding is available and as needed.

Element A.3 SWHA Nesting Buffer and Trees

Objective: Monitor, conserve, and maintain the riparian habitats to provide suitable mature trees for SWHA nesting sites and buffer habitat.
Objective: Conserve and protect SWHA nesting locations occurring onsite.

Task 1: As part of the annual site walk-through, examine the Bank's covered habitat for any nesting SWHA or any conditions that may affect nesting habitat for SWHA. Any necessary tasks will be identified, prioritized, and implemented as funding is available.

Task 2: Evaluate and prioritize other tasks that improve SHWA habitat quality if funding is available and as needed.

Element A.4 Breach Location

Objective: Monitor, conserve, and maintain hydrologic function of the breach in the berm and the Bank's covered habitat.

Task 1: As part of the annual site walk-through and high-flow site visits, inspect the breach location to evaluate the hydrology and water flow.

Task 2: If the breach location is obstructed or if the current flow regime is negatively affecting habitat (e.g., incomplete draining of backwater channels), take corrective actions. Corrective actions may include the mechanical removal of debris or sediment using long-reach excavators or other suitable equipment to restore hydrologic function as designed.

Element A.5 Nonnative Invasive Species

Invasive plant species threaten the diversity or abundance of native species through competition for resources, predation, parasitism, interbreeding with native populations, transmitting diseases, or causing physical or chemical changes to the invaded habitat. For the purposes of this

Management Plan, plants native to the Bank will be defined as those plants believed by the scientific community to have been present in northern Sacramento Valley prior to the settlement of Europeans.

The Bank supports numerous native and California endemic plant species. Additionally, the site currently functions with a number of nonnative plant species, many of which have become naturalized. The nature of floodplain communities involves a dynamic open system with periodic flooding from adjacent habitats. The Sacramento River is known to contain over 100 invasive plant species (Sacramento River Watershed Program 2015). Therefore, is likely that some nonnative invasive plant species will occur or be transported onto the Bank from adjacent properties during flood events, and species transported in may become established at the Bank. Although steps will be taken to manage nonnative invasive plant species at the Bank to the extent practicable, because of the open hydrologic system that the Bank will become part of, it is unrealistic to expect the Bank to have a different native and nonnative species composition then that of the surrounding areas.

The Bank Manager shall consult the following sources for guidance on what species may threaten the site and on management of those species: The California Invasive Plant Council (Cal-IPC) *California Invasive Plant Inventory, Online Database* is updated regularly and currently represents the best available knowledge of nonnative, invasive plant species of California. This list includes nonnative invasive plant species that are considered an ecological threat to the habitat function of public and private lands that support native ecosystems. This Management Plan recommends use of this list for defining nonnative, invasive plant species of concern, with a focus on species identified as “Red Alert” or “High.”

Objective: Monitor and maintain control over nonnative invasive plant species, including, but not limited to, those that diminish the site quality for which the Bank was established.

Task 1: Conduct annual baseline mapping of invasive species.

Task 2: During each year’s annual walk-through survey (or a monthly survey), perform a qualitative assessment (i.e., a visual estimate of cover) of potential or observed nonnative invasive plant species populations, primarily in or around the riparian habitats. Evaluate and prioritize additional actions to control invasive species.

Task 3: If necessary, control nonnative invasive plant species by hand removal, mechanical equipment, biological controls, or herbicides. The use of biological control agents other than livestock will require IRT review and approval.

Element A.6 Vegetation Management for Access Needs

Vegetation on the majority of the Bank will be managed by natural processes (e.g., natural recruitment and survival without human intervention). Vegetation management within the covered habitat may be implemented if determined to be beneficial for overall habitat quality or to provide limited access to backwater channels for the purposes of fish monitoring, invasive species control, or channel maintenance. Management actions to prevent the spread of nonnative invasive species at the Bank are described above in **Element A.5**.

Objective: Maintain areas within fifty feet of the toe of the Project Levee and along the farm berm access road for site access.

Task 1: Remove Fremont cottonwood (*Populus fremontii*) or other trees with invasive root structures from the structural toe of the Project Levee, maintaining it in pre-restoration condition.

Task 2: Manage access along the existing farm berm road, including vegetation control and road grading (e.g., level tire ruts).

Element A.7 Grazing Management

Healthy native wildland ecosystems can respond favorably to an ongoing reduction of vegetative biomass to maintain the diversity and density of native plant species or to promote the establishment of target vegetation associations. The accumulation of dead plant material (thatch) in herbaceous plant communities can reduce the habitat value of wild areas for wildlife species, minimize structural diversity (different heights, density, and cover of vegetation), and prevent colonization by target plant species. Historically, vegetation composition within floodplain complexes was maintained though the natural processes of flooding, scour, wildfire, and, to some extent, by the grazing of native ungulates, such as antelope and elk. Active land management, including grazing, can be required to periodically reduce thatch accumulation in herbaceous floodplain plant communities and in some instances minimize encroachment or expansion of nonnative invasive plant species.

Livestock grazing for habitat management requires the proper balancing of animal numbers, type (e.g., goats, sheep, or cattle), seasonal timing, and grazing intensity to achieve the desired effect on the landscape. Elimination of grazing in absence of other disturbance mechanisms (e.g., flooding, fire, mowing) allows the accumulation of thatch, which could lead to a reduction of plant diversity, hinder species movement, and reduce food web support for salmonids. Overgrazing can pose a greater threat to the habitat, and facilitates invasion of nonnative invasive species, and more severe overgrazing can lead to erosion and sedimentation.

Management of California grassland habitats has traditionally relied on grazing on a winter/early spring cycle that can most uniformly remove thatch, mimicking the historical effects of large migrating herds of native ungulates. However, given the primary management objective of managing the Bank for floodplain habitat, any implemented grazing management program will be altered to more effectively control later-season (i.e., spring to early summer) growth of herbs and perennial grasses (such as Johnson grass, *Sorghum halepense*) than can rapidly overtake the floodplain under certain conditions and in channel habitats.

Grazing on the Bank not expected to occur on a regular basis; it is used for episodic thatch reduction in the event that natural processes are not managing herbaceous buildup. Grazing may also be used to help manage nonnative invasive species. If thatch accumulation or nonnative invasive plant species become a problem, livestock, preferably goats or sheep, may be placed onsite during the appropriate time to manage the target issue (i.e., thatch or nonnative invasive plant species). Stocking rate will vary on livestock type utilized; however, it is likely that goats

or sheep will be the preferred livestock, because they are more likely to target summer annual weeds and produce a more random pattern of utilization, resulting in a greater diversity of vegetative cover conditions. Stocking rates and density will be actively managed to meet grazing objectives.

Objective: Utilize a livestock grazing program on the Bank as needed to reduce thatch and manage nonnative invasive plant species. Considerations for the Bank's livestock grazing program include:

- Grazing duration, intensity, and appropriate timing to reduce thatch, control nonnative invasive vegetation, and/or maintain appropriate vegetation height and density for floodplain habitat utilization
- Maintain a mixture of both low-growing and taller and emergent cover in backwater channels when grazing is used to manage vegetation
- Maintain close-growing ground cover in uplands (between three and 12 inches)
- Maintain native plant diversity
- Reduce the presence of nonnative invasive plant species

Task 1: Implement livestock (e.g., goats, sheep, or cattle) grazing as needed to reduce thatch and manage nonnative invasive plant species.

Annual site monitoring, coupled with focused monitoring of the habitats and sensitive species, will provide feedback as to whether or not the grazing is necessary or if the grazing program is assisting in meeting the goals and objectives for the Bank. This feedback will provide a basis for decision making regarding the grazing management.

3.2 Adaptive Management

Adaptive management is the management philosophy that recognizes the need to constantly monitor restored or created habitats and adapts the management actions if necessary, based on the results of monitoring. Over time, as restored habitats mature and more is learned about how the habitats respond to initial management actions, it is likely that adjustments to management actions will be required. New information from ongoing research on listed species can also lead to changes in management actions. Adaptive management means incorporates changes to management practices, including corrective actions as determined to be appropriate by the IRT in discussion with the Bank Manager. Adaptive management includes those activities necessary to address the effects of climate change, fire, flood, or other natural events, force majeure, etc. Before considering any adaptive management changes to this Interim Plan, the IRT will consider whether such actions will help ensure the continued viability of Bank's biological resources.

With the written consent of the IRT and appropriate permits, remedial earthwork and planting may be undertaken within the Bank to ensure Performance Standards are attained, and to reduce or eliminate the negative effects of past land use practices within the Bank.

Adaptive management changes will be attached to this plan as amendments; the table of contents will be updated accordingly. Each amendment must be approved by the IRT.

Element B.1 Adaptive Management

Objective: Implement adaptive management process to site operations.

Task 1: Document adjustments to management actions.

3.3 Security, Safety, and Access

The Bank will be fenced and shall provide no general public access, nor any regular public or private use. Research and educational programs or efforts may be allowed on the Bank as deemed appropriate by the Bank Manager. These programs are not specifically funded or a part of this Interim Plan.

The Bank represents an opportunity to educate and encourage a sense of respect for open space, floodplain value, and wildlife habitat in local students and the community as a whole. Individuals or groups using the Bank for educational purposes will coordinate their use with the Bank Manager. If the educational activities will be passive in nature, such as an occasional walk through the Bank to discuss plants and animals in the Bank habitats, then the consent of the Bank Manger is sufficient. If active use or passive but regular use of the Bank is proposed, review and approval by the IRT is required. To avoid repeated inquiries with these agencies, a use plan could be developed by the interested organization for a one-time approval. Interpretive trails and benches are not proposed on the Bank.

The Property Owner may engage in or allow Property Owner's guests certain occasional recreational activities that will have no potential affect on the sensitive resources protected on the Bank. All recreational activities will follow State and Federal laws and may include birding, hunting, photography, or walking.

Should mosquitoes become a public nuisance, the Bank Manager will coordinate with the Sacramento-Yolo Mosquito and Vector Control District to develop best management practices to minimize mosquito reproduction at the Bank. Several of the recommended management actions for minimizing mosquitos (e.g., preventing trash accumulation onsite, providing good access, and removing silt or sediment that obstruct drainage) are already included in and allowed by this Interim Plan. Any physical site alterations recommended by Sacramento-Yolo Mosquito and Vector Control beyond those maintenance actions described in the Interim Plan will require IRT approval.

Element C.1 Trash and Trespass

The Bank should remain free of trash and other debris that harms the aesthetic and ecological value of the Property. Proper site maintenance and site control will limit the amount of trash on Bank. Trash is most likely to occur outside of the Bank's fences and gates.

Objective: Monitor sources of trash and trespass.

Objective: Collect and remove trash, repair vandalized signs, and rectify trespass impacts.

Task 1: During each site visit, record occurrences of trash or trespass. Record type of incident, location, and management mitigation recommendations to avoid, minimize, or rectify a trash or trespass impact.

Task 2: At least once yearly, collect and remove trash and repair and rectify vandalism and trespass impacts. Maintain no-trespassing signs at a minimum of three per mile around the perimeter of the Bank.

3.4 Infrastructure and Facilities

The only access to the Bank is through the locked gates along the Project Levee roads on the west. Since the Property is bounded by waterways on the east, north, and south sides, the only land access is from the west and thus only the west border of the Bank will be fenced and gated to deter unauthorized public access. Signage will be installed along the external perimeters of the Bank to inform the public of the presence of the Bank. The Bank Manager will be responsible for the maintenance and replacement of the fencing and signage. Temporary fencing may be placed as needed on the Bank to aid in partitioning the property for grazing, but it will be removed prior to the designated flood season.

Element D.1 Gates

Objective: Monitor condition of site access gates.

Objective: Maintain site access gates and signage to prevent casual trespass and allow necessary maintenance access.

Task 1: During each site visit, record condition of fences and gates. Record locations and types of damage as well as recommendations to implement gate repair or replacement, if applicable.

Task 2: Maintain signage and gates as necessary by replacing posts and wire. Replace signage and gates as necessary and as funding allows.

4 Monitoring Reports

The reporting period will be from October 1 of each year through September 30 of the following year to mirror the water year period. The Annual Reports will be due November 30 each year. This reporting period and due date will allow for inclusion of hydrological monitoring of restored floodplain, which takes place in late winter and early spring; vegetative surveys, which take place in early summer; and any Salmonid or SWHA surveys that may take place during rearing, out-migrating timeframes for salmonids and nesting season for SWHA. **Exhibit C** contains the standard list of contents and formats required by the USACE for Annual Reports. The Annual Report will include results of the Habitat Development Plan Monitoring and Long-Term Management Plan monitoring as described above. The Annual Report will also make recommendations with regard to:

- Any habitat enhancement measures deemed to be warranted
- Any problems that need immediate and long-term attention (e.g., nonnative invasive plant management, fence repair, erosion control)
- Any changes in the monitoring or management program that appear to be warranted based on monitoring results to date

5 Transfer, Replacement, Amendments, and Notices

5.1 Transfer

Under this Interim Plan, any subsequent transfer of responsibilities to a different Bank Manager shall be requested by the Bank Manager in writing to the IRT, shall require written approval by the IRT, and shall be incorporated into this Interim Plan by amendment. Any subsequent Property Owner assumes the Bank Manager responsibilities described in this Interim Plan and as required in the Conservation Easement, unless otherwise amended in writing by the IRT.

5.2 Replacement

If the Bank Manager fails to implement the tasks described in this Interim Plan and is notified of such failure in writing by the IRT, the Bank Manager shall have 90 days to cure such failure. If failure is not cured within 90 days, the Bank Manager shall meet with the IRT to resolve the failure. Such meeting shall occur within 30 days or a longer period if approved by the IRT. Based on the outcome of the meeting, the IRT may request, in writing, a replacement Bank Manager by amendment of this Interim Plan. If Bank Manager fails to designate a replacement Bank Manager, then such public or private land or resource management organization acceptable to the IRT and Property Owner may enter onto the Bank in order to fulfill the purposes of this Interim Plan.

5.3 Amendments

The Bank Manager, Property Owner, and IRT may meet and confer, upon the request of any one of them, to revise this Interim Plan to better meet management objectives and preserve the habitat and conservation values of the Bank. Any proposed changes to this Interim Plan shall be discussed with the IRT and the Bank Manager. Any proposed changes will be designed with input from all parties. Amendments to this Interim Plan shall be approved by the IRT in writing, shall become required management components, and shall be implemented by the Bank Manager.

If the CDFW or NMFS specify in writing that continued implementation of this Interim Management Plan would jeopardize the continued existence of a listed species, any written amendment to this Interim Management Plan determined by the CDFW and/or NMFS as necessary to avoid such jeopardy, shall become a required management component and shall be implemented by the Bank Manager.

5.4 Notices

Any notices regarding this Interim Plan shall be directed as follows:

Bank Manager and Property Owner:

Westervelt Ecological Services, LLC
600 N. Market Boulevard, Suite 3
Sacramento, CA 95834-1257
Telephone: (916) 646-3644
Fax: (916) 646-3675

IRT, BEI Signatory Agencies:

United States Army Corps of Engineers, Sacramento District
1325 J Street, Room 1480
Sacramento, CA 95814
Attn: Division Chief
Telephone: (916) 557-2520
Fax: (916) 557-6877

United States Environmental Protection Agency
Region IX
75 Hawthorne Street
San Francisco, CA 94105
Attn: Director, Water Division
Telephone: (415) 947-8707
Fax: (415) 947-3549

National Marine Fisheries
West Coast Region
650 Capitol Mall
Sacramento, CA 95814
Attn: Sacramento River Branch Manager
Telephone: (916) 930-3608
Fax: (916) 930-3629

California Department of Fish and Wildlife
Region 2 Office
1701 Nimbus Road
Rancho Cordova, CA 95670
Attn: Regional Manager
Telephone: (916) 358-2900
Fax: (916) 358-2912

Conservation Easement Holder:

Wetlands America Trust
One Waterfowl Way
Memphis, TN 38120-2351
Telephone: (901) 758-3700
Fax: (901) 758-3855

6 Funding and Task Prioritization

6.1 Funding

WES will fund all maintenance, management, and monitoring activities during the Interim Management Period. To ensure funding for these activities, WES will establish the Interim Management Security (**BEI Exhibit D-1**) which will be provided as a Letter of Credit to the California Department of Fish and Wildlife in the amount of 3 years' worth of routine maintenance, monitoring, and management costs for the Bank.

6.2 Task Prioritization

Due to unforeseen circumstances, prioritization of tasks, including tasks resulting from new requirements, may be necessary if insufficient funding is available to accomplish all tasks. The Bank Manager and the IRT shall discuss task priorities and funding availability to determine which tasks will be implemented. In general, tasks are prioritized in this order:

1) Tasks required by a local, state, or federal agency
2) Tasks necessary to maintain or remediate habitat quality
3) Tasks that involved the monitoring of resources, particularly if past monitoring has not shown downward trends

Equipment and materials necessary to implement priority tasks will also be considered priorities. Final determination of task priorities in any given year of insufficient funding will be determined in consultation with the IRT and as authorized by the IRT in writing.

7 References

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Marine, K. R., and J. J. Cech (2004). Effects of high water temperature on growth, smoltification, and predator avoidance in Juvenile Sacramento River Chinook salmon. *North American Journal of Fisheries Management* 24(1):198-210.

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O'Connell, Martin T. (2003). Direct Exploitation of Prey on an Inundated Floodplain by Cherryfin Shiners (*Lythrurus roseipinnis*) in a Low Order, Blackwater Stream. *Copeia* 2003(3):635-645. 2003.

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Sommer, T., B. Harrell, M. Nobriga, R. Brown, P. Moyle, W. Kimmerer and L. Schemel (2001). California's Yolo Bypass: Evidence that flood control can be compatible with fisheries, wetlands, wildlife and agriculture. *Fisheries* 26 (8): 6-16.

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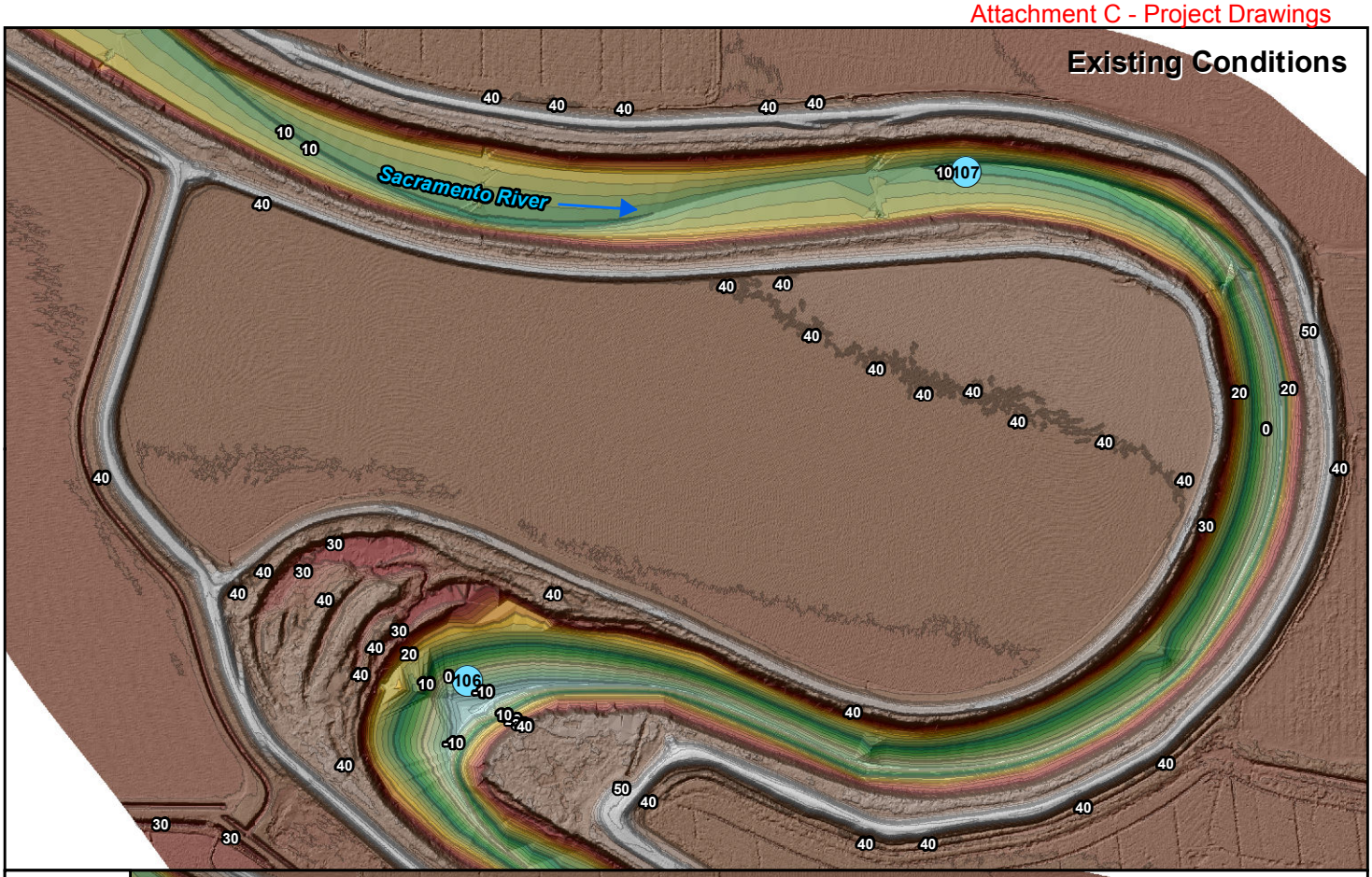
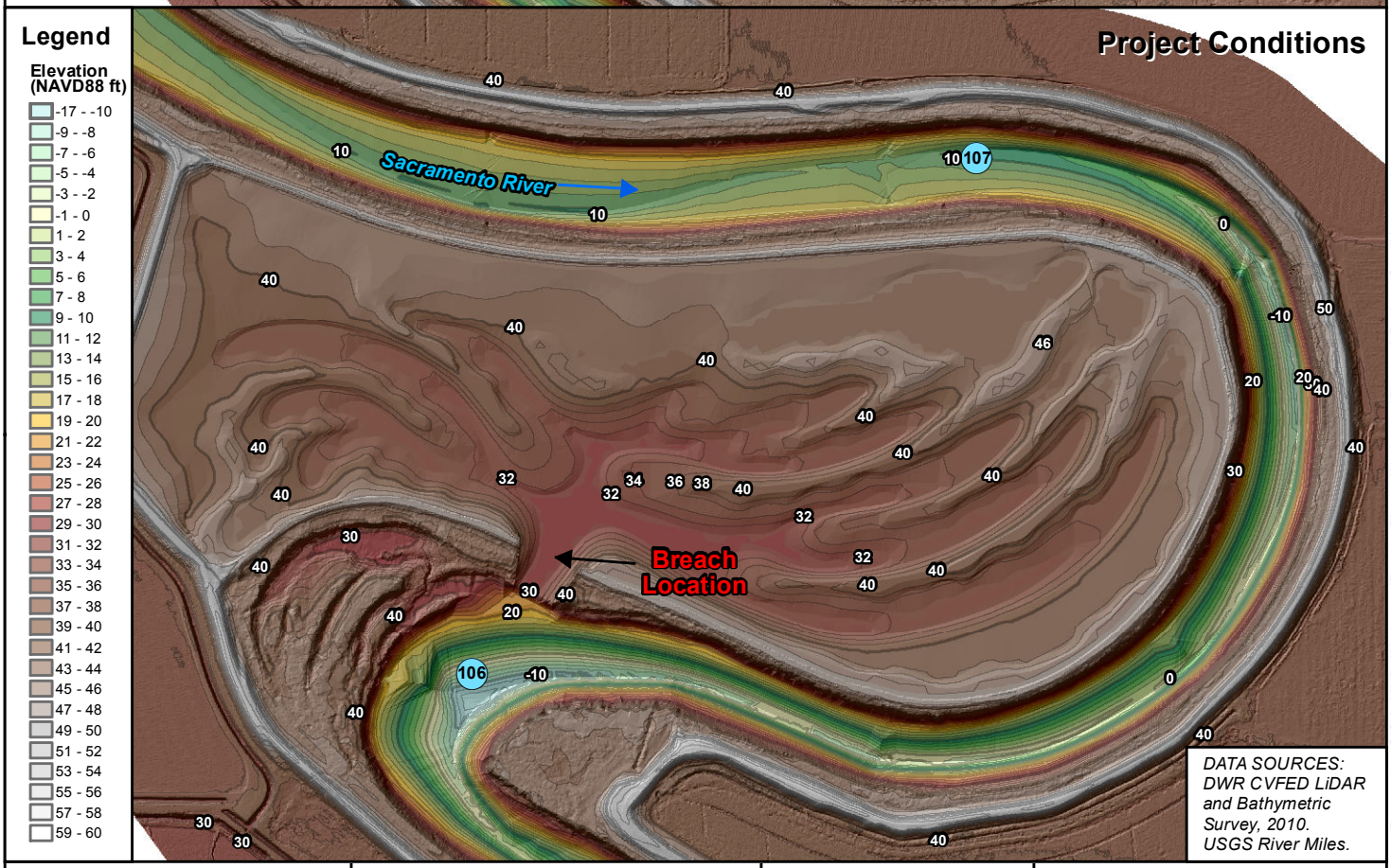
Westervelt Ecological Services (WES) (2015a). Bullock Bend Mitigation Bank Habitat Development Plan. Dated August 2015.

Westervelt Ecological Services (WES) (2015b). Bullock Bend Mitigation Bank Long-Term Management Plan. Dated August 2015.





Legend

Elevation (NAVD88 ft)

- -17 - -10
- -9 - -8
- -7 - -6
- -5 - -4
- -3 - -2
- -1 - 0
- 1 - 2
- 3 - 4
- 5 - 6
- 7 - 8
- 9 - 10
- 11 - 12
- 13 - 14
- 15 - 16
- 17 - 18
- 19 - 20
- 21 - 22
- 23 - 24
- 25 - 26
- 27 - 28
- 29 - 30
- 31 - 32
- 33 - 34
- 35 - 36
- 37 - 38
- 39 - 40
- 41 - 42
- 43 - 44
- 45 - 46
- 47 - 48
- 49 - 50
- 51 - 52
- 53 - 54
- 55 - 56
- 57 - 58
- 59 - 60

Westervelt Ecological Services	SCALE - 1:7,200 0 300 600 Feet N	*Job: 500116*	*Bullock Bend Restoration*
nhc northwest hydraulic consultants	Coordinate System: CA State Plane, Zone 2 Units: NAD83, feet	*Date: MAY 2015* *FIGURE 5*	*Figure 5* *Project Conditions*

Bullock Bend Mitigation Bank

SITE APN: 053-030-010-000

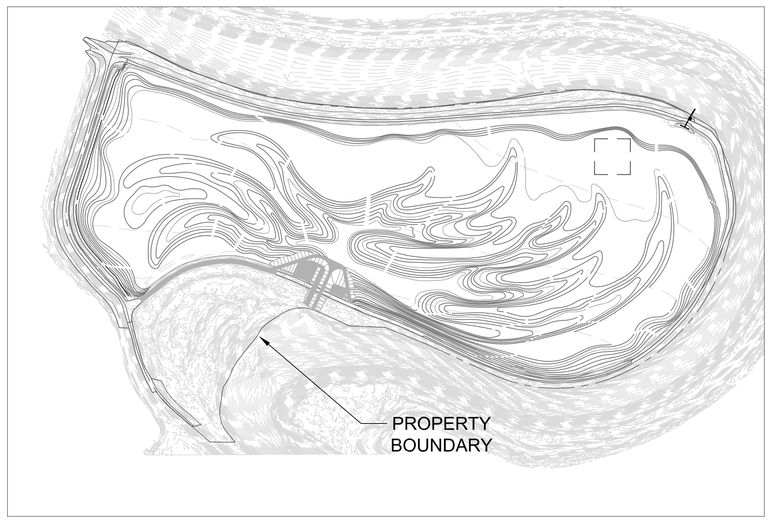
YOLO COUNTY, CALIFORNIA

LEGEND

PROPOSED	EXISTING	
24"SD	24"SD	STORM DRAIN AND MANHOLE
8"SS	8"SS	SANITARY SEWER AND MANHOLE
		FIRE HYDRANT AND VALVE ASSEMBLY
10" W	10" W	WATER MAIN, VALVE, AIR RELEASE VALVE & BLOWOFF VALVE
I	I	IRRIGATION PIPELINE
JT	JT	JOINT UTILITY TRENCH
G	G	GAS MAIN
E	E	ELECTRICAL LINE (OH–OVERHEAD)
T	T	TELEPHONE LINE (OH–OVERHEAD)
TV	TV	CABLE TELEVISION (OH–OVERHEAD)
		PG & E TRANSFORMER LOCATION
SL	SL	STREET LIGHT CONDUIT, WIRING & PULL BOX
		STREET LIGHT AND POLE
		UTILITY POLE WITH DOWN GUY & ANCHOR
PP,TP,JP	PP,TP,JP	POWER POLE, TELEPHONE POLE, JOINT POLE
HB	HB	HEADER BOARD
x	x	FENCE
		LOW PROFILE CURB, GUTTER AND SIDEWALK
		VERTICAL CURB, GUTTER AND SIDEWALK WITH DRIVEWAY
		CURB OR CURB AND GUTTER FACE OF CURB (FC)
		CATCH BASIN OR DRAINAGE INLET
		CURB INLET
		GRATE INLET
		FLOWLINE OF DITCH OR SWALE
		DIRECTION OF SURFACE DRAINAGE FLOW
PROPOSED	EXISTING	CUT OR FILL SLOPE
		RIGHT OF WAY OR PROPERTY LINE
		STREET CENTERLINE OR BASELINE
		SURVEY MONUMENT
		SIGN
		TREE
		TREE TO BE REMOVED
+60.3	+60.3	EXISTING GROUND SURFACE ELEVATION
58.75	58.75	EDGE OF PAVEMENT AND ELEVATION
55.75 TC	55.75 TC	TOP OF CURB (TC) ELEVATION
55.75	55.75	BACK EDGE OF WALK ELEVATION
59.1		FINISHED GRADE OF LOT IF DIFFERENT THAN BUILDING PAD GRADE
55.75	55.75	FINISHED BUILDING PAD ELEVATION
		DRAINAGE DITCH
		ANGLE POINT
		MASONRY WALL
4/6		DETAIL NO. / SHEET NO.

Location Map
(Not to Scale)

NORTH



Vicinity Map
(Not to Scale)

Sheet Index

Earthmoving Quantities

Cut	205,000 CY
Fill	140,000 CY
Import	0
Export	65,000 CY

NOTE: Export material to be taken by Reclamation District 108. Site to be determined.

CALL BEFORE YOU DIG

USA NORTH : 811 / 800-227-2600
PG&E : 800-743-5000
AT&T : 800-288-2020

Storm Water Pollution Prevention Plan Coordinator

Name:_____ WDID: _____

Signature:_____ Date:_____

Company:_____ Phone:_____

NAME OF FIRE DISTRICT
APPROVED FOR FIRE HYDRANTS
(AS APPROPRIATE)

_____
TITLE
DATE APPROVED_____

NAME OF SERVICE DISTRICT
APPROVED FOR WATER, SEWER, & STREETLIGHTS

_____
TITLE
DATE APPROVED_____

YOLO COUNTY PLANNING AND PUBLIC WORKS
Reviewed for conformance with the Yolo County Improvement Standards. The undersigned shall not be liable for errors and omissions on the plans. Approval valid for twelve months from date signed.

_____ _____
COUNTY ENGINEER DATE
P.E. C42401

	NO.	BY	DATE	REVISION	APP'D	DATE
DESIGNED_						
DRAWN_						
CHECKED_						

DESIGN ENGINEER - BREACH
BY: BRIAN G. WARDMAN
DATE: 1/27/2016 P.E. 74371
REGISTRATION EXPIRES 06/30/2017

REGISTERED PROFESSIONAL ENGINEER BRIAN G. WARDMAN No. 74371 Exp: 06/30/17 CIVIL STATE OF CALIFORNIA

WESTERVELT ECOLOGICAL SERVICES

600 N. Market Blvd, Ste 3
Sacramento, CA 95834
Phone: (916) 646-3644
Fax: (916) 646-3675
www.westervelt.com

LICENSED LANDSCAPE ARCHITECT Mark J. Young No. 4806 Signature Renewal Date Date STATE OF CALIFORNIA

Bullock Bend Mitigation Bank

COVER SHEET

Sheet Number
C1.0

SPECIAL PROVISIONS

OVERVIEW

The Contractor shall assume sole responsibility for oversight of the construction crews and services as part of the implementation of the project, including safety for all personnel and minimizing impacts to the site. Contractor will designate point-of-contact for the field supervision of construction crews.

EXISTING SITE CONDITIONS

The existing agricultural landscape is actively farmed to control grass cover and weed growth. Irrigation supply and drains exist on the site. A farm berm separates the agricultural area and the natural riparian vegetation.

The Contractor shall contact the Restoration Ecologist immediately upon finding any discrepancies in the actual field conditions that what is shown on the plans.

CONSTRUCTION ACCESS AND HAUL ROUTES

Access to the project site will be made from a single point off of County Road 97 to the staging area. The Contractor shall strictly follow the haul routes while traversing the site. Citations against the Contractor from the Resources Agencies for not following such routes shall be born solely by the Contractor and remedial actions and fines will not be reimbursed by the Client.

SURVEY CONTROL & GRADING TOLERANCE

Survey control points have been set by the Restoration Ecologist's team and coordinates will be provided to the Contractor. Shape files or DTM (digital terrain model) will be supplied to the Contractor. Contractor shall set up temporary, supplemental control points as may be needed to implement the landscape grading. Contractor's grade setter / checker shall verify that the final shape is within three (3) inches in the horizontal directions, and the depth is within one-tenth (0.10) inches in vertical elevation from what is shown on the plan. The Restoration Ecologist may make adjustments to the grading configuration to account for sub-surface soil conditions. Any modifications are considered incidental work to the landscape grading and included as part of completion of the plans.

PRODUCT / MATERIAL QUALITY

Contractor shall verify that all material and products supplied for the project are either new or certified recyclable items. Any changes from the specifications, including "or equivalent" and "or equal" items will need approval from the Restoration Ecologist before purchase / installation. The cost and application of non-approved materials or products will not be reimbursed to the Contractor.

MATERIAL DELIVERY, HANDLING & STORAGE

Contractor shall be responsible for receiving materials delivered to the site and verifying that the material meets the specifications. Contractor is responsible make sure that the delivery vendor is in full compliance with the requirements for the project. Any restoration associated with failure to meet these requirements will be born solely by the Contractor and is incidental to the work.

Material or products shall be delivered in unopened, manufacture's containers and include clearly-visible product labeling.

COMPACTION

Site Preparation

The footprint of the fill within 15 feet of the existing levee should be cleared and grubbed of surface and subsurface deleterious matter including trees, grasses, other vegetation and debris designated for removal. The site should be stripped to sufficient depth to remove vegetation and soil containing roots. Tree roots greater than 1-inch in diameter should be removed. Stripped and grubbed materials should be removed from the site and should not be used as fill.

Fill Materials

Since the fill will not be considered as part of the levee, standard USACE criteria for the fill is not required. We conclude that the material from the interior of the parcel is suitable for placement against the levee

Compaction

Surfaces in areas to be filled should be scarified to a depth of at least 8-inches. The scarified soil should be moisture conditioned to at least optimum moisture content and compacted to at least 95 percent relative compaction. ASTM test D-698 should be used to establish the reference values for computing optimum moisture content and relative compaction. If soft or yielding soils are present during subgrade preparation or fill compaction, they should be scarified, moisture conditioned and compacted or removed by excavating to expose firm soil.

Fill should be placed in lifts 8-inches or less in loose thickness and moisture conditioned to at least optimum moisture content. Moisture conditioning should be performed before compaction. Each lift should be methodically compacted to at least 95 percent relative compaction. A sheepsfoot compactor or equivalent equipment should be used for compacting clay soils. Material that fails to meet the moisture or compaction criteria should be loosened by ripping or scarifying, moisture conditioned, and then recompacted.

Fill should be placed on horizontal surfaces. The fill should be benched into the existing levee slope to bond the existing levee and new fill. The horizontal bench width into the existing slopes should not exceed 5 feet.

SITE CLEAN-UP

On final approval of the project completion from the Restoration Ecologist, the Contractor shall verify that all temporary materials and features are removed, and staging areas and haul routes are stabilized to allow natural re-vegetation of occur.

Contractor will make sure that the site is always maintained in a neat and orderly manner during the Construction Period. This includes, but is not limited to, removal and disposal of litter and debris at a County-approved disposal site.

CONSTRUCTION DRAWINGS

Westervelt Ecological Services, LLC and its consultants have used the best available landscaping practices and applied a reasonable 'Standard of Care' in the preparation of the Construction Drawings. This included collection of soils, biological and botanical data, site topography, cultural resources information and hazardous substances investigation. However, some features may not have been mapped or represented on the Construction Drawings. The Contractor shall review the drawings and report any discrepancies to the Restoration Ecologist for clarification.

The Contractor shall note that all scaled drawings are approximate for viewing the design features. Written dimension supersede scaled dimensions. AutoCad files for the design features are available for use by the Contractor for determining the specific location(s) of such features.

The Restoration Ecologist may make field adjustments to the final shape of the staging area(s), haul route(s), backwater channels, swales, and spoils piles, based on specific site conditions revealed during construction. Such adjustments are incidental to the work conducted for the project.

Normal construction practices or Standards of Care for implementing the restoration project will be conducted by the Contractor even if these practices are not described or indicated on the Construction Drawings.

Approved design changes by the Restoration Ecologist will be considered as new parts of the Construction Drawings and shall adhere to all of the project requirements.

CONTRACTOR SUBMITTALS

The Contractor shall make the following submittals as part of the Scope of Work:

1. Construction safety plan, including emergency fire control measures
2. Any modifications to the Suggested Construction Sequencing
3. List of sub-consultant(s) and their contact information
4. Schedule of activities for the entire project and shown on a weekly timeline
5. List of material supplier(s) within thirty (30) days after contract signature
6. Copy of material suppliers verifying compliance with specifications (e.g., seed tag)
7. Copy of inspection certificates for materials
8. Percent completion table/memo for each bid item at weekly project meetings
9. Material samples that may be required for review by Restoration Ecologist
10. Shop drawings that may be required for review by Restoration Ecologist
11. Re-submittal(s) of items as necessary if original submittals were rejected

SCHEDULE

The Contractor shall complete the Scope of Work within one Construction Window. The construction window for all grading work shall occur between May 1st and October 31st and as designated by the environmental permits. Seeding shall be per the schedule outlined in the Erosion and Sediment Control Notes. Work will be suspended if rainy weather occurs during this time period and will not be considered as a time delay factor for the project.

Construction may occur Monday through Friday from 5 AM to 7 PM, and, if needed, on Saturday from 6 AM to 6 PM. No earthwork work may occur during the evening or on a Sunday or federal holiday, unless approved by the Restoration Ecologist.

QUALITY OF WORK

The prime Contractor shall hold a valid Class A: General Engineering Contractor licensed in the State of California and shall provide a construction supervisor that has experience in construction of habitat features, including work in rivers. The company supplying the seed shall hold a valid California nursery license. If not implemented by the prime Contractor, the seeding installer shall hold a valid Class 27: Landscaping Contractor licensed in the State of California. If herbicides are allowed by the Restoration Ecologist, all herbicide treatments are to be prescribed by a County approved and licensed Pest Control Advisor. Use of the herbicides shall be performed by a licensed Pesticide Applicator.

The Contractor shall perform all work in accordance with the best practices and standard of care relating to the various professional trades required for implementing this project, and provide continuous direction to such trades from an experienced and qualified supervisor capable of interpreting the Construction Drawings and Specifications.

All construction crews shall attend a worker environmental awareness program (WEAP) training given by the Restoration Ecologist to learn about the required conditions that need to be followed to protect the sensitive plants and animals on the site, actions to be followed when working adjacent to these areas, and the responsibilities and reporting processes that need to be followed when such species are encountered.

To assure quality control in the construction site, the following restrictions and responsibilities shall be adhered to by the Contractor:

- Call Underground Service Alert (USA) at 1-800-227-2600, forty-eight (48) hours before commencing construction for determining existing utility location(s).
- No Contractor crews may enter areas outside of the construction limits unless permitted by the Restoration Ecologist.
- No pets are permitted.
- No catering trucks or unauthorized vendors are allowed on the site.
- No dumping of litter or debris, including tobacco products and food wrappers, is allowed. A common trash receptacle is allowed but must be secured to prevent access by animals or toppling by wind, and be emptied as needed, with the refuse deposited at an approved County facility. Trash or debris can not be burned on site.
- Portable sanitary facilities shall be supplied and clean by a licensed company specializing in such services. A self-contained, hand-washing station shall be part of the service. No wastes shall be deposited on the site.
- Entry to and around the site shall be via the designated Access Point(s) and Haul Routes.
- Stationary equipment (such as motors, generators, pumps, etc.) or parked machinery (such as scrapper, excavators, etc.) shall be supplied with spill prevention containment measures (e.g., drip pans) and checked / cleaned regularly in accordance with federal, state and county requirements.
- Any spills of hazardous substances will be cleaned up immediately following federal, state and county requirements, including removal and legal disposal of contaminated soils, and the appropriate reporting submitted to such Regulatory Agencies with a copy to the Restoration Ecologist.
- Equipment maintenance and fueling shall be done at the approved staging area(s) with full hazardous material containment measures in place. If emergency maintenance is needed outside of the staging area(s), all protection measures will be required, including, but not limited to, placement of drip pans, absorbent rags, etc.
- Contractor shall contact the Restoration Ecologist twenty-four (24) hours in advance to request technical review(s).
- No fuels, oils or lubricants will be allowed to be stored on the construction site.

CONSTRUCTION / RESTORATION NOTES

CONTACT INFORMATION

Client: Westervelt Ecological Services, LLC
600 North Market Boulevard, Suite #3
Sacramento, CA 95834

Phone: (916) 646-3644
Facsimile: (916) 646-3675

Contacts: Chris Holland (cholland@westervelt.com)
Mark Young (myoung@westervelt.com)
Matt Gause (mgause@westervelt.com)

SCOPE OF WORK

This project is to enhance the natural landscape by creating backwater channels in the existing agricultural field and breaching the farm berm on the site. To achieve this, the Contractor shall conduct all activities in accordance with the Construction Documents and conditions of the Permits set forth by the Regulatory Agencies having jurisdiction over the project. The Contractor shall construct the backwater channels, fill slopes and breach of the farm berm to the Sacramento River as shown on these Constructions Drawings and as field adjusted by the Restoration Ecologist. The Contractor shall furnish all materials, services, labor, transportation, equipment necessary for the complete implementation of the habitat restoration / creation shown on the landscaping plans and described in the notes and specifications, including all incidental work necessary to complete the project.

DEFINITIONS

- The term 'Access Point' is an allowable access spot to the construction site and shall be secured by the contractor to prevent after-hour access by unauthorized people.
- The terms 'Approved,' 'Approval' or 'Approve' means written authorization will be required from the Restoration Ecologist to the Contractor before that the item may proceed.
- The term 'Best Management Practices' (BMPs) are the current and acceptable construction techniques to minimize environmental damages to the site during construction, and is not just limited to erosion control measures.
- The term 'Construction Documents' are the collection of drawings, notes, agreements, permits, etc. associated with the implementation of the restoration scope of work.
- The term 'Construction Drawings' is the approved set of plans for the project, and includes the location and layout of the new vernal pools and swales, access and haul routes, erosion control measures, and project notes.
- The term 'Construction Period' refers to the time that the Contractor is authorized to commence work on the project through to when the Contractor is deemed to have completed all required construction activities. There may be times when the Contractor is not physically doing work on the site, but is still considered within the Construction Period.
- The term 'Construction Window' or 'Construction Season' includes both the allowable hours for construction on a daily basis and the months that construction may proceed.
- The term 'Contractor' refers to the prime Contractor, all subcontractors, material suppliers and service suppliers hired or contracted by the prime Contractor for work conducted on the project.
- The term 'Grading' is all the earthmoving activities associated with the landscaping for the project implementation. This includes, but is not limited to, disking, excavating, compacting, spoiling, finishing, and hauling of soils on the site.
- The term 'Haul Route' is the access corridor on the site where construction equipment is allowed to travel between access point(s), staging area(s), and construction work.
- The term 'Not In Contract' (NIC) are those items that are shown on the plans for restoration work but are NOT part of the Contractor's Scope of Work.
- The term 'Permits' refers to the approval documents that have been issued by the Resource Agencies that allows the project to be implemented.
- The term 'Preservation Areas' refers to the natural landscape portions of the project site that are located outside of the construction limits.
- The term 'Resource Agencies' or 'Regulatory Agencies' refers to the environmental permitting agencies that have jurisdictional authority over the site construction. These may include, but are not limited to, the US Army Corps of Engineers (USACE), US Environmental Protection Agency (USEPA), National Oceanographic and Atmospheric Administration (NOAA) Fisheries, US Fish and Wildlife Service (USFWS), CA Department of Fish & Wildlife (CDFW), Central Valley Regional Water Quality Control Board (Water Board), the Central Valley Flood Protection Board (CVFPB) and the County of Yolo (County).
- The term 'Restoration Ecologist' is the Client or Client's representative overseeing or observing the construction activities, and providing technical review for the final configuration of each vernal pool shape and site's soil stabilization.

COUNTY NOTES

The Contractor shall notify the County of Yolo Construction Inspection Office two (2) working days prior to the intention to commence work. The Contractor shall not start any grading until the county completes a pre-construction meeting. (Phone 530-206-0529)

1. The County of Yolo is a member of the Underground Service Alert (U.S.A) one call program. the Contractor or any sub contractor for this contract shall notify members of the U.S.A. two working days in advance of performing any excavation work by calling the toll-free number: 1-800-227-2600.
   Site Location: Section 1, Township 12 North, Range 1 East, Mt. Diablo Base and Meridian, Knight's Landing CA
2. The Contractor shall be responsible for the protection of all existing survey monuments and other survey markers during construction. All such monuments or markers destroyed during construction shall be replaced at the Contractors expense.
3. Erosion control measures shall be in accordance with State of California Best Management Practices.
4. All construction shall conform to the standards and specifications of the County of Yolo on file in the office of the Director of Public Works, Yolo County, California.

SUGGESTED CONSTRUCTION SEQUENCING

The following is the suggested construction sequencing for implementing the project and is not intended to dictate construction means, methods or measures.

1. Attend kick-off meeting at the site with Resource Agencies
2. Attend WEAP training (all Contractor crews that will be working on site)
3. Install construction entrance stabilization(s)
4. Field locate allowed haul routes
5. Remove debris as designated on Plans
6. Set up staging area
7. Implement construction activities
8. Implement seeding and other erosion control activities
9. Remove equipment and surplus materials from the site
10. Remove any temporary access

WESTERVELT ECOLOGICAL SERVICES
600 N. Market Blvd, Ste 3
Sacramento, CA 95834
Phone: (916) 646-3644
Fax: (916) 646-3675
www.westervelt.com

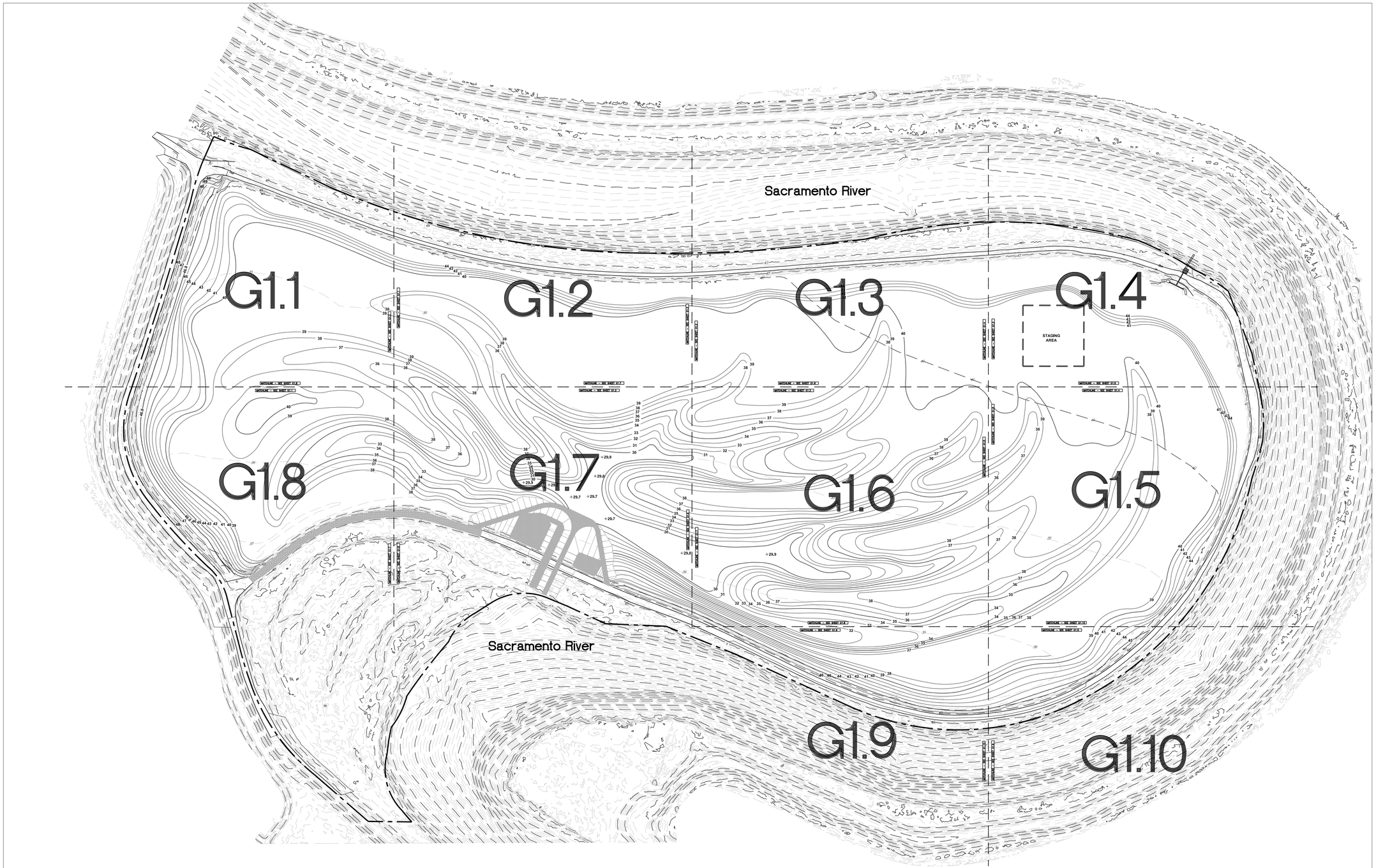
LICENSED LANDSCAPE ARCHITECT
Mark J. Young
No. 4806
Signature
Renewal Date
Date
STATE OF CALIFORNIA

Bullock Bend Mitigation Bank

CONSTRUCTION NOTES

Sheet Number
N1.0

Attachment C - Project Drawings



WESTERVELT
ECOLOGICAL SERVICES
600 N. Market Blvd, Ste 3
Sacramento, CA 95834
Phone: (916) 646-3644
Fax: (916) 646-3675
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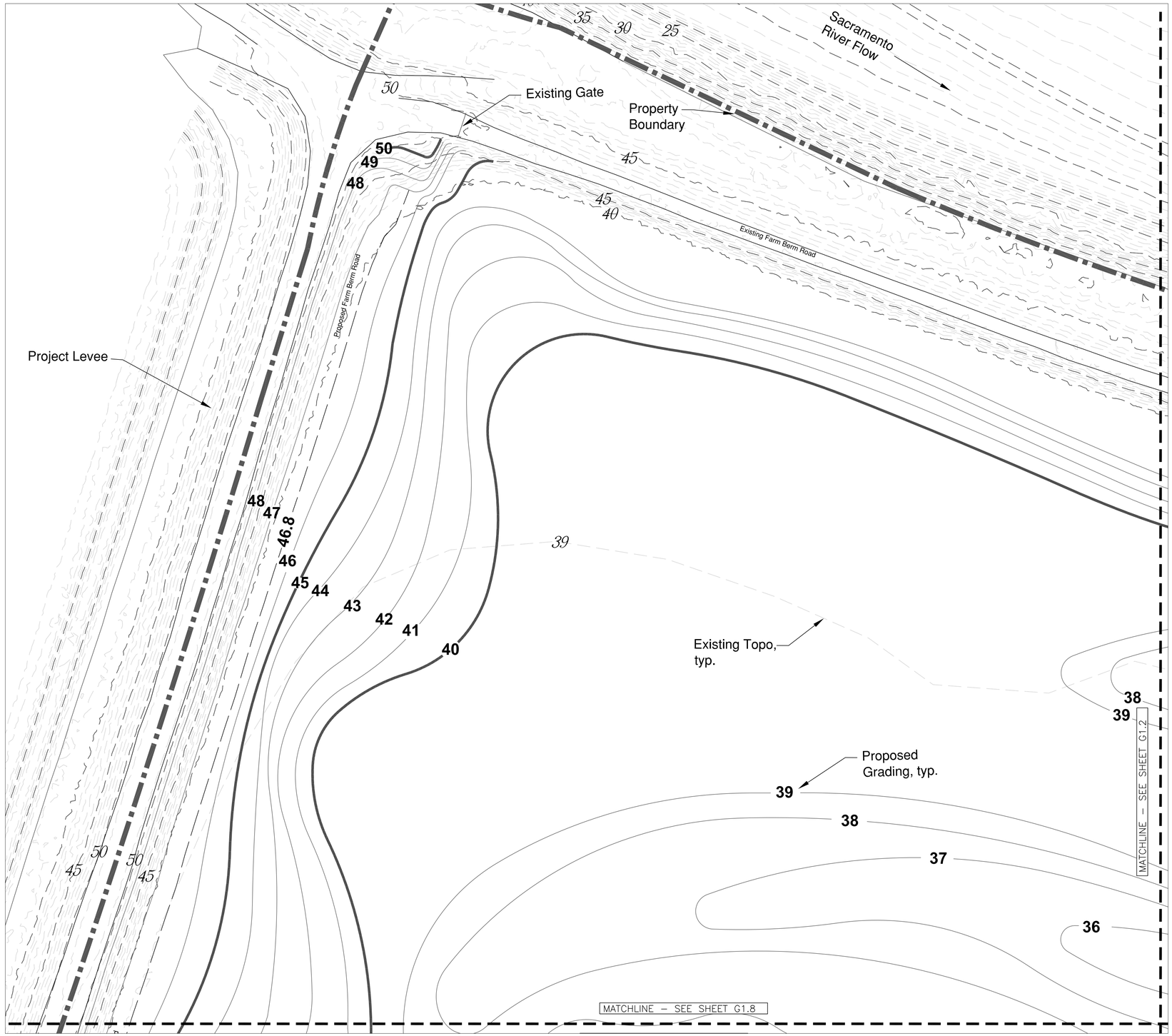
GRADING PLAN OVERVIEW

Sheet Number
G1.0

Attachment C - Project Drawings



WESTERVELT ECOLOGICAL SERVICES
600 N. Market Blvd, Ste 3
Sacramento, CA 95834
Phone: (916) 646-3644
Fax: (916) 646-3675
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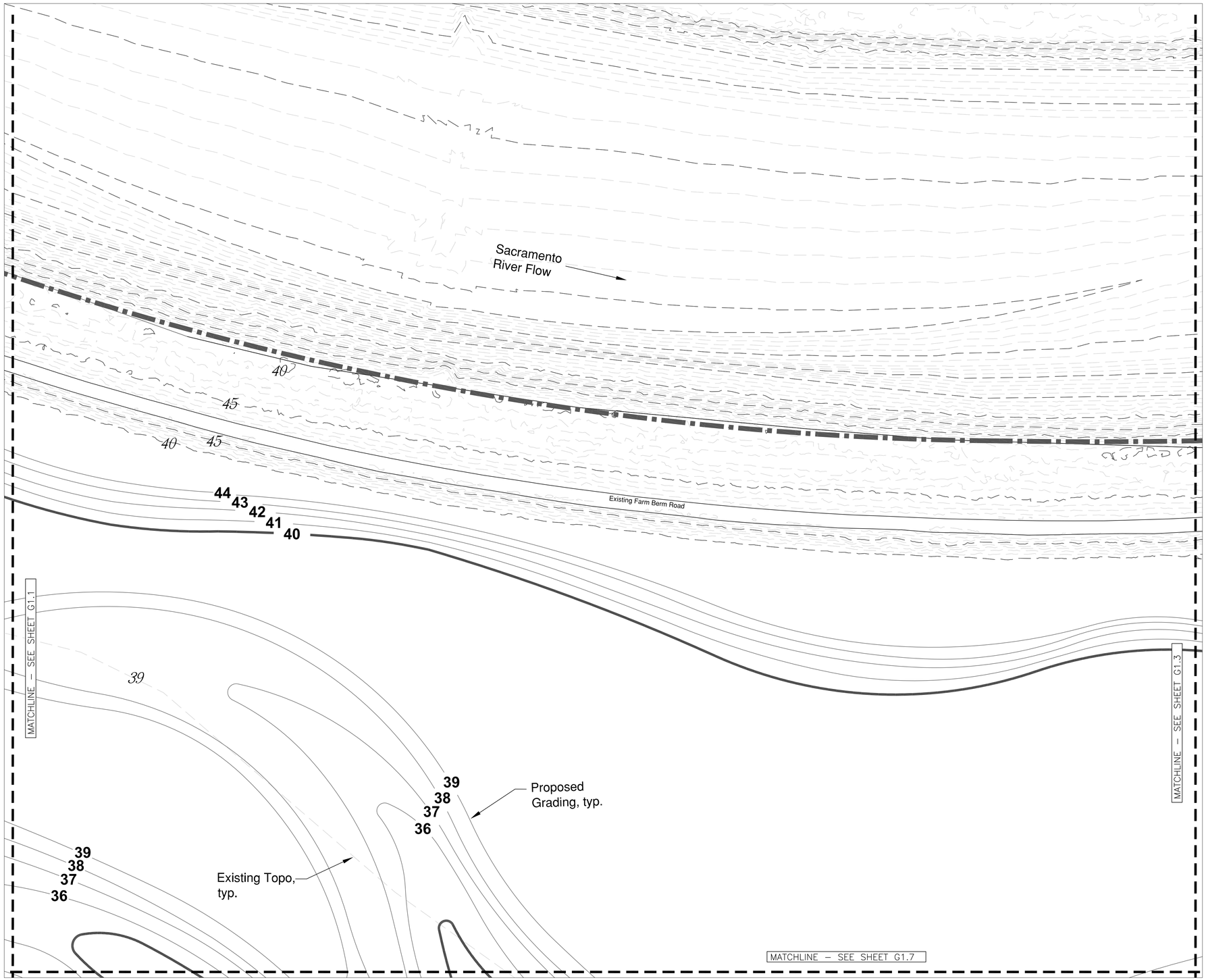
GRADING PLANS

Sheet Number
G1.1



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ECOLOGICAL SERVICES
600 N. Market Blvd, Ste 3
Sacramento, CA 95834
Phone: (916) 646-3644
Fax: (916) 646-3675
www.westervelt.com

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No. 4806
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Renewal Date
Date
STATE OF CALIFORNIA

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GRADING PLANS

Sheet Number
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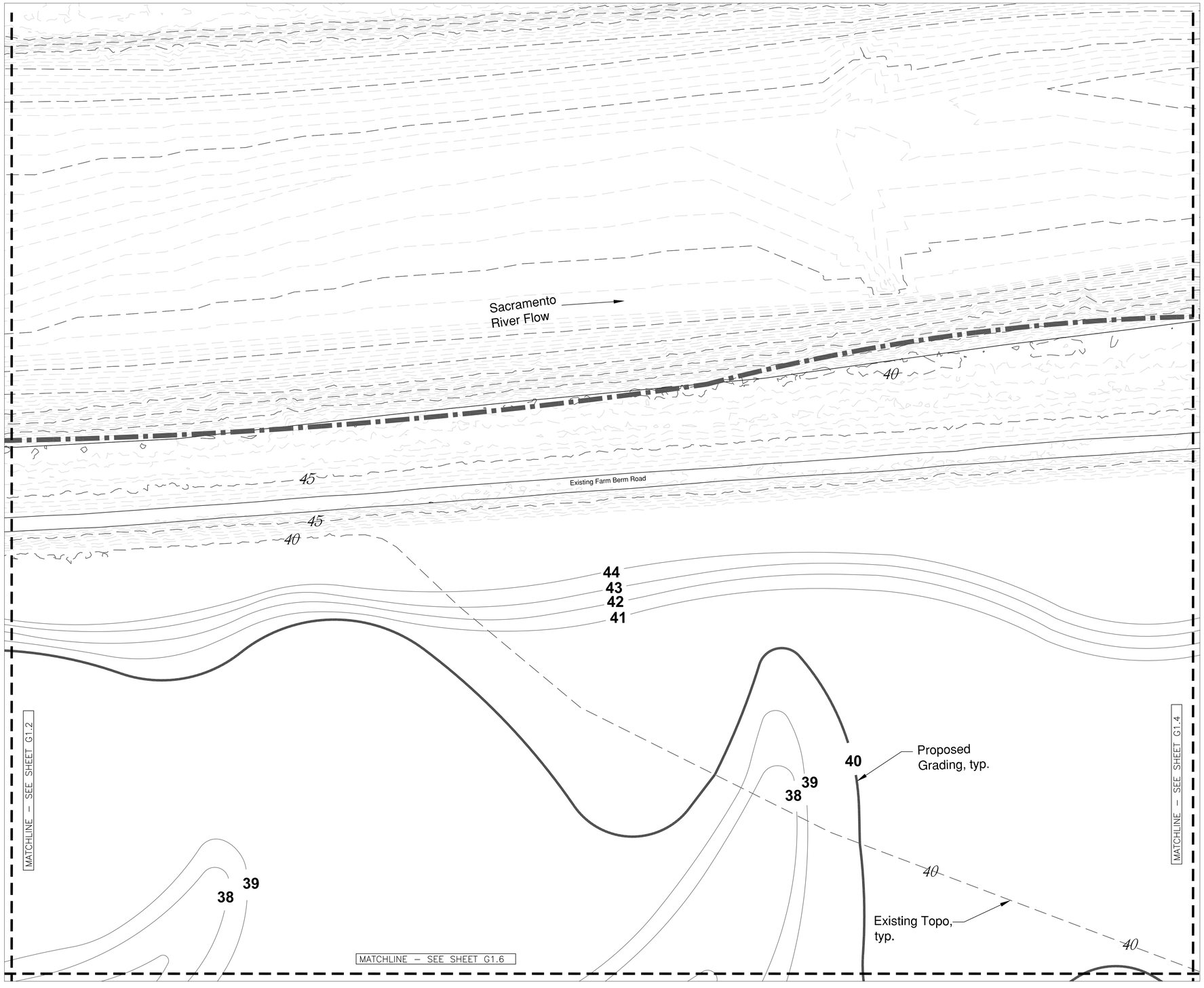

WESTERVELT
ECOLOGICAL SERVICES
600 N. Market Blvd, Ste 3
Sacramento, CA 95834
Phone: (916) 646-3644
Fax: (916) 646-3675
www.westervelt.com

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Mark J. Young
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GRADING PLANS

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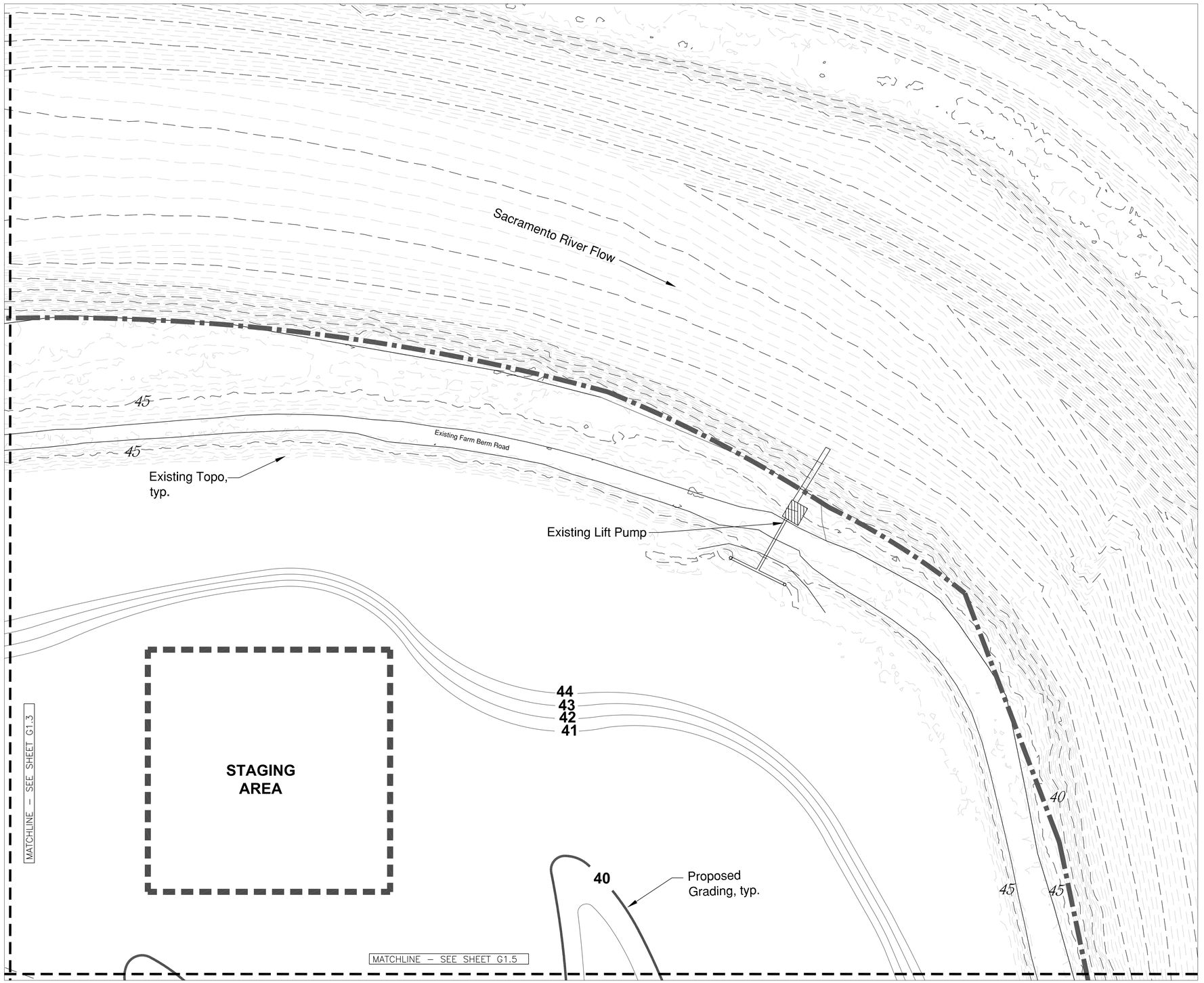

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600 N. Market Blvd, Ste 3
Sacramento, CA 95834
Phone: (916) 646-3644
Fax: (916) 646-3675
www.westervelt.com

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STATE OF CALIFORNIA

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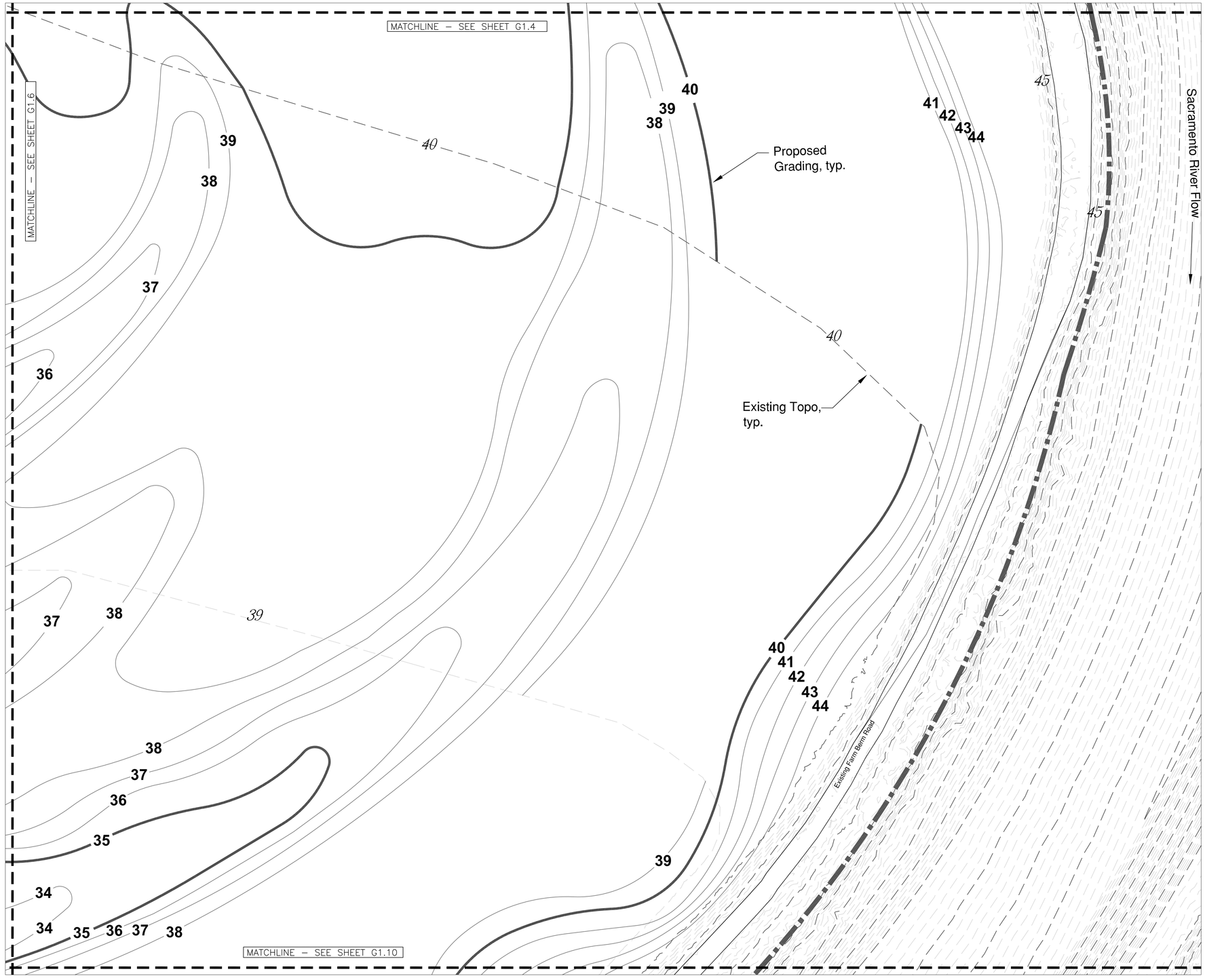

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600 N. Market Blvd, Ste 3
Sacramento, CA 95834
Phone: (916) 646-3644
Fax: (916) 646-3675
www.westervelt.com

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GRADING PLANS

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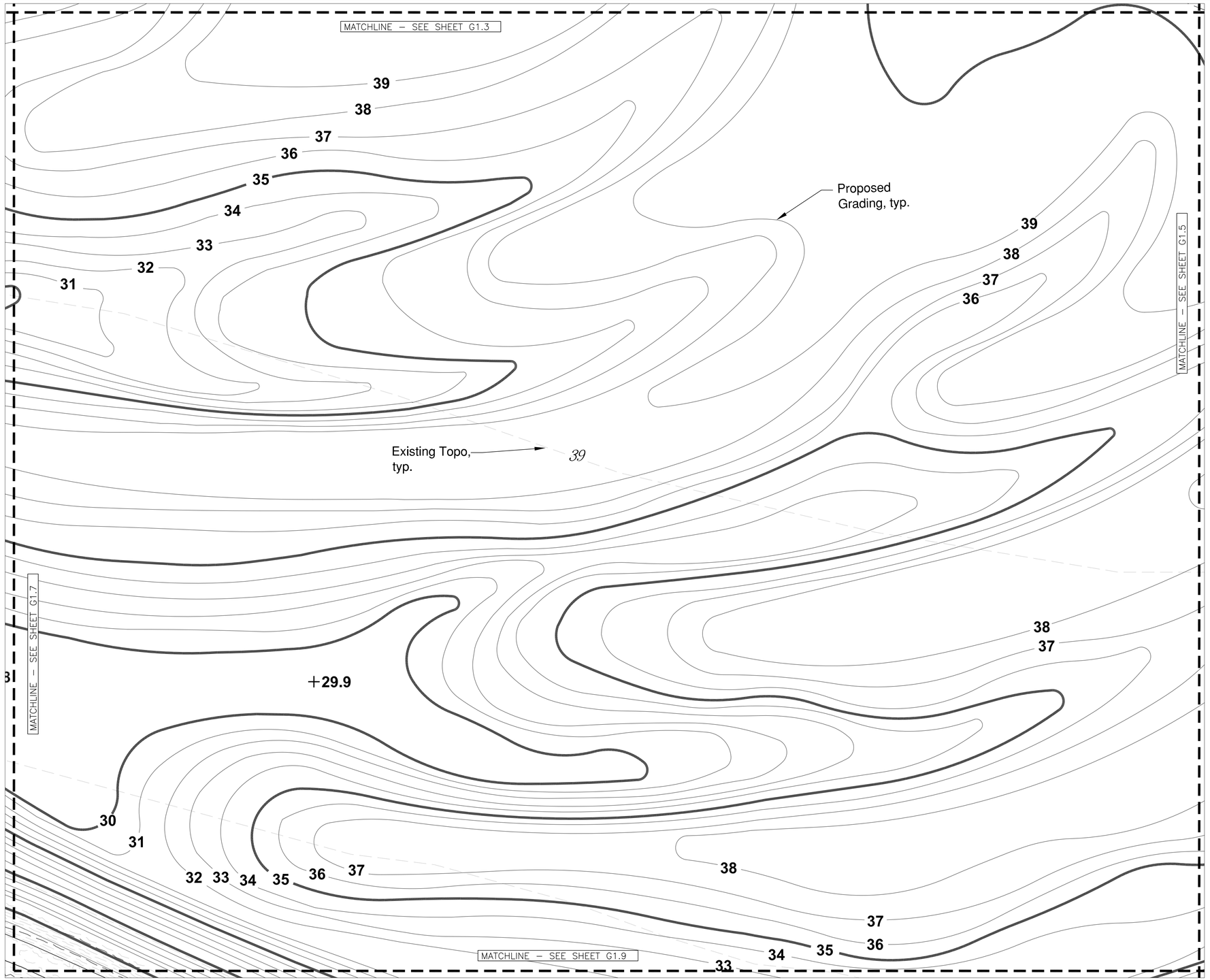

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600 N. Market Blvd, Ste 3
Sacramento, CA 95834
Phone: (916) 646-3644
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GRADING PLANS

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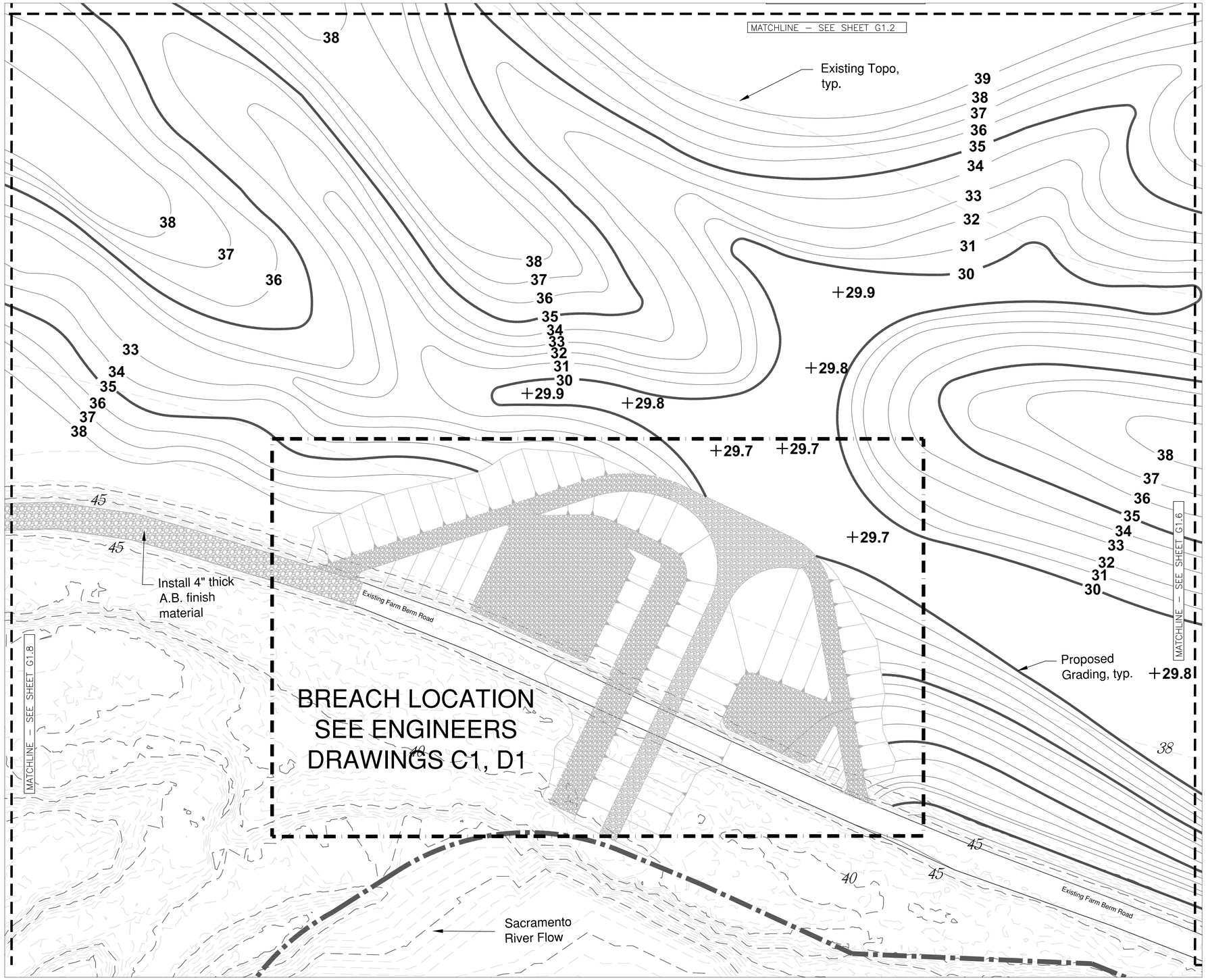

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600 N. Market Blvd, Ste 3
Sacramento, CA 95834
Phone: (916) 646-3644
Fax: (916) 646-3675
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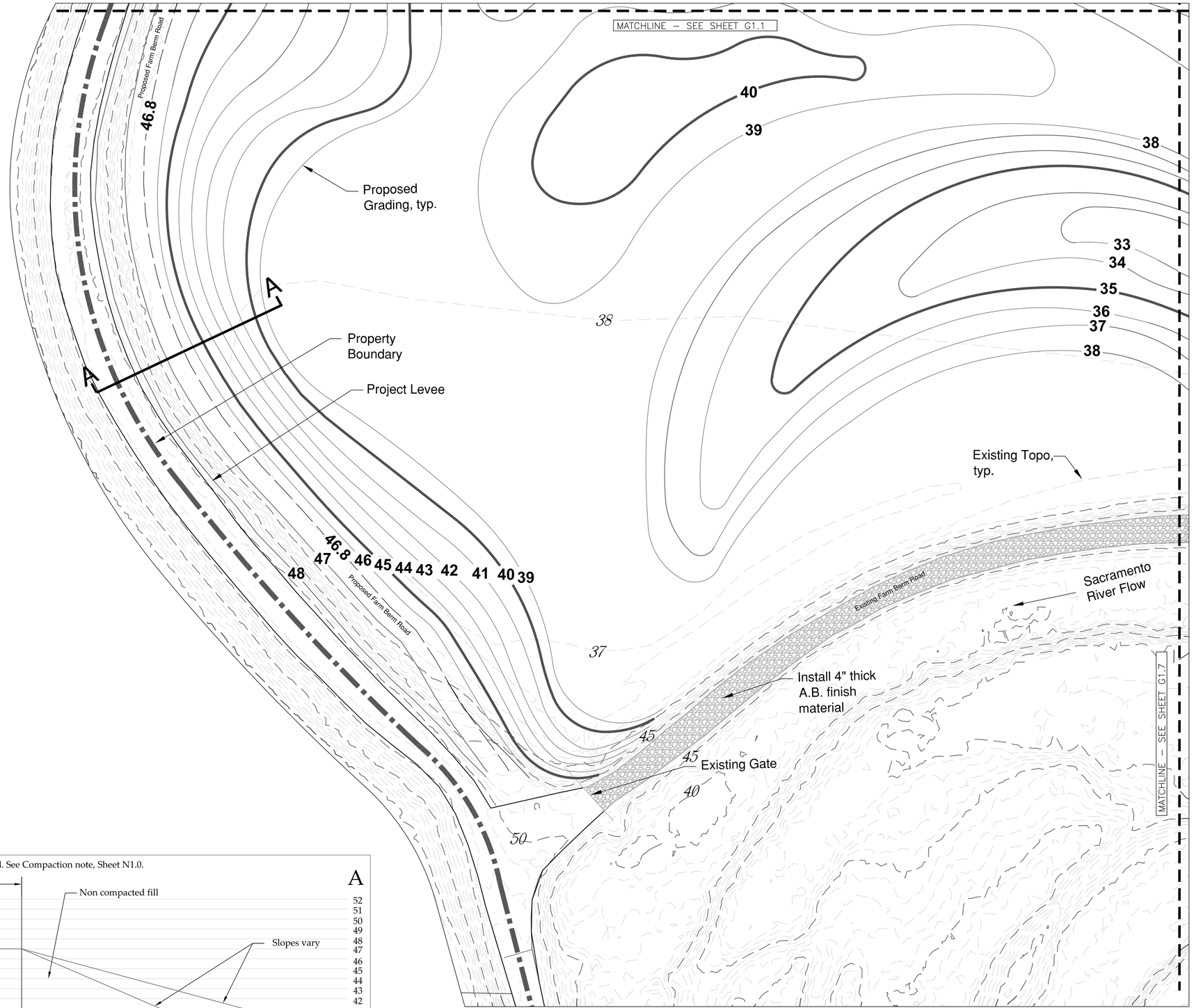

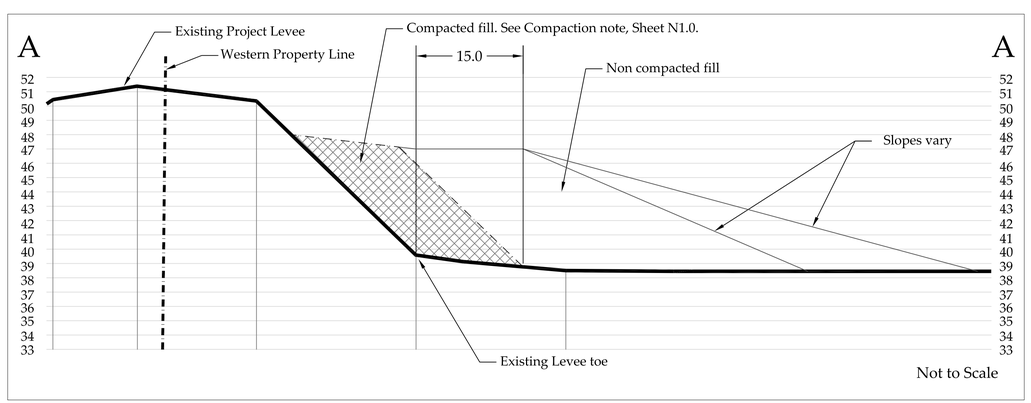

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ECOLOGICAL SERVICES
600 N. Market Blvd, Ste 3
Sacramento, CA 95834
Phone: (916) 646-3644
Fax: (916) 646-3675
www.westervelt.com

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Mark J. Young
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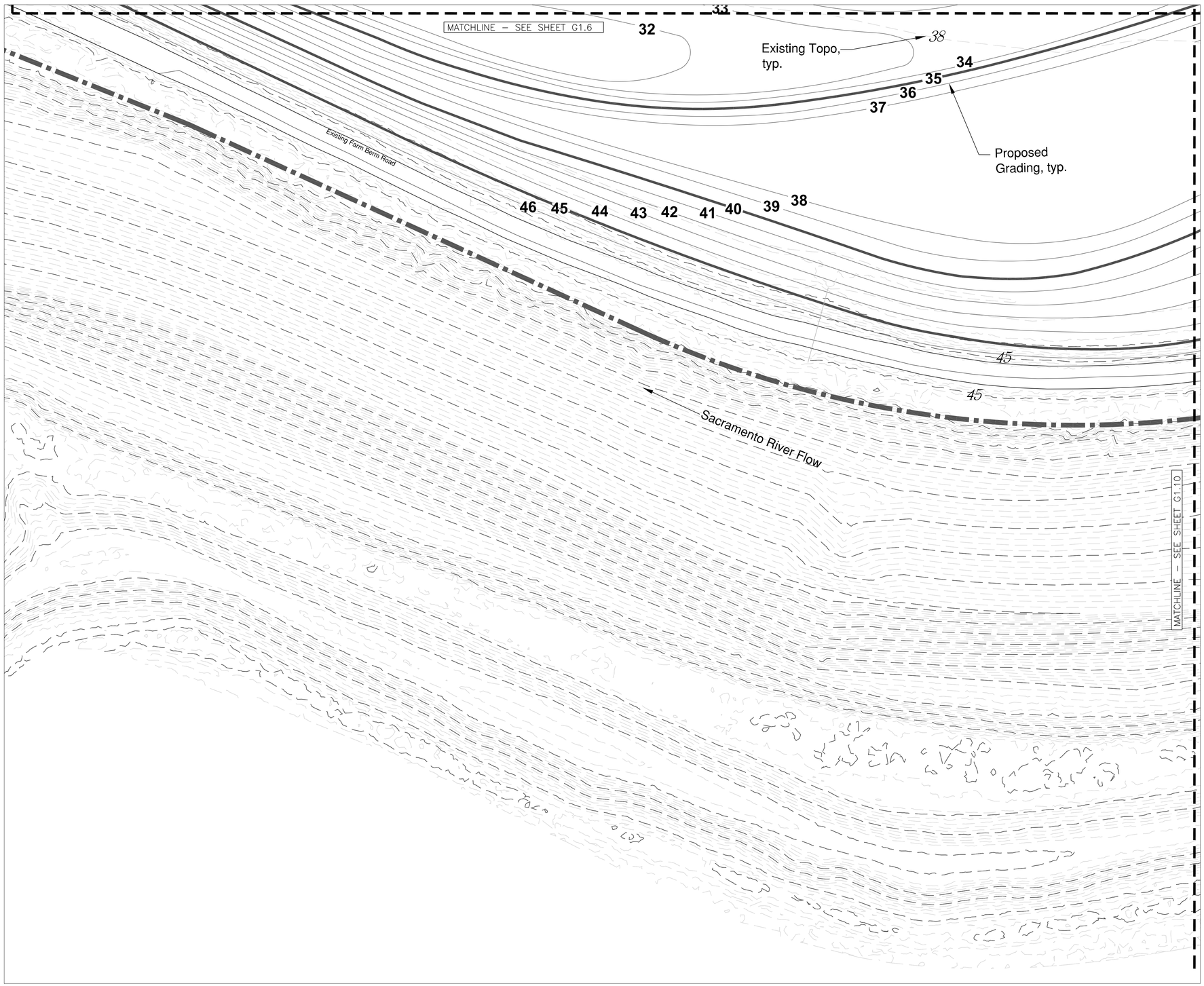
G1.8

Attachment C - Project Drawings



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ECOLOGICAL SERVICES
600 N. Market Blvd, Ste 3
Sacramento, CA 95834
Phone: (916) 646-3644
Fax: (916) 646-3675
www.westervelt.com

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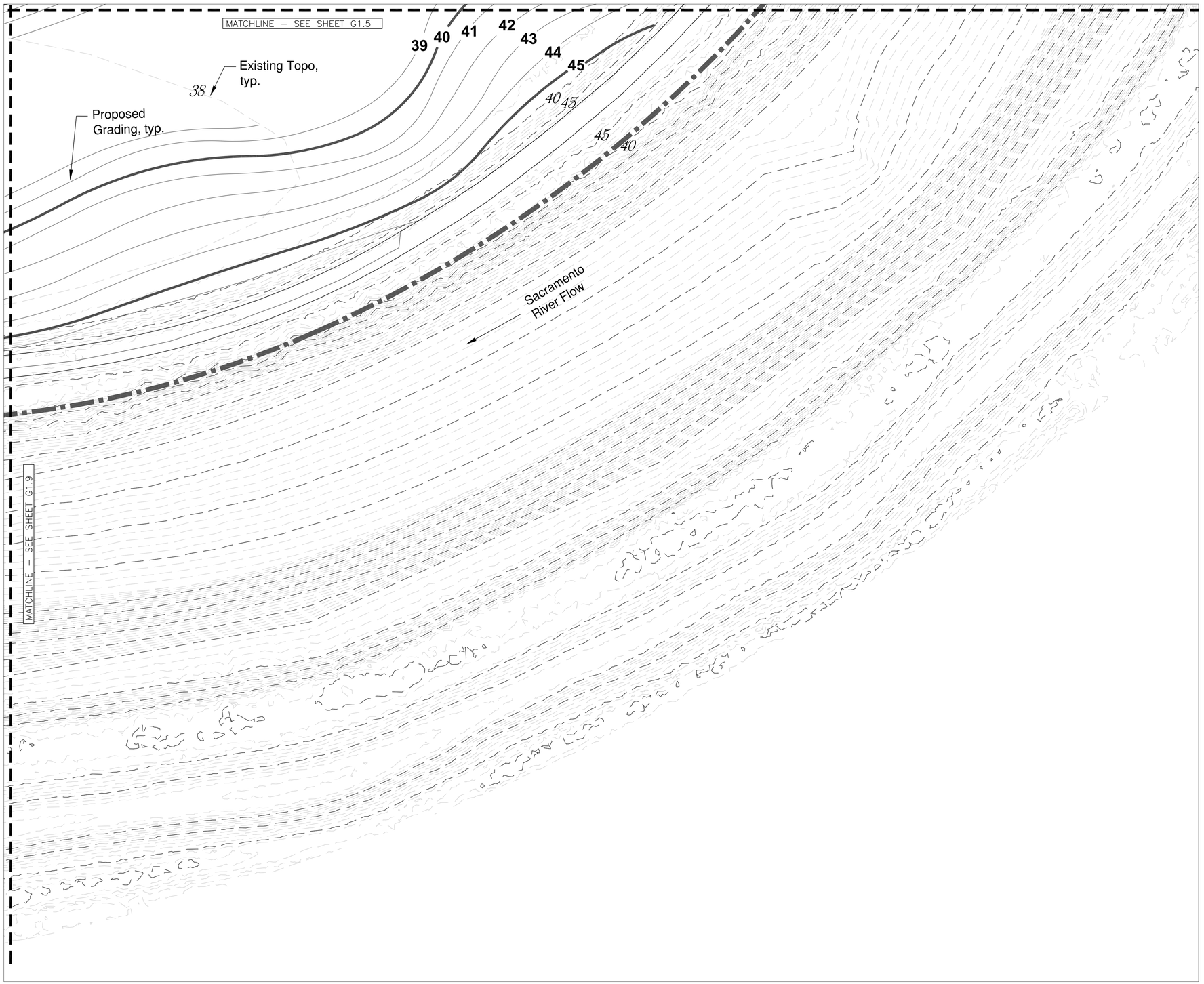

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600 N. Market Blvd, Ste 3
Sacramento, CA 95834
Phone: (916) 646-3644
Fax: (916) 646-3675
www.westervelt.com

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GRADING PLANS

Sheet Number
G1.10

High-Floodplain Zone: Mix A - High Floodplain Seed Mix
Valley oak dominated riparian woodland and grassland habitats.

Mid-Floodplain Zone: Mix B - Mid Floodplain Seed Mix
Mixed riparian forest and herbaceous riparian habitats.

Low-Floodplain / Backwater Channels:
Willow dominated riparian scrub and herbaceous riparian habitats.

NORTH

0 150 300

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600 N. Market Blvd, Ste 3
Sacramento, CA 95834
Phone: (916) 646-3644
Fax: (916) 646-3675
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Mark J. Youngs
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PLANTING PLANS

Sheet Number
P1.0

YOLO COUNTY IMPROVEMENT STANDARDS NOTES

A. Unless shown or specified otherwise, all construction and materials shall comply with the latest edition of the Yolo County Improvement Standards.

B. The Contractor shall not begin any work shown on these plans until the signature of approval of the County Engineer is affixed hereon and all applicable permits have been obtained.

C. The Contractor shall schedule a pre-construction meeting with County staff, other Agency staff, Contractor, material testing lab, Consultants, and other appropriate personnel representing the Developer at least 2 working days in advance of any construction activities.

D. Contractors shall be responsible for coordinating their operations with all required materials testing services as required by the Yolo County Improvement Standards and the County Inspector. Each phase of construction shall be tested and approved by the County Inspector prior to proceeding to subsequent phases.

E. Contractor shall notify all utility companies involved in the development prior to beginning of work.

F. Utilities to be installed under existing pavements shall be directionally bored.

G. No pavement work will occur within the road right-of-way prior to completion of any necessary utility pole removal and utility undergrounding work within that right-of-way.

H. Contractor shall notify "Underground Service Alert" at 811 at least two working days before starting any excavation activities.

I. Materials submittals for material incorporated into the work including, but not limited to, aggregate base, asphalt concrete, and concrete materials shall be submitted to the County at least 2 weeks prior to delivery of materials to the site.

J. Contractor shall be responsible for the protection of all existing survey monuments and/or other survey markers during construction. All monuments or markers destroyed during construction shall be replaced by a licensed California Land Surveyor at the Contractor's expense.

K. Prior to requesting County acceptance of improvements, the Contractor shall set standard survey monuments at locations referenced by Engineer. All survey monuments shall be punched and shall bear the license number of the surveyor.

L. Contractor shall notify the appropriate Special District, after receipt of permits and payment of required fees, prior to making water or sewer taps.

M. Contractor is responsible for compliance with all currently applicable safety laws of all jurisdictional bodies. The Contractor is directed to contact the California State Department of Industrial Relations. The Contractor shall be responsible for all barricades, safety devices, and control of traffic within and around the construction area. For all trench excavation 5 feet or more in depth, the contractor shall obtain a permit from the California State Division of Industrial Relations prior to beginning any excavation.

N. Public safety and traffic control shall be provided in accordance with the Caltrans Traffic Manual and as may be directed by the County. Any lane closures (vehicle or bicycle) shall be approved in advance by the County. Safe vehicular, bicycle, and pedestrian access shall be provided at all times.

O. The Contractor shall maintain continuous temporary traffic barricades, with operable flashing devices, spaced at intervals of not to exceed 50 feet whenever the work area is adjacent to an existing traffic lane and there is a pavement cut, trench, or ditch which is over 2 inches in depth, or if the traffic lane used by vehicles is not paved. If the cut, trench or ditch is more than 10 feet from a traffic lane, then the barricade spacing may be greater, provided that it does not exceed 200 feet.

P. Contractor agrees that in accordance with generally accepted construction practices Contractor shall be required to assume sole and complete responsibility for job site conditions during the course of the construction of the project, including safety of all persons and property; that this requirement shall be made to apply continuously and not be limited to normal working hours, and Contractor further agrees to indemnify and hold the County of Yolo, its officers, employees, agents, and volunteers harmless from any and all liability, real or alleged, in connection with the performance of the work on this project.

Q. All construction and material delivery vehicles shall use the designated access and haul route(s) to the construction site. Route(s) is (are) (*design engineer to enter route description or reference detail*). Any deviation in route(s) shall be subject to County Engineer approval. The route(s) shall be monitored during the project for any damage and debris attributable to the project vehicles. All damage and debris as a result of the project shall be repaired per County Standards.

R. In the event that any street or portion of any street will be closed to emergency traffic, the Contractor shall notify Yolo County Communications Dispatch at (530) 666-8920 prior to closure, and immediately after reopening said street.

S. Contractor shall be responsible for conducting his operation entirely outside of any floodplain boundaries unless otherwise approved. The 100-year floodplain boundaries shall be clearly delineated in the field prior to construction.

T. Contractor shall be responsible for conducting his operation entirely outside of any "no grading" area. These areas shall be clearly delineated in the field prior to construction.

U. Where work is being done in an off-site easement the Contractor shall notify the property owner two working days prior to commencing work within said easement. Copies of all signed/approved off-site easement and/or right-of-entry documents shall be provided to the County.

V. Contractor shall not dispose of chlorinated or other chemically treated water into any drainage system.

W. Contractor shall provide evidence to County of notification of Lake or Streambed Alteration to the California Department of Fish and Wildlife, if necessary.

REQUIRED BEST MANAGEMENT PRACTICES (BMPs)

1. Access points to the construction site shall have Stabilized Construction Access

- A temporary stabilized construction entrance shall be built per the plan and approved by the Restoration Ecologist where direct access abuts a paved street. Contractor shall inspect stabilized construction access daily for damage and effectiveness of preventing soil, sediment, and construction debris from being tracked onto public streets. To maintain the integrity of the temporary construction entrance, gravel shall be added as necessary.

2. The preservation of existing vegetation shall be done in accordance with Preservation of Existing Vegetation and Silt Fence.

- Existing vegetation shall be protected according to the plans unless approved by the Restoration Ecologist. Prior to construction, preserved areas shall be staked by Restoration Ecologist.

3. Seeding areas will be prepared after completion of the rough landscape grading, permitting that the soil conditions are right. Slopes needing seeding will be prepared by disking or harrowing to break up clods and to smooth the surface. Dirt clods / clumps shall be smaller than 2-inches in diameter for the finish landscape grading.

- Seed will be installed via a range drill or air drill. The specific species of plant to be used in the seed mix is shown on the Erosion & Sediment Control Plans.

- The Contractor shall only seed within the Construction Limits of work.

- Seeding shall be implemented in advance of the time when there is risk of erosion. To protect areas by October 31, seeding shall be implemented no later than October 15 unless a work extension has been authorized by the County of Yolo and the Restoration Ecologist. Seeding applied after October 31 and before April 30 shall be covered with straw mulch, soil binder, or erosion control blanket/mat. The Contractor is advised that the County of Yolo may suspend all work between November 1 and May 1 without advanced notice due to weather-related changes in site conditions. After October 15, erosion control measures must be in place or be able to be placed within 24 hours.

- Seeded areas shall be inspected for failures and re-seeded and mulched within the planting season. Any temporary revegetation efforts that do not provide adequate cover must be revegetated as required by the Restoration Ecologist.

- A known source for native seed is:

Hedgerow Farms - (530) 662-6847

MIX A - HIGH FLOODPLAIN SEED MIX

Item	Common Name	Botanical Name	Pounds Per Acre
1	Blue Wildrye	Elymus glaucus	7
2	Slender Wheatgrass	Elymus trachycaulus	5
3	Meadow Barley	Hordeum brachyantherum 'Yolo Bypass'	5
4	Creeping Wildrye	Leymus triticoides 'Rio'	1

MIX B - MID FLOODPLAIN SEED MIX

Item	Common Name	Botanical Name	Pounds Per Acre
1	Bentgrass	Agrostis exarata	1
2	Blue Wildrye	Elymus glaucus	5
3	Slender Wheatgrass	Elymus trachycaulus	5
4	Meadow Barley	Hordeum brachyantherum 'Yolo Bypass'	5
5	Creeping Wildrye	Leymus triticoides 'Rio'	2

EROSION & SEDIMENT CONTROL NOTES

GENERAL REQUIREMENTS

1. All erosion and sediment control measures shall be constructed and maintained in accordance with State of California Best Management Practices.

2. Erosion control best management practices (BMPs) shall be installed and maintained during the wet season (October 1 through April 30). Sediment control BMPs shall be installed and maintained year round.

3. All stabilized construction access locations shall be constructed per Plan where construction traffic enters or leaves paved areas. The stabilized access shall be maintained on a year round basis until the completion of construction.

4. All areas disturbed during construction by grading, trenching, or other activities, shall be protected from erosion during the wet season (October 1 through April 30). Hydroseed, if utilized, must be placed by September 15. Hydroseed placed during the wet season shall use a secondary erosion protection method.

5. Sensitive areas and areas where existing vegetation is being preserved shall be protected with construction limits demarcation. Sediment control BMPs shall be installed where active construction areas drain into sensitive or preserved vegetation areas.

6. Sediment control BMPs shall be placed along the project perimeter where drainage leaves the project. Sediment control BMPs shall be maintained year round until the construction is complete or the drainage pattern has been changed and no longer leaves the site.

7. Erosion and sediment control measures for the project shall be in substantial compliance at all times with the stormwater pollution prevention plan (SWPPP) prepared for the project in accordance with the State of California General Construction Permit. This permit requires that the SWPPP be kept up to date to reflect the changing site conditions and the SWPPP is to be available on site at all times for review state and local inspectors.

8. Effective erosion control BMPs shall be in place prior to any storm events.

9. During the construction process, the Contractor will prevent the movement of sediment from the site to any drainage system, watercourse, or any property adjacent to the site and prevent any damage to those areas caused by erosion or deposition. Contractor shall minimize any mobilization of soils and limit any movement of soils during construction and after stabilization measures are in place. Contractor will seek plan clarification from the Restoration Ecologist.

10. All locations for implementing erosion control measures may not be shown on the plans. If conditions are created during construction and have not been shown on the plans, the Contractor shall implement BMPs to prevent erosion and sedimentation. Such actions are incidental to the project work.

11. Erosion measures will be in place per the timeline described below and include both construction stabilization activities and long term upland restoration.

12. Haul Routes shall be verified by the Contractor per the plans and approved by the Restoration Ecologist prior to any construction activity. Haul Routes shall not deviate outside plans unless site conditions require the Haul Route to change, in which case the Restoration Ecologist shall be notified for an approved change.

13. Contractor will perform a good faith effort to minimize the creation of dust at all times during construction. Water will be taken from an approved water source. If a permit is required (e.g., hydrant permit) for dust control measures, this will be obtained by the Contractor prior to construction. The Contractor shall spray the approved water at least once a day on all unpaved, un-vegetated areas to control dust. These areas include haul roads, areas being graded, excavated, dirt stockpiles and sites that are completed and awaiting seeding. Contractor shall take precaution while spraying for dust control to avoid runoff. Dust control will conform to Yolo County Code and Yolo-Solano Air Quality Management District Rule 205 Fugitive Dust Emissions.

WESTERVELT ECOLOGICAL SERVICES
600 N. Market Blvd, Ste 3
Sacramento, CA 95834
Phone: (916) 646-3644
Fax: (916) 646-3675
www.westervelt.com

LICENSED LANDSCAPE ARCHITECT
Mark J. Young
No. 4806
Signature
Renewal Date
Date
STATE OF CALIFORNIA

Bullock Bend Mitigation Bank

EROSION NOTES

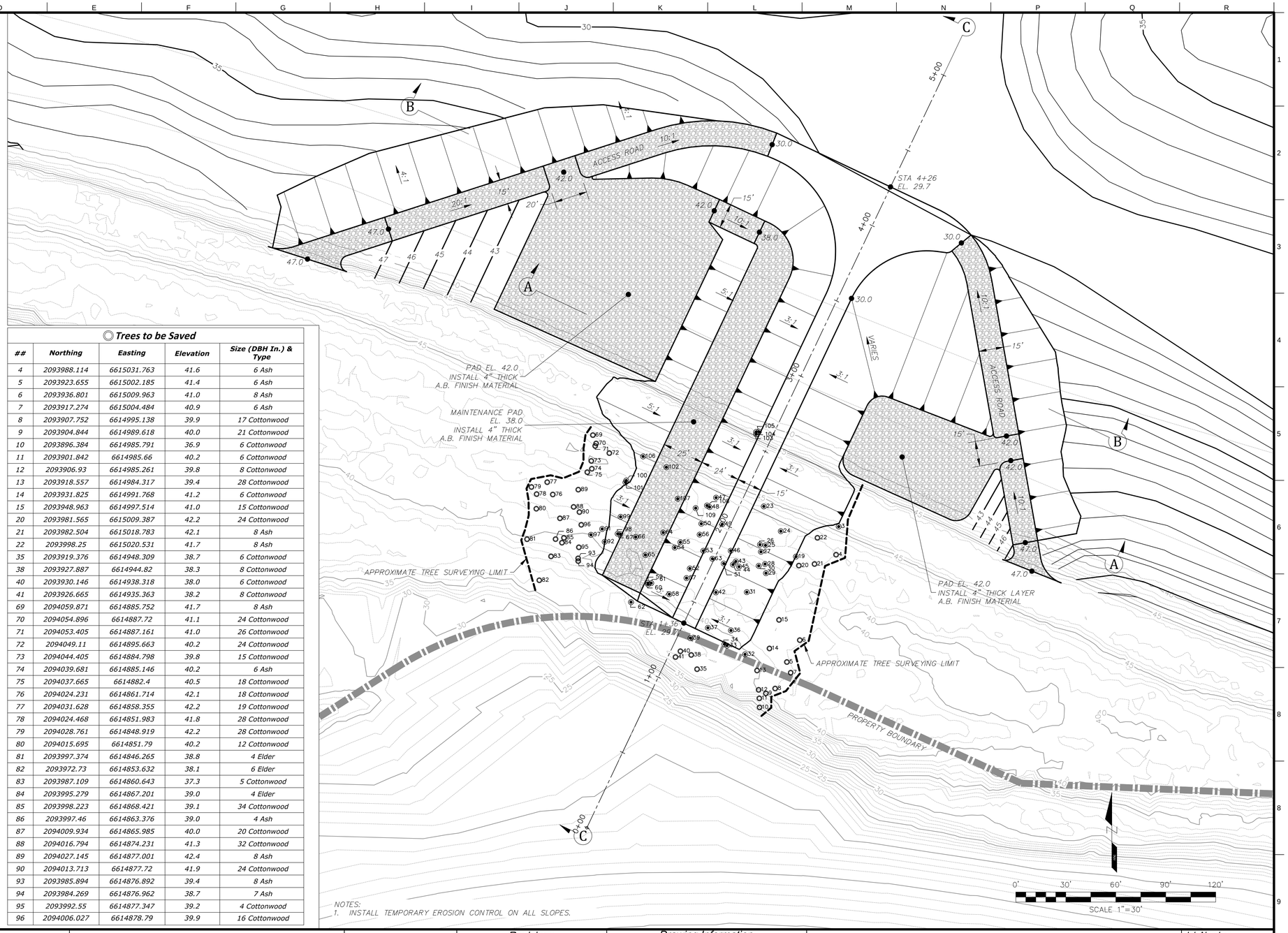
Sheet Number
EN1.0

Trees to be Removed

##	Northing	Easting	Elevation	Size (DBH In.) & Type
3	2094004.995	6615033.314	47.0	20 Cottonwood
19	2093986.931	6615007.663	42.0	6 Ash
23	2094017.093	6614988.364	42.7	14 Oak
24	2094002.188	6614998.537	41.0	4 Ash
25	2093993.72	6614989.357	42.1	17 Cottonwood
26	2093994.162	6614986.027	42.1	19 Cottonwood
27	2093989.846	6614986.631	42.3	26 Cottonwood
28	2093982.472	6614989.098	41.3	27 Cottonwood
29	2093977.011	6614989.633	40.1	20 Cottonwood
30	2093981.421	6614985.285	40.8	13 Cottonwood
31	2093965.585	6614978.162	40.4	7 Ash
32	2093928.24	6614977.102	39.4	12 Ash
33	2093933.508	6614966.316	39.1	10 Ash
34	2093934.331	6614964.707	38.9	7 Ash
36	2093942.591	6614968.637	40.2	9 Ash
37	2093944.222	6614954.782	39.5	12 Ash
39	2093938.019	6614944.283	37.9	36 Cottonwood
42	2093965.446	6614959.597	40.7	9 Ash
43	2093984.062	6614971.563	40.4	7 Ash
44	2093982.125	6614969.867	40.3	27 Cottonwood
45	2093980.889	6614973.513	40.0	34 Cottonwood
46	2093990.433	6614968.486	41.8	34 Cottonwood
47	2094022.348	6614959.697	41.5	34 Cottonwood
48	2094016.677	6614955.793	40.6	4 Ash
49	2094006.384	6614963.441	41.4	21 Cottonwood
50	2094006.669	6614950.869	41.8	12 Cottonwood
51	2093982.791	6614964.311	40.5	18 Cottonwood
52	2093979.801	6614943.93	40.3	5 Ash
53	2093990.426	6614952.071	40.8	7 Ash
54	2093992.348	6614934.921	40.0	36 Cottonwood
55	2093995.528	6614938.307	40.9	4 Ash
56	2094000.15	6614949.844	42.1	6 Ash
57	2093974.022	6614941.937	40.3	4 Ash
58	2093964.364	6614931.677	40.1	7 Ash
59	2093971.054	6614918.847	39.8	6 Ash
60	2093970.239	6614918.885	39.8	6 Ash
61	2093971.043	6614920.792	39.9	6 Ash
62	2093959.596	6614908.641	37.9	4 Ash
63	2093985.669	6614957.484	40.3	22 Cottonwood
64	2094001.382	6614927.979	42.2	13 Cottonwood
65	2093987.958	6614917.299	40.0	6 Ash
66	2093998.746	6614911.471	40.6	48 Cottonwood
67	2094000.397	6614902.326	40.1	4 Ash
91	2094003.559	6614891.36	40.0	26 Cottonwood
92	2093995.821	6614892.843	39.7	24 Cottonwood
97	2094000.032	6614884.615	39.7	24 Cottonwood
98	2094000.652	6614900.644	40.0	5 Ash
99	2094010.837	6614902.395	41.5	43 Cottonwood
100	2094032.63	6614905.823	40.7	48 Cottonwood
101	2094031.478	6614905.298	40.9	36 Cottonwood
102	2094040.578	6614929.899	42.4	6 Ash
103	2094060.44	6614983.755	42.3	4 Elder
104	2094061.765	6614983.774	41.7	4 Elder
105	2094061.952	6614985.386	41.5	4 Elder
106	2094047.068	6614915.889	41.9	6 Ash
107	2094021.633	6614936.712	40.2	8 Ash
108	2094017.632	6614954.255	40.4	4 Elder
109	2094016.027	6614947.458	40.5	4 Ash

Trees to be Saved

##	Northing	Easting	Elevation	Size (DBH In.) & Type
4	2093988.114	6615031.763	41.6	6 Ash
5	2093923.655	6615002.185	41.4	6 Ash
6	2093936.801	6615009.963	41.0	8 Ash
7	2093917.274	6615004.484	40.9	6 Ash
8	2093907.752	6614995.138	39.9	17 Cottonwood
9	2093904.844	6614989.618	40.0	21 Cottonwood
10	2093896.384	6614985.791	36.9	6 Cottonwood
11	2093901.842	6614985.66	40.2	6 Cottonwood
12	2093906.93	6614985.261	39.8	8 Cottonwood
13	2093918.557	6614984.317	39.4	28 Cottonwood
14	2093931.825	6614991.768	41.2	6 Cottonwood
15	2093948.963	6614997.514	41.0	15 Cottonwood
20	2093981.565	6615009.387	42.2	24 Cottonwood
21	2093982.504	6615018.783	42.1	8 Ash
22	2093998.25	6615020.531	41.7	8 Ash
35	2093919.376	6614948.309	38.7	6 Cottonwood
38	2093927.887	6614944.82	38.3	8 Cottonwood
40	2093930.146	6614938.318	38.0	6 Cottonwood
41	2093926.665	6614935.363	38.2	8 Cottonwood
69	2094059.871	6614885.752	41.7	8 Ash
70	2094054.896	6614887.72	41.1	24 Cottonwood
71	2094053.405	6614887.161	41.0	26 Cottonwood
72	2094049.11	6614895.663	40.2	24 Cottonwood
73	2094044.405	6614884.798	39.8	15 Cottonwood
74	2094039.681	6614885.146	40.2	6 Ash
75	2094037.665	6614882.4	40.5	18 Cottonwood
76	2094024.231	6614861.714	42.1	18 Cottonwood
77	2094031.628	6614858.355	42.2	19 Cottonwood
78	2094024.468	6614851.983	41.8	28 Cottonwood
79	2094028.761	6614848.919	42.2	28 Cottonwood
80	2094015.695	6614851.79	40.2	12 Cottonwood
81	2093997.374	6614846.265	38.8	4 Elder
82	2093972.73	6614853.632	38.1	6 Elder
83	2093987.109	6614860.643	37.3	5 Cottonwood
84	2093995.279	6614867.201	39.0	4 Elder
85	2093998.223	6614868.421	39.1	34 Cottonwood
86	2093997.46	6614863.376	39.0	4 Ash
87	2094009.934	6614865.985	40.0	20 Cottonwood
88	2094016.794	6614874.231	41.3	32 Cottonwood
89	2094027.145	6614877.001	42.4	8 Ash
90	2094013.713	6614877.72	41.9	24 Cottonwood
93	2093985.894	6614876.892	39.4	8 Ash
94	2093984.269	6614876.962	38.7	7 Ash
95	2093992.55	6614877.347	39.2	4 Cottonwood
96	2094006.027	6614878.79	39.9	16 Cottonwood



nhc
northwest hydraulic consultants
3950 industrial boulevard, suite 100c
west sacramento, california 95691
phone: (916) 371-7400
fax: (916) 371-7475
www.nhcweb.com

REGISTERED PROFESSIONAL ENGINEER
BRIAN G. WARDMAN
No. 74371
Exp. 06/30/17
CIVIL
STATE OF CALIFORNIA

Revisions		
No.	Date	Description

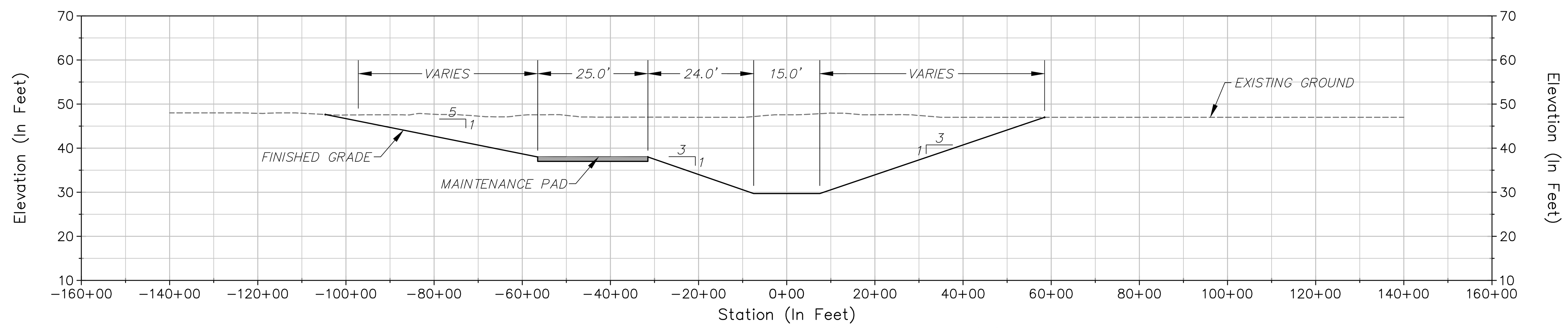
Drawing Information	
Date	21 December 2015 (12:05)
Status	
Designer	tvs
Drafter	tvs
Checked	bgw
File Name	BULLOCK BEND
Plotted Scale	0 1/2 1

Bullock Bend Mitigation Bank

Berm Breach Plan Sheet

Job Number 5000114

Sheet Number C1



A TYPICAL CROSS SECTION (1+00 TO 2+58)
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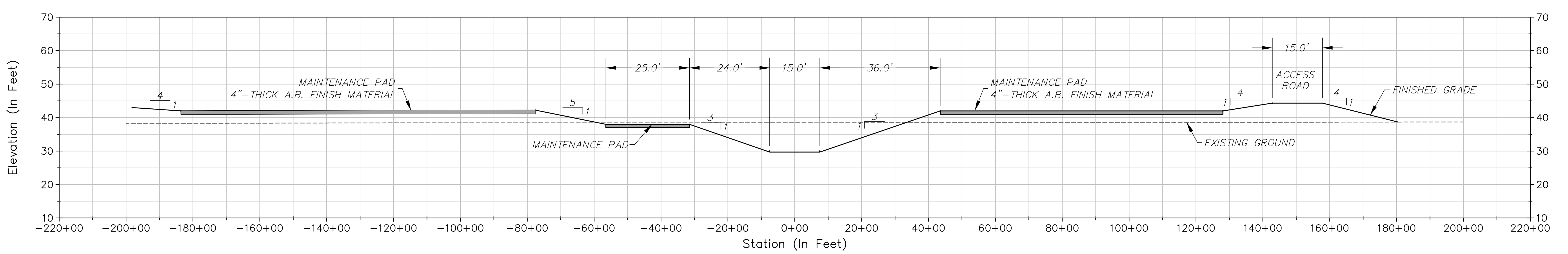

B TYPICAL CROSS SECTION (2+59 TO 3+00)
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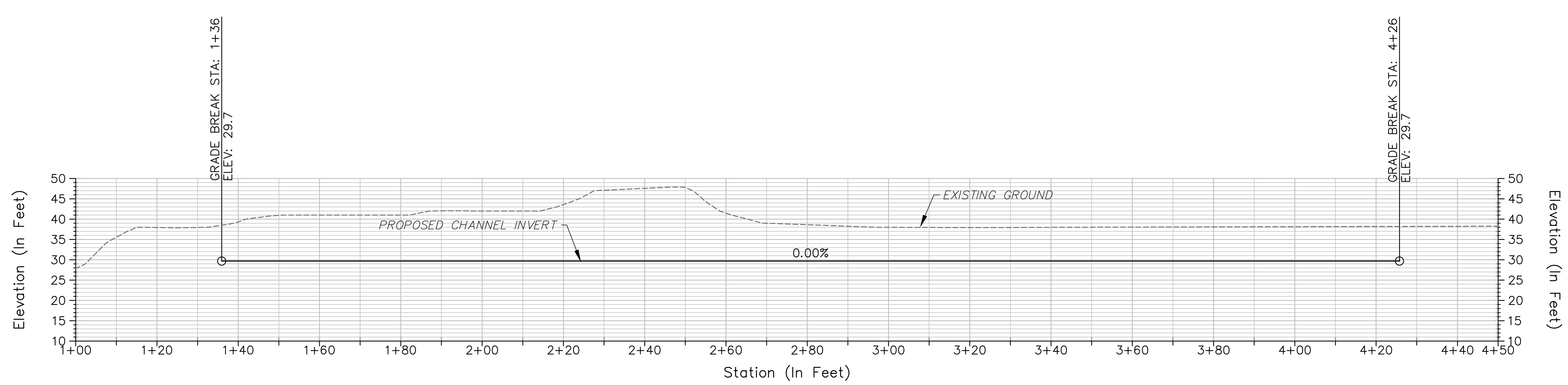

C BREACH CHANNEL PROFILE
H: 1"=20' V: 1"=20'

nhc
northwest hydraulic consultants
3950 industrial boulevard, suite 100c
west sacramento, california 95691
phone: (916) 371-7400
fax: (916) 371-7475
www.nhcweb.com

REGISTERED PROFESSIONAL ENGINEER
BRIAN G. WARDMAN
No. 74371
Exp: 06/30/17
CIVIL
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File Name	BULLOCK BEND
Plotted Scale	0 1/2 1

Bullock Bend Mitigation Bank

Berm Breach Profile & Sections Sheet

Job Number
5000114

Sheet Number
D1

Attachment C - Project Drawings

Bullock Bend Mitigation Bank

Note: Natural recruitment of vegetation is also expected to occur. The vegetation will be maintained following the program set forth in the long-term management plan.

Excerpt from the Exhibit C-1: Habitat Development Plan of the Bank Enabling Instrument

Table 4. Riparian Planting Palette				
Common Name (*Scientific Name*)	**Growth Form**	**Material**	**Plant Spacing (on center)**	**QTY**
Fremont cottonwood (*Populus fremontii*)	Tree	Containers/Cuttings	40 feet	2200
willow (*Salix* spp.)	Tree/Shrub	Cuttings	20 feet	2600
California black walnut (*Juglans hindsii*)	Tree	Containers	Mix with oak	35
Valley oak (*Quercus lobata*)	Tree	Acorns/Containers	30 feet	500
Oregon ash (*Fraxinus latifolia*)	Tree	Containers	Mix with cottonwood	35
California box elder (*Acer negundo*)	Tree	Containers	Mix with oak	35
bentgrass (*Agrostis exarata*)	Herb	Seed	1 lbs./acre	
blue wildrye (*Elymus glaucus*)	Herb	Seed	3 lbs./acre	
slender wheatgrass (*Elymus trachycaulus*)	Herb	Seed	5 lbs./acre	
meadow barley (*Hordeum brachyantherum*)	Herb	Seed	5 lbs./acre	
creeping wildrye (*Elymus triticoides*)	Herb	Seed	1 lbs./acre	

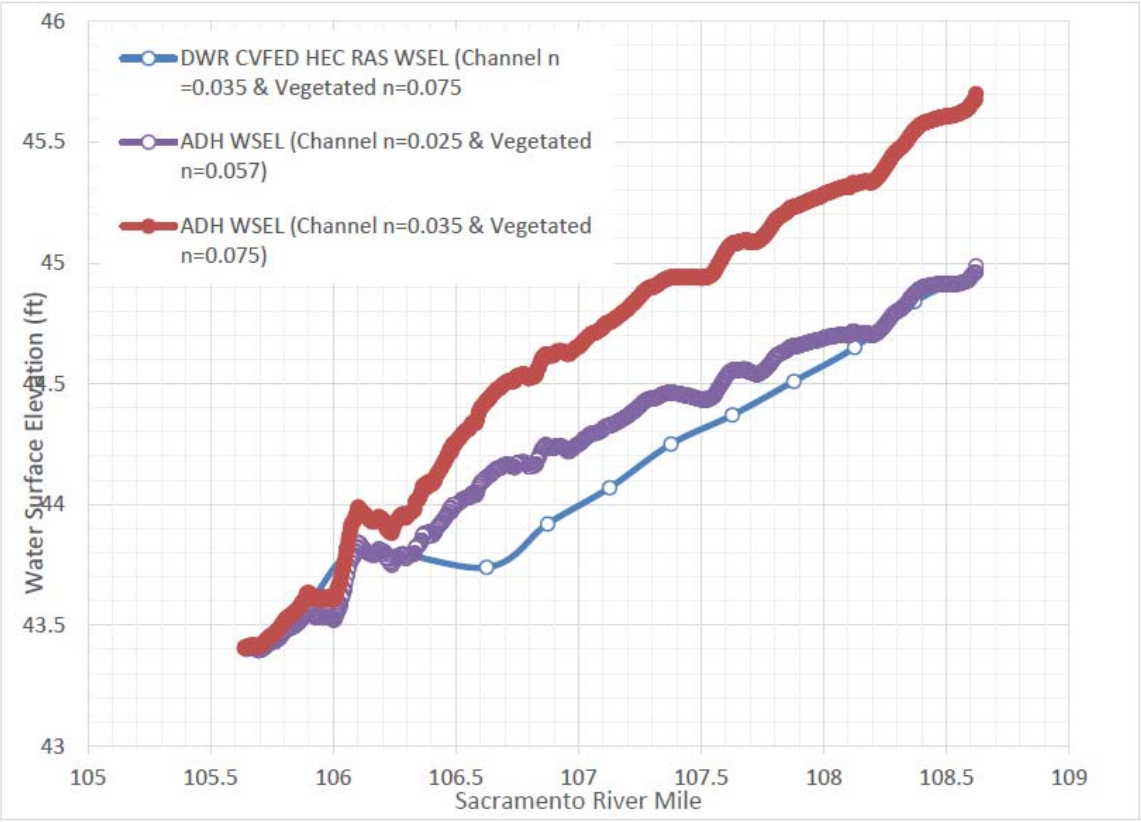


Figure 7: Comparison of peak water surface elevations computed through the site with DWR CVFED HEC-RAS model and calibrated ADH model for the 1997 event.

Figure 8: Material types used in two-dimensional ADH model.

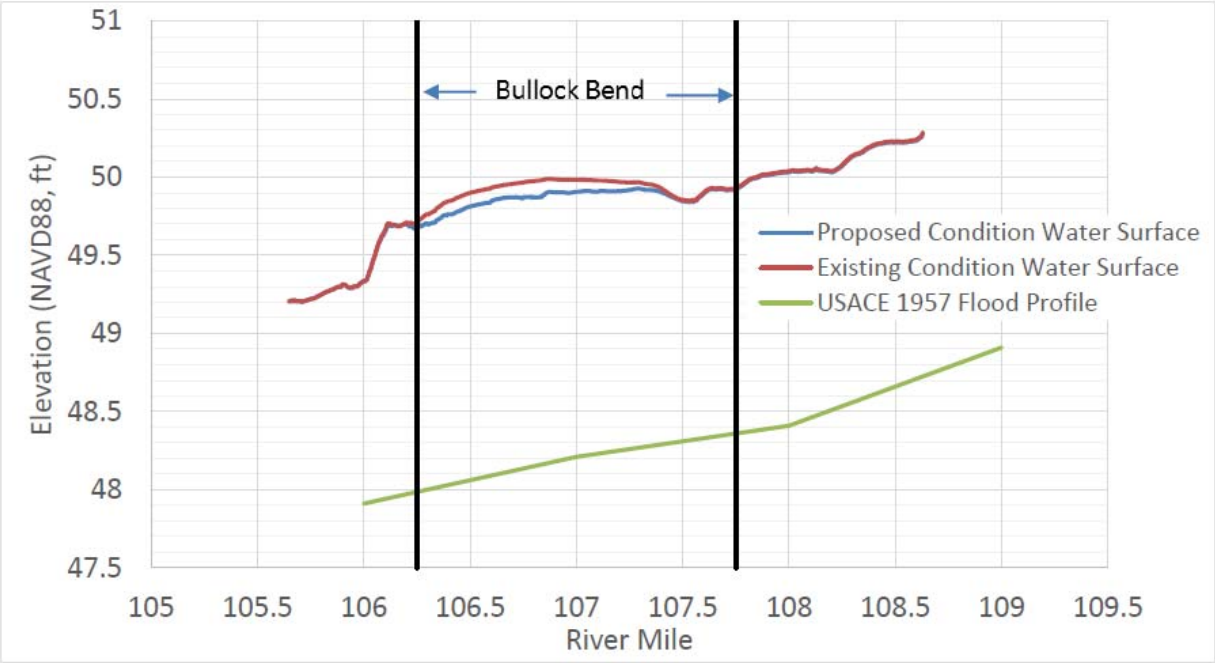


Figure 9: Comparison of peak water surface elevation computed in ADH model for discharge of 39,500 cfs (100-year discharge for reach computed by USACE HEC-RAS Model)

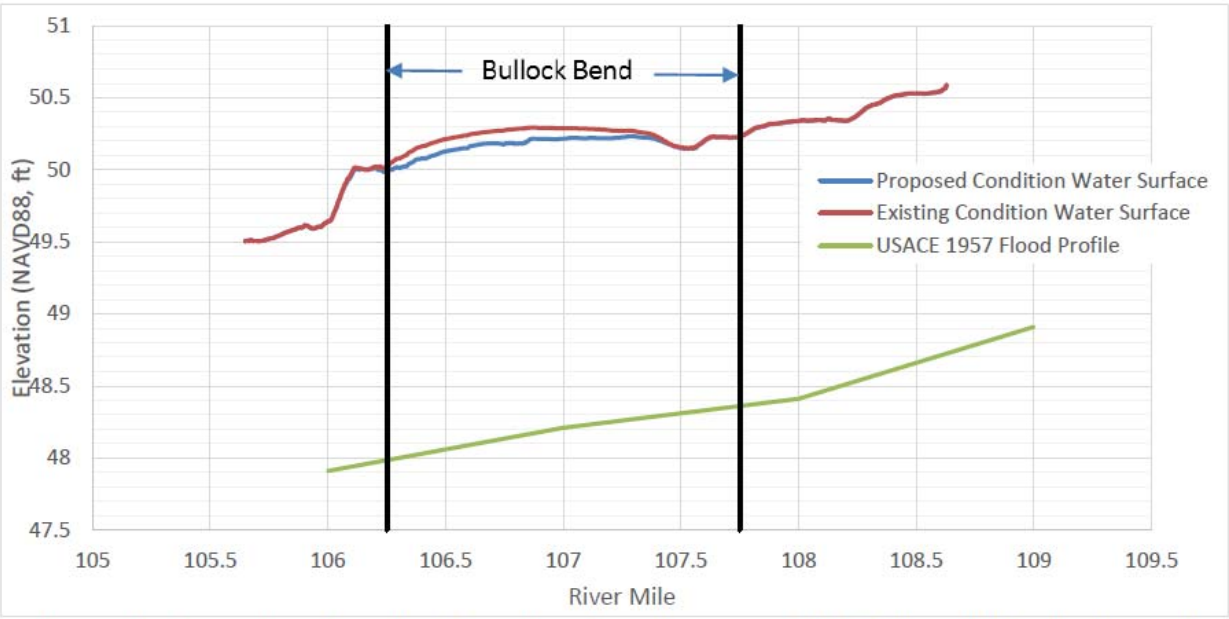


Figure 10: Comparison of peak water surface elevation computed in ADH model for discharge of 42,500 cfs (200-year discharge for reach computed by USACE HEC-RAS Model)

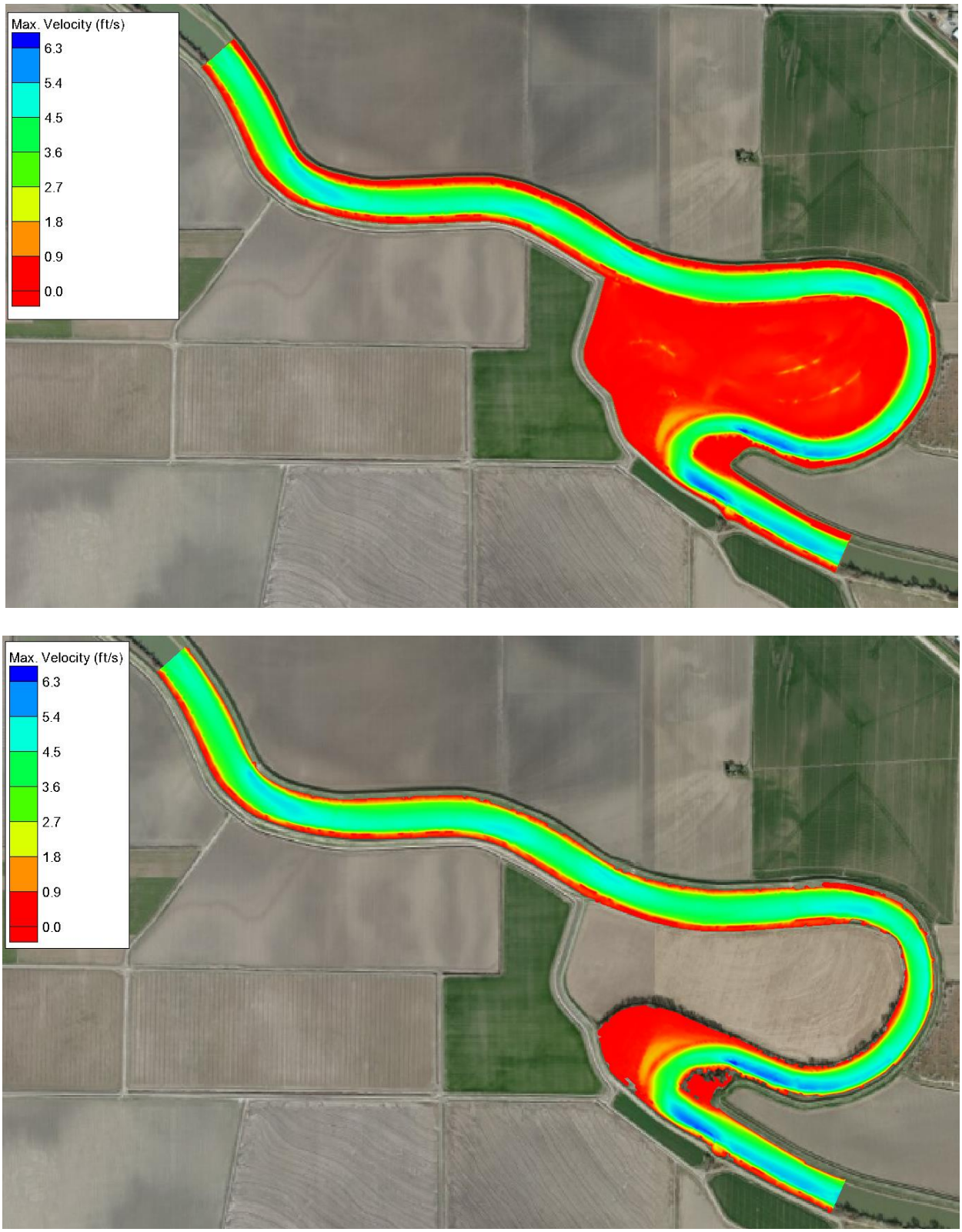


Figure 11: Peak velocity during the 1997 event (Q=31,000 cfs) for existing conditions (bottom) and proposed conditions (top).

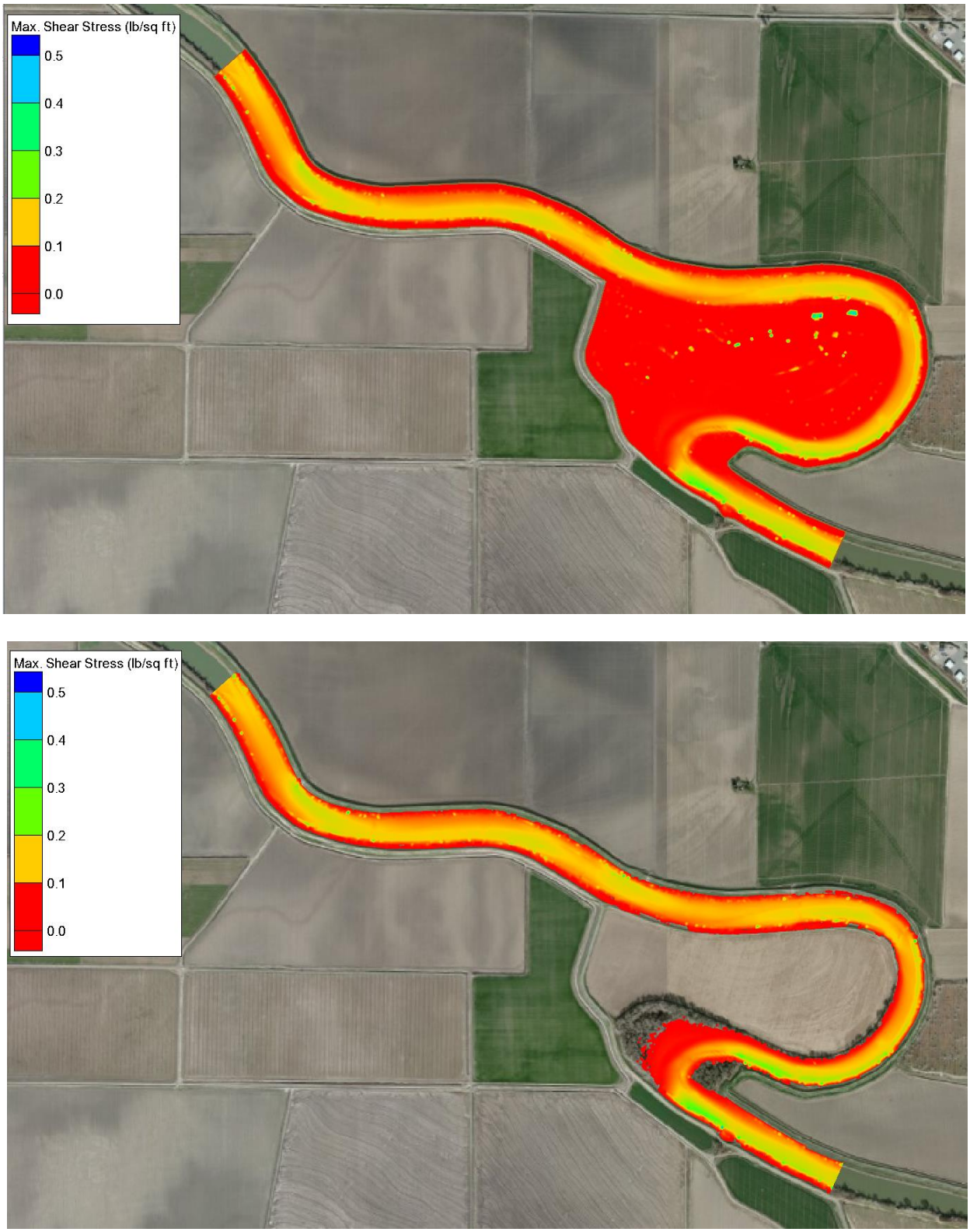
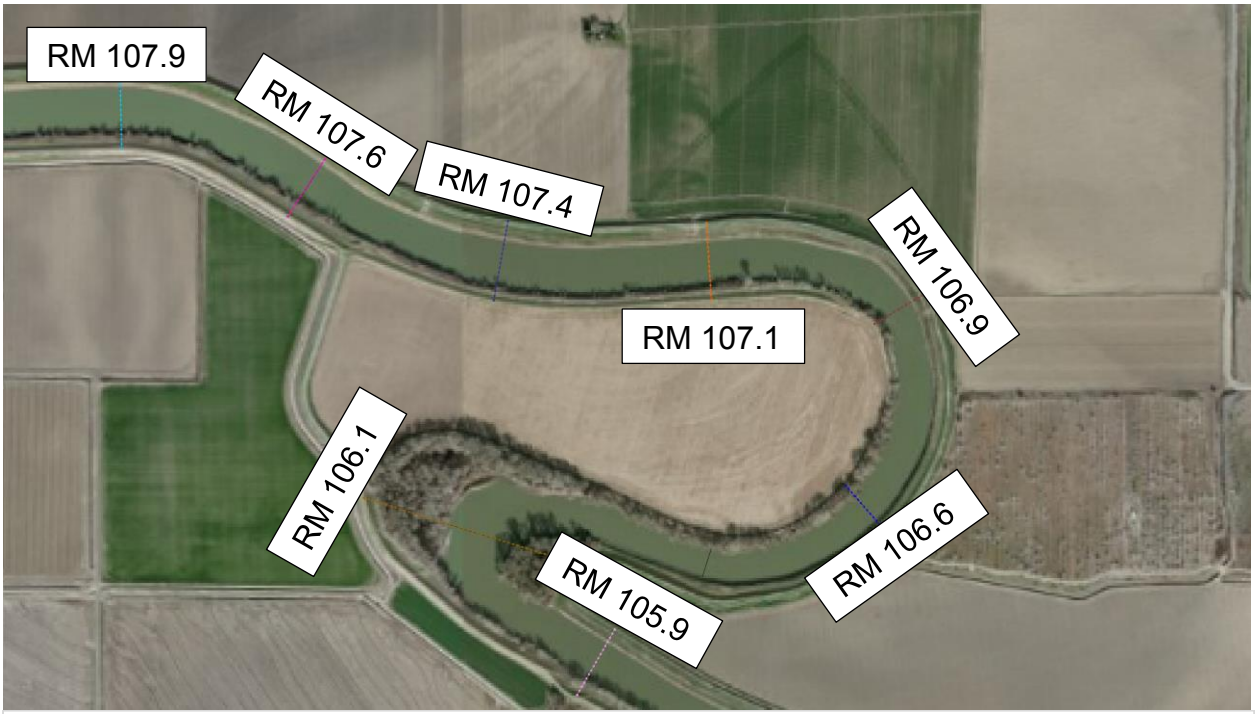


Figure 12: Peak shear stress during the 1997 event (Q=31,000 cfs) under proposed conditions (top) and existing conditions (bottom).



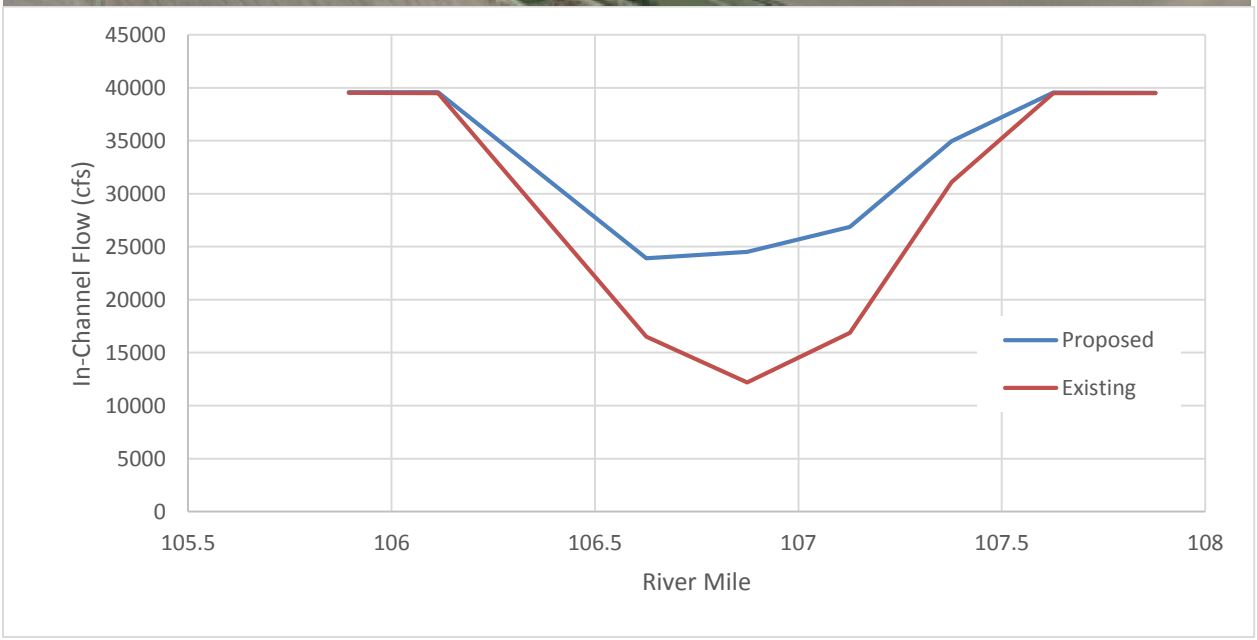


Figure 13: In-channel flow through the project site computed in ADH model for discharge of 39,500 cfs (100-year discharge for reach computed by USACE HEC-RAS Model)

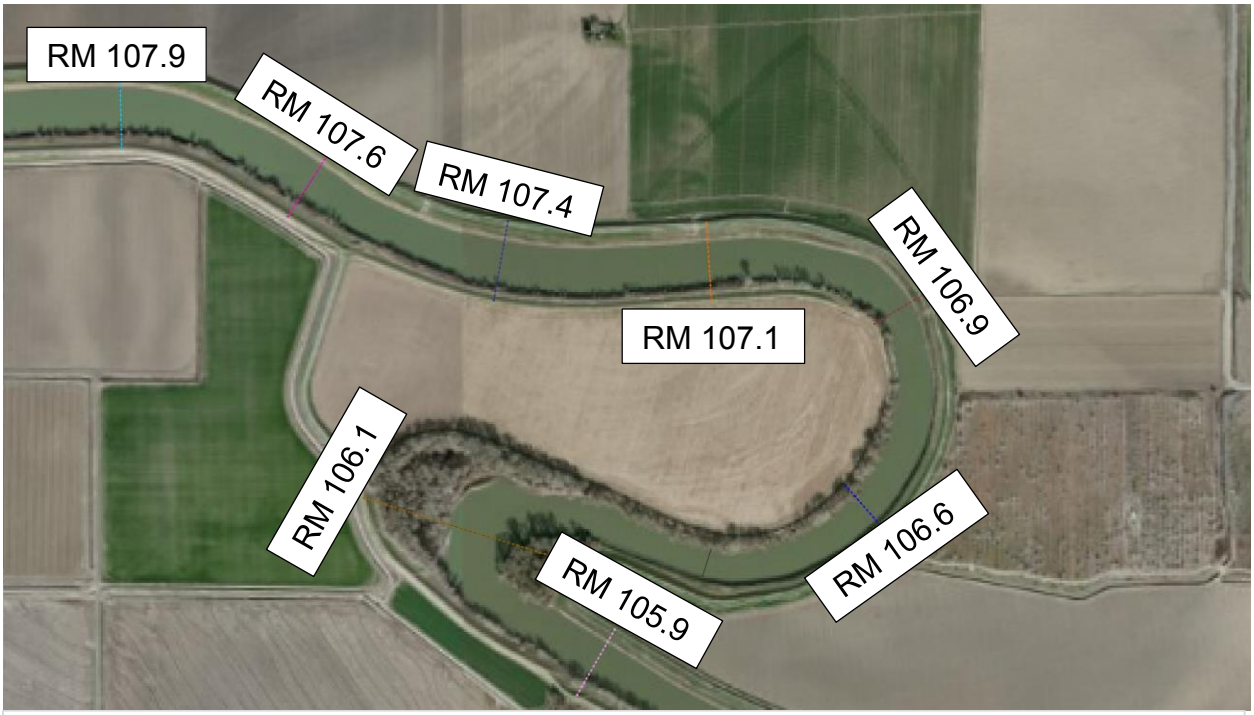


Figure 14: In-channel flow through the project site computed in ADH model for discharge of 42,500 cfs (200-year discharge for reach computed by USACE HEC-RAS Model)

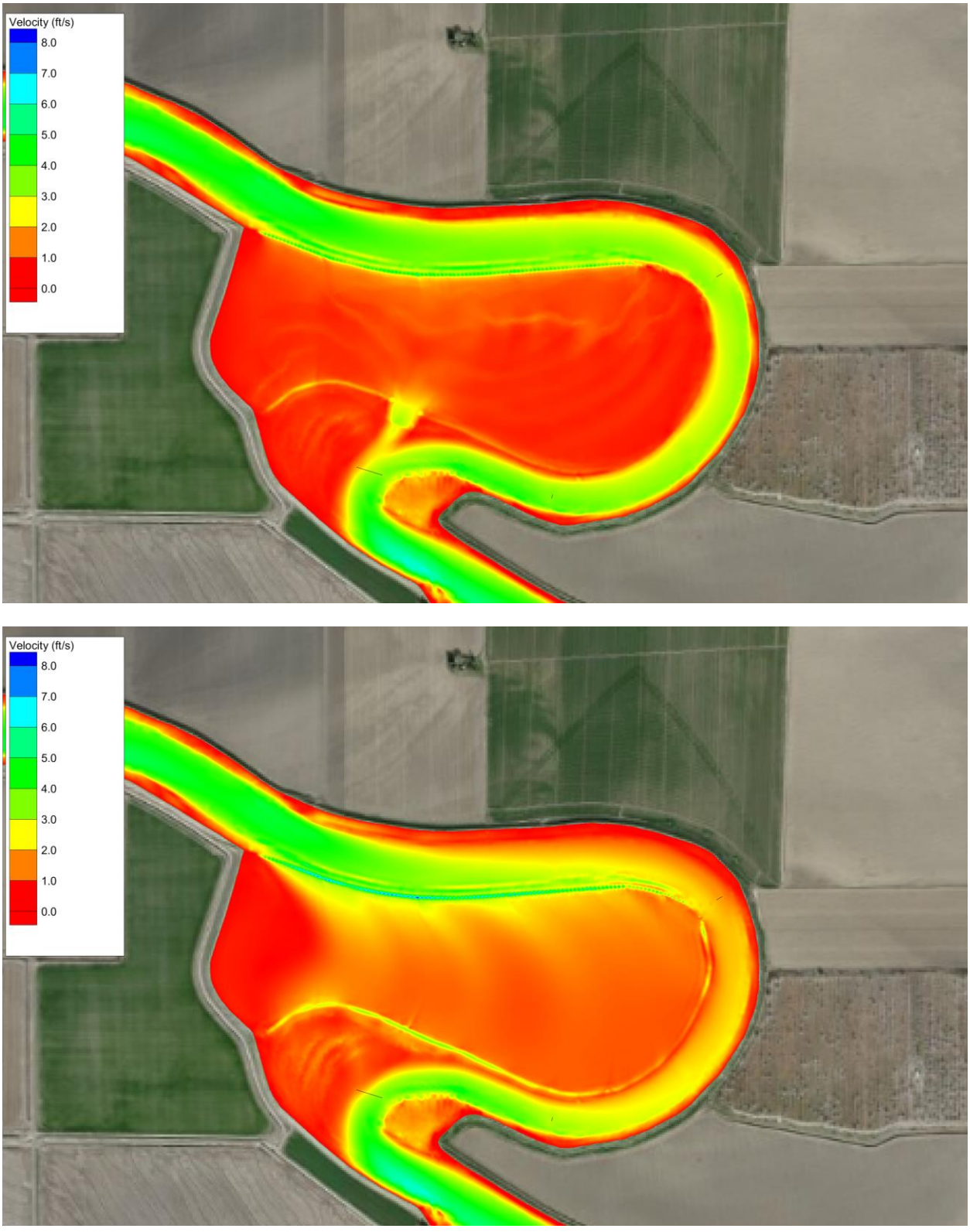


Figure 15: Peak velocity contours computed in ADH model for discharge of 39,500 cfs (100-year discharge for reach computed by USACE HEC-RAS Model) for proposed conditions (top) and existing conditions (bottom)

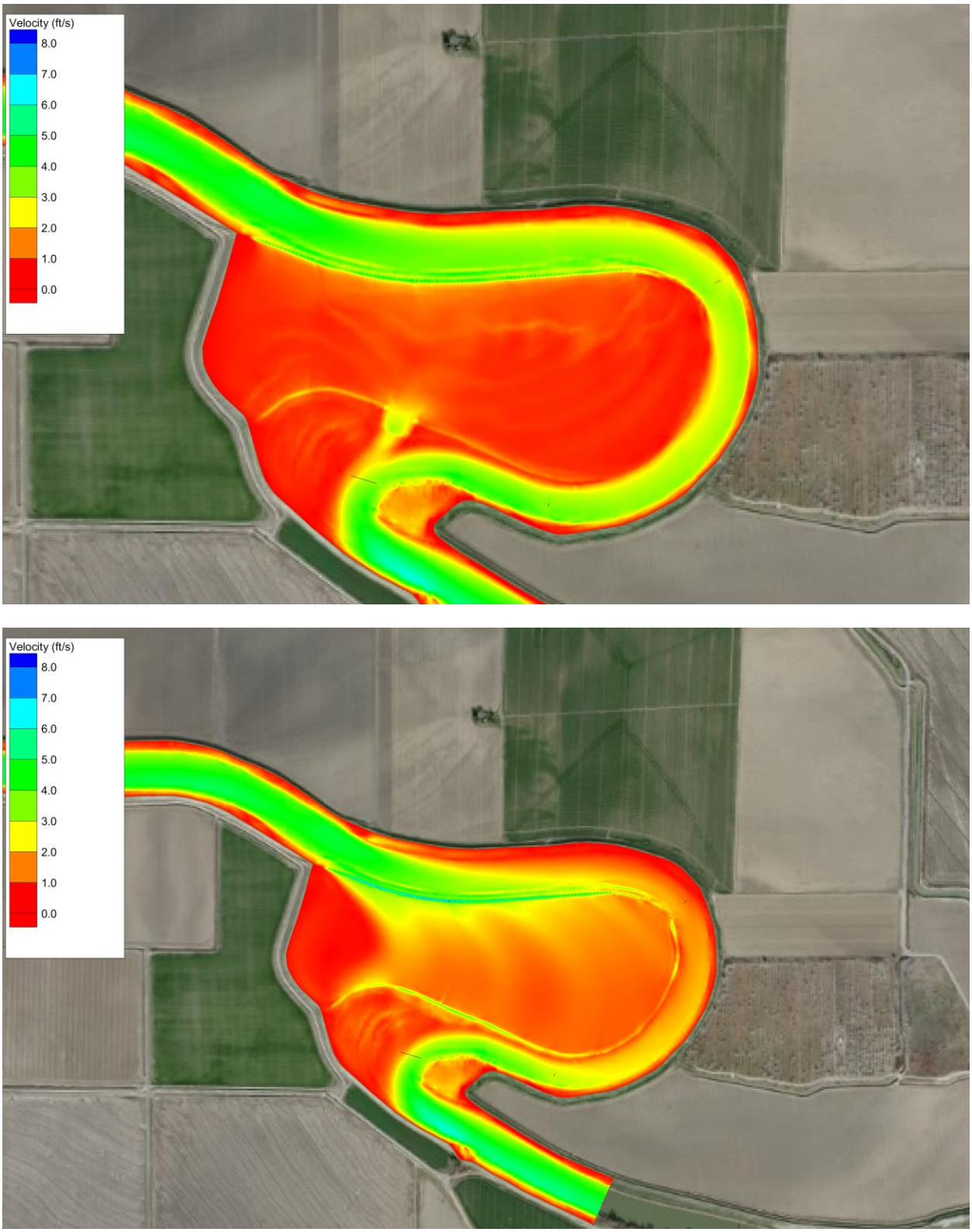


Figure 16: Peak velocity contours computed in ADH model for discharge of 42,500 cfs (200-year discharge for reach computed by USACE HEC-RAS Model) for proposed conditions (top) and existing conditions (bottom).

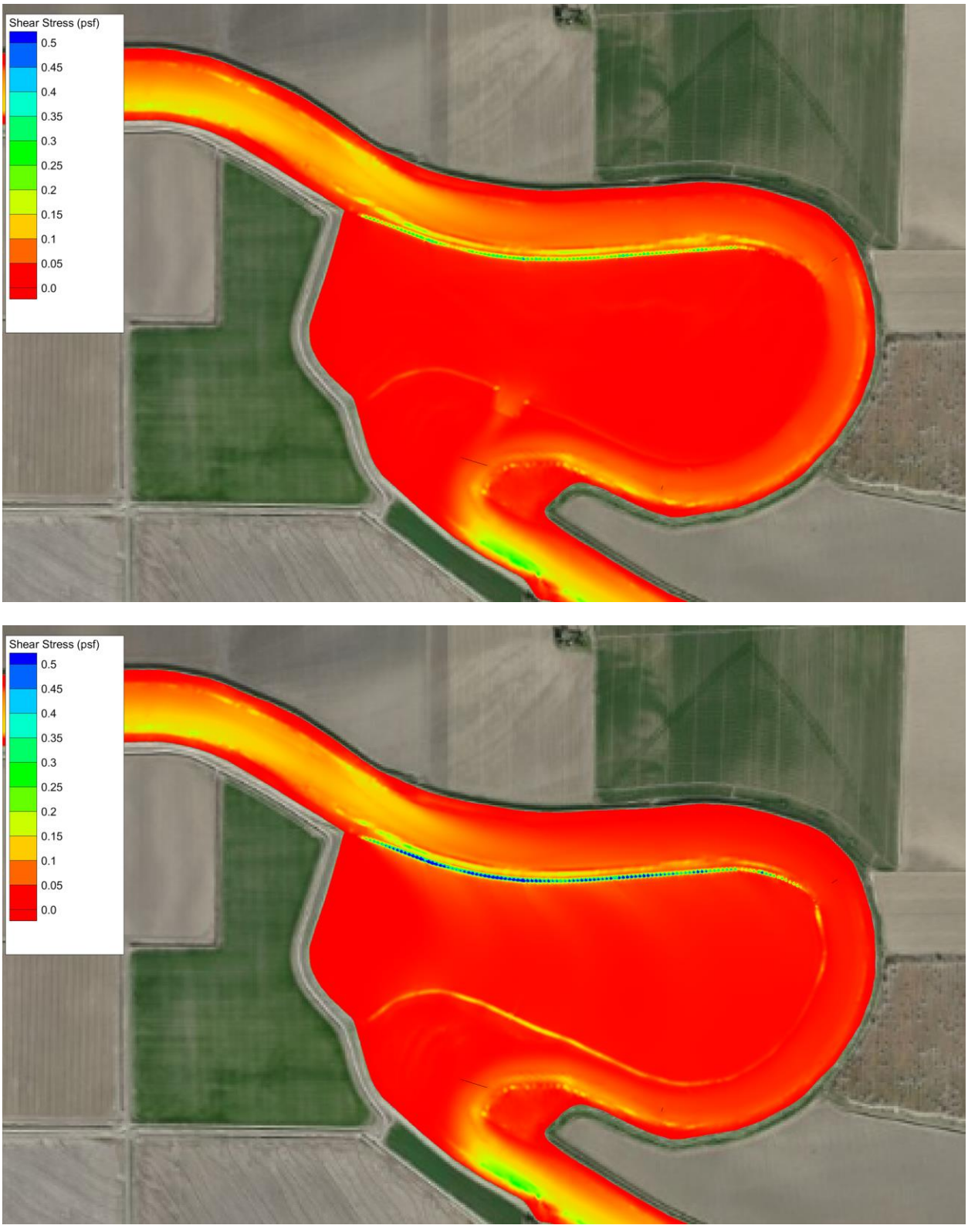


Figure 17: Peak hydraulic bed shear contours computed in ADH model for discharge of 39,500 cfs (100-year discharge for reach computed by USACE HEC-RAS Model) for proposed conditions (top) and existing conditions (bottom).

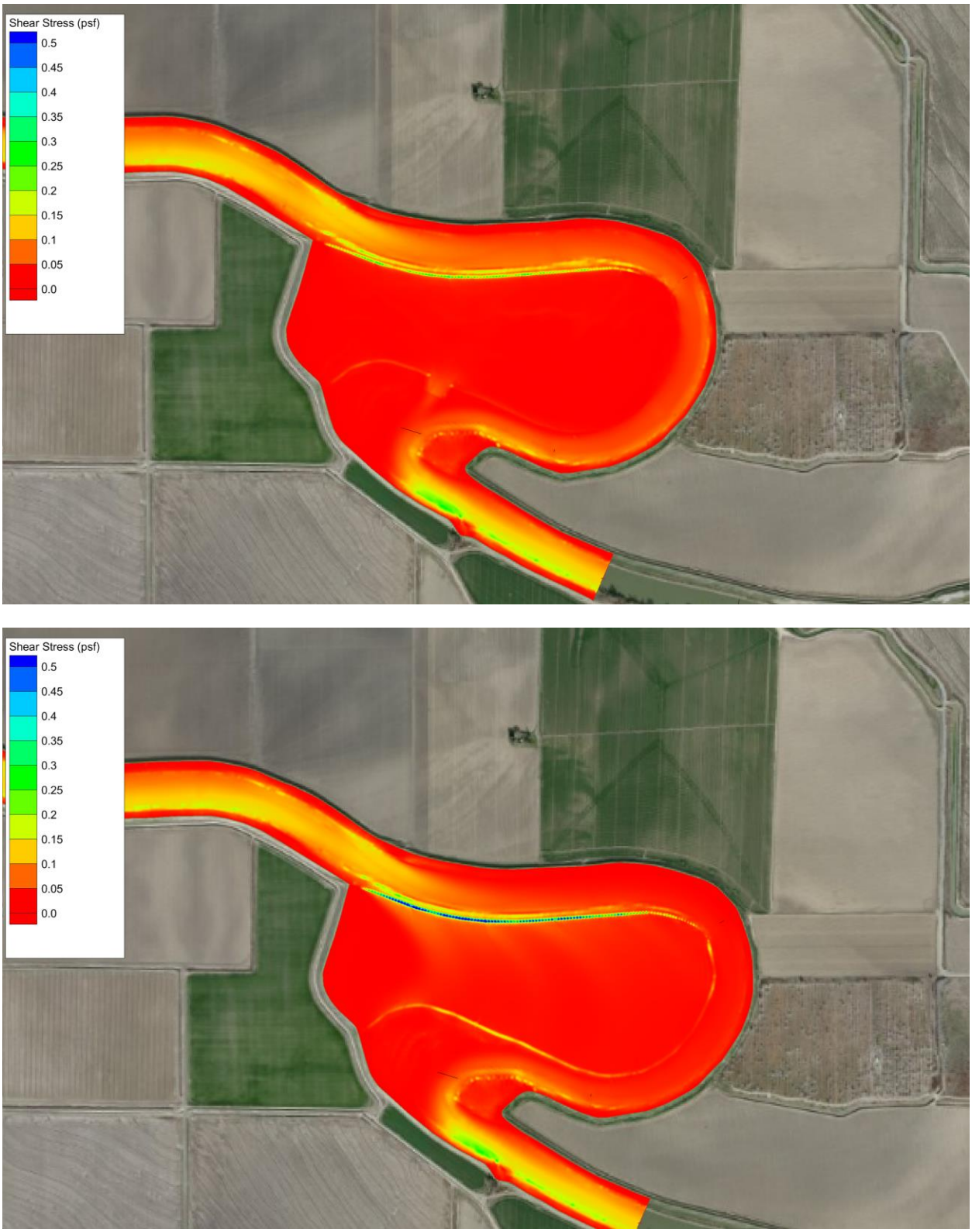
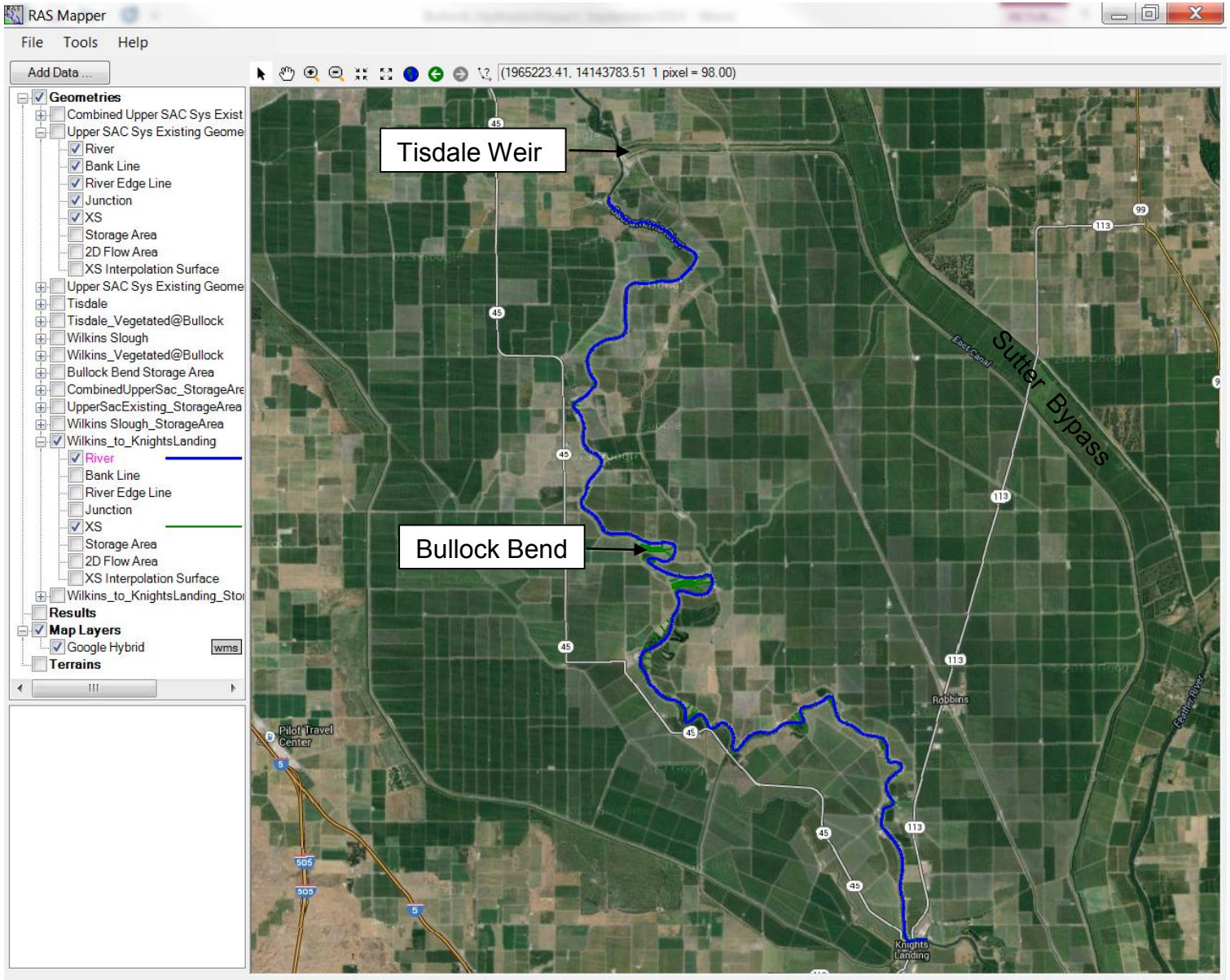
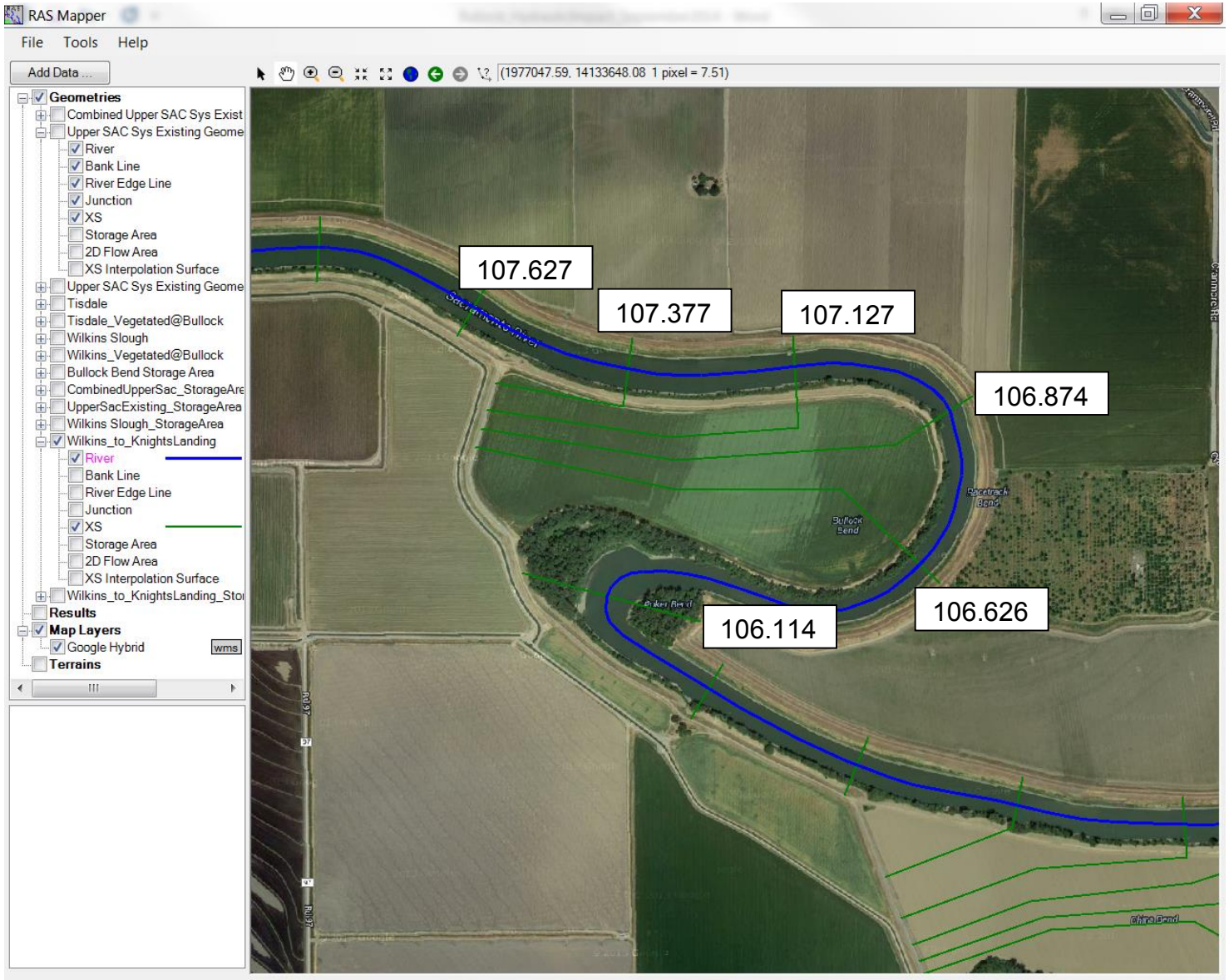


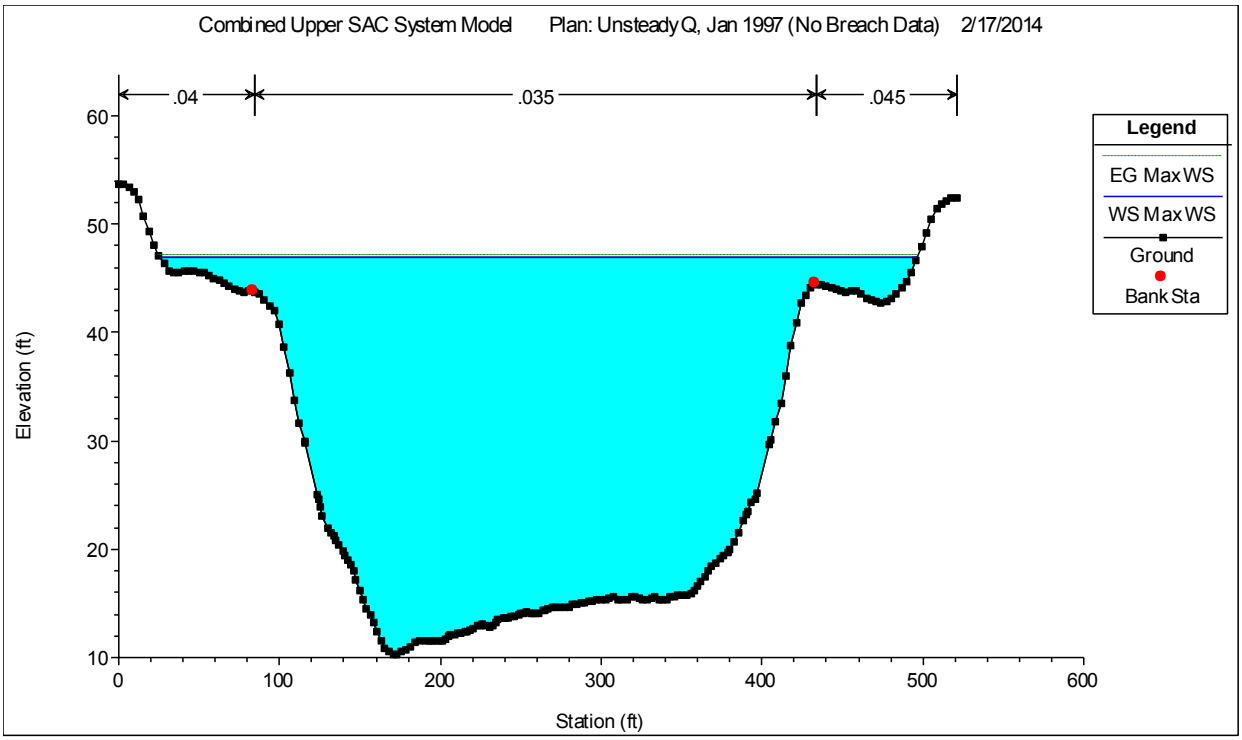
Figure 18: Peak hydraulic bed shear contours computed in ADH model for discharge of 42,500 cfs (200-year discharge for reach computed by USACE HEC-RAS Model) for proposed conditions (top) and existing conditions (bottom).



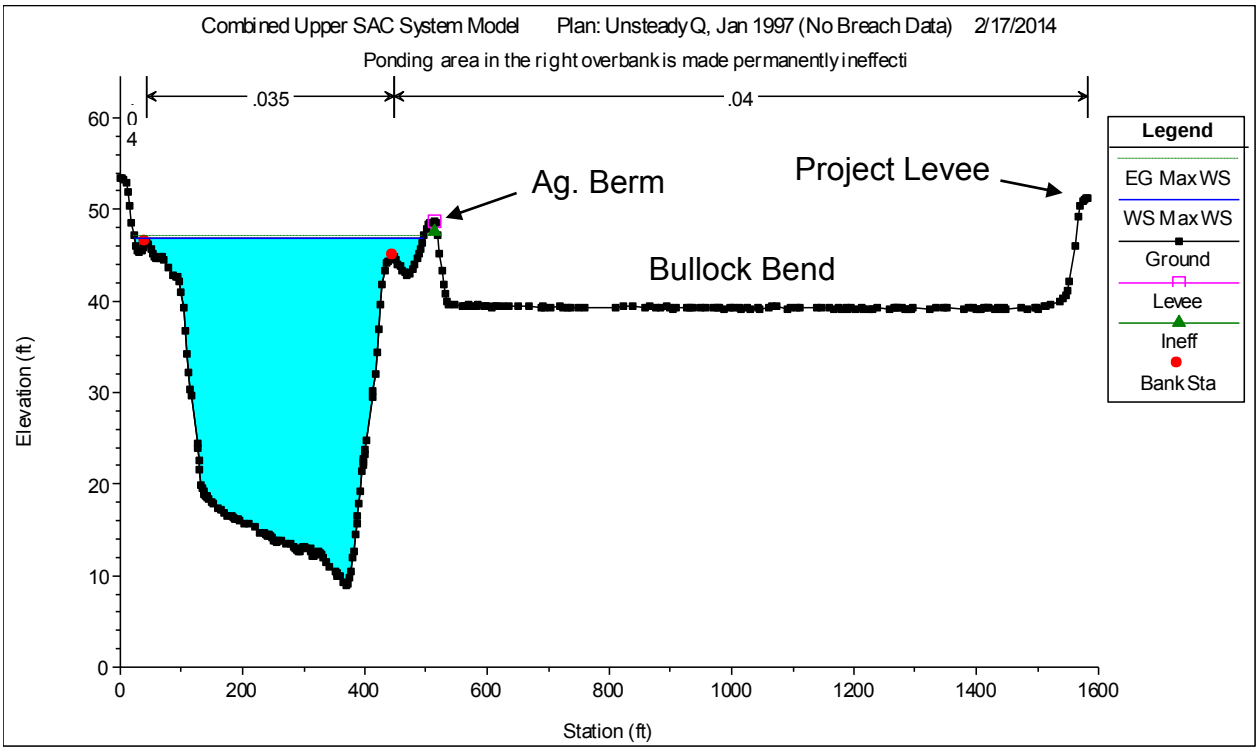
Project Reach parsed from DWR CVFED HEC-RAS model for evaluating project impacts discussed in Section 5.



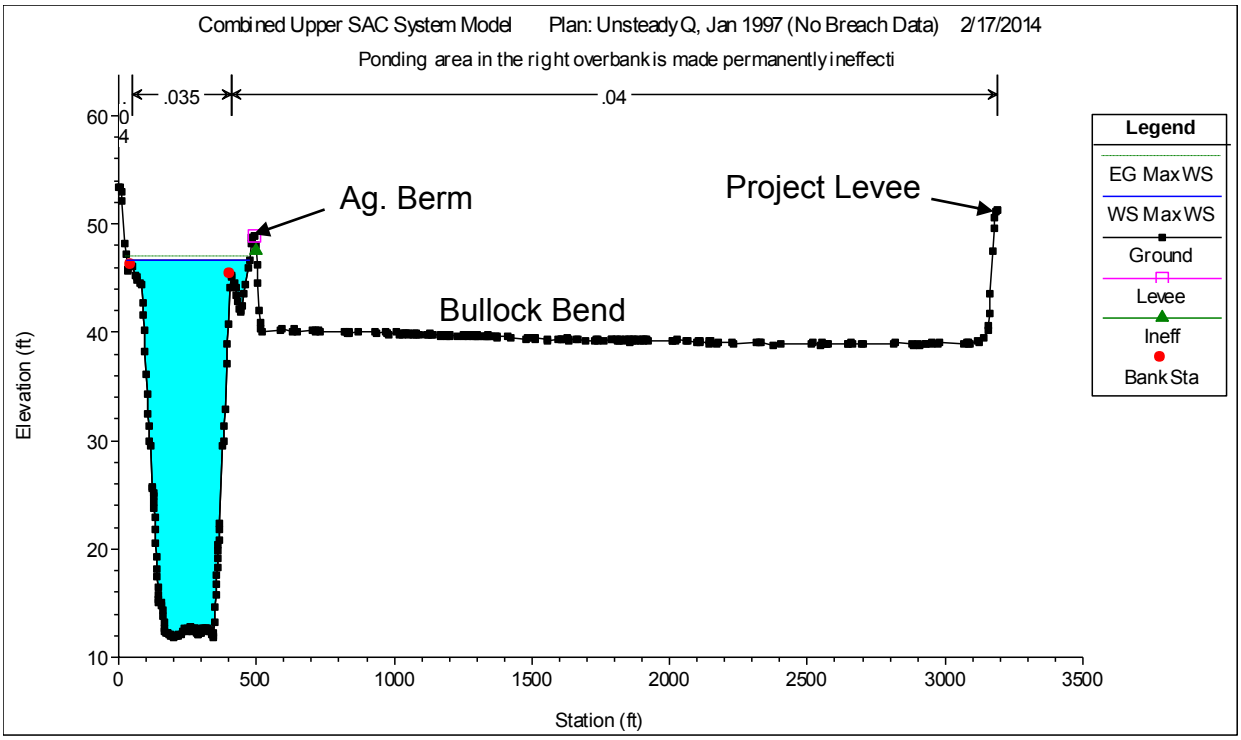
Cross-section locations in DWR CVFED HEC-RAS model at Bullock Bend



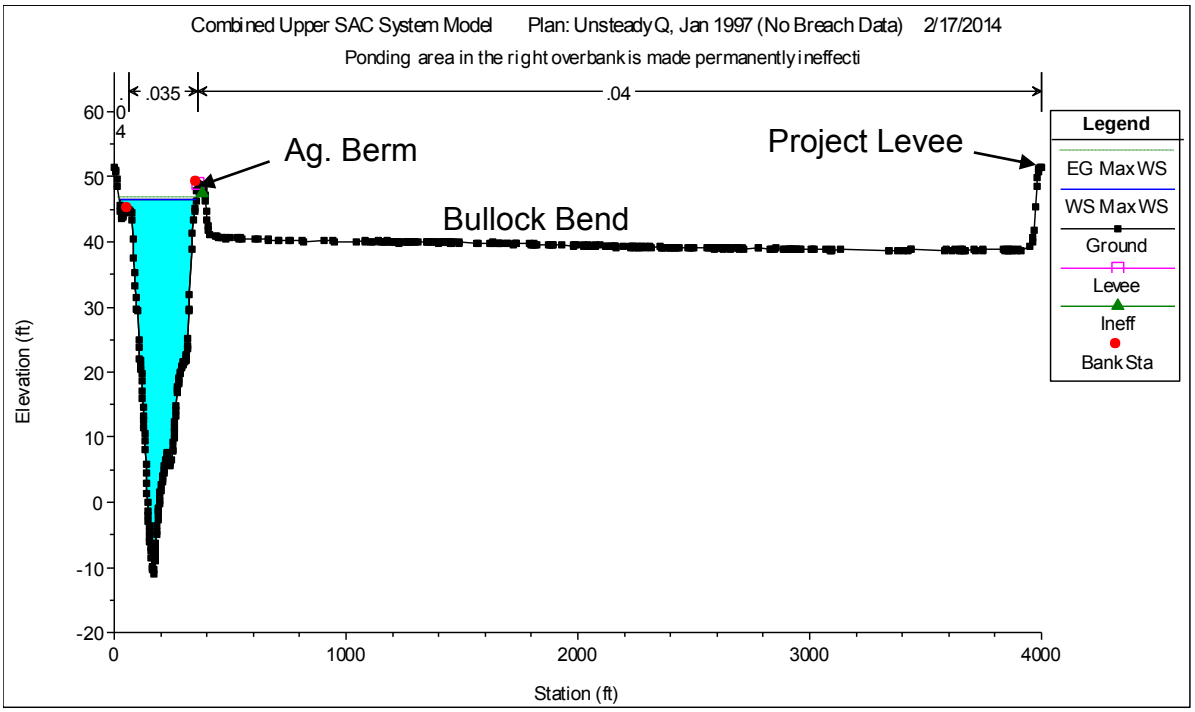
Cross-section 107.627 from DWR CVFED HEC-RAS model with peak WSEL from 1997 event.



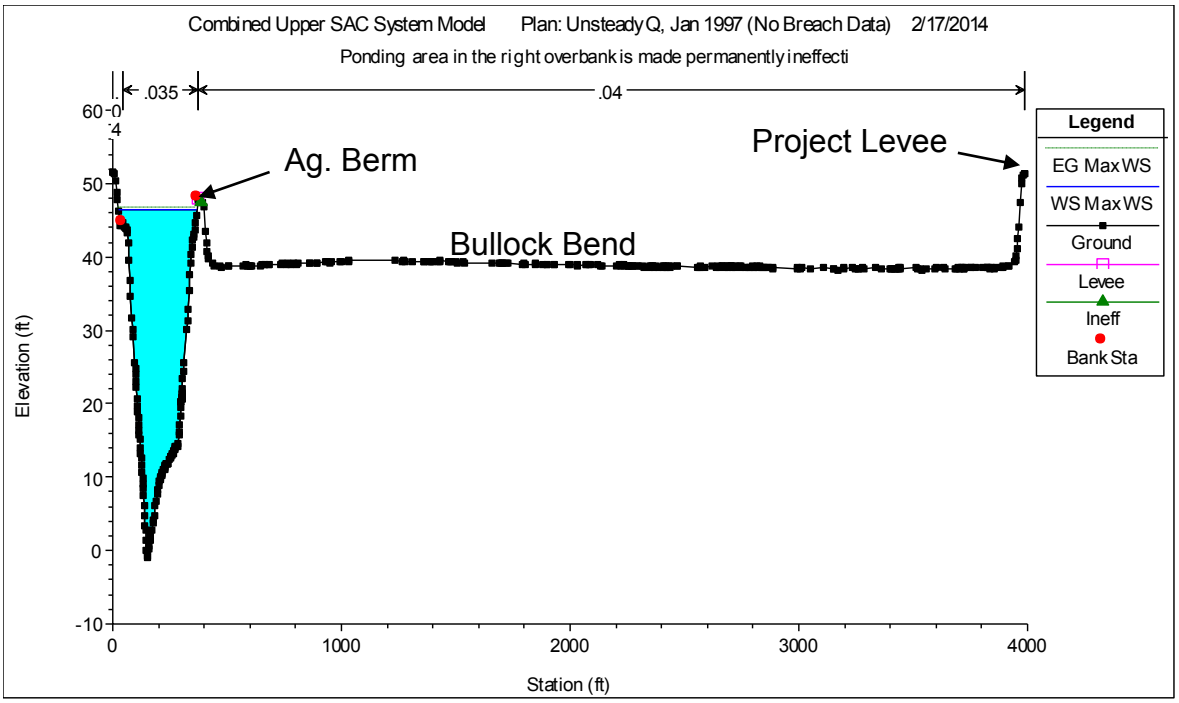
Cross-section 107.337 from DWR CVFED HEC-RAS model with peak WSEL from 1997 event.



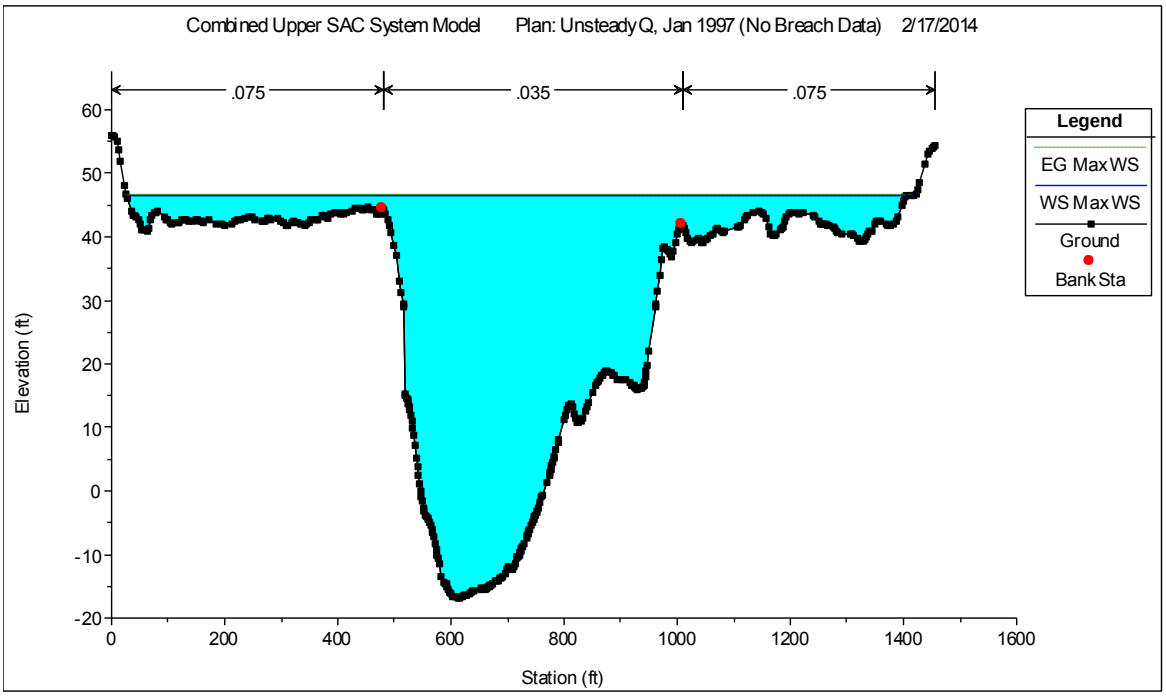
Cross-section 107.127 from DWR CVFED HEC-RAS model with peak WSEL from 1997 event.



Cross-section 106.874 from DWR CVFED HEC-RAS model with peak WSEL from 1997 event.



Cross-section 106.626 from DWR CVFED HEC-RAS model with peak WSEL from 1997 event.



Cross-section 106.114 from DWR CVFED HEC-RAS model with peak WSEL from 1997 event.