
DRAFT ENVIRONMENTAL IMPACT REPORT

LOOKOUT SLOUGH TIDAL HABITAT RESTORATION AND FLOOD IMPROVEMENT PROJECT

State Clearinghouse No. 2019039136

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Date: December 2019



Lookout Slough Tidal Habitat Restoration and
Flood Improvement Project
Draft Environmental Impact Report

State Clearinghouse No. 2019039136

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December 2019

Draft Environmental Impact Report for the Lookout Slough Tidal Habitat Restoration and Flood Improvement Project

Pursuant to:

California Environmental Quality Act, Public Resources Code § 21000 et seq.;
State CEQA Guidelines, Title 14 California Code of Regulations § 15000 et seq.

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We hereby approve the release of this draft for public review and comment,



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I. INTRODUCTION

1. INTRODUCTION

The subject of this Draft Environmental Impact Report (EIR) is the proposed Lookout Slough Tidal Habitat Restoration and Flood Improvement Project (State Clearinghouse No. 2019039136, Proposed Project). The California Department of Water Resources (DWR) is the lead agency under the California Environmental Quality Act (CEQA) (California Public Resources Code, Section 21000 et seq.) This Draft EIR discloses environmental information concerning the Proposed Project and invites interested parties to comment on that information and the Proposed Project. This Draft EIR also provides state, regional, and local decision-makers with detailed information concerning potential environmental impacts associated with the Proposed Project.

2. PURPOSE OF THE EIR

This Draft EIR has been prepared pursuant to CEQA and the CEQA Guidelines (Title 14 California Code of Regulations Chapter 3, Section 15000 et seq.). CEQA requires that all state and local government agencies consider the environmental consequences of projects over which they have discretionary authority before taking action on them. The purpose of an EIR is to provide decision makers, public agencies, and the general public with an objective and informational document that discusses the potential significant environmental effects associated with the project, describes and evaluates reasonable alternatives to the project, and proposes feasible mitigation measures that would avoid or reduce the project's significant environmental effects. An EIR is intended to serve alongside other information before discretionary bodies to aid in informed decision-making and to provide a venue for public disclosure of a project's potential environmental effects.

This Draft EIR is a project EIR (CEQA Guidelines, Section 15161) that includes enough specificity for a site-specific, project-level environmental review under CEQA and will allow the consideration of discretionary approvals for this project. This Draft EIR has been prepared to evaluate the significant or potentially significant environmental impacts associated with implementation of the Proposed Project and to address appropriate and feasible mitigation measures and alternatives to the Proposed Project that would reduce or eliminate those impacts.

3. PROPOSED PROJECT

As described in more detail in Section III (Project Description), the Proposed Project is a multi-benefit project intended to enhance habitat for fish and wildlife while improving flood control infrastructure. The Proposed Project involves the habitat restoration and flood control enhancement of an approximate 3,400-acre area in eastern Solano County, CA (Proposed Project Site) into self-sustaining tidal marsh and floodplain.

The Proposed Project Site is located within the historic footprint of the Sacramento-San Joaquin Delta's (Delta) estuary. The Delta's once sprawling network of tidal marsh and wetlands has undergone conversion from its natural state since the mid-1800s. Among other factors, habitat loss has contributed to the decline of several special-status species, including, Delta Smelt (*Hypomesus transpacificus*), Longfin Smelt (*Spirinchus thaleichthys*), Chinook Salmon - Central Valley spring-run evolutionarily significant unit (ESU) (*Oncorhynchus tshawytscha*), Chinook Salmon - Sacramento River winter-run ESU (*Oncorhynchus tshawytscha*), and Steelhead - Central Valley Distinct Population Segment (DPS) (*Oncorhynchus mykiss*).

The United States Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) issued biological opinions (BiOps) in 2008 and 2009, respectively with regard to Delta Smelt and salmonids. Under Reasonable and Prudent Alternative (RPA) 4 of the 2008 USFWS Delta Smelt BiOp, DWR must restore 8,000 acres of tidal marsh complex in the Delta to provide habitat for the species.

The Proposed Project is intended to restore approximately 3,164 acres of tidal marsh that would create habitat beneficial to Delta Smelt and other fish and wildlife species. Levee modifications, grading, placement of fill material, and revegetation would be used to restore and enhance upland, tidal, subtidal, and floodplain habitat designed to perform a range of habitat functions for the target species listed above, as well as other special-status species such as giant garter snake (*Thamnophis gigas*). In addition to helping to satisfy DWR's obligations under RPA 4, the Proposed Project is designed to be consistent with RPA I.6.1 (Restoration of Floodplain Rearing Habitat) of the 2009 NMFS Salmonid BiOp. Habitat improvements are described in further detail and depicted graphically in Ch. III, Project Description.

The Proposed Project is designed to provide multiple benefits, including improved flood conveyance. It would widen a portion of the Yolo Bypass to increase flood storage and conveyance, increase the resilience of levees, and reduce flood risk. The Proposed Project involves constructing a new setback levee along Duck Slough and Liberty Island Road (Duck Slough Setback Levee) to replace flood protection currently offered by the existing Shag Slough Levee, which would be breached at nine locations and degraded along two segments. These modifications to the Shag Slough Levee, which is part of the Yolo Bypass West Levee System, are intended to connect the Proposed Project Site to the tidal waters of Shag Slough as well as to create additional flood conveyance during bypass flooding events. The existing Cache/Hass Slough levee would be improved to reduce subsidence and prevent erosion and would function as a training levee to prevent increased water surface elevations in Cache and Hass Sloughs. Proposed levee modifications would help meet regional flood protection objectives in a manner consistent with DWR's 2017 Sacramento Basin-wide Feasibility Study (Feasibility Study). Flood improvements are described in further detail and depicted graphically in Ch. III, Project Description.

4. LEAD AGENCY DETERMINATION

As the state agency carrying out the Proposed Project, DWR is designated as the lead agency under CEQA. Other agencies with discretionary authority over the Proposed Project (Responsible Agencies) are listed in Chapter III, Project Description. DWR, Responsible Agencies, and trustee

agencies under CEQA will use this Draft EIR as part of their decision-making record, and to certify that they have met CEQA requirements before deciding whether to approve or permit project components over which they have jurisdiction.

This Draft EIR was prepared by WRA, Inc. (WRA), an environmental consultant (CEQA Guidelines, Section 15084(d)(2)). DWR has the principal responsibility for approving and implementing the project and for certifying that CEQA requirements have been met, including exercising independent judgement and analysis. Lists of personnel who assisted in preparing the EIR as well as organizations and persons consulted on the EIR are provided in Section VIII (Preparers of the EIR and Persons Contacted).

5. EIR REVIEW PROCESS

a. Overview

CEQA requires preparation of an EIR when the lead agency makes a determination that there is substantial evidence that the Proposed Project may have impacts on the environment. Based on the CEQA Initial Study prepared for the Proposed Project, DWR determined that an EIR would be prepared to analyze potential environmental impacts.

b. Notice of Preparation

In accordance with Section 15082 of the CEQA Guidelines, DWR prepared a Notice of Preparation (NOP) for this Draft EIR (available at <https://ceqanet.opr.ca.gov/2019039136/2>). The NOP was circulated from March 21, 2019 to April 22, 2019, to local, state, and federal agencies, and to nearby property owners for a 30-day public review period. The NOP provided a general description of the Proposed Project, a summary of the main regulations and permit conditions applicable to the development and operation of the Proposed Project, and a summary of potential environmental effects of the Proposed Project in the form of an Initial Study (IS). Additionally, a public EIR scoping meeting was held on April 10, 2019 at the Olde Vets Hall (231 N. First Street) in Dixon, CA from 6:00 to 8:00pm. The scope of this Draft EIR includes the potential environmental impacts identified in the NOP and issues raised by agencies and the public in response to the NOP and Scoping Meeting. Commenters on the NOP are listed in Table I-1. There was only one oral comment provided from the public at the Scoping Meeting, which came from Jacob Katz, California Trout. Mr. Katz expressed satisfaction that restoration is being built at landscape scale. He also asserted that project is unique in its benefits to Delta Smelt and that that project important to water security in Solano County and state-wide. Written comments on the NOP are provided in Appendix V – NOP Comment Letters.

c. Environmental Issues to Be Analyzed in the Draft EIR

Based on the conclusions of the IS, the following environmental impact topics are analyzed in detail in the Draft EIR:

- | | |
|---------------------------------------|--------------------------------|
| A. Air Quality | F. Hydrology and Water Quality |
| B. Agriculture & Forestry | G. Mineral Resources |
| C. Biological Resources | H. Public Services |
| D. Cultural Resources | I. Recreation |
| E. Hazards and Hazardous
Materials | J. Tribal Cultural Resources |

Please refer to Section IV.A (Impacts Found to be Less Than Significant) for brief discussions on why other impact topics regarding environmental impacts are not analyzed in detail in the Draft EIR.

d. Public Review Process

The Draft EIR will be circulated for review by the public and interested parties, agencies, and organizations for 60 days, beginning December 16, 2019 and ending February 14, 2020. Written comments on the Draft EIR will be accepted through mail and e-mail during this 60-day period. Oral comments on the Draft EIR will be accepted at a public meeting on the evening of January 22, 2020 at the Olde Vets Hall (231 N. First Street) in Dixon, CA. For information on how to access the Draft EIR during the 60-day period and how to submit a comment on the Draft EIR, please see Section 9 below.

e. Final EIR

Following the close of the 60-day public and agency comment period, responses to comments on the Draft EIR will be prepared for publication in the Final EIR.

DWR will provide a 10-day review period for public agencies commenting on the Draft EIR before DWR certifies the Final EIR. If it certifies the Final EIR, DWR may decide to adopt Findings of Fact including a Statement of Overriding Considerations; adopt a Mitigation Monitoring and Reporting Program (MMRP); approve DWR's Preferred Alternative or another alternative, including the No Project Alternative; and file a Notice of Determination (NOD). Once the NOD is filed, a CEQA statute of limitations period will run for 30 days.

Table I-1. NOP Comments Received

Affiliation	Signatory	Date
Public Agencies		
Delta Stewardship Council	Jeff Henderson	4/22/19
Delta Protection Commission	Erik Vink	4/17/19
California Department of Conservation: Division of Oil, Gas, & Geothermal Resources	Charlene L. Wardlow	4/22/19
Native American Heritage Commission	Steven Quinn	4/2/19
California State Lands Commission	Jennifer Lucchesi	4/22/19
Central Delta Water Agency	Dante J. Nomellini, Jr.	4/22/19
North Delta Water Agency	Melinda Terry	4/15/19
Central Valley Regional Water Quality Control Board	Jordan Hensley	4/19/19
Solano County Mosquito Abatement District	Bret Barner	4/19/19
Downey Brand on Behalf of Reclamation District 2060	Scott Shapiro	4/19/19
Reclamation District 2068	Bryan Busch	4/19/19
Solano County & Solano County Airport Land Use Commission	Jim Leland	4/11/19
Solano County Department of Resource Management	Bill Emlen	4/22/19
City of Vallejo Water Department	Beth Schoenberger	4/22/19
Private Individuals and Organizations		
Cal Trout	Jacob Katz	4/10/19
California Waterfowl	Jeffrey Volberg	4/22/19
D&R Livestock	Martin Ronayne & Cliff DeTar	4/22/19
Hasting Island Land Company	Henry N. Kuechler	4/18/19
John Cronin	John Cronin	4/19/19
Petersen Estate	Lisa Ivancich	4/22/19
Willow Ranch Properties	Warren Gomes, Jr.	4/19/19

6. LEVELS OF SIGNIFICANCE

This EIR uses a variety of terms to describe the significance of the Proposed Project's potential environmental impacts. The following terms are categorical descriptors of the significance of environmental effects relative to specified thresholds of significance. Thresholds of significance are determined for each environmental resource type based on regulatory guidance, scientific information, expert opinion, and best professional judgement of the authors of this EIR. Terms that may be used to characterize environmental impacts in this Draft EIR include:

- **Less-than-significant impact:** Impacts that are adverse, but that do not exceed the specified thresholds of significance (CEQA Guidelines Section 15128).
- **Less-than-significant impact with mitigation:** Impacts that may exceed the defined thresholds of significance and that can be eliminated or reduced to a less-than-significant level through the implementation of feasible mitigation measures (CEQA Guidelines Section 15126.4).
- **Significant and unavoidable impact:** Impacts that exceed the defined thresholds of significance and cannot be eliminated or reduced to a less-than-significant level through the implementation of feasible mitigation measures (CEQA Guidelines Section 15126.2).

7. INFORMATION SOURCES

To assess the significance of the Proposed Project's potential environmental impacts, this Draft EIR has referenced multiple technical studies, analyses, plans, and previously certified environmental documents, all of which are outlined in Section IX (references).

Technical studies and analyses prepared for the Proposed Project include, but are not limited to the following, which are included in the Appendix of the DEIR and available upon request from FRPA@water.ca.gov (please include a subject line of "Lookout Slough Information Request"). Information from the documents and their relationship to the Draft EIR are briefly summarized in the appropriate section(s):

- Appendix A – Notice of Preparation (NOP) and Initial Study.
- Appendix B – Air Quality and Greenhouse Gas Emissions Calculations and Summary, Baseline Environmental Consultants 2019.
- Appendix C – Lookout Slough Tidal Habitat Restoration and Flood Improvement Project: 65% Geotechnical Basis of Design Report, Blackburn Consulting 2019.
- Appendix D – Lookout Slough Tidal Habitat Restoration and Flood Improvement Project: 65% Basis of Design Report, Wood Rodgers 2019.
- Appendix E – Good Neighbor Checklist.
- Appendix F – Biological Resources Assessment (BRA): Lookout Slough Tidal Habitat Restoration and Flood Improvement Project, Revised December 2019.
- Appendix G – Aquatic Resources Delineation Report: Lookout Slough Restoration Project, Updated October 2019.
- Appendix H – Fish Study Restoration Basis of Design: Lookout Slough Restoration Project, WRA Inc., January 2019.
- Appendix I – Lookout Slough Tidal Habitat Restoration and Flood Improvement Project – Cultural Resources Inventory and Evaluation Report, ESA 2019.

- Appendix J – Phase I Environmental Site Assessment (Phase I ESA): Lookout Slough Restoration Project [Bowlsbey and Vogel Properties], WRA, February 2017.
- Appendix K – Phase II Environmental Site Assessment (Phase II ESA): Cache Slough Project Property [Bowlsbey and Vogel Properties], ENGEO, February 2017.
- Appendix L – Phase I ESA: Liberty Island Ranch [Liberty Farms Property], WRA, June 2017.
- Appendix M – Phase II ESA: Liberty Island Ranch [Liberty Farms Property], Blackburn Consulting, September 2017.
- Appendix N – Hazardous Materials Survey Report (ACM/Lead), Liberty Island Ranch (Liberty Farms Property), Blackburn Consulting, November 2-17.
- Appendix O – Baseline Study Deliverable for Flood Conveyance Optimization, Environmental Science Associates, June 2019.
- Appendix P – Basis of Design Report – Tidal Hydrology and Hydraulic Analysis: Lookout Slough Restoration Project, Environmental Science Associates, January 2019.
- Appendix Q – Draft Hydrologic and Hydraulic System Analysis – Lookout Slough Tidal Habitat Restoration and Flood Improvement Project, Environmental Science Associates, September 2019.
- Appendix R – Hydrologic and Hydraulic Risk and Uncertainty Analysis: Lookout Slough Tidal Habitat Restoration and Flood Improvement Project, Environmental Science Associates, August 2019.
- Appendix S – Lookout Slough Tidal Habitat Restoration and Flood Improvement Project – Potential Salinity Impacts Assessment, Environmental Science Associates, April 2019.
- Appendix T – Lookout Slough Tidal Habitat Restoration and Flood Improvement Project – Potential Tidal Water Levels and Tidal Prism Impacts Assessment, Environmental Science Associates, June 2019.
- Appendix U – Mineral Report and Remoteness Opinions: Bowlesby and Vogel Properties, Cantrell & Associates, Inc. and GeoResource Management, Inc., February 2017.
- Appendix V – Mineral Report and Remoteness Opinion: Liberty Farms Property, Cantrell & Associates, Inc., August 2017.
- Appendix W – NOP Comment Letters.

a. Documents Incorporated by Reference

Other documents that have been used in the preparation of this Draft EIR and are incorporated by reference include, but are not limited to:

- Delta Plan, Delta Stewardship Council, Amended 2018
- Delta Land Use and Resource Management Plan, Delta Protection Commission
- Design Guidance for Levee Under-Seepage, Engineering Technical Letter 1110-2-569, 2005, U.S. Army Corps of Engineers (Corps)
- Engineering Manual No. 1110-2-1913 – Engineering and Design – Design and Construction of Levees, U.S. Army Corps of Engineers (Corps)
- General Plan, Solano County 2008
- Solano County Code, Solano County, Amended 2019
- CEQA Air Quality Handbook, Yolo-Solano Air Quality Management District (YSAQMD) 2007
- Climate Action Plan Phase 1: Greenhouse Gas Emissions Reduction Plan, DWR 2012
- Climate Action Plan Initial Study, DWR 2012

- Central Valley Flood Protection Plan, DWR, Updated 2017

8. ORGANIZATION OF THE DRAFT EIR

This Draft EIR is organized into the following main sections:

- Section I – Introduction: This section provides an introduction and overview describing the purpose of the EIR, its scope and contents, and its review and certification process.
- Section II – Executive Summary: This section includes a summary of the Proposed Project and alternatives to be addressed in the Draft EIR, a brief description of the areas of controversy and issues to be resolved, and overview of the Mitigation Monitoring Reporting Program (MMRP). A table that summarizes the impacts, mitigation measures, and level of significance after mitigation is also included in this section.
- Section III – Project Description: This section includes a detailed description of the Proposed Project, including its general location, site, and project characteristics. A discussion of the Proposed Project objectives, responsible agencies, and approvals that are needed for the Proposed Project are also provided.
- Section IV – Environmental Impact Analysis: This section analyzes the environmental impacts of the Proposed Project. Impacts are organized into major topic areas. Each topic area includes a description of the regulatory and environmental setting, methodology, significance criteria, impacts, including mitigation measures and significance after mitigation. The specific environmental topics that are addressed within Section IV are as follows:
 - Section IV.A – Impacts Found to be Less than Significant: Analyzes the topical sections not addressed further in Section IV.
 - Section IV.B – Agriculture and Forestry Resources: Addresses the potential impacts of project implementation on the availability and productivity of agriculture and forestry resources.
 - Section IV.C – Air Quality: Addresses potential air quality impacts, including consistency with the Yolo-Solano Air Quality Management District (YSAQMD) guidelines and air quality plans.
 - Section IV.D – Biological Resources: Addresses potential impacts on habitat, vegetation, and wildlife; the potential degradation or elimination of important habitat; and impacts on listed, proposed, and candidate threatened and endangered species.
 - Section IV.E– Cultural Resources: Assesses the presence of archaeological or historical resources and the possibility of impacts to their significance.
 - Section IV.F – Hazards and Hazardous Materials: Addresses potential hazards to the public and the environment, including accidental release of hazardous materials, impacts on emergency response, and proximity to hazardous waste sites.
 - Section IV.G– Hydrology and Water Quality: Addresses potential impacts on local hydrological and water quality conditions, including flood elevations, tidal range, groundwater seepage, and concentrations of pollutants of concern.

- Section IV.H – Mineral Resources: Addresses potential impacts on the availability of mineral resources important to the county, region, and state.
- Section IV.I – Public Services: Addresses potential impacts on local and regional public services such as fire and police protection, flood protection, and vector control.
- Section IV.J – Recreation: Addresses potential physical environmental impacts due to loss or displacement of recreational opportunity, and potential loss of regional shoreline fishing opportunities.
- Section IV.K – Tribal Cultural Resources: Addresses potential impacts on Tribal Resources and discusses the tribal consultation process.
- Section V – Cumulative Effects: This section discusses the cumulative impacts associated with the Proposed Project, including the impacts of associated related ecosystem restoration and flood improvement projects in the Delta.
- Section VI – General Impact Categories: This section provides discussion of other CEQA requirements, including significant and unavoidable environmental impacts, potential population growth inducement, and potential significant, irreversible environmental changes.
- Section VII – Alternatives to the Proposed Project: This section compares the impacts of the Proposed Project with three project alternatives: The No Project Alternative, the No Channel Alternative, and the Yolo Bypass Option 3 Alternative. An environmentally superior alternative is identified, and alternatives initially considered but rejected from further consideration are discussed.
- Section VIII – Preparers of the Draft EIR and Persons Consulted: This section contains a list of the authors who assisted in the preparation of the EIR by name and affiliation. This section also contains a list of persons and organizations that were consulted during the preparation of the EIR.
- Section IX – References: This section contains a full list of references that were used in the preparation of this EIR.

9. REVIEW OF THE DRAFT EIR

a. Where to Review the Draft EIR

Upon release of the Draft EIR, DWR filed a Notice of Completion (NOC) with the State Office of Planning and Research to begin the public review period (Public Resources Code Section 21161). Concurrent with the NOC, a Notice of Availability (NOA) of this Draft EIR has been distributed to responsible and trustee agencies, other affected agencies, surrounding cities, and interested parties, as well as all parties requesting a copy of the Draft EIR in accordance with Public Resources Code Section 21092(b)(3).

During the public review period, the Draft EIR is available for review on DWR's website at: <https://water.ca.gov/Programs/Environmental-Services/Restoration-Mitigation-Compliance/Delta-Projects>

Physical copies of the Draft EIR are available during the 60-day public review period at the following locations:

DWR Division of Environmental Services 3500 Industrial Blvd. West Sacramento, CA 95691	Dixon Public Library 230 North First St. Dixon, CA 95620	Rio Vista Library 44 South Second St. Rio Vista, CA 94571	Vacaville Public Library 1 Town Sq., Vacaville, CA 95688	Mary L. Stephens Davis Branch Library 315 E 14 th St. Davis, CA 95616
M-F: 8am-5pm	M-Th: 11am-8pm F, Sa: 11am-6pm	M, W: 10am-6pm Tu, Th: 10am-9pm F, Sa: 10am-5pm	M, W: 10am-6pm Tu, Th: 10am-9pm F, Sa: 10am-5pm Su: 1-5pm	Su, M: 1pm-5pm T, W, Th: 10am-9pm F, S: 10am-5:30pm

b. Commenting on the Draft EIR

Agencies, organizations, and interested parties have the opportunity to comment on the Draft EIR during the 60-day public review period, from December 16, 2019 to February 14, 2020. Public comments received during this time will become part of the public record and be included in the Final EIR for consideration by decision-makers. Submittal of electronic comments in Microsoft Word or Adobe PDF format is encouraged. Comments received and the responses to comments will be included as part of the record for consideration by decision-makers for the Proposed Project.

Written comments on this Draft EIR should be addressed to:

FRPA@water.ca.gov

Subject: Lookout Slough Public Comment

or

California Department of Water Resources
Attn: Heather Green
3500 Industrial Blvd West Sacramento, CA 95691

There will be an opportunity for oral comments on the Draft EIR on the evening of January 22, 2020 at the Olde Vets Hall in Dixon, CA. Further detail can be found on DWR's website at <https://water.ca.gov/Programs/Environmental-Services/Restoration-Mitigation-Compliance/Delta-Projects>

II. EXECUTIVE SUMMARY

1. INTRODUCTION

This executive summary provides a brief description of the Proposed Project, areas of known controversy, and unresolved issues. The executive summary also identifies which environmental impacts associated with the Proposed Project are significant, what specific mitigation measures have been identified to reduce or avoid each significant impact, and the level of significance of the impact after mitigation. This executive summary is intended as an overview and should be used in conjunction with a thorough reading of the Draft EIR. The text of this Draft EIR, including figures, tables, and appendices, serves as the basis for this executive summary.

2. SUMMARY OF PROPOSED PROJECT

a. Project Location

The Proposed Project Site is comprised of three properties totaling approximately 3,400 acres in size in unincorporated southeastern Solano County, California, with a small portion of work extending into Yolo County. This portion of Solano County is dominated by agriculture and the marshes, sloughs, and rivers of the Sacramento-San Joaquin Delta (Delta), including Cache Slough and the Yolo Bypass. This area, around the confluence of Cache Slough and the Yolo Bypass, comprises the Cache Slough Complex.

The Proposed Project Site's surroundings are characterized by the presence of extensive agriculture, wetlands, and tidally inundated marsh. The Proposed Project Site is bounded by Liberty Island Road and Duck Slough on the north and west, Shag Slough on the east, and Cache and Hass Sloughs on the south. The Proposed Project Site is bordered to the west, north, and south by agricultural land and the east by the Liberty Island Ecological Reserve. The Proposed Project Site consists of agricultural land maintained as irrigated pasture on its western side and managed wetlands used for private waterfowl hunting on its eastern side, and an unused area with unmaintained vegetation on its southern end.

b. Project Description

The Proposed Project would restore within the Proposed Project Site approximately 3,164 acres of tidal marsh that would partially fulfill DWR's obligations under Reasonable and Prudent Alternative (RPA) 4 of the 2008 United States Fish and Wildlife Service (USFWS) Delta Smelt Biological Opinion (BiOp) and is consistent with RPA I.6.1 of the 2009 National Marine Fisheries Service (NMFS) Salmonid BiOp for the coordinated operations of the State Water Project and the Central Valley Project. The Proposed Project would create habitat that is beneficial to Delta Smelt and other fish and wildlife species and widen a portion of the Yolo Bypass to increase flood storage and conveyance.

When completed, the Proposed Project would provide habitat for Delta Smelt, Longfin Smelt (*Spirinchus thaleichthys*), Chinook Salmon (*Oncorhynchus tshawytscha*), Green Sturgeon (*Acipenser medirostris*), Steelhead (*Oncorhynchus mykiss*), giant garter snake (*Thamnophis gigas*), and other species. The Proposed Project is also designed to meet regional flood protection objectives in a manner consistent with the 2017 DWR Sacramento Basin-wide Feasibility Study.

The Proposed Project involves constructing a new setback levee along Duck Slough and Liberty Island Road. The existing levee at Shag Slough would be breached and partially degraded to provide tidal and flood connectivity between Duck Slough and Shag Slough. The existing Cache/Hass Slough Levee would be enhanced to increase stability and reduce long term maintenance cost. The Cache/Hass Slough Levee would continue to function to prevent increased water surface elevations upstream of the Cache Slough Complex. Grading, placement of fill material, and revegetation would be used to restore and enhance upland, tidal, subtidal, and floodplain habitat.

c. Project Objectives

The Proposed Project would create, restore, and maintain ideal habitat conditions to encourage the proliferation of Delta Smelt and other sensitive fish species associated with unrestricted tidal freshwater ecosystems in the Delta. Restoration activities would provide spawning and rearing habitat for Delta smelt, which is on the brink of extinction in its natural habitat¹, and would serve to fulfill a portion of the Delta Smelt habitat mitigation required by the 2008 Delta Smelt Biological Opinion for the state Water Project and Central Valley Project (81420-2008-F-1481-5)².

The goals and objectives of the Lookout Slough Tidal Habitat Restoration and Flood Improvement Project are listed below:

Goal 1:

Create and maintain a diverse landscape of intertidal and associated subtidal habitat that supports habitat elements for native species and improved food productivity within the Project area.

Objectives:

- a. Improve primary and secondary productivity and food availability for Delta Smelt and other native fishes within the Proposed Project and the immediate tidal sloughs surrounding the Proposed Project Site.
- b. Improve rearing habitat for Delta Smelt, salmonids, and other native fish.

¹ Peter Moyle et al., "Delta Smelt: Life History and Decline of a Once-Abundant Species in the San Francisco Estuary," San Francisco Estuary and Watershed Science 14, no. 2 (July 18, 2016), <https://doi.org/10.15447/sfew.s.2016v14iss2art6>

² United States Fish and Wildlife Service, "Formal Endangered Species Act Consultation on the Proposed Coordinated Operations of the Central Valley Project (CVP) and the State Water Project (SWP)" (Sacramento, CA, 2008)

- c. Promote suitable spawning habitat with appropriate water velocities and depths accessible for Delta Smelt within the Proposed Project and the immediate tidal sloughs surrounding the Project Site.
- d. Increase on-site diversity of foraging, breeding, and refuge habitat conditions for aquatic and terrestrial wetland-dependent species.
- e. To the greatest extent practical, preserve existing topographic variability to allow for habitat succession and resilience against future climate change.
- f. To the greatest extent practical, avoid promoting conditions adverse to Proposed Project biological objectives, such as those that would favor establishment or spread of invasive exotic species.

Goal 2:

Design and implement a Project that also supports viable populations of special status aquatic and terrestrial species.

Objectives:

- a. Minimize temporary effects to special status aquatic and terrestrial species when implementing Proposed Project activities (e.g., earth disturbance and vegetation management activities).
- b. Include habitat elements for special status aquatic and terrestrial species.

Goal 3:

Provide additional flood storage and conveyance within the Yolo Bypass to reduce the chance of catastrophic flooding and protect existing nearby infrastructure (e.g., agriculture, power, and human habitation).

Objectives:

- a. Protect existing nearby infrastructure surrounding the Proposed Project and avoid any adverse flood-related impacts in the region.
- b. Provide flood management benefits by reducing flood stages in the lower part of the Yolo Bypass.

3. SUMMARY OF PROJECT ALTERNATIVES

Below is a summary of the alternatives to the Proposed Project considered in Chapter VII. (Alternatives) of the Draft EIR.

a. No Project Alternative

Under the No Project Alternative, no project would take place. The Shag Slough Levee and Vogel Levees would not be breached or partially degraded, nor would the Duck Slough Setback Levee be constructed. Flood conveyance would remain unchanged in the Yolo Bypass and existing

flood control infrastructure would continue to protect existing uses in RD 2098 and the adjacent RD 2068.

b. No Channel Alternative

The Proposed Project includes a network of over 20 miles of tidal channels throughout the site interior. Under the No Channel Alternative, these channels would not be constructed. All other elements would remain the same as the Proposed Project. Accordingly, the Duck Slough Setback Levee would be constructed, the Shag Slough Levee would be breached and partially degraded, the Vogel Levee would be breached, and the Cache/Hass Slough would be improved. Specifications of levee elevations and breach size would remain unchanged. Existing on-site infrastructure for water control would be removed while Pacific Gas & Electric (PG&E) transmission towers would be accessed through the construction of elevated peninsulas. All approvals, permits, and consultations required of the Proposed Project are anticipated to be required of the No Channel Alternative. For a complete list, please see Table III-4 of Chapter III, Project Description.

c. Yolo Bypass Option 3 Alternative

The Yolo Bypass Option 3 Alternative is based on Option 3 of the Draft 2017 Central Valley Flood Protection Plan Basin-Wide Feasibility Study for the Sacramento River (Feasibility Study). The purpose of the Feasibility Study is to evaluate the feasibility and benefits of actions for improving the capacity, flexibility, and resilience of the State Plan of Flood Control (SPFC) flood management system within the Sacramento River Basin. Various actions are developed in the Feasibility Study using considerations such as hydraulic performance, ecosystem improvements, geotechnical suitability, cost efficiency, and implementation feasibility. Option 3, which is the basis of the Yolo Bypass Option 3 Alternative, is among the options formulated under this set of considerations for the Proposed Project Site.

Similar to the Proposed Project, the Yolo Bypass Option 3 Alternative would rely on levee degrade and breaching to enhance connectivity between the Proposed Project Site and adjacent waterways. This alternative would involve construction of a setback levee and would include one levee breach and degradation of two levees. This setback levee would run roughly north-south from the southern terminus of Cache Slough to approximately half-way up the Liberty Farms Property before turning to the northeast and running until roughly the northeastern terminus of Lookout Slough. This alternative would provide connectivity between the Proposed Project Site and the Yolo Bypass during high-flow events.

4. AREAS OF KNOWN CONTROVERSY/ISSUES TO BE RESOLVED

Section 15123 of the CEQA Guidelines requires an EIR to identify areas of controversy known to the lead agency, including issues raised by agencies and the public, and issues to be resolved. The following concerns were raised in letters submitted to DWR in response to the Notice of Preparation (NOP) and comments raised at the Draft EIR scoping meeting. The full language of these comments is included in Appendix W.

- Agriculture & Forestry
- Air Quality
- Biological Resources
- Cultural Resources
- Cumulative Impacts
- Greenhouse Gas Emissions
- Hydrology & Water Quality
- Land Use & Planning
- Public Services
- Recreation
- Transportation
- Tribal Cultural Resources
- Utilities / Service Systems

5. PUBLIC REVIEW OF THE DRAFT EIR

Upon completion of the Draft EIR, DWR filed a Notice of Completion (NOC) with the State Office of Planning and Research to begin a 60-day public review period (Public Resources Code, Section 21161). Concurrent with the NOC, a Notice of Availability (NOA) of this Draft EIR has been distributed to responsible and trustee agencies, other affected agencies, surrounding cities, and any parties requesting a copy of the Draft EIR in accordance with Public Resources Code 21092(b)(3). During the public review period, the Draft EIR is available for review on DWR's website at:

<https://water.ca.gov/Programs/Environmental-Services/Restoration-Mitigation-Compliance/Delta-Projects>

Physical copies of the Draft EIR are available during the 60-day public review period, beginning December 16, 2019 and ending February 14, 2020, at the following locations:

DWR Division of Environmental Services 3500 Industrial Blvd. West Sacramento, CA 95691	Dixon Public Library 230 North First St. Dixon, CA 95620	Rio Vista Library 44 South Second St. Rio Vista, CA 94571	Vacaville Public Library 1 Town Sq., Vacaville, CA 95688	Mary L. Stephens Davis Branch Library 315 E 14 th St. Davis, CA 95616
M-F: 8am-5pm	M-Th: 11am-8pm F, Sa: 11am-6pm	M, W: 10am-6pm Tu, Th: 10am-9pm F, Sa: 10am-5pm	M, W: 10am-6pm Tu, Th: 10am-9pm F, Sa: 10am-5pm Su: 1-5pm	Su, M: 1pm-5pm T, W, Th: 10am-9pm F, S: 10am-5:30pm

Agencies, organizations, and interested parties have the opportunity to comment on the Draft EIR during the 60-day public review period. Written comments on this Draft EIR should be addressed to:

Attn: Heather Green
California Department of Water Resources
3500 Industrial Blvd West Sacramento, CA 95691
FRPA@water.ca.gov

Submittal of electronic comments in Microsoft Word or Adobe PDF format is encouraged.

6. SUMMARY OF SIGNIFICANT ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Table II-1 summarizes the various significant environmental impacts associated with the Proposed Project that are analyzed in detail in the Draft EIR. Table II-1 also includes the

mitigation measures recommended to reduce or avoid the significant environmental impacts and identifies the level of impact significance after mitigation. Refer to Chapter 4 for additional environmental impacts that were not analyzed in detail in the Draft EIR.

Table II-1. Summary of Environmental Impacts that were Analyzed and Mitigation Measures

Impact #	Impact	Significance	Proposed Mitigation
Impacts found to be Less than Significant			
AES-i.	Adverse effects on scenic vistas	Less than Significant	No mitigation is proposed
AES-ii.	Damage of scenic resources, including but not limited to, trees, rock outcroppings, and historical buildings within a state scenic highway	No impact	No mitigation is proposed
AES-iii.	Substantial degradation of the existing visual character or quality of public views of the site and its surroundings	Less than Significant	No mitigation is proposed
AES-iv.	New sources of substantial light or glare which would adversely affect day or nighttime views in the area	Less than Significant	No mitigation is proposed
ENE-i.	Potentially significant environmental impacts due to wasteful, inefficient, or unnecessary consumption of energy resources during construction or operation	Less than Significant	No mitigation is proposed

ENE-ii.	Conflict with or obstruction of a state or local plan for renewable energy or energy efficiency	Less than Significant	No mitigation is proposed
GEO-i.	Direct or indirect substantial adverse effects including the risk of loss, injury, or death involving rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning map issued by the State Geologist	Less than Significant	No mitigation is proposed
GEO-ii.	Direct or indirect substantial adverse effects including the risk of loss, injury, or death involving strong seismic ground shaking	Less than Significant	No mitigation is proposed
GEO-iii.	Direct or indirect substantial adverse effects including the risk of loss, injury, or death involving liquefaction	Less than Significant	No mitigation is proposed
GEO-iv.	Direct or indirect substantial adverse effects including the risk of loss, injury, or death involving landslides	Less than Significant	No mitigation is proposed

GEO-v.	Substantial soil erosion or loss of topsoil	Less than Significant	No mitigation is proposed
GEO-vi.	Location on a geologic unit or soil that is unstable or that would become unstable as a result of the Proposed Project and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse	Less than Significant	No mitigation is proposed
GEO-vii.	Location on expansive soil, creating substantial direct or indirect risks to life or property	Less than Significant	No mitigation is proposed
GEO-viii.	Soil adequacy for supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water	Less than Significant	No mitigation is proposed
GHG-i.	Generation of greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment	Less than Significant	No mitigation is proposed
GHG-ii.	Conflict with an applicable plan, policy, or regulation adopted for the purpose of	Less than Significant	No mitigation is proposed

	reducing the emissions of greenhouse gases		
LUP-i.	Physical division of an established community	Less than Significant	No mitigation is proposed
LUP-ii.	Significant environmental impacts due to conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental impact	Less than Significant	No mitigation is proposed
LUP-iii.	Conflict with existing easements	Less than Significant	No mitigation is proposed
NOISE-i.	Substantial temporary or permanent increase in ambient noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies	Less than Significant	No mitigation is proposed
NOISE-ii.	Generation of excessive groundborne vibration or groundborne noise levels	Less than Significant	No mitigation is proposed
NOISE-iii.	Exposure of people residing or working in the vicinity of a private airstrip or public use airport or	Less than Significant	No mitigation is proposed

	within an airport land use plan to excessive noise		
POP-i.	Direct and indirect inducement of substantial unplanned population growth	Less than Significant	No mitigation is proposed
POP-ii.	Displacement of substantial numbers of people or existing housing, necessitating the construction of replacement housing elsewhere	Less than Significant	No mitigation is proposed
TRANS-i.	Conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadways, or bicycle and pedestrian facilities	Less than Significant	No mitigation is proposed
TRANS-ii.	Conflict with or be inconsistent CEQA Guidelines Section 15064.3, subdivision (b)	Less than Significant	No mitigation is proposed
TRANS-iii.	Substantially increase in hazards due to a geometric design feature or incompatible uses	Less than Significant	No mitigation is proposed
TRANS-iv.	Inadequate emergency access	Less than Significant	No mitigation is proposed

UTIL-i.	Relocation or construction of new or expanded water, wastewater treatment or stormwater drainage, electrical power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects	Less than Significant	No mitigation is proposed
UTIL-ii.	Sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry, and multiple dry years	Less than Significant	No mitigation is proposed
UTIL-iii.	Wastewater treatment provider capacity to serve the project's projected demand and existing commitments	Less than Significant	No mitigation is proposed
UTIL-iv.	Generation of solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or other impairment of solid waste reduction goals	Less than Significant	No mitigation is proposed
UTIL-v.	Compliance with federal, State, and local management and	Less than Significant	No mitigation is proposed

	reduction statutes and regulations related to solid waste		
FIRE-i.	Substantial impairment of an adopted emergency response plan or emergency evacuation plan	Less than Significant	No mitigation is proposed
FIRE-ii.	Exposure of project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire due to exacerbation of wildfire risk	Less than Significant	No mitigation is proposed
FIRE-iii.	Installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines, or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment	Less than Significant	No mitigation is proposed
FIRE-iv.	Exposure of people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope	Less than Significant	No mitigation is proposed

	instability, or drainage changes		
Agriculture & Forestry			
AG-i.	Conversion of a substantial amount of prime farmland to non-agricultural use	Less than Significant with Mitigation	<p><u>Mitigation Measure AG-1a: Off-Site Agricultural Improvements</u></p> <p>Prior to commencement of construction, improvements beneficial to agricultural productivity shall be installed to improve the irrigation capability and extent of the Zanetti property and improve drainage of the Wineman Property. Improvements shall include irrigation infrastructure with potential to convert all or part of the property to Prime Farmland; these may include, but are not limited to, power drops, pumps, and pipelines. Other improvements may include, but are not limited to, farm buildings such as barns, workshops, corrals and fencing, and worker housing with an associated septic system.</p> <p><u>Mitigation Measure AG-1b: Agricultural Conservation Easement</u></p> <p>The Applicant shall establish an off-site agricultural preserve by placing a conservation easement on a minimum of 1,000 acres of Prime Farmland. The property to be placed under an agricultural conservation easement shall be located in Solano County and shall be of similar quality. Mitigation lands shall meet all of the following criteria to qualify as agricultural mitigation:</p> <ul style="list-style-type: none"> ○ The soil quality of agricultural mitigation land shall have a farmland classification of Prime Farmland, or Prime Farmland if Irrigated according to the USDA Soil Survey; ○ The land shall have an adequate water supply for the purposes of irrigation. The water supply shall be sufficient to support ongoing agricultural uses;

			<ul style="list-style-type: none"> ○ The mitigation land may not have been previously encumbered by any other agricultural conservation easement or have been used for agricultural mitigation. ○ The mitigation land may also provide compensatory mitigation for special-status species such as Swainson’s hawk, so long as agricultural uses can be implemented in a manner that is consistent with the needs of the species.
AG-ii.	Conflict with a Williamson Act Contract	Less than Significant	No mitigation is proposed
AG-iii.	Changes to the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use	Less than Significant	No mitigation is proposed
AG-iv.	Conflict with existing zoning for, or cause rezoning of forest land (as defined in PRC section 1220(g), timberland (as defined by PRC section 4526) or timberland zoned Timberland Production (as defined by government code section 51104(g)	No Impact	No mitigation is proposed
AG-v.	Loss of forest land or conversion of forest land to non-forest land	Not Impact	No mitigation is proposed

Air Quality			
AIR-i.	Would the project conflict with implementation of the applicable air quality plan?	Less than Significant with Mitigation	<p><u>Mitigation Measure AIR-1: Construction Equipment Standards</u></p> <p>Contractors for construction of the Proposed Project shall implement the following emission control measures, as applicable:</p> <p>(a) Operation Requirements</p> <ul style="list-style-type: none"> • Idling times on all diesel-fueled off-road construction equipment over 25 horsepower shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to five consecutive minutes, as required by CCR, Title 13, section 2449. • All construction equipment shall be maintained and properly tuned in accordance with the manufacturer’s specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation. Equipment check documentation should be kept at the construction site and be available for review. <p>(b) Engine Requirements</p> <ul style="list-style-type: none"> • If commercially available, the engines of the diesel off-road equipment shall meet the USEPA or CARB Tier 4 Final off-road emission standards. The equipment that shall use Tier 4 Final engines may include, but are not limited to: compactors, rollers, bulldozers, excavators, motor graders, scrapers equivalent to the Caterpillar 631K Wheel Tractor-Scraper model, and off-road haul trucks. • Equipment requirements above may be waived by the project director of EIP or DWR, but only under any of the following unusual circumstances: if a particular piece of off-road equipment with Tier 4 Final standards or

			<p>Tier 3 standards is technically not feasible; or there is a compelling emergency need to use off-road equipment that does not meet the equipment requirements, above. If the project director of EIP or DWR grants the waiver, the contractor shall use the next cleanest piece of off-road equipment available, in the following order: Tier 4 Interim, Tier 3, and then Tier 2 engines.</p> <p><u>Mitigation Measure AIR-2: Dust Control</u></p> <p>Contractors for construction of the Proposed Project shall implement all of the following applicable dust control measures:</p> <ul style="list-style-type: none"> • Water all exposed surfaces of active construction areas where the soil moisture content is low enough to produce visible dust emissions upon soil disturbance. Increased watering frequency may be necessary whenever wind speed exceeds 15 miles per hour. • Cover all trucks hauling soil, sand, and other loose materials. • All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited. • All demolition activities shall be suspended when average wind speeds exceed 20 miles per hour. • Monitor moisture content of exposed areas after cut and fill. Apply non-toxic binders (e.g., latex acrylic copolymer) to exposed areas if needed and consistent with the goals of the restoration project. • Apply chemical soil stabilizers on exposed stockpiles if consistent with the goals of the restoration project.
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AIR-ii.	Would the project have cumulatively considerable net increase of a criteria pollutant for which the Proposed Project region is non-attainment under applicable federal and state ambient air quality standards?	Less than Significant	No mitigation is proposed
AIR-iii.	Would the project result in exposure of sensitive receptors to substantial pollutant concentrations?	Less than Significant	No mitigation is proposed
AIR-iv.	Would the project result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	Less than Significant	No mitigation is proposed
Biological Resources			
BIO-i.	Substantial adverse effects on riparian habitat or other sensitive natural communities	Less than Significant with Mitigation	<p><u>Mitigation Measure BIO-1. Re-Plant Riparian Vegetation at a 1.1:1 Ratio</u></p> <p>To compensate for Proposed Project impacts to riparian habitat the Proposed Project shall:</p> <ol style="list-style-type: none"> 1) Avoid a long-term net loss of riparian habitat, and 2) Mitigate for temporarily impacted riparian habitat at a 0.1:1 ratio. Therefore, the overall riparian habitat shall be mitigated at a 1.1:1 ratio.

BIO-ii.	Substantial adverse effects on State and Federally protected wetlands	Less than Significant	No mitigation is proposed
BIO-iii.	Substantial adverse effects on special-status plant species	Less than Significant with Mitigation	<p><u>Mitigation Measure BIO-2. Special-Status Plant Avoidance, Preservation, and Re-Planting</u></p> <p>A Restoration Plan shall be prepared that includes the following elements to avoid and mitigate for potential impacts to Mason’s lilaepsis, woolly rose mallow, Suisun Marsh aster, and Parry’s rough tarplant. The Plan shall be prepared and provided to DWR prior to the start of construction and may be included as part of the Proposed Project’s Adaptive Management and Monitoring Plan or Long-Term Management Plan.</p> <ol style="list-style-type: none"> 1) Within one year prior to the start of construction, a qualified botanist shall re-survey all areas to be disturbed as part of Proposed Project activities. Special-status plant species identified shall be flagged and the location re-mapped if locations have changed. 2) To the maximum extent feasible, impacts to new locations of the other special-status plant species mapped during pre-construction surveys shall be avoided, and habitat that supports these special-status plant species shall be preserved. 3) Seed, propagules, and/or rhizomes of impacted special-status plant species shall be collected, as appropriate, under the direction of the qualified botanist from at least 50 percent of plants impacted. Harvested plant seeds shall be stored in a manner suited to the species, as outlined by seed propagation experts (Emery 1988). 4) Seeds and propagules shall be planted into suitable habitat after restoration activities are complete. Planting areas shall be adequate to ensure a minimum of 1:1 replacement of occupied habitat for each of the

			<p>impacted special-status species. Planted habitat shall be maintained and adaptively managed for three years to ensure successful species establishment.</p> <p>5) Performance shall be monitored to evaluate success of replacement of special-status species habitat. Target replacement shall be at a minimum 1:1 ratio of impacted to established habitat acreage for each of the directly impacted special-status plant species. Success would be considered achieved when an equal area of habitat is occupied at a plant density similar to pre-project conditions. Monitoring shall be conducted for a minimum of three growing seasons following initial planting or until performance has been achieved.</p> <p>6) If individuals of Mason's lilaepsis are newly detected during pre-construction surveys in areas to be impacted by Proposed Project activities and complete avoidance is not feasible, the Applicant shall consult with CDFW prior to the start of construction to obtain authorization for project implementation and develop an appropriate type and amount of compensatory mitigation. Mitigation shall be provided at a minimum 1:1 ratio of impacted individuals to replanted; final mitigation ratios and other specific compensatory requirements shall be determined through consultation with CDFW.</p>
<p>BIO-iv.</p>	<p>Substantial adverse effects on special-status wildlife species through habitat modification</p>	<p>Less than Significant with Mitigation</p>	<p><u>Mitigation Measure BIO-3. Habitat Protection and Avoidance</u></p> <p>A project-specific Worker Environmental Awareness Program (WEAP) for construction personnel shall be conducted by a qualified biologist approved by USFWS and CDFW before commencement of construction activities and as needed when new personnel begin work on the Proposed Project. The program shall inform all construction personnel about the life history and status of all special-status wildlife species with potential to occur on-site; the need to avoid damage to suitable habitat and species harm, injury, or mortality; measures to avoid and minimize impacts on species and associated habitats; the conditions</p>

			<p>of relevant regulatory permits, and the possible penalties for not complying with these requirements. The training could consist of a recorded presentation to be reused for new personnel throughout the duration of construction. The WEAP training shall also generally include:</p> <ol style="list-style-type: none"> 1) Applicable State and federal laws, environmental regulations, Proposed Project permit conditions, and penalties for non-compliance. A physical description of special-status plant and wildlife species with potential to occur on or in the vicinity of the Proposed Project Site, avoidance and minimization measures, and protocol for encountering such species including communication chain; 2) BMPs for erosion control and their location on the Proposed Project Site. 3) Contractors shall be required to sign documentation stating that they have read, agree to, and understand the required avoidance measures. 4) Field identification of any Proposed Project Site boundaries, egress points and routes to be used for work. Work shall not be conducted outside of the Proposed Project Site. 5) Wildlife exclusion fencing shall be installed in several locations throughout the Proposed Project Site. Fencing shall be strategically placed to prevent wildlife from entering staged equipment or active construction areas adjacent to potential habitats. Those areas where wildlife exclusion fencing must be placed include the perimeter of any designated staging areas and along Duck Slough. 6) Any vehicles or equipment left overnight inside of fenced areas shall not be required to be inspected for wildlife prior to moving. Equipment left outside of staging areas, in unfenced areas shall be inspected for wildlife prior to moving. Operators and construction personnel may conduct fence and vehicle inspections if they have received training on how to conduct the inspections by the qualified biologist. Fencing shall be
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			<p>checked on a regular basis (e.g. weekly) by a biologist or trained construction personnel to assure it is fully functional.</p> <p><u>Mitigation Measure BIO-4. Invasive Species Abatement</u></p> <p>Prior to the start of construction activities, protocols shall be developed for targeted invasive weed abatement, which shall include at a minimum, the following:</p> <ol style="list-style-type: none"> 1) Identify target weeds that are rated High or Moderate for negative ecological impact in the California Invasive Plant Database (Cal-IPC) within the Proposed Project Site that have potential to spread off-site and/or sustain on-site following the Proposed Project’s restoration actions. 2) Where determined necessary, target weed infestations shall be treated according to control methods and practices considered appropriate for those species. 3) Weed control treatments shall include all legally permitted herbicide, manual, and mechanical methods. The application of herbicides shall be in compliance with all state and federal laws and regulations under the prescription of a Pest Control Advisor and implemented by a Licensed Qualified Applicator. 4) The timing of weed control treatment shall be determined for each target plant species with the goal of controlling populations.
<p>BIO-v.</p>	<p>Substantial adverse effects on special-status wildlife species, either directly or through habitat modification</p>	<p>Less than Significant with Mitigation</p>	<p><u>Mitigation Measure BIO-3: Habitat Protection and Avoidance</u></p> <p>Please see above.</p> <p><u>Mitigation Measure BIO-5A: Nesting Birds</u></p>

			<p>The following measures shall be implemented prior to construction to avoid or minimize impacts to nesting birds:</p> <ol style="list-style-type: none"> 1) Implement Mitigation Measure BIO-3 (WEAP). 2) To the extent feasible, vegetation removal and initial ground disturbance shall occur from September 1 through January 31 so that initial ground disturbing work occurs outside of the general nesting bird season. 3) For vegetation removal and ground disturbance within the Proposed Project footprint that is conducted within the general nesting bird season (February 1 through August 31), pre-construction nesting bird surveys shall be conducted within an appropriate radius of vegetation removal or ground disturbance within 14 days of the initiation of these activities to avoid disturbance to active nests, eggs, and/or young. <p>All active nests of native birds found during the survey shall be protected by a no-disturbance buffer until all young from each nest fledge or the nest otherwise becomes inactive. The size of each buffer shall be determined by a qualified biologist dependent upon extant conditions and may require consultation with the CDFW. Buffers are typically a minimum of 50 feet for non-special-status birds and may be larger for special-status or raptor species.</p> <p><u>Mitigation Measure BIO-5B. Swainson’s Hawk Nesting and Foraging Habitat</u></p> <p>Due to the potential for adverse impacts to Swainson’s hawk, consultation and permitting with CDFW may be required if reduced buffers during the nesting season are necessary for construction activities. If permitting for potential take of Swainson’s hawk is determined to be necessary, the Applicant shall consult with CDFW and implement all avoidance and minimization measures as</p>
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			<p>required in the Proposed Project Incidental Take Permit and Lake and Streambed Alteration Agreements. In addition, the following measures shall be implemented prior to and during construction to avoid or minimize impacts to Swainson’s hawk:</p> <ol style="list-style-type: none"> 1) In each year that Proposed Project activities occur during Swainson’s hawk nesting season, two surveys shall be conducted within each of nest season Phases II and III³ as described below: <ol style="list-style-type: none"> a) In the first year of construction: <ol style="list-style-type: none"> i) If work has been initiated prior to March 20 (prior to the nesting season for Swainson’s hawk), two surveys each shall be conducted within Phases II (March 20-April 5) and Phase III of the nesting season (April 5 - May 20) to determine if nests have established during Proposed Project activities. ii) If work begins between March 20 and April 5 (Phase II) at least one of the two surveys within Phase II shall be conducted prior to the start of ground disturbing activities. Two surveys shall also be conducted between April 5 – April 20 (Phase III). iii) If work begins in Phase III, two surveys shall be conducted in Phase II and at least one survey in Phase III shall be conducted prior to start of ground disturbing activities. b) In the second year of construction, two surveys shall be conducted within each of the Phases II and III windows identified above. c) Surveys shall be conducted within 0.25-mile of planned work areas during the nesting season. <ol style="list-style-type: none"> i) If a nest is determined to be active and ground disturbance has not yet been initiated, a 0.25-mile (1,320-foot) buffer shall be
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³ California Department of Fish and Game, Swainson’s Hawk Technical Advisory Committee, “Recommended Timing and Methodology for Swainson’s Hawk Nesting Surveys in California’s Central Valley” (Sacramento, May 31, 2000), <https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=83990&inline>.

			<p>established. If ground disturbance has been initiated and a Swainson's hawk establishes a nest after construction has been initiated, a 500-foot buffer shall be established around the nest tree.</p> <ul style="list-style-type: none"> d) Following surveys, monthly checks shall be conducted in May, June, and July to provide status updates on any active nests. If a nest is determined to have become inactive, the nest buffer would be removed. e) If a smaller buffer is sought, CDFW shall be consulted and the methods described below (Item 2) shall be instituted in addition to any measures requested by CDFW in approving the reduced buffer. <p>2) Reduced buffer: If construction will occur within 0.25-mile of an active Swainson's hawk nest site (and the nest was established prior to initial construction in the area) or within 500 feet of an active Swainson's hawk nest established during construction, the following additional measures shall be implemented:</p> <ul style="list-style-type: none"> a) Staging areas for equipment, materials, and work personnel shall be located 0.25-mile away from active Swainson's hawk nest sites. These areas shall be flagged and identified to all work personnel during employee orientation. b) For nests established during construction, if construction needs to occur within 500 feet of an active Swainson's hawk nest, no construction shall occur prior to 8:00 AM, and shall be discontinued by 5:00 PM each day. c) If work needs to occur temporarily within any buffer, a qualified biologist shall monitor active nests daily for signs of disturbance for the duration of the construction activity. If it is determined that Proposed Project-related activities are resulting in nest disturbance, then work in those sensitive areas shall cease immediately and the 0.25-mile buffer or 500-foot buffer (for nests in ongoing work areas)
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			<p>shall be re-established. CDFW shall then be contacted for further guidance.</p> <ol style="list-style-type: none"> 3) Potential Swainson's hawk nest trees shall be removed during the non-nesting season. If potential Swainson's hawk nest trees must be removed during the nesting season, no potential nest trees shall be removed until surveys are completed and trees are determined to not have active Swainson's hawk nests. . 4) While trees with active nests would not be removed, Active Nest Trees (trees that have had active nests within the last 5 years) may need to be removed if Swainson's hawk nest within the Proposed Project Site prior to construction. Active Nest Trees are determined from pre-construction surveys and the most recent surveys in 2018, which also captured all documented occurrences within 500 feet. In the event an Active Nest Tree cannot be avoided, the Applicant shall plant three trees for every Active Nest Tree removed. 5) The loss of approximately 1,850 acres of foraging habitat shall be mitigated through establishment of an off-site easement and/or purchase of credits at a CDFW-approved mitigation bank. The mitigation shall permanently conserve a minimum of approximately 1,000 acres of Swainson's hawk foraging habitat of equal or greater forage quality than irrigated pasture. This may include perennial grassland, tomatoes, alfalfa, beets, dryland pasture, or irrigated pasture. <p><u>Mitigation Measure BIO-5C: Tricolored Blackbird Nesting</u></p> <p>The following measures shall be implemented prior to construction to avoid or minimize impacts to nesting tricolored blackbirds:</p> <ol style="list-style-type: none"> 1) If construction is to commence during the nesting season, two pre-construction surveys, the first no more than 14 days prior to, and the second within 48 hours of initial ground disturbance, shall be performed by a qualified biologist. If ground disturbance lapses for more than 14
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			<p>days during the nesting season, the surveys shall be repeated before construction activities resume. Surveys shall include the extent of ground disturbance and the surrounding 250 feet.</p> <p>2) If an active nesting colony is found within the survey area, the colony shall be avoided by a buffer of at least 250 feet. The buffer shall remain in place until a qualified biologist confirms the colony is no longer active and has dispersed.</p> <p><u>Mitigation Measure BIO-5D: Giant Garter Snake</u></p> <p>Due to the potential for adverse impacts to giant garter snake, consultation and permitting with the USFWS and CDFW are required. As part of the permitting process, the Applicant shall consult with USFWS and CDFW and implement all avoidance and minimization measures as required in the Proposed Project's Biological Opinion, Incidental Take Permit, and Lake and Streambed Alteration Agreements. In addition, the following measures shall be implemented prior to and during construction to avoid or minimize impacts to giant garter snake:</p> <ol style="list-style-type: none"> 1) Implement Mitigation Measure BIO-3 (WEAP). 2) If new construction or ground clearing is proposed within 200 feet of suitable giant garter snake habitat between October 31 and February 28, a qualified biologist shall survey the area for potential winter refugia habitat. Any winter refugia habitat identified shall be flagged with a 50-foot buffer for avoidance. Work in areas with no winter refugia habitat and outside of any buffers may be conducted without additional surveys. 3) One or more qualified biologist(s) shall be on site during all project construction within 200 feet of suitable giant garter snake habitat during the extended active season (March 1 to October 31). The qualified biologist shall monitor work in this area. 4) Wildlife exclusion fencing (i.e. silt fencing) shall be installed surrounding the designated staging areas. Vehicles or equipment left overnight inside of fenced areas will not be required to be inspected prior to moving. Equipment left outside of staging areas shall be inspected for giant garter snake prior to moving. Operators and construction
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			<p>personnel may conduct vehicle inspections if they have received training on the inspections by the qualified biologist. The exclusion fence shall be inspected on a weekly basis by either a qualified biologist or trained construction personnel. See Mitigation Measure BIO-1A. Habitat Protection and Avoidance.</p> <ol style="list-style-type: none"> 5) A speed limit of 15 mph shall be observed in areas within 200 feet of areas designated as suitable giant garter snake aquatic habitat by a qualified biologist. 6) Escape routes or coverings shall be provided at any temporary open excavations with steep-sided walls that have potential to entrap giant garter snake. For excavations determined to be sufficiently steep that wildlife may become stranded, an escape ramp shall be installed, or an adjustment to the slope of the wall to be less steep shall be made in a location to allow escape, or the feature shall be completely covered to prevent entrapment of wildlife. If questions occur about excavations, a qualified biologist shall be available to determine if a ramp is necessary and advise on potential solutions for ramp design to allow animal escape. 7) Escape ramps do not apply to the cutoff wall excavation due to the combination of fencing, and bare ground which would be sufficient to deter wildlife from the vicinity. 8) Plastic, monofilament, jute netting, or similar temporary erosion control matting that could entangle snakes shall not be placed on the site. Possible substitutes include coconut coir or matting, burlap wrapped straw wattles, tackified hydroseeding compounds, or other materials. 9) To eliminate attraction of predators of giant garter snake, all food-related trash items, such as wrappers, cans, bottles, and food scraps, shall be disposed of in closed containers and hauled off-site on a regular basis. <p><u>Mitigation Measure BIO-5E. Western Pond Turtle</u></p> <p>The following measures shall be implemented prior to and during construction to avoid or minimize impacts to western pond turtle:</p> <ol style="list-style-type: none"> 1) Implement Mitigation Measure BIO-3 (WEAP).
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			<p>2) A qualified biologist shall monitor areas in suitable western pond turtle aquatic habitat prior to and during work that has the potential to disturb or harm western pond turtle. Western pond turtle individuals found in harm's way shall be moved by a qualified biologist to a safe location outside of the work area in a manner consistent with applicable CDFW regulations.</p> <p>3) During dewatering activity of suitable western pond turtle habitat, a qualified biologist shall be present on-site to capture and relocate western pond turtles out of the work area.</p> <p>4) Any viable western pond turtle nests encountered including those with eggs or hatchlings shall be flagged and a 100-ft buffer around the nest shall be designated. If construction activity cannot avoid the nest area, the nest shall be relocated either off site or to an appropriate wildlife care facility.</p> <p>5) In areas where surveys for western pond turtle have been completed and turtles have been relocated but continue to move back into the area, exclusion fencing or a similar deterrent may be used to prevent turtles from returning to the active work area. Western pond turtles found inside exclusion fencing shall be moved by a qualified biologist to a safe location outside of the work area.</p> <p><u>Mitigation Measure BIO-5F. Roosting Bats</u></p> <p>The following measures shall be implemented prior to construction to avoid or minimize impacts to roosting bats:</p> <p>1) Implement Mitigation Measure BIO-3 (WEAP).</p> <p>2) Prior to any building demolition, a bat roost assessment shall be conducted at least 30 days beforehand by a qualified biologist to determine if roost habitat is present.</p>
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			<ul style="list-style-type: none"> a) If the structure has no potential to support bats, the structure may be demolished with no further measures required to protect roosting bats. b) If a potential bat roost is present, and work is occurring outside the maternity season, the qualified biologist shall survey the potentially suitable structure the morning of demolition to confirm if bats are present. If bats are not present, the structure may be demolished. If bats are present, the qualified biologist shall exclude bats from the structure (e.g. with the use of one way exits). Once the qualified biologist confirms bats are no longer present, the structure may be demolished. c) If a potential bat roost is present and work is occurring during the maternity season, and a maternity roost is present, the structure shall be given a 100-foot buffer and demolition shall be delayed until after the young are capable of flying and able to leave on their own. Once the young have reached sufficient age to leave the roost, the structure may then be excluded, and subsequently demolished. <p>3) Prior to the removal of any large trees (DBH>16 inches) a bat roost assessment shall be conducted by a qualified biologist at least 30 days beforehand to determine if potential roost habitat is present.</p> <ul style="list-style-type: none"> a) If the tree has no potential to support roosting bats (e.g. no large basal cavities, exfoliating bark or interstitial spaces), the tree may be removed with no further measures required to protect roosting bats. b) If a potential bat habitat is present, and work is occurring outside the maternity season, the qualified biologist may either 1.) Conduct an emergence survey to determine if the roost is occupied; or 2.) The tree may be felled using a two-phased cut. <ul style="list-style-type: none"> i) If the emergence survey confirms the roost is inactive, the tree may be felled normally.
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			<p>ii) If the roost is confirmed active, or is assumed to be active, a two-phased cut shall be employed to remove the tree. On day one the qualified biologist shall oversee removal of branches and small limbs not containing potential bat roost habitat using hand tools such as chainsaws or handsaws only. The next day, the rest of the tree may be removed.</p> <p>c) If potential bat roosting habitat is present and work is occurring during the maternity season, the qualified biologist may either 1.) Conduct an emergence survey to determine if the roost is occupied; or 2.) Assume the roost is occupied and a buffer shall be implemented.</p> <p>i) If the roost assessment does not detect bats, the tree may be removed normally. If roosting bats are detected, or the tree is assumed to be an active roost, the tree shall be given a 100-foot buffer and shall be avoided until after the maternity roosting season is complete.</p> <p><u>Mitigation Measure BIO-5G. Valley Elderberry Longhorn Beetle</u></p> <p>Prior to Proposed Project Activities that would directly impact elderberry shrubs, the Applicant shall implement the following to avoid impacts to Valley elderberry longhorn beetle (adapted from USFWS 2017⁴):</p> <p>1) <u>Avoidance and Minimization:</u> To the extent feasible, project activities within 165 feet of elderberry shrubs shall be avoided. For all activities that occur within 165 feet of elderberry shrubs, the following measures shall be implemented to ensure that avoidance activities completely avoid impacting elderberry shrub habitat for valley elderberry longhorn beetle:</p>
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⁴ United States Fish and Wildlife Service, "Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle (*Desmocerus Californicus Dimorphus*)" (Sacramento, CA, 2017).

			<ul style="list-style-type: none"> a) <u>Fencing</u>: All areas to be avoided during project activities shall be fenced and/or flagged near project activity limits. b) <u>Avoidance area</u>: Trenching, paving, or similar activities that may damage or kill elderberry shrubs shall have an avoidance area of at least 20 feet from the drip-line of the shrub. c) <u>Worker education</u>: A qualified biologist shall provide training for all contractors, work crews, and any on-site personnel on the status of the valley elderberry longhorn beetle, its host plant and habitat, the need to avoid damaging the elderberry shrubs, and the possible penalties for non-compliance. d) <u>Construction monitoring</u>: A qualified biologist shall monitor the project at appropriate intervals to ensure avoidance and minimization measures are implemented. e) <u>Timing</u>: As feasible, all activities that would occur within 165 feet of an elderberry shrub shall be conducted outside of valley elderberry longhorn beetle flight season (March - July). f) <u>Trimming</u>: Trimming of elderberry shrubs shall occur between November and February and shall avoid removing any branches or stems that are ≥ 1 inch in diameter. Measures to address regular and/or large-scale maintenance (trimming) shall be established in consultation with the Service. g) <u>Chemical Usage</u>: Herbicides shall not be used within the drip-line of an elderberry shrub. Insecticides shall not be used within 98 feet of an elderberry shrub. All chemicals shall be applied using a backpack sprayer or similar direct application method. h) <u>Mowing</u>: Mechanical weed removal within the drip-line of an elderberry shrub shall be limited to the season when adults are not active (August - February) and shall avoid damaging the elderberry shrub. <p>2) <u>Transplanting</u>: Where elderberry shrubs cannot be avoided or indirect impacts nearby would result in the death of stems or entire shrubs, the</p>
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			<p>Applicant shall transplant all elderberry shrubs with stems greater than 1 inch in diameter, where feasible, to protect potential valley elderberry longhorn beetle larvae. In addition, the Applicant shall use the following guidelines when transplanting elderberry shrubs to a USFWS-approved location:</p> <ul style="list-style-type: none"> a) <u>Monitor</u>: A qualified biologist shall be on-site for the duration of transplanting activities to ensure compliance with avoidance and minimization measures, in addition to other conservation measures. b) <u>Exit holes</u>: Exit-hole surveys shall be completed immediately before transplanting. Details of the survey including number of exit holes observed, the GPS location of the plant to be transplanted, and the GPS location of the final position of the transplanted shrub shall be recorded and reported to the Service and to CNDDDB. c) <u>Timing</u>: Elderberry shrubs shall be transplanted while shrubs are dormant (from November through the first two weeks in February) and after shrubs have lost their leaves to reduce shock to the shrub and increase transplantation success. d) <u>Transplanting Procedure</u>: Transplanting shall follow the most current version of ANSI A300 (Part 6) guidelines for transplanting. e) <u>Trimming Procedure</u>: Any trimming of elderberry shrubs shall occur between November and February and should minimize removal of branches and/or stems that exceed one (1) inch in diameter. f) Regardless of whether exit holes are detected, if direct impacts cannot be avoided to elderberry shrubs or transplanting is not feasible, elderberry shrubs shall be replanted at a 3:1 ratio in riparian areas and a 1:1 ratio in non-riparian areas, in accordance with USFWS guidelines⁵
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⁵ United States Fish and Wildlife Service.

<p>BIO-vi.</p>	<p>Substantial adverse effects on special-status fish species, either directly or through habitat modification</p>	<p>Less than Significant with Mitigation</p>	<p><u>Mitigation Measure BIO-3. Habitat Protection and Avoidance</u></p> <p>Please see above.</p> <p><u>Mitigation Measure BIO-6 Special-Status Fish Species</u></p> <p>Due to the potential for adverse impacts to listed and special-status fish species, consultation and permitting with the USFWS, NMFS, and CDFW is required. As part of the permitting process, consultation with USFWS, NMFS, and CDFW shall be completed and the Applicant/DWR shall implement all requirements in the Proposed Project Biological Opinions, Incidental Take Permit, Lake and Streambed Alteration Agreement, as well as water quality protection measures required in the Section 401 Water Quality Certification. The following measures shall be implemented prior to and during construction to avoid or minimize impacts to protected fish species:</p> <ol style="list-style-type: none"> 1) Implement Mitigation Measure BIO-3 (WEAP). 2) In-water work outboard of the SPFC levees shall be completed between June 1 and October 31. In-water work on the outboard side of existing levees shall only occur outside the work window if a cofferdam separates the work area from the channel. 3) If sheet piles are used to construct a cofferdam, a vibratory hammer shall be used to start the installation of each pile and shall be used as long as geotechnical conditions permit. A vibratory hammer shall be used to remove the sheet pile. 4) A qualified biologist shall monitor cofferdam installation, removal, and final breaching activity. 5) Prior to closing or dewatering the work side of a cofferdam, a qualified biologist shall lead fish exclusion and/or relocation activities as necessary to clear the work area of fish. Prior to construction, methods for fish rescue and relocation shall be approved by NMFS, USFWS, and CDFW as appropriate.
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			<p>6) To reduce the velocity of water entering the Proposed Project Site and avoid potentially injuring fish, all final breaches (i.e., unencumbered connection to Shag or Cache Slough) shall occur within one foot or less of the daytime low tide level. If a breach cannot take place at low tide or within the work window, measures to reduce water velocity during final breaches shall be provided to NMFS, USFWS, and CDFW.</p> <p>7) Levee excavation shall be conducted in a manner to minimize erosion and excavated material from entering Shag Slough, Cache Slough, or Hass Slough.</p>
BIO-vii.	Substantial interference with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impendance with the use of native wildlife nursery sites	Less than Significant	No mitigation is proposed
BIO-viii.	Conflict with any local policies or ordinances protection biological resources, such as a tree preservation policy or ordinance	Less than Significant	No mitigation is proposed
Cultural Resources			
CULT-i.	Substantial adverse changes in the significance of an archaeological resource	Less than Significant	No mitigation is proposed.

	resource pursuant to Section 15064.5		
CULT-ii.	Inadvertent disturbance of human remains	Less than Significant	No mitigation is proposed.
Hazards and Hazardous Materials			
HAZ-i.	Significant hazards to the public or the environment through the routine transport, use, or disposal of hazardous materials	Less than Significant	No mitigation is proposed.
HAZ-ii.	Significant hazards to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment	Less than Significant with Mitigation	<p>d. Mitigation Measure HAZ-1: Natural Gas Well and Pipeline Abandonment and Avoidance</p> <p>Prior to the start of construction, EIP shall develop plans and procedures for natural gas well and pipeline abandonment and avoidance during construction, which may include but are not limited to re-abandonment, plugging, removal, or avoidance of on-site natural gas pipelines and wells. These procedures shall be incorporated into final construction plans provided to DWR and DOGGR prior to the start of ground disturbance and shall describe what work, if any, would be performed on each well and/or pipeline and which wells and/or pipelines would be avoided during site excavation.</p> <p>Should mitigation of leaks, modification to well casing, or re-abandonment of wells or pipelines be necessary, EIP shall notify DOGGR in writing prior to commencing any such work. Should any natural gas wells or pipelines not previously documented be discovered during excavation, they shall immediately be reported to the Solano County recorder and DOGGR.</p>

HAZ-iii.	Hazardous emissions or handling of acutely hazardous materials, substances within one-quarter mile of an existing or proposed school	No Impact	No mitigation is proposed
HAZ-iv.	Location on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, resultant significant hazards to the public or the environment	No Impact	No mitigation is proposed
HAZ-v.	Safety hazards or excessive noise for people residing or working within an airport land use plan or in the vicinity of a public or public use airport	Less Than Significant	No mitigation is proposed
HAZ-vi.	Impairment or physical interference with implementation of an adopted emergency response plan or emergency evacuation plan	No Impact	No mitigation is proposed
HAZ-vii.	Exposure of people or structures to significant risk of loss, injury, or death involving wildland fires, including where	No Impact	No mitigation is proposed

	wildlands are adjacent to urbanized areas		
Hydrology and Water Quality			
HYDRO-i.	Violation of water quality standards or waste discharge requirements or substantial degradation of surface or groundwater quality	Less than Significant with Mitigation	<p><u>Mitigation Measure HYDRO-1: The contractor in charge of the Proposed Project construction shall obtain the NPDES permits required for construction and discharge of dewatering prior to the start of construction activities.</u></p> <p><u>Mitigation Measure HYDRO-2: Turbidity Monitoring Program</u></p> <p>The Basin Plan for the Delta Estuary⁶ contains turbidity objectives. Specifically, the plan states that where natural turbidity is less than 1 nephelometric turbidity unit (NTU), controllable factors shall not cause downstream turbidity to exceed 2 NTUs; where natural turbidity is between 1 and 5 NTUs, increases shall not exceed 1 NTU; where natural turbidity is between 5 and 50 NTUs, turbidity levels may not be elevated by 20% above ambient conditions; where ambient conditions are between 50 and 100 NTUs, conditions may not be increased by more than 10 NTUs; and where natural turbidity is greater than 100 NTUs, increases shall not exceed 10%.</p> <p>When water is flowing through the Proposed Project Site, the Proposed Project shall monitor turbidity approximately 500 feet downstream of construction activities to determine whether turbidity is being affected by construction. Grab samples shall be collected at a downstream location that is representative of the flow near the construction site. If there is a visible sediment plume being created from construction, the sample shall represent this plume. A sampling plan shall</p>

⁶California Regional Water Quality Control Board Central Valley Region. Revised 2018. *The Water Quality Control Plan (Basin Plan) for the California Regional Water Quality Control Board Central Valley Region.*

			<p>be developed and implemented based on specific site conditions and in consultation with the Central Valley Water Board.</p> <p>If turbidity limits exceed Basin Plan standards, construction-related earth-disturbing activities shall halt until sufficient turbidity limits can be met by application of BMPs specified in the NPDES Construction General Permit. DWR shall notify the Central Valley Water Board of the issue immediately and provide an explanation of the cause.</p>
HYDRO-ii.	Violation of water quality standards or substantial degradation of surface water quality due to erosion and sedimentation during post-construction operation	Less than significant	No mitigation is proposed
HYDRO-iii.	Violation of salinity standards for drinking water during post-construction operation	Less than Significant	No mitigation is proposed
HYDRO-iv.	Violation of salinity standards for agriculture during post-construction operation	Less than Significant	No mitigation is proposed
HYDRO-v.	Violation of salinity standards for fish and wildlife during post-construction operation	Less than Significant	No mitigation is proposed
HYDRO-vi.	Post-construction changes to tidal range that could affect in-Delta agricultural	Less than Significant	No mitigation is proposed

	water supplies and drainage		
HYDRO-vii.	Post-construction changes to tidal range that could affect in-Delta wetland and wetland riparian habitats	Less than Significant	No mitigation is proposed
HYDRO-viii.	Post-construction changes to wind-wave generated erosion	Less than Significant	No mitigation is proposed
HYDRO-ix.	Impacts on water temperature in the Delta	Less than Significant	No mitigation is proposed
HYDRO-x.	Risk of release of pollutants due to inundation from flood, tsunami, or seiche	Less than Significant	No mitigation is proposed
HYDRO-xi.	Impedance of sustainable groundwater management through decreased groundwater supplies or interference with groundwater	Less than Significant	No mitigation is proposed
HYDRO-xii.	Changes to flood flow and conveyance that could result in a potential increase to flood risk	Less than Significant	No mitigation is proposed
Mineral Resources			
MIN-i	Would the project result in the loss of availability of a known mineral resource	Less than Significant	No mitigation is proposed

	that would be of value to the region and the residents of the state?		
MIN-ii	Would the project result in the loss of availability of a locally important mineral resources recovery site delineated on a local general plan, specific plan, or other land use plan?	Less than Significant	No mitigation is proposed
Public Services			
PUB-i-ii	Adverse physical impacts associated with provision of new or physically altered fire or police protection facilities, the construction of which could cause significant environmental impacts	Less than Significant	No mitigation is proposed
PUB-iii	Adverse physical impacts associated with provision of new or physically altered schools, the construction of which could cause significant environmental impacts	No Impact	No mitigation is proposed
PUB-iv	Adverse physical impacts associated with provision of new or physically	Less than Significant	No mitigation is proposed

	altered parks, the construction of which could cause significant environmental impacts		
PUB-v1	Adverse physical impacts associated with provision of other new or physically altered public service facilities related to flood control, the construction of which could cause significant environmental impacts	Less than Significant	No mitigation is proposed
PUB-v2	Adverse physical impacts associated with provision of other new or physically altered public service facilities related to vector control, the construction of which could cause significant environmental impacts	Less than Significant	No mitigation is proposed
Recreation			
REC-i	Displacement of impacts to other shoreline fishing opportunities in the Delta	Less than Significant	No mitigation is proposed
REC-ii	Impacts resulting from any construction or expansion of parks and recreational facilities	Less than Significant	No mitigation is proposed

REC-iii	Impacts resulting from a loss of regional shoreline fishing opportunities	Less than Significant	No mitigation is proposed
Tribal Cultural Resources			
TCR-i	Adverse change in the significance of a tribal cultural resource that is listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in PRC section 5020.1(k) or on a resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of PRC Section 5024.1.	Less than Significant with Mitigation	<p><u>Mitigation Measure TCR-1a: Stop Work for Accidental Discoveries</u></p> <p>If indigenous archaeological resources are encountered during project development or operation, all activity within 100 feet of the find shall cease and the find shall be flagged for avoidance. DWR and a qualified archaeologist, defined as one meeting the U.S. Secretary of the Interior’s Professional Qualifications Standards for Archaeology and with expertise in California archaeology, shall be immediately informed of the discovery. The qualified archaeologist shall inspect the discovery and shall notify DWR of their initial assessment. Indigenous archaeological materials might include obsidian and chert flaked-stone tools (e.g., projectile points, knives, scrapers) or toolmaking debris; culturally darkened soil (midden) containing heat-affected rocks, artifacts, or shellfish remains; stone milling equipment (e.g., mortars, pestles, handstones, or milling slabs); and battered stone tools, such as hammerstones and pitted stones.</p> <p><u>Mitigation Measure TCR-1b: Tribal Cultural Resources Management Plan</u></p> <p>If the qualified archaeologist determines that the resource is or is potentially indigenous in origin, YDWN shall be contacted to assess the find and determine whether it is potentially a tribal cultural resource. If DWR determines, based on recommendations from YDWN, that the resource may qualify as a tribal cultural resource (as defined in Public Resources Code Section 21074), DWR shall consult with YDWN to develop and implement a tribal cultural resources management plan that outlines the background on and treatment measures for the resource. Treatment may include, as feasible, processing materials for</p>

			<p>reburial, minimizing handling of cultural objects, leaving objects in place within the landscape, returning objects to a location within the Proposed Project Site where they would not be subject to future impacts, avoidance, and treating with culturally appropriate dignity. Avoidance means that no activities associated with the Proposed Project Site may affect the tribal cultural resource. "Treating with culturally appropriate dignity" means taking into account the tribal cultural values and meaning of the resource through implementation of, but not limited to, the following measures:</p> <ul style="list-style-type: none"> • Protecting the cultural character and integrity of the resource • Protecting the traditional use of the resource • Protecting the confidentiality of the resource • Protecting the resource <p>DWR shall determine whether avoidance and such treatment are feasible, considering factors such as the nature of the find, project design, costs, and other considerations. If avoidance and the suggested treatment outlined above are not feasible, DWR shall consult with YDWN to determine treatment measures to minimize or mitigate any potential impacts on the resource pursuant to Public Resources Code Section 21083.2 and State CEQA Guidelines Section 15126.4.</p> <p>Construction work at the location of the find may commence only upon DWR authorization. Work may proceed in other parts of the Proposed Project Site while the mitigation is being implemented.</p>
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III. PROJECT DESCRIPTION

The section describes the objectives, proposed actions, responsible agencies, approvals and regional and local setting of the Proposed Project. Additional descriptions of the environmental setting as relates to each of the environmental issues analyzed in Section IV (Environmental Impact Analysis) of this Draft EIR are included within Sections IV.B - IV.I.

CEQA Guidelines Section 15125(a) states an EIR must include a description of the physical environmental conditions in the vicinity of the Proposed Project from both a local and regional perspective as they exist at the time the NOP is published, or if no NOP is published, at the time environmental analysis is commenced. This environmental setting normally constitutes the baseline physical conditions by which a lead agency determines whether an impact is significant. The NOP was prepared and circulated on March 21, 2019.

The following names will be used throughout this document to describe specific areas within the Proposed Project Site, as well as levees and sloughs within and adjacent to the Proposed Project Site:

- Bowsbey Property – Approximate 1,644-acre property in the northwestern portion of the Proposed Project Site bounded by Liberty Island Road to the north, Shag Slough to the west, Lookout Slough to the south, and Duck and Hass Sloughs to the west.
- Liberty Farms Property – Approximate 1,711-acre property in the southeastern portion of the Proposed Project Site bounded by Lookout Slough to the north, Lookout and Cache Sloughs to the west, the cross levee to the south, and Shag Slough to the east.
- Vogel Property – Approximate 51-acre property in the southwestern portion of the Proposed Project Site bounded by the Bowsbey Property to the north and Cache Slough to the south, east, and west.
- Shag Slough Levee – State Plan of Flood Control (SPFC) levee on the west side of Shag Slough, which borders the eastern boundaries of the Bowsbey and Liberty Farms Properties. The Shag Slough Levee is part of the Yolo Bypass West levee system.
- Cache/Hass Slough Levee – SPFC levee located on the north side of Cache and Hass Sloughs, which borders the southern boundaries of the Bowsbey and Liberty Farms Properties. The Cache/Hass Slough Levee is part of the Yolo Bypass West levee system.
- Cache/Hass Slough Training Levee – The Proposed Project includes improvements to the stability of the Cache/Hass Slough Levee and the Cross Levee. The improved levee would function to maintain stage differences between the Proposed Project Site and waters in Cache/Hass Slough during bypass flooding events. The Cache/Hass Slough Training Levee refers to the Cache/Hass Slough Levee and the Cross Levee in their modified post-project state and altered function.
- Duck Slough Setback Levee – Proposed SPFC setback levee proposed as part of the Yolo Bypass levee system, located on the eastern side of Duck Slough and the southern side of Liberty Island Road.

- Cross Levee – SPFC levee on the southern end of the Proposed Project Site, runs roughly west-east between Cache and Hass Sloughs.
- Vogel Levee – Existing agricultural levee located on the eastern, southern, and western boundaries of the Vogel property.
- Lookout Slough – Man-made drainage/water control channel that separates the Bowsbey and Liberty Farms Properties. Lookout Slough is not connected to Cache Slough and is not open to tidal inundation.
- Duck Slough – Man-made drainage/water control channel that forms the western boundary of the Bowsbey Property. Duck Slough is not connected to Hass Slough and is not open to tidal inundation.
- Sycamore Slough – Remnant of a historical slough, which is no longer connected to Hass Slough and is not open to tidal inundation.

The Proposed Project would restore within the Proposed Project Site approximately 3,164 acres of tidal marsh that would help satisfy DWR's obligations under Reasonable and Prudent Alternative (RPA) 4 of the 2008 United States Fish and Wildlife Service (USFWS) Delta Smelt Biological Opinion (BiOp) and is consistent with RPA I.6.1 of the 2009 National Marine Fisheries Service (NMFS) Salmonid BiOp for the coordinated operations of the State Water Project and the Central Valley Project. The Proposed Project would create habitat that is beneficial to Delta Smelt and other fish and wildlife species.

The Proposed Project was designed to provide multiple benefits, including improved flood conveyance. It would widen a portion of the Yolo Bypass to increase flood storage and conveyance, increase the resilience of levees, and reduce flood risk. Flood improvement elements as proposed are consistent with the Central Valley Flood Protection Plan, which calls for multi-benefit projects that expand the Yolo Bypass while incorporating ecosystem-enhancing features.

To accomplish this, a new setback levee would be constructed to the east of Duck Slough and south of Liberty Island Road. The Shag Slough Levee would be breached in nine locations to provide tidal inundation to the areas within the Bowsbey and Liberty Farms Properties. The Vogel Levee would also be breached in two locations to provide tidal inundation to the areas within the Vogel Property. These breaches would also allow food for Delta Smelt that is produced within the new tidal marsh areas to be exported to the waterways of the Cache Slough Complex. The Shag Slough Levee would also be lowered at two locations to allow floodwaters from the Yolo Bypass to be conveyed across and stored within the Proposed Project Site during flood events. The Cache/Hass Slough Levee would undergo a series of improvements, remain in place, and function as a training levee to maintain stage differences between the Proposed Project Site and Cache and Hass Sloughs.

When completed, the Proposed Project would provide upland, tidal, subtidal, and floodplain habitat for Delta Smelt, Longfin Smelt, Steelhead, Sacramento Splittail, Chinook salmon, giant garter snake, and other species.

1. PROJECT LOCATION AND SETTING

a. Regional Setting

The Proposed Project Site is an approximately 3,400-acre area located in unincorporated Solano County, California, with a very small portion of the Proposed Project extending into unincorporated Yolo County (Figure III-1). The Proposed Project Site is approximately 20 miles southwest of Sacramento and 50 miles northeast of San Francisco. It is bounded by Liberty Island Road on the north, Cache and Hass Sloughs on the south, Duck Slough on the west, and Shag Slough on the east. Solano County is considered part of the nine-county San Francisco Bay Area, but sits on its northeastern edge, and as such is also considered part of the Sacramento Metropolitan Region and the Central Valley. Eastern portions of the county, including the Proposed Project Site, are part of the Delta.

The Delta is a unique ecosystem and an important resource for the state of California. Sitting at the confluence of the Sacramento and San Joaquin Rivers, the Delta is home to or serves as a migratory path for many species, including special-status species such as the Delta Smelt and the Chinook Salmon. The Delta provides drinking water for over two-thirds of California's population and irrigation water for much of the state's multi-billion-dollar agricultural industry. The Delta landscape has changed significantly over time. Once a highly productive ecosystem of tidal marshes and floodplains, settlers in the 1800s reclaimed the Delta for agriculture, dredged and straightened its waterways to improve flood flow to the ocean, and built earthen levees to protect surrounding cities and communities. This engineered landscape has altered the Delta's natural flows, eliminated many natural land and water connections, and contributed to the loss of native vegetation, habitat, and food for fish and wildlife.

i. Regional Conservation

The Proposed Project Site is located within the Cache Slough Complex, a portion of the Delta that is important for conservation efforts. The Cache Slough Complex has been described by fisheries experts as having particularly strong potential to benefit native fish species, including the target special-status fish species of this Proposed Project: Delta Smelt, Longfin Smelt, Chinook salmon – Central Valley spring-run evolutionarily significant unit (ESU), Chinook salmon – Sacramento River winter-run ESU, and steelhead – Central Valley distinct population segment (DPS). It is also one of the few remaining places in the Delta where Delta Smelt are consistently found, with a portion of the population remaining in the region year-round.¹

¹ Department of Water Resources and Department of Fish and Wildlife, "Fish Restoration Program Cache Slough Complex Conservation Assessment. Volume 1: Characterization Report," November 2015.

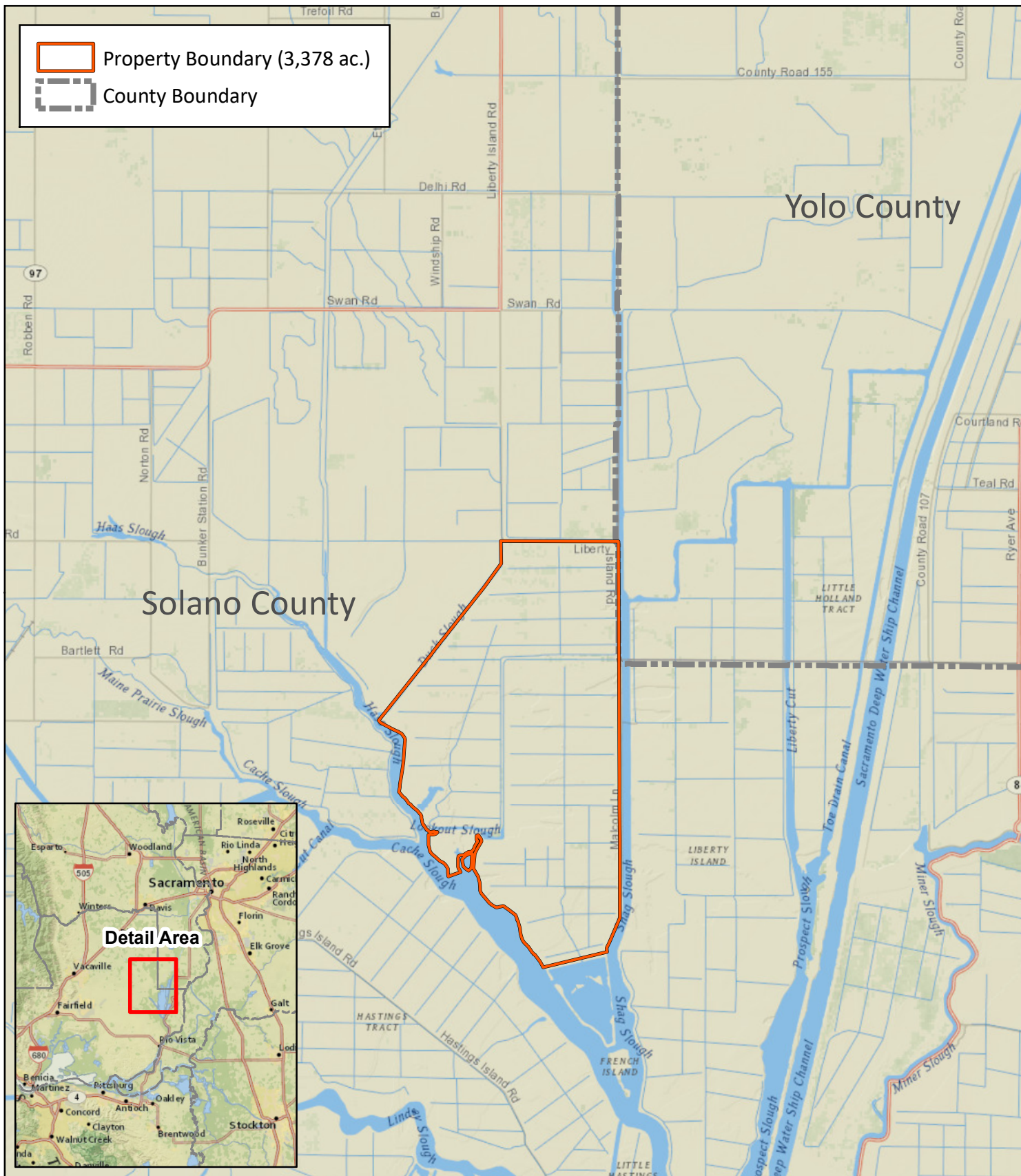


Figure III-1. Project Location

Lookout Slough Tidal Habitat Restoration and Flood Improvement Project



Prepared by:



Map Prepared Date: 12/7/2019
 Map Prepared By: njander
 Base Source: Esri - Nat. Geo.
 Data Source(s): WRA

Habitat restoration projects in and around the Cache Slough Complex aim to restore important habitat for Delta Smelt and other special-status species. In conjunction with other completed and in-progress projects in the area, the Proposed Project would contribute to 16,000 acres of nearly contiguous tidal marsh habitat in the Cache Slough Complex. This is important for Delta Smelt, which has rapidly declined in population in recent decades. Although reduced outflow and entrainment are among the most discussed causes of Delta Smelt's decline, a number of other factors contribute, likely synergistically. Such causes include increased competition for food, predation by non-native fish, water contamination, and alterations to the Delta's hydrology, salinity, turbidity, temperature, and other important indicators of the habitat's suitability for the Delta Smelt².

ii. Regional Flood Concerns

Construction of levees began in the Delta in the late 1800's and early 1900's to reduce seasonal flooding and support agricultural development while maintaining navigable channels for commerce. Later, in the early to mid-1900's, the Sacramento River Flood Control Project was built to address the Sacramento Basin's flooding and drainage problems. Levees were constructed and strengthened along the Sacramento River and Yolo Basin, and the Yolo Bypass Floodway was created. The State Plan of Flood Control (SPFC) includes the state and federal flood control works, lands, programs, plans, conditions, and modes of maintenance and operations of the Sacramento River Flood Control Project and flood control projects in the Sacramento and San Joaquin River watersheds.

Most non-SPFC levees were originally constructed to heights of 4 to 12 feet using organic Delta soil. This height proved inadequate to prevent flooding, and levees were subsequently built to be taller. Organic Delta soil also proved unsuitable for levee construction due to its tendency to quickly oxidize, leading to up to 1.5 inches of land subsidence annually. Many levees constructed in the late-1800s and early-1900s require repair and maintenance.

The potential costs to public health, safety, and the economic costs of island flooding due to levee failure are high; for example, the 2004 inundation of the Upper Jones Tract in nearby Contra Costa County cost over \$50 million in repairs and over \$100 million in damage. Delta levees are at risk of failure for a number of reasons, most prominently due to earthquakes and winter storms. Accounting for seismic risks, risks due to rainfall, and other "dry-weather risks", the mean annual probability of levee failure in the Delta generally ranges from 1% to 7% for various sub-regions. DWR assigns the Proposed Project Site and nearby areas an approximate 3 to 5% annual risk of levee failure;³ although other entities have estimated risk to be higher, with the U.S. Army Corps

² Peter Moyle et al., "Delta Smelt: Life History and Decline of a Once-Abundant Species in the San Francisco Estuary," *San Francisco Estuary and Watershed Science* 14, no. 2 (July 18, 2016), <https://doi.org/10.15447/sfews.2016v14iss2art6>.

³ California Department of Water Resources, "Delta Risk Management Strategy," February 2009, http://water.ca.gov/LegacyFiles/floodmgmt/dsmo/sab/drmsp/docs/drms_execsum_ph1_final_med.pdf.

of Engineers (Corps) assigning levees in the Proposed Project Site a 12.5% annual failure risk as recently as 2007.⁴

In the Cache Slough Complex, levee maintenance responsibilities are shared among DWR, the Corps, and local reclamation districts (RDs). Eastern Solano County has 21 RDs and one Levee Maintenance District that maintain levees protecting over 80,000 acres of land and 700 people. The state of California estimates that over \$12 billion in levee repairs are needed in the Delta; approximately \$900 million have been earmarked for this purpose recently.⁵

Lands within the Proposed Project Site are protected by levees maintained and operated by RD 2098. Adjacent lands are protected by levees maintained and operated by RD 2098, 2068, 2104, and 2060. Levee systems on the Proposed Project Site's perimeter along Cache Slough and Hass Slough are considered deficient due to lack of adequate freeboard and deferred maintenance over time, making them particularly vulnerable to increases in water level, erosion, or wind-wave run-up potential.⁶

iii. Regional Agriculture

Flood protection systems have enabled agricultural lands within the Delta to become some of the most productive in the state, with roughly 80% of Delta agricultural land classified as prime farmland.⁷

Delta agricultural production is geared towards a small number of types of crops, with the top ten crops accounting for 66% of production. Agricultural commodities in the Delta with the greatest economic impact include alfalfa, corn, wheat, and wine grapes. Though not one of the highest grossing agricultural activities in terms of economic impact, livestock grazing on irrigated pasture remains an important Delta agricultural activity and has a significant presence in the vicinity of the Proposed Project Site. Agriculture annually contributes 10,000 jobs and \$1.4 billion to the regional economy, with overall economic impact expanding past the Delta region and totaling \$5.4 billion.⁸ In Solano County, the agricultural industry is valued at approximately \$354 million annually.⁹

In Solano County, local government has utilized the California Land Conservation Act of 1965 (Williamson Act) to preserve agricultural land and open space. Approximately 62% (215,000

⁴ Michael Brandman Associates, "FINAL Municipal Service Review: Solano County Water, Irrigation, Reclamation, and Flood Management Agencies" (Solano County LAFCO, April 13, 2009), <http://www.solanolafco.com/Studies/MSR/SpecialDistricts/WaterMSRfinalApril132009.pdf>.

⁵ Public Policy Institute of California, "The Sacramento-San Joaquin Delta," October 2016, http://www.ppic.org/content/pubs/report/R_1016JM5R.pdf.

⁶ Wood Rogers, "Lookout Slough Restoration Project: Baseline Study for Flood Conveyance Optimization," June 2019.

⁷ University of the Pacific Eberhardt School of Business et al., "Economic Sustainability Plan for the Sacramento-San Joaquin Delta" (Delta Protection Commission, January 19, 2012), https://www.delta.ca.gov/files/2016/10/Final_ESP_w_Appendices_2012.pdf.

⁸ Heidi Williams and Delta Science Program, "Part Three: Delta as a Place," *Atavist*, May 6, 2018, <https://sacdeltaguide.atavist.com/part-three-delta-as-a-place>.

⁹ Agricultural Impact Associates, "Economic Effects of Solano County Agriculture: Baseline Assessment and Cache Slough Case Study," June 2017, <http://www.solanocounty.com/civicax/filebank/blobdload.aspx?blobid=27084>.

acres) of agricultural land in Solano County is under Williamson Act contracts. These contracts encompass 19,145 acres of prime farmland, 9,811 acres of non-prime farmland, and 4,581 acres of mixed prime and non-prime farmland. The majority of the Cache Slough Complex, including farmland and open space, is under Williamson Act contracts. Prime and non-prime farmland are both eligible for enrollment in Williamson Act contracts and are subject to a different set of rules for acceptable uses, as specified by the Solano County Williamson Act Guidelines.

Cache Slough Complex agriculture has an approximate annual economic impact of \$43 million and supports 171 jobs. There are approximately 53,000 acres in the Cache Slough Complex, approximately 38,133 of which (71.9%) are estimated to be used for agriculture. Top crops in the Cache Slough Complex include alfalfa, turf, and cucurbit, which together account for approximately 117 jobs. Irrigated pasture, which is cultivated throughout much of the Proposed Project Site, is responsible for roughly \$710,000 and two jobs in the region.¹⁰

The Cache Slough Complex contains approximately 13,721 acres of prime farmland, 3,730 acres of farmland of statewide importance, 2,113 acres of unique farmland, and 15,852 acres of grazing land.¹¹ There were approximately 139,459 acres of prime farmland, 7,159 acres of farmland of statewide importance, 11,031 acres of unique farmland, and 202,702 acres of grazing land across Solano County as of 2006.¹² The Cache Slough Complex therefore contains approximately 10% of Solano County's prime farmland, 52% of its farmland of statewide importance, 19% of its unique farmland, and 8% of its grazing land. By comparison, the Cache Slough Complex comprises roughly 9.1% of Solano County by area.

Agricultural operations in the region obtain their water from a variety of sources, but most agricultural water is sourced from rivers and reservoirs that flow into the Delta and local groundwater resources that are replenished with Delta infiltration and watershed runoff. The Cache Slough Complex supports many agricultural diversions and one municipal diversion through a series of pumps and gravity siphons varying in size from 15 to 30 inches in diameter. These include the Barker Slough Pumping Plant, RD 2068 diversions, the Ulatis Creek Flood Control Project, the Lisbon Weir, and several small agricultural diversions and drains.

b. Local Setting

The Proposed Project Site includes three adjacent properties, the Bowlsbey, Liberty Farms, and Vogel Properties (Figure III-2). The Proposed Project Site is located in the Liberty Island United States Geologic Service (USGS) 7.5-minute quadrangle, and neighbors several large protected areas including Liberty Island Ecological Reserve (Reserve), Liberty Island Conservation Bank, and Little Hastings Island Conservation Bank. It is bordered on the northwest by Duck Slough and on the east by Shag Slough. The southwestern boundary of the Proposed Project Site is formed

¹⁰ Agricultural Impact Associates, "Economic Effects of Solano County Agriculture: Baseline Assessment and Cache Slough Case Study."

¹¹ Agricultural Impact Associates, "Economic Effects of Solano County Agriculture: Baseline Assessment and Cache Slough Case Study."

¹² Solano County, "Solano County - General Plan," November 4, 2008, https://www.solanocounty.com/depts/rm/planning/general_plan.asp.

by Cache Slough and its tributary, Hass Slough, and the northern boundary of the Proposed Project Site is Liberty Island Road. Figure III-3 and Figure III-4 provide views of the Proposed Project Site

i. General Plan and Zoning Designation

The Proposed Project Site consists of irrigated agricultural land and managed wetlands. The Solano County General Plan designates the site and its surroundings as agricultural land with a resource conservation overlay. The Proposed Project Site is currently zoned A-80 (Exclusive Agricultural 80 acres).¹³ The Exclusive Agriculture designation, however, allows for resource conservation uses, including 1) conservation and mitigation banks; 2) tidal, managed, and seasonal wetland restoration; and 3) cultivation of plants and natural feed important to wildlife habitat.

ii. Proposed Project Site Land Use

Elevations within the Proposed Project Site are generally within the range for tidal and subtidal habitat that historically would have been inundated during daily tides prior to reclamation in the 1800s.¹⁴ This property is currently protected from tidal waters by a series of levees. As a result, the Bowsbey, Liberty Farms, and Vogel Properties currently support land uses including agriculture, ranching and recreation. The Bowsbey Property is used for irrigated pasture. The Liberty Farms Property is managed and operated as a private duck club. The Vogel Property was originally designed for duck hunting but has not been used for this purpose for over five years and is currently used for occasional grazing.

The Bowsbey Property is designated Prime Farmland and largely used as grazing land for cattle. It is evenly divided into nine agricultural fields, which are separated by earthen access roads and irrigation canals. Concrete v-ditches bisect each field. The Bowsbey Property was graded and infrastructure was constructed to provide irrigation for pasture land. Irrigation systems include pumps located along Cache, Hass, and Duck Sloughs, storage ponds, concrete ditches for distributing irrigation water, and a series of collection ditches and toe drains to collect and pump excess irrigation water back into Cache and Hass Sloughs.

¹³ Solano County Planning Department, "Solano County - Zoning Maps," accessed June 27, 2018, https://www.solanocounty.com/depts/rm/planning/zoning_maps.asp.

¹⁴ Sacramento - San Joaquin Delta Conservancy, "Delta Carbon Program | Delta Conservancy," 2015, <http://deltaconservancy.ca.gov/delta-carbon-program/>.

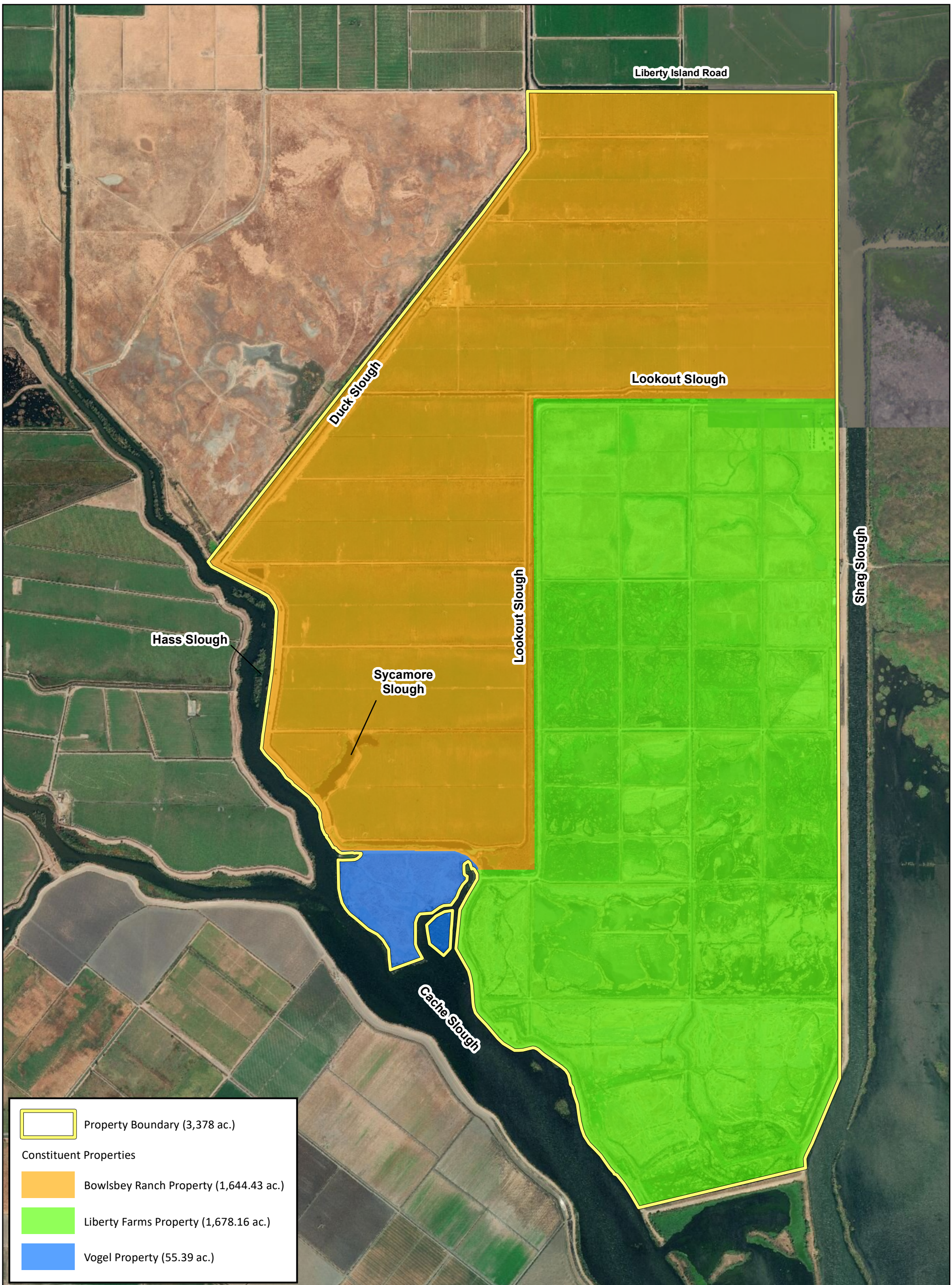
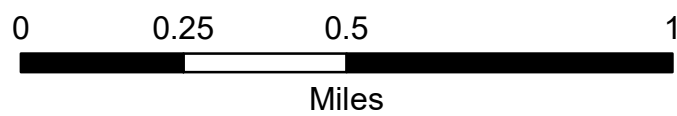


Figure III-2. Proposed Project Site Aerial with Property Boundaries



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Lookout Slough Tidal Habitat Restoration and Flood Improvement Project

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View 1. View of farm equipment on the Bowsbey Property looking east from Malcolm Lane Road.



View 2. View of the irrigated pasture of the Bowsbey Property looking west from Liberty Island Road during waterfowl migration.



View 3. View of the Vogel Property looking south from the Cache/Hass Slough Levee where Cache Slough connects via screw gates to Lookout Slough.



View 4. View of irrigation infrastructure within the Bowsbey Property, looking east from the Property's western edge.

Figure III-3. Views of the Proposed Project Site

Lookout Slough Tidal Habitat Restoration and Flood Improvement Project
Solano County, CA



View 1. View of the Bowsbey Property, looking north along drainage ditch that parallels Lookout Slough.



View 2. View of the Liberty Farms Property looking west from the Shag Slough Levee.



View 3. View of a managed wetland cell in southwest quadrant of the Liberty Farms Property, looking west from an internal access road.



View 4. View of a managed wetland cell in the Liberty Farms Property, looking west from the Property's eastern edge.

Figure III-4. Views of the Proposed Project Site

Lookout Slough Tidal Habitat Restoration and Flood Improvement Project
Solano County, CA



The Liberty Farms Property is subject of a USDA Wetland Reserve Program (WRP) easement, and contains water management infrastructure, which is used to flood and drain the wetland areas used for duck hunting. The components of the water management system include a gravity gate at the junction between Cache and Lookout Sloughs, a series of gravity gates along Lookout Slough, water distribution channels and gates throughout the Liberty Farms Property, toe drains, and pumps to drain water from the site. In general, water enters the site from Cache Slough into Lookout Slough, moves through the site from west to east to flood selected fields, and is then pumped into Shag Slough. The wetland areas within the Liberty Farms Property are flooded in late summer and drained in early spring. Duck club operations include growing corn cover crops to provide supplemental food to attract ducks during hunting season.

The Vogel Property was historically used for hunting ducks. The interior was divided into two basins. There is a central berm that separates the two basins. There is a flood gate that connects to Cache Slough, which can be opened and closed to flood or drain these areas. The property has not been used for duck hunting for the past 5 years and is occasionally used for grazing.

Both the Bowsbey and the Liberty Farms Properties contain several structures and buildings that were previously used for farm housing, storing equipment, and supplies. These would be properly demolished and removed by a licensed contractor. The Vogel Property has no structures on it.

iii. Surrounding Land Uses

The Proposed Project Site is adjacent to open space and agricultural lands on all sides (Figure III-5). Lands immediately north of Liberty Island Road and some areas west of Shag Slough are used as irrigated pasture. These lands are divided into fields with a few small buildings associated with agricultural production scattered throughout. Lands immediately west of Duck Slough have some small roads but are otherwise largely non-irrigated pasture. The Reserve is located immediately to the east of the Proposed Project Site, across Shag Slough. This partially flooded island is publicly owned and maintained as tidal marsh habitat. In addition to its main function as conservation land, the Reserve is primarily accessed by boat but can be accessed by foot across the Shag Slough Bridge and used for recreational purposes. It is open to the public for waterfowl hunting, bird watching, and fishing.

The immediate vicinity of the Proposed Project Site is almost entirely used for recreation, agriculture, and conservation. Approximately 2.5 miles east of the Proposed Project Site, the Sacramento River Deep Water Ship Channel is used for industry and commerce. The channel provides passage for large ships from the San Francisco and San Pablo Bays to the Port of West Sacramento.

iv. Topography

The topography within the Bowsbey and Liberty Farms Properties varies from approximately -2.0 feet North American Vertical Datum of 1988 (NAVD88) in the southeast to approximate 9.0 feet NAVD88 along the northern boundary and the northwest corner of the Bowsbey Property. The elevations within the Vogel Property vary from approximately 3.0 feet to 6.0 feet NAVD88. The majority of the Proposed Project Site is below the natural high tide elevations (6.5 feet NAVD88)

in the surrounding sloughs and would be subject to daily flooding if not isolated by the perimeter levee system (Figure III-6).

The Bowlsbey and Liberty Farms Properties are bordered by the Shag Slough and Cache/Hass Slough Levees. The elevation of the top of these SPFC levees is approximately 21.0 feet NAVD88. The Vogel Property is protected from tidal inundation by the Vogel Levee. The elevation of the top of this levee is approximately 9.0 feet NAVD88.

v. Infrastructure

The Proposed Project Site is traversed by large (greater than 500 kilovolt) electrical transmission lines with 13 pylons from the northeast corner to the southwest corner of the Proposed Project Site. These lines are owned and operated by Pacific Gas and Electric Company (PG&E), provide statewide service, and would remain in place. Smaller electrical distribution lines owned and operated by PG&E provide local service to the buildings and pumps within the Proposed Project Site. These service lines are supported by wooden poles. The majority of these lines and poles would be abandoned or removed as part of the project. The local electrical line serving the pump at the confluence of Duck Slough and Cache Slough would remain in place.

Recorded easements exist for the high voltage (greater than 500 kilovolt) transmission lines and the smaller distribution lines that parallel the canal separating the Bowlsbey and Vogel Properties. Existing easements are depicted in Figure III-7. The Proposed Project would include elevated peninsulas to facilitate access to the high voltage (greater than 500 kilovolt) transmission lines for maintenance. The smaller distribution lines would be removed and associated easements extinguished as part of the Proposed Project.

Adjacent to the Project Site to the north are power lines that convey power to the Rasmussen's property. These power lines are located on the south side of Liberty Island Road. The existing alignment would be in conflict with the footprint of the proposed Duck Slough Setback Levee and the Proposed Project would relocate these power lines to the north side of Liberty Island Road.

c. Project Context within Delta Regional Restoration Efforts

The Proposed Project Site is located at a unique landscape position in the northern Delta. It is part of the Cache Slough Complex, a 53,000-acre region in the northern Delta composed of extensive diked lands mostly in agricultural use; flooded islands containing tidal marsh and shallow tidal open waters and sloughs; and the southern end of the Yolo Bypass.



View 1. View of adjacent, tidally restored lands along Cache Slough looking towards French Island from the southern end of the Bowsbey Property.



View 2. View of the Liberty Island Ecological Reserve looking east across Shag Slough from Liberty Island Road.



View 3. View of agricultural lands adjacent to the Project Site looking north from Liberty Island Road.



View 4. View of the structurally deficient bridge over Shag Slough and to the Liberty Island Ecological Reserve looking east from the Shag Slough Levee.

Figure III-5. Views of Adjacent Land Uses

Lookout Slough Tidal Habitat Restoration and Flood Improvement Project
Solano County, CA



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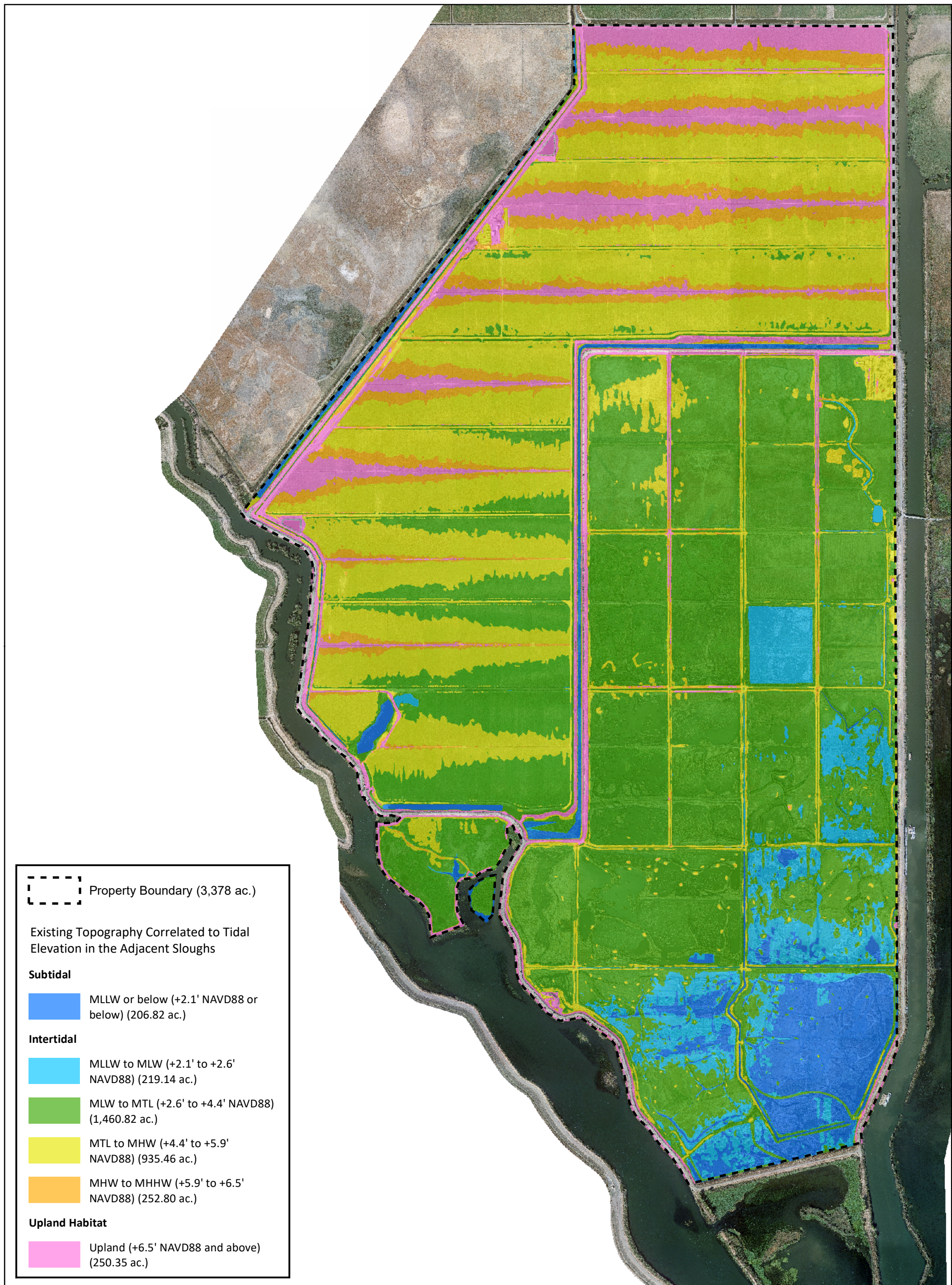
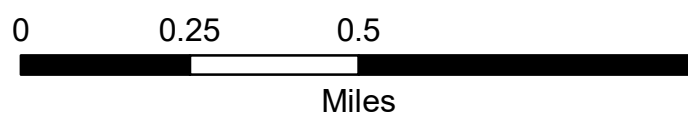


Figure III-6. Existing Topography Within the Property Boundary

Lookout Slough Tidal Habitat Restoration and Flood Improvement Project



Ecosystem Investment Partners

Prepared by:



Map Prepared Date: 12/6/2019
Map Prepared By: njander
Base Source: Wood Rogers
Base Date: 10/24/17
Data Source(s): WRA

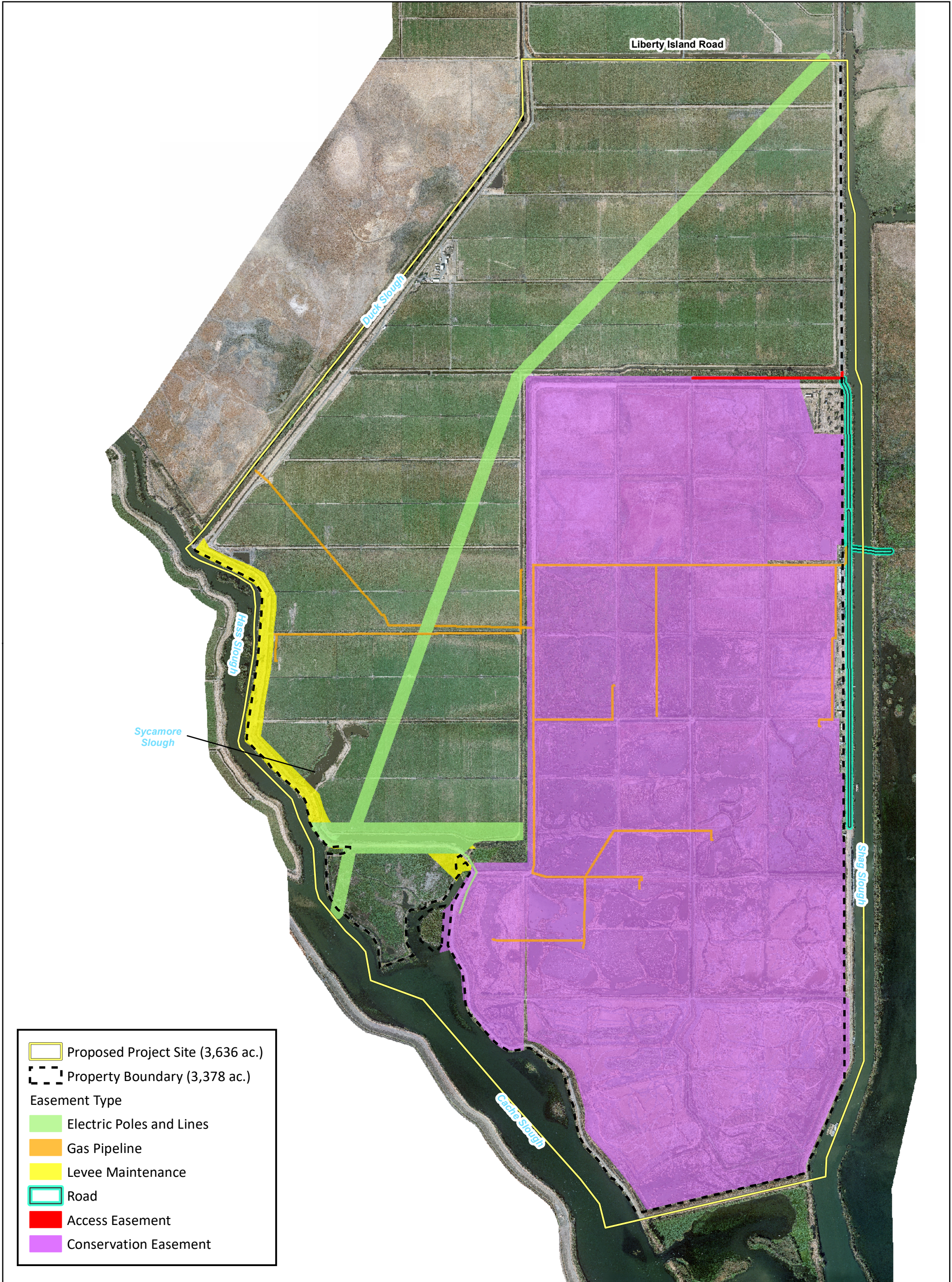
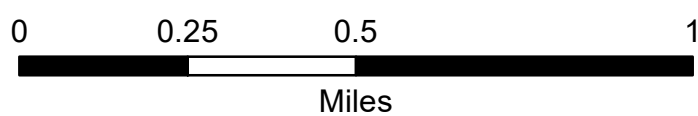


Figure III-7. Existing Easements

Lookout Slough Tidal Habitat Restoration and Flood Improvement Project



Map Prepared Date: 12/6/2019
 Map Prepared By: njander
 Base Source: Wood Rogers
 Base Date: 10/24/17
 Data Source(s): WRA



The landscape position and identified ecological functions of the Cache Slough Complex, in combination with its sparse urban development and infrastructure, relatively intact hydrologic connections to tidal influence, and little land subsidence as compared with the central Delta, have made the region a focus for ecosystem restoration since the early development of the CALFED Bay-Delta Program (CALFED) Ecosystem Restoration Program in the 1990s.

The Proposed Project Site is within the Plan Area of the Solano County Water Agency's Solano Multispecies Habitat Conservation Plan¹⁵. Use of the Proposed Project Site is consistent with the Plan's Coastal Marsh Natural Community goals and objectives, which apply to all marsh habitats within the historic influence of tidal action, including areas that are currently influenced by tidal action or are diked and no longer affected by tides. One of the stated goals of the Plan is to "contribute to enhancing essential ecological processes, functions, and values; species diversity; and habitat heterogeneity of coastal marsh habitat within the Plan Area".¹⁶ The Proposed Project Site was historically influenced by tidal action and the proposed restoration would re-establish tidal activity and enhance ecological processes, species diversity, and habitat heterogeneity through the creation of subtidal, intertidal, and floodplain habitat.

The Delta Stewardship Council (Council) was established through the Delta Reform Act of 2009, and was created to advance the state's co-equal goals in the Delta of 1) providing a more reliable water supply for California; and 2) protecting, restoring, and enhancing the Deltas ecosystem; both goals must be met in a manner that protects and enhances the unique cultural, recreational, natural resource, and agricultural values of the Delta as an evolving place.¹⁷ The Council's plan to achieve this directive is laid out in the Delta Plan (2013, amended 2018). The Proposed Project Site lies within one of the Delta Plan's designated Priority Habitat Restoration Areas.

d. Project Context within Regional Flood Protection Plans

The Central Valley Flood Protection Board (CVFPB) adopted the Central Valley Flood Protection Plan in 2012, which includes the framework for multi-benefit projects that are designed to reduce flood risk, enhance fish and wildlife habitat, and create additional public benefits, such as sustaining agricultural production, improving water quality, increasing groundwater recharge, supporting commercial fisheries, and providing public recreation opportunities.

In the Central Valley Flood Protection Plan 2017 Update, proposed options to increase flood capacity through multi-benefit projects were further detailed. Among these options was a proposal to expand the Yolo Bypass with associated ecosystem and multi-benefit improvements. The

¹⁵ "Solano County Water Agency : Solano Multispecies Habitat Conservation Plan," accessed August 20, 2019, <http://www.scwa2.com/water-supply/habitat/solano-multispecies-habitat-conservation-plan>.

¹⁶ "Solano County Water Agency : Solano Multispecies Habitat Conservation Plan," accessed August 20, 2019, <http://www.scwa2.com/water-supply/habitat/solano-multispecies-habitat-conservation-plan>.

¹⁷ Delta Stewardship Council, "The Delta Plan: Ensuring a Reliable Water Supply for California, a Healthy Delta Ecosystem, and a Place of Enduring Value" (Sacramento, April 26, 2018).

Proposed Project helps fulfill the objectives put forth in the Central Valley Flood Protection Plan by improving fish and wildlife habitat and increasing flood conveyance in the Yolo Bypass.¹⁸

Flood control systems in the vicinity of the Proposed Project Site are mostly managed by RD 2098 and RD 2068. These entities are charged with maintenance and operation of levees, sloughs, canals, pumps, and other flood protection structures within their area of jurisdiction. As flood control systems in the Delta function as an interconnected network, inundation of the Proposed Project Site may have implications for nearby RDs, potentially altering flood risk in the area and modifying the capacity of nearby levees to provide flood protection. Accordingly, hydraulic models were developed to inform the Proposed Project design and to evaluate probable changes to regional hydrology for the Proposed Project alone and in conjunction with nearby related projects. The findings of these models are discussed in Chapter IV.F, Hydrology and Water Quality.

Following the Proposed Project's completion, RD 2098 would be responsible for maintaining the Duck Slough Setback Levee. DWR would be responsible for maintaining the Cache/Hass Slough Training Levee and the Shag Slough Levee north of the northernmost breach, where an access-controlled boat launch for use by public agencies would be constructed. The Shag Slough Levee would no longer serve in a flood control capacity and would accordingly not be maintained for that function. The Proposed Project's potential impacts on levee maintenance operations are discussed in Chapter IV.H, Public Services.

e. Pre-Project Actions that Affect the Proposed Project Site

Phase I and Phase II Environmental Site Assessments (ESAs) were prepared for the Proposed Project Site. The current landowner is in the process of removing hazardous materials and structures at the site that represent safety risks as part of an ongoing land acquisition and management program. This includes the removal of buildings and other agricultural related structures that pose a safety risk and the removal of hazardous materials that were identified as part of the Phase I and Phase II ESAs completed for the Proposed Project Site (Appendices J-M). The remediation of hazardous materials is being performed in accordance with State guidelines. These actions are independent of the Proposed Project and will be completed before the start of Proposed Project.

2. PROJECT GOALS AND OBJECTIVES

a. Background

The Lookout Slough Tidal Habitat Restoration and Flood Improvement Project is proposed to help satisfy DWR's obligation to restore 8,000 acres of tidal marsh per the 2008 USFWS BiOp and the 2009 NMFS BiOp, and to increase flood storage and conveyance, increase the resiliency of levees, and reduce flood risk within the Yolo Bypass. The Proposed Project is part of the California EcoRestore Initiative, which seeks to restore and/or enhance 30,000 acres of habitat in the Delta and Suisun Marsh.

¹⁸ Sacramento Area Flood Control Agency (SAFCA) and MBK Engineers, "Flood Element of Lookout Slough Multi-Beneficial Project," June 15, 2017.

The Proposed Project is also part of the Fish Restoration Program (FRP). On October 18, 2010, DWR and the California Department of Fish and Wildlife (CDFW) signed an agreement regarding implementation of the FRP to satisfy the 2008 and 2009 BiOps and a 2009 CDFW Incidental Take Permit. The agreement signed between the agencies commits CDFW to work cooperatively with and assist DWR to establish the management and financial framework necessary to implement a FRP that would satisfy DWR's obligations. Program structure, restoration principles, and action components are described in the FRP Agreement Implementation Strategy.

The goals of the FRP, as mutually agreed upon by DWR and CDFW, are to:

- identify and implement actions that would address the habitat restoration requirements of the BiOps and incidental take permit;
- facilitate interagency planning discussions to achieve the above goal;
- facilitate interagency project planning forums to achieve a process that would include public openness and the interests of stakeholders;
- utilize and incorporate sound science and current available information in developing restoration and enhancement designs; and
- maintain consistency with the DSC's Delta Plan and other large-scale planning efforts.

These goals are meant to be attained by the following actions:

- restore 8,000 acres of intertidal and associated subtidal habitat in the Delta and Suisun Marsh, including 800 acres of mesohaline habitat to benefit Longfin Smelt, to enhance food production and availability for native Delta fishes;
- restore processes that would promote primary and secondary productivity and tidal transport of resources to enhance the pelagic food web in the Delta;
- increase the amount and quality of salmonid rearing and other habitat; and
- increase through-Delta survival of juvenile salmonids by potentially improving beneficial migratory pathways.

b. Project Objectives and Goals

The Lookout Slough Tidal Habitat Restoration and Flood Improvement Project is designed to achieve the goals and objectives identified below.

Goal 1:

Create and maintain a diverse landscape of intertidal and associated subtidal habitat that supports habitat elements for native species and improved food productivity within the Project area.

Objectives:

- a. Improve primary and secondary productivity and food availability for Delta Smelt and other native fishes within the Proposed Project Site and the immediate tidal sloughs surrounding the Proposed Project Site.
- b. Improve rearing habitat for Delta Smelt, salmonids, and other native fish.

- c. Promote suitable spawning habitat with appropriate water velocities and depths accessible for Delta Smelt within the Proposed Project Site and the immediate tidal sloughs surrounding the Proposed Project Site.
- d. Increase on-site diversity of foraging, breeding, and refuge habitat conditions for aquatic and terrestrial wetland-dependent species.
- e. To the greatest extent practical, preserve existing topographic variability to allow for habitat succession and resilience against future climate change.
- f. To the greatest extent practical, avoid promoting conditions adverse to Proposed Project biological objectives, such as those that would favor establishment or spread of invasive exotic species.

Goal 2:

Design and implement a Project that also supports viable populations of special-status aquatic and terrestrial species.

Objectives:

- a. Minimize temporary effects to special-status aquatic and terrestrial species when implementing Proposed Project activities (e.g., earth disturbance and vegetation management activities).
- b. Include habitat elements for special-status aquatic and terrestrial species.

Goal 3:

Provide additional flood storage and conveyance within the Yolo Bypass to reduce the chance of catastrophic flooding and protect existing nearby infrastructure (e.g., agriculture, power, and human habitation).

Objectives:

- a. Protect existing nearby infrastructure surrounding the Proposed Project Site and avoid any adverse flood-related impacts in the region.
- b. Provide flood management benefits by reducing flood stages in the lower part of the Yolo Bypass.

3. PROJECT DESCRIPTION

a. Summary of Project Elements

The Proposed Project would restore approximately 3,164 acres of tidal marsh that would help satisfy DWR's obligations under RPA 4 of the 2008 Delta Smelt BiOp and is consistent with RPA I.6.1 of the 2009 NMFS Salmonid BiOp for the coordinated operations of the State Water Project and the Central Valley Project. The Proposed Project would create habitat that would benefit wildlife, including Delta Smelt, salmonids, giant garter snake, and other species, widen a portion of the Yolo Bypass to increase flood storage and conveyance, increase the resiliency of levees, and reduce flood risk.

The Proposed Project consists of levee modifications (including setback), grading to achieve suitable elevation for tidal inundation, and ecosystem restoration and monitoring. The proposed design concept is presented in Figure III-9 and approximate present and future habitat acreages are outlined in Table III-1.

Upon completion, the Proposed Project would protect approximately 3,400 acres of open space in permanence, including approximately 3,164 acres of tidal marsh and subtidal habitat within the Proposed Project Site that would provide suitable habitat for target species such as Delta Smelt (*Hypomesus transpacificus*), Longfin Smelt (*Spirinchus thaleichthys*), Chinook Salmon - Central Valley spring-run evolutionarily significant unit (ESU) (*Oncorhynchus tshawytscha*), Chinook Salmon - Sacramento River winter-run ESU (*Oncorhynchus tshawytscha*), and Steelhead - Central Valley Distinct Population Segment (DPS) (*Oncorhynchus mykiss*). Additionally, the Proposed Project would create over 40,000 acre-feet of transitory flood storage at the Delta confluence.

Elements of the Proposed Project are discussed in greater detail below and the overall concept is depicted in Figure III-8 and Figure III-9. In summary, proposed elements include:

- 1) Prepare the Proposed Project Site for construction through activities including dewatering, clearing, constructing access roads, and preparing staging areas, for the purpose of implementing all of the following actions.
- 2) Perform invasive plant species control within the areas of disturbance, for the purpose of reducing the potential for ecological impairment caused by invasive species within the restoration site and surrounding areas.
- 3) Remove old infrastructure and debris including buildings, agricultural equipment, water control structures, and site-specific utilities.
- 4) Excavate competent soils from on-site borrow areas for use in creating the Duck Slough Setback Levee.
- 5) Create Duck Slough Setback Levee to protect properties to the north and west of the Proposed Project Site from inundation.
- 6) Complete improvements to Cache/Hass Slough Levee project-side slope and levee crown for long-term stability.
- 7) Excavate ponds to create aquatic foraging habitat for giant garter snake.
- 8) Construct raised peninsulas that provide vehicular access for PG&E transmission tower maintenance, and summer basking habitat and winter refugia for giant garter snake.
- 9) Excavate tidal channels throughout the Bowlsbey, Liberty Farms, and Vogel Properties to facilitate full tidal hydrology within the Proposed Project Site and tidal connectivity between the Proposed Project Site and the Cache Slough Complex.
- 10) Dispose of unused excavated soils within the interior of the site in a manner that is consistent with the ecological goals of the Proposed Project.

- 11) Install temporary cofferdams at all outboard breach locations during the appropriate work window to allow for all excavation at breach locations to have flexible timing.
- 12) Degrade portions of the Shag Slough Levee to allow flood waters to be stored within and conveyed across the Proposed Project Site.
- 13) Excavate nine levee breaches in the Shag Slough Levee for the purpose of restoring tidal connectivity.
- 14) Excavate two levee breaches in the Vogel Levee for the purpose of restoring tidal connectivity.
- 15) Create spawning habitat for Delta Smelt.
- 16) Replant riparian and other vegetation such as rare plants and erosion control vegetation.
- 17) Create a boat launch for use by DWR and CDFW staff to perform scientific monitoring.
- 18) Post-construction operations and maintenance of the habitat areas, new Duck Slough Setback Levee, the Cache/Hass Slough Training Levee including the Cross Levee, and the Shag Slough Levee segment north of the agency boat launch.
- 19) Vacate a portion of Liberty Island Road and relocate the existing residential electrical service to the north side of Liberty Island Road.

b. Anticipated Future Habitat Conditions

The Proposed Project would restore approximately 3,164 acres of tidal marsh habitat including intertidal and shallow subtidal habitats including a network of tidal channels. This would provide rearing, foraging, spawning, and flood refugia habitat for Delta Smelt, as well as rearing habitat and flood refugia for other target fish species including Longfin Smelt, winter and spring-run Chinook salmon, and steelhead. The Proposed Project would also provide conditions for primary and secondary food production for Delta Smelt and facilitate export of these food resources from the Proposed Project Site into and throughout the Cache Slough Complex.

The majority of the Proposed Project Site exhibits elevations within the intertidal habitat range. Physical conditions including salinity, temperature, and turbidity of adjacent waterbodies are presently suitable for target special-status fish species and would remain so upon Proposed Project implementation.

The Proposed Project would include habitat for giant garter snake to ensure that there is sufficient habitat to support the snake. This includes foraging ponds that would support prey species such as juvenile fish and amphibians. This also includes summer basking habitat along portions of the upland peninsulas and along the slopes of the levees. This also includes opportunities for winter refugia at the higher elevations along the upland peninsulas and the areas on the landside of the Duck Slough Setback Levee between this levee and Duck Slough.

Hydrology is considered to be the single most important determinant for establishing and maintaining wetland processes. Restoring tidal hydrology to the Proposed Project Site would allow for establishment and growth of emergent vegetation such that ecological processes

including food web production occur naturally within the Proposed Project's tidal marsh areas. Tidal channel networks provide important low resistance pathways for exporting food into and throughout the Cache Slough Complex, which is important for the recovery of Delta Smelt and other target fish species. The Proposed Project's channel network was designed to provide maximum habitat benefit by delivering full or new full tidal hydrology throughout the restored tidal areas. The resulting habitats are described in Table III-1.

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Table III-1. Existing and Future Habitat Conditions for the Lookout Slough Tidal Habitat Restoration and Flood Improvement Project

Habitat type	Existing (acres)	Future (acres)	Net Habitat Change*
Marsh and Wetland			
Intertidal emergent marsh and mud flats	5	2,762	+2,757
Shallow subtidal including tidal sloughs and tidal channels	195	615	+420
Coastal and Valley Freshwater Marsh	1,127	6	-1,121
Non-tidal Open water	142	12	-130
Food Production			
Food production for Delta Smelt and other target fish species	200	3,377	+3,177
Food production for ducks	1,120	2,740	+1,719
Giant Garter Snake Habitat			
Aquatic foraging	164	216	+52
Emergent foraging and refugia	0	2,147	+2147
Terrestrial summer basking	561	228	-333
Terrestrial winter refugia	127	24	-103
Fish Habitat			
Spawning areas for Delta Smelt	0	0.25	+0.25
Open water for Delta Smelt and other target fish species	195	615	+420
Upland Habitat			
Great Valley mixed riparian forest	36	38	+2
Non-Native Grassland	487	193	-294
Developed	293	0	-293
Irrigated Pasture	1,364	0	-1,364

*This table was developed for impact analysis purposes and includes the Proposed Project Site as well as areas immediately outside the property boundary with potential to be impacted.

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c. Description of Project Components and Construction Activities

The Proposed Project consists of a suite of components and construction activities to implement habitat restoration and flood improvement goals. The activities include pre-construction site preparation, infrastructure removal, and earthwork to create the new Duck Slough Setback Levee, creating breaches and channels necessary to create tidal marsh and subtidal habitat, and lowering portions of the Shag Slough Levee. Figure III-9 depicts a general design schematic for the Proposed Project. Table III-2 provides estimated material quantities and dimensions for the restoration activities and features of the Proposed Project below.

d. Construction Activities

i. Pre-Construction Site Preparation

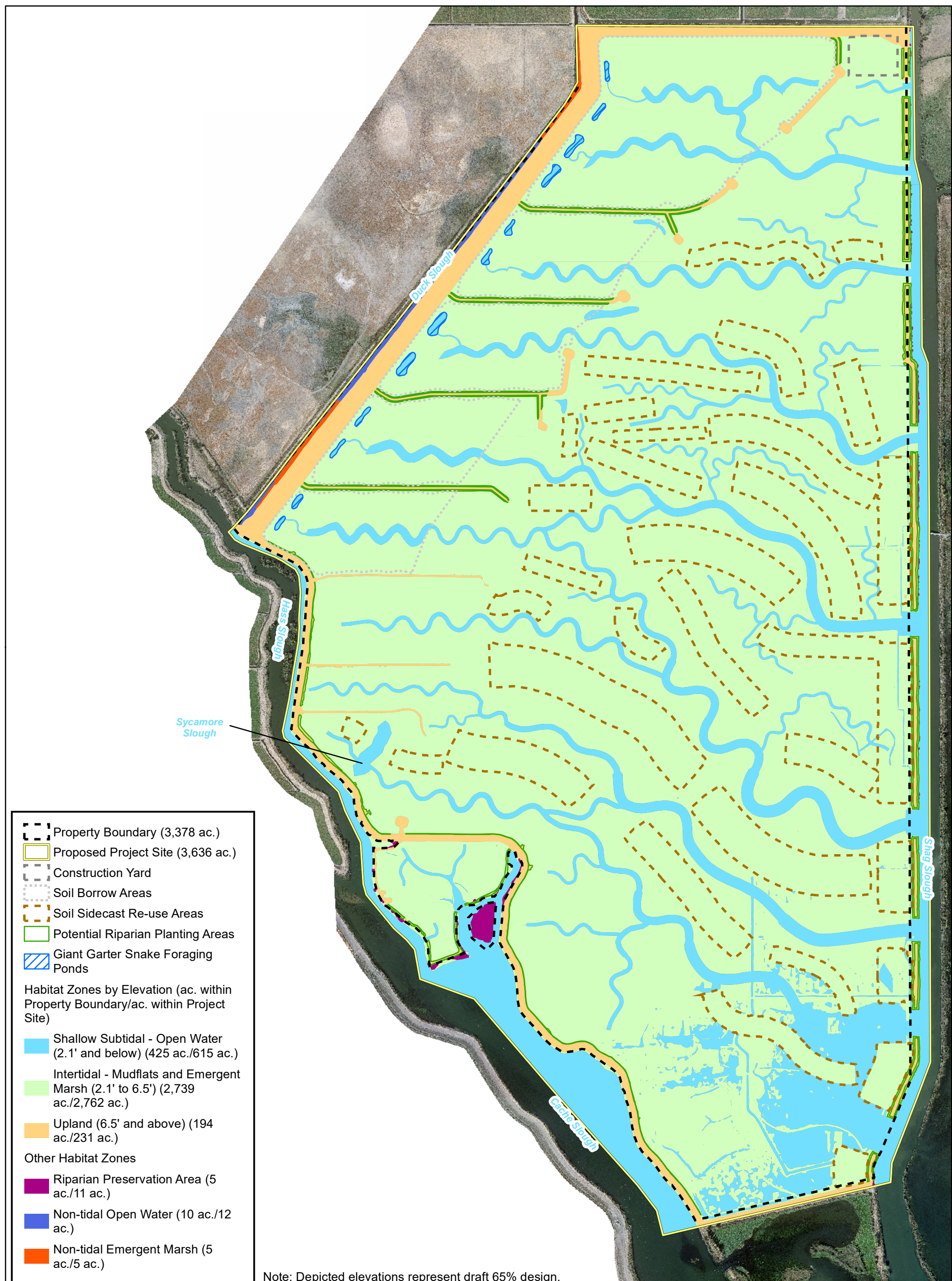
Pre-construction site preparation would be conducted to facilitate equipment operations and access during construction and begin invasive plant control activities. Pre-construction site preparation would include dewatering, vegetation clearing, invasive species control, removal of infrastructure associated with Cache/Hass Slough Training Levee, and staging area establishment. Each of these activities are discussed in greater detail below.

Dewatering

The existing water control system would be used to dewater many of the internal water features of the Project site such as ponds, irrigation ditches, drainage ditches, toe drains, and water distribution channels. More specifically, irrigation ditches within the Bowsbey Property, toe drains within the Bowsbey and Liberty Farms Properties, water distribution channels within the Liberty Farms Property, irrigation transfer ponds within the Bowsbey Property, and Lookout Slough would be dewatered. This process would temporarily lower the water table, which would facilitate the excavation of material suitable for Duck Slough Setback Levee construction, enable the use of heavy construction equipment, and allow channel excavation to occur in relatively dry soil. Once construction is complete, dewatering activities would cease and ground and surface water would be allowed to rebound to its natural elevations.

In general, dewatering would consist of a phased approach moving water incrementally across the Proposed Project Site by using the existing water conveyance infrastructure to draw down water levels. Dewatering is expected to start from the northwest with the Bowsbey Property and Lookout Slough, after which the Liberty Farms Property would be dewatered. In general, water would be drained from the northwest to the southeast corner of the Proposed Project Site, where existing pumps would be used to pump water into Shag Slough. Settling basins would be installed in the vicinity of each pump, and drainage water would be stored within the basins long enough to remove suspended solids prior to discharge into Shag Slough.

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Legend

- Property Boundary (3,378 ac.)
- Proposed Project Site (3,636 ac.)
- Construction Yard
- Soil Borrow Areas
- Soil Sidecast Re-use Areas
- Potential Riparian Planting Areas
- Giant Garter Snake Foraging Ponds

Habitat Zones by Elevation (ac. within Property Boundary/ac. within Project Site)

- Shallow Subtidal - Open Water (2.1' and below) (425 ac./615 ac.)
- Intertidal - Mudflats and Emergent Marsh (2.1' to 6.5') (2,739 ac./2,762 ac.)
- Upland (6.5' and above) (194 ac./231 ac.)

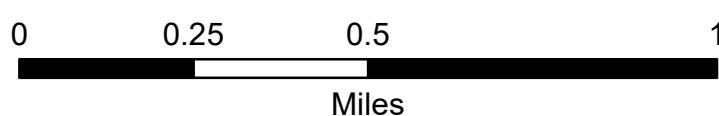
Other Habitat Zones

- Riparian Preservation Area (5 ac./11 ac.)
- Non-tidal Open Water (10 ac./12 ac.)
- Non-tidal Emergent Marsh (5 ac./5 ac.)

Note: Depicted elevations represent draft 65% design.

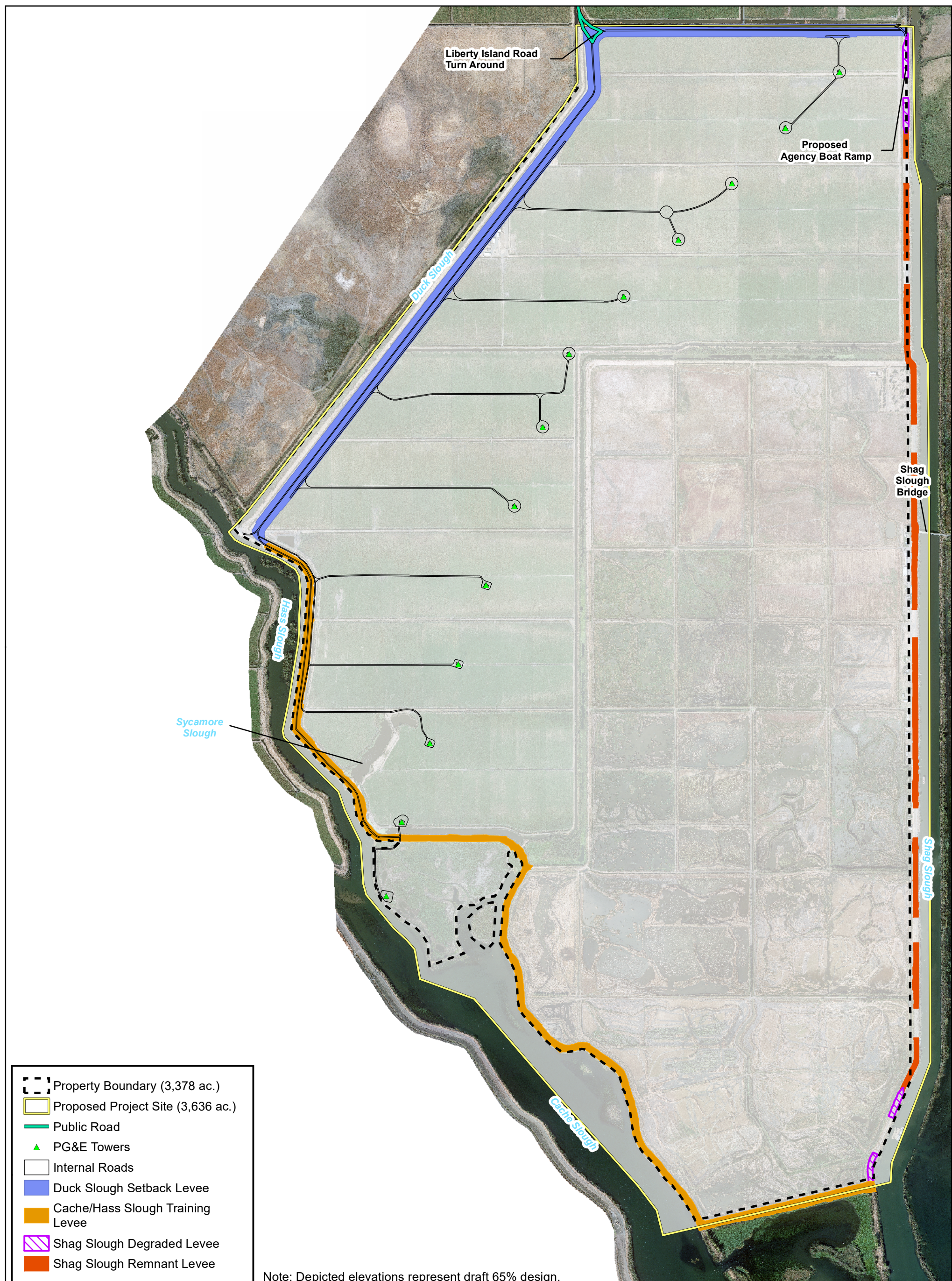
Figure III-8. Proposed Habitat Concept

Lookout Slough Tidal Habitat Restoration and Flood Improvement Project



Prepared by:



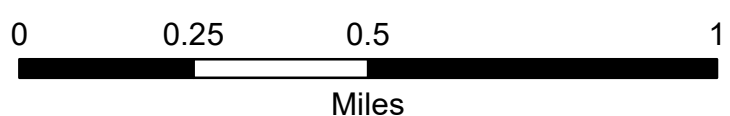


- Property Boundary (3,378 ac.)
- Proposed Project Site (3,636 ac.)
- Public Road
- PG&E Towers
- Internal Roads
- Duck Slough Setback Levee
- Cache/Hass Slough Training Levee
- Shag Slough Degraded Levee
- Shag Slough Remnant Levee

Note: Depicted elevations represent draft 65% design.

Figure III-9. Proposed Infrastructure

Lookout Slough Tidal Habitat Restoration and Flood Improvement Project



Prepared by:



Dewatering would be performed in a manner which would facilitate the volitional movement of giant garter snake out of the Proposed Project Site or to the southeast corner of the property, where a temporary giant garter snake habitat area (GGS protected area) would be maintained throughout the majority of construction activities. The GGS protected area would be located in an area that is outside the limit of disturbance of construction activities. The GGS protected area would provide giant garter snakes with foraging, basking, and winter refugia habitat for the duration of construction and an opportunity to leave the Proposed Project Site and move into Shag or Cache Sloughs.

Vegetation Clearing

Most vegetation, including the emergent vegetation from the managed wetlands of the Liberty Farms and Vogel Properties, and trees and shrubs from Liberty Farms Property would be cleared prior to construction to enable earth work. The top layer of soil and vegetation would be removed from the Duck Slough Setback Levee alignment area, borrow areas for the Duck Slough Setback Levee, and the Cache/Hass Slough Levee improvement area and placed in non-structural fill areas on-site. Additionally, areas selected for temporary construction staging would be cleared of vegetation and debris. Designated staging areas would be established at various locations distributed throughout the Proposed Project Site.

Vegetation clearing activity would require a variety of construction equipment and methods. Smaller trees, brush, and debris would be cleared using a combination of bulldozers, excavators, and wheel loaders. Larger trees within areas designated for clearing may need to be cut down and cut into pieces with chainsaws. Large woody debris such as large tree trunk/limbs and root wads would be reused on-site to enhance habitat structure to the extent practical. Areas outside the limit of grading and the limit of disturbance would remain vegetated. These areas include the outside slopes of the Shag Slough Levee slopes of the Shag Slough, Cache/Hass Slough, and Vogel Levees, southern portions of the Liberty Farms Property, and Duck and Sycamore Sloughs. Upon completion of construction, revegetation of the site would occur via a mix of natural recruitment and active planting, as further detailed below.

Invasive Species Control

As part of the clearing process, target invasive plant species would be mechanically removed and/or sprayed. These would subsequently be processed and disposed of or buried on-site. Targeted invasive species include but are not necessarily limited to: Common reed (*Phragmites australis*), pampas grass (*Cortaderia selloana*), giant reed (*Arundo donax*), Brazilian waterweed (*Egeria densa*), water hyacinth (*Eichhornia crassipes*), spongeplant (*Limnobiium laevigatum*), red sesbania (*Sesbania punicea*), and water primrose (*Ludwigia* spp.).

Infrastructure and Debris Removal

Infrastructure associated with farming and duck hunting would be removed from the Proposed Project Site. Infrastructure slated for removal includes livestock fencing, concrete-lined ditch, concrete pads, pumps and associated pipes and control structures, stock and agricultural fuel

tanks, utility poles, trash and material piles, and structures such as residences, office and farm buildings, and storage units. Approximate removal quantities are outlined in Table III-2.

Table III-2. Existing Infrastructure for Removal

Feature Type	Feature Count	Approximate Length (feet)	Approximate Area (square feet)
Six-Foot Wide Concrete-Lined Ditch	-	56,300	337,800
Concrete Pad	7	-	5,300
Fence	-	208,500	-
Pump	8	-	-
Stock and Agricultural Fuel Tanks	12	-	-
Trash/Material Pile	8	-	2,750
Structure (e.g. farm buildings)	103	-	114,320
Utility Pole	219	-	-

Abandoned Gas Wells and Gas Pipes

The Project Site contains gas wells and a network of distribution pipes. The gas wells have been previously capped and decommissioned in compliance with the California Department of Conservation, Division of Oil, Gas, and Geothermal Resources (DOGGR) regulations. The Proposed Project would leave decommissioned wells in place and they would not be disturbed during construction unless required for grading. Abandoned gas pipes would be cut and removed in areas where they would interfere with excavation activities or risk exposure based on implementing the Proposed Project. Any wells or pipelines disturbed would be re-decommissioned in accordance with DOGGR regulations.

Abandonment of Levee Penetrations and Removal of Associated Infrastructure

The Proposed Project would abandon penetrations through the Cache/Hass Slough Levee associated with the drainage and inlet pipes that were used at the Bowsbey Property. This would include plugging pipes with concrete or grout in accordance with established guidelines. In addition, the Proposed Project would remove wood structures associated with the drainage/inlet pipes. The wood structures including woodpiles would be removed with an excavator from the levee bank. Following removal of the wooden structures, divers would cut the pipes at the existing slope, or if necessary, the area would be dewatered to expose the pipe and isolate work, and then pipe would be cut. The outboard side of the pipe would then be plugged with a “pig” or cap. The pipe would also be cut at the existing slope on the inboard side. A tremie pipe would be inserted and concrete pumped from the outboard side to fill the pipe, extracting the tremie as the pipe is filled.

In-water work associated with the abandonment of levee penetration and the removal of wood structures would be performed within from June 1 to October 31. For all work outboard of the Cache/Hass Slough Levee, a turbidity curtain or other containment potentially including sheet

piles or super sack cofferdam would be installed surrounding the structures to be abandoned or removed.

Removal of Drainage/Inlet Pipes and Infrastructure at Duck Slough

The Proposed Project would remove drainage and inlet pipes along Duck Slough, which would interfere with the construction of the proposed Duck Slough Setback Levee.

Temporary Access Road Construction

Temporary construction access roads will be constructed to facilitate movement of equipment within the interior of the Proposed Project Site. This would involve cutting and placement of soil excavated on-site to create flat, even driving surfaces. These temporary construction roads would be decommissioned as work progressed and restored to conform to the Proposed Project design.

ii. Road Vacation and Movement of Private Utilities

The Proposed Project Site is presently accessed via Liberty Island Road. Near the southeastern terminus of Liberty Island Road, the Shag Slough Bridge provides pedestrian access to the Reserve. The Proposed Project would vacate Liberty Farm Road from the northwest corner of the project to the Shag Slough Bridge. Other than the Shag Slough Bridge, only the neighbor to the north of the property requires road access. Provisions for the neighbor's access is being made by moving driveway access to the new proposed terminus of Liberty Island Road. The Proposed Project would require relocating the neighbor to the north's electrical service to the property from the southern side of the current Liberty Island Road to the northern side of the vacated Liberty Island Road. This would be required because the footprint of the Duck Slough Setback Levee coincides with the current location of the power poles/lines.

The Proposed Project would provide non-public internal access to the Duck Slough Setback Levee, Cache/Hass Training Levee, Cross Levee, and the northern section of the degraded Shag Slough Levee. A gate would be installed at the northwest corner of the Project Site in order to restrict public pedestrian and vehicular access to the Project Site. Internal access would include a network of internal roads along the top and toes of the levees and PG&E access peninsulas. Internal access would support inspection and maintenance activities associated with the levees and high voltage towers and lines, which are owned by PG&E. Internal access would also provide access to the proposed boat ramp, which would be used by DWR and CDFW to monitor the long-term success of the restoration goals of the Proposed Project.

iii. Habitat Restoration

Delta Smelt Habitat Creation

The Project Area would include suitable spawning, rearing, and food production habitat for Delta Smelt. The Proposed Project would reconnect historic habitat and create new high-quality spawning, rearing, and food production habitat in an important location for Delta Smelt. Following restoration, the restored tidal marsh area would have a direct hydrologic connection to Shag Slough, which has salinity, turbidity, and water temperatures that are known to support all life stages of Delta Smelt. The design has incorporated the current understanding of the habitat

requirements of Delta Smelt with variable channel size, depth, and favorable water velocity to provide spawning habitat and food web support (i.e. tidal marsh habitat and water residence time) for the species. If feasible, and at select locations, tidal channels excavated within the Proposed Project Site would be lined with sand or other suitable substrates for Delta Smelt spawning.

The restoration is designed to provide full or nearly full tidal inundation within the restored tidal marsh by constructing a network tidal channels and breaching the Shag Slough Levee at several locations. The configuration and sizing of the levee breaches and tidal channels were designed to provide full tidal inundation to the maximum extent feasible. Site and regional hydrology considerations have been incorporated into the overall design, and post project conditions were modeled to demonstrate suitable conditions to support rearing and spawning habitat, food production, and the conveyance and export of food for Delta Smelt from the Project Area into the Cache Slough Complex.

Tidal Channel System Excavation

The Proposed Project would include a system of tidal channels designed to provide full tidal inundation to the majority of the Proposed Project below MHHW, convey food for Delta Smelt to the Cache Slough Complex, and provide shallow subtidal habitat for target fish species, including spawning habitat for Delta Smelt and foraging and rearing habitat for other native fish species. Over 20 miles of channels would be constructed with a combination of excavators, bulldozers, and scrapers. Material excavated from the channels would be re-used on site.

Based on preliminary design calculations, the channels would be excavated in the site interior to have approximate channel top widths between 60 and 400 feet, channel invert elevations between -1.0 to 1.0 feet NAVD88, and maximum side slopes of 3H:1V. This would require an approximate total of 1,780,000 cubic yards of soil excavation. Channels would be sufficiently deep to be free of emergent vegetation. Channels were designed to have appropriate velocities and shear stress to maintain open water channels through moderate scouring and provide habitat for Delta Smelt and other native fish species.

Additionally, various water control infrastructure would be removed to enhance flow to the Proposed Project Site. This includes the removal of man-made berms throughout the Proposed Project Site to facilitate the efficient exchange of tidal waters. A number of man-made agricultural ditches, water distribution channels, and toe drains would also be filled with approximately 400,000 cubic yards of fill material to prevent flow capture and hydraulic short-circuiting within the proposed system of tidal channels. This includes Lookout Slough, which has previously been realigned, straightened, and dredged. Material to fill these features would come from on-site excavation of the new tidal channels and the partial degradation of the Shag Slough Levee.

Unused Excavated Soil Deposit within Tidal Marsh Restoration Area

The Proposed Project would cumulatively necessitate excavation of approximately 5,255,000 cubic yards of soil. Excavated materials would be re-used on-site as appropriate based on soil types and beneficial re-use needs. Some of the material from the degradation of the Shag Slough Levee and the excavation of the tidal channels would be placed within the proposed marsh plain

to eliminate hauling the material over long distances. This material would be placed at a maximum elevation below MHHW in order to promote the development of tidal marsh habitat. This material would also be placed in a manner and location that would not interfere with the development of the restored tidal marsh or the efficient flow of tidal water.

Elevated Peninsula Construction

A series of raised peninsulas (PG&E Access Peninsulas) would be constructed to facilitate access to the high voltage transmission towers that are owned by PG&E. PG&E currently holds an access easement on the property and would continue to have access to maintain these towers and the associated transmission lines. The elevation of the peninsulas would be at least 8.0 feet NAVD88, which is above MHHW. These peninsulas would contain 12-foot-wide roads surfaced with crushed gravel or recycled concrete to provide year-round access to the base of each PG&E tower within the Proposed Project Site. Approximately 270,000 cubic yards of fill material would be placed to construct the raised peninsulas.

In addition to facilitating PG&E access to their on-site infrastructure, the peninsulas would be designed to provide summer basking sites and winter flood refugia for giant garter snake. To create summer basking habitat and winter flood refugia the majority of peninsula top elevations would be raised to approximately 11.5 feet NAVD88. These raised areas would provide refugia from flood events in the range of 50% ACE (2-year flood event).

Giant Garter Snake Habitat Creation

The Proposed Project would include the creation of giant garter snake habitat. The goal is to create sufficient habitat to support the species within the Proposed Project Site. This would include open water foraging, emergent refugia/foraging habitat, summer basking, and winter refugia/brumation habitat.

Open water foraging habitat for giant garter snake would be created by excavating a series of open water tidal ponds, which would provide habitat for prey species such as tree frogs and juvenile fish. The foraging ponds would be located adjacent to upland and emergent tidal marsh habitat. Half of the foraging ponds would be connected to tidal channels and half would not be connected to tidal channels to allow the study of whether tidal channel access might influence predation levels of giant garter snake by predatory fish.

Emergent refugia/foraging habitat refers to the emergent vegetation that would become established throughout the restored tidal marsh. Emergent vegetation including tules and cattails would establish throughout the marsh plain and along the tidal channels providing increased habitat complexity and structure for giant garter snake in aquatic habitats. This would provide cover from predators and improve thermoregulation opportunities in aquatic habitats and is presumed to reflect historical habitat conditions.

Summer basking habitat would consist of upland areas with grassland vegetation that are located adjacent to aquatic features such as Duck Slough, the restored tidal marsh area, and the proposed foraging ponds. Summer basking areas would include the slopes of the Duck Slough Setback Levee that are adjacent to Duck Slough and the proposed restored tidal marsh and the

slopes and crown of the elevated peninsulas. Giant garter snake would also be able to utilize the slopes of the Cache/Hass Slough Training Levee and the slopes and crown of the Shag Slough Levee.

Winter refugia habitat would consist of the upland areas west of the Duck Slough Setback Levee, which are adjacent to Duck Slough and the PG&E Access Peninsulas. The upland area west of the Duck Slough Setback Levee is outside the maintenance zone associated with the setback levee, such that burrows and other brumation sites would not be disturbed by required maintenance activities. The additional winter refugia habitat that would also be available along portions of the water-side toe of the Duck Slough Setback Levee and portions of the PG&E Access Peninsulas, which are high enough to provide winter refugia for most bypass flooding events.

Riparian trees and shrubs would be planted in a manner that promotes appropriate basking sites and access to winter refugia by giant garter snake. The shoreline between foraging habitat and summer basking habitat would be modulated with and without riparian vegetation to maintain adequate sunny areas and promote access to upland areas. The following is a summary of design constraints that were used to ensure compatibility between the needs of giant garter snake and the need to create riparian habitat:

- Avoid planting riparian trees along the shoreline of the Duck Slough Setback Levee to allow giant garter snake unobstructed access to the summer basking habitat on the slope of the levee and winter refugia that is located on the western side of the Duck Slough Setback Levee between the levee and Duck Slough;
- Avoid planting riparian trees or shrubs within 200 feet of foraging ponds;
- Avoid planting riparian trees within 700 feet of foraging ponds;
- Limit the shade producing effects for riparian trees by planting only lower height shrubs within 200 to 700 feet of the foraging ponds.

iv. Levee Improvements

Various modifications are proposed to levees within the Proposed Project site to promote tidal inundation in the restored marsh area and protect assets near the Proposed Project Site. These modifications include constructing a new setback levee along Duck Slough and Liberty Island Road, breaching and partially lowering portions of the Shag Slough Levee, breaching the Vogel Levee, and improving the Cache/Hass Slough Levee. An overview of proposed levee work is provided in Figure III-9. Each individual modification is discussed separately below and depicted as a cross-section in Figure III-10.

Duck Slough Setback Levee Construction

A new setback levee (Duck Slough Setback Levee) would be constructed along Duck Slough and Liberty Island Road. The Duck Slough Setback Levee would be located along the eastern side of Duck Slough and southern side of Liberty Island Road. The Duck Slough Setback Levee would include a soil-bentonite cutoff wall ranging in depth from 25 to 50 feet below the existing ground surface. The levee would be setback an average 100 feet from Duck Slough and provide flood

refugia and winter brumation habitat for giant garter snake that may utilize Duck Slough or the adjacent restored tidal marsh. The Duck Slough Setback Levee would become part of the Yolo Bypass West Levee System within the State-Federal levee system and protect properties to the north and west of the Proposed Project Site from inundation upon degradation and breaching of the Shag Slough levee.

The levee would begin near the confluence of Hass Slough and Duck Slough, run parallel to Duck Slough on the northwestern side of the Proposed Project Site; and upon reaching the northwestern corner of the Proposed Project Site, turn east and run parallel to the south side of Liberty Island Road, eventually tying into the Shag Slough levee system in the northeast corner of the Proposed Project Site.

Duck Slough Setback Levee Borrow Excavation

Soils for the new Duck Slough Setback Levee are required to meet specific geotechnical criteria. Geotechnical investigations were completed to identify on-site borrow areas with soil that would be suitable for the construction of the Duck Slough Setback Levee. The majority of the soil needed to construct the setback levee would come from on-site borrow areas that are located adjacent to and on the water-side of the proposed setback levee. These borrow areas would be constructed such that the final configuration would develop into viable tidal marsh habitat. Approximately 1,586,560 cubic yards of fill would be necessary for setback levee construction. Approximately 861,000 cubic yards of fill material would come from on-site borrow areas located adjacent to the new levee. An additional approximate 712,000 cubic yards would come from tidal channel excavations throughout the restoration area and degraded portions of the Shag Slough Levee.

Cache/Hass Slough Training Levee Improvements

The levee along Cache and Hass Sloughs would be retained as a training levee to prevent increased water surface elevations in Cache and Hass Sloughs during high water events in the Yolo Bypass. The Cache/Hass Slough would be improved to reduce subsidence, increase slope stability, increase resilience to wind-wave forces, and improve maintenance access. Material would be removed from the levee to reduce the extent of future levee subsidence and standardize the crest height to either the 1957 water surface profile or 1% ACE water surface elevation, whichever is higher, plus one foot of freeboard. Removing material from the levee top is proposed to relieve weight and consequently reduce the potential for future subsidence, which has historically been a maintenance issue. Removed levee material would be used to flatten the Project-side levee slope to a maximum of 4H:1V and construct an operations and maintenance roadway at the waterside toe of the slope. The levee crown and upper portion of the slope would be made more uniform in width (minimum of 16-foot wide) and include a maintenance road with an improved road surface.

Erosion protection would be added to the crown and upper slope of the Cache/Hass Slough Training Levee to provide protection from potential erosion due to overtopping caused by wind wave splash. Erosion protection could be in the form of rock or bio-geotechnical methods. In addition, riparian vegetation may be planted at appropriate elevations along portions of the Project-side slope.

Levee Breach Methodology

The Shag Slough and Vogel Levees would be breached using similar methodologies. Prior to breaching, temporary sheet pile cofferdams would be installed outboard of breach locations during appropriate in-water work windows (between June 1 and October 31).

Prior to breaching, a temporary working platform would be installed by dozing a level and stable platform large enough to accommodate a conventional driving rig. A mid-sized excavator with a vibratory hammer pile would be used to drive the sheet pile during installation. Sheet piles would be connected by a vertical interlocking ball and socket system to form a continuous, watertight wall of sheet piling. Alternatively, an earthen cofferdam would be installed. Sheet piles and earthen cofferdams would later be removed.

Vogel Levee Breach

The Vogel Levee would be breached at two locations to provide hydraulic connectivity with Cache Slough, restore tidal exchange to the restoration area, and provide habitat connectivity to Cache Slough. In large flood events, remnant levee segments would continue to overtop as they do today. One breach along the Vogel Levee would be approximately 45 feet wide while the second would be roughly 154 feet wide, necessitating between 1,100 and 2,600 cubic yards of excavation. In total, approximately 3,700 cubic yards of soil would be excavated and balanced within the interior of the property to facilitate Vogel Levee breaching.

Shag Slough Levee Breach and Degrade

The Shag Slough Levee would be breached at nine locations south of Liberty along the eastern boundary of the Proposed Project Site. Breaches along Shag Slough would have widths of approximately 300 feet (one breach), 350 feet (three breaches), 400 feet (four breaches), and 575 feet (one breach), collectively requiring approximately 261,250 cubic yards of excavation. Levee breaches would reconnect the restored tidal areas to tidal influence and would be the final step of construction. Breaches along the Shag Slough Levee would provide hydraulic and habitat connectivity with Shag Slough.

The Shag Slough Levee would be degraded in two 1,500-foot sections to provide flood benefits. The locations of these degraded sections are shown on the Proposed Habitat Concept Plan (Figure III-8). The degraded section of the Shag Slough Levee that is located at the northern end of the Project Site would be lowered to approximately elevation 14.7 feet NAVD88. The degraded section of the Shag Slough Levee that is located at the southern end of the Project Site would be lowered to approximately elevation 11.8 feet NAVD88. This would allow floodwaters during a significant flood event to be conveyed across the Project Site.

Rock slope protection would be included at the northern and southern portions of the degraded sections of the Shag Slough Levee. The rock slope protection would provide additional protection from erosion for the adjacent levees including the adjacent unmodified section of the Shag Slough Levee in the north and the adjacent section of the Cross Levee in the south.

Material excavated from the levee would be directly placed within the tidal marsh plain. Soil placed within the tidal marsh area would be limited in height to be below MHHW to ensure that spoil distribution does not inhibit development of emergent tidal marsh habitat.

Salvage Rock from Shag Slough for Levee Protection

The Proposed Project may salvage and reuse rock from the Shag Slough Levee. The salvaged rock would be used to protect levees from erosion. There is an estimated 10,000 tons for rock that may be salvaged from the Shag Slough Levee. Rock would be salvaged from areas that would not impact existing riparian vegetation, which is located in discrete areas along Shag Slough. A long-reach excavator and loader would be used to salvage the rock from the Shag Slough Levee. As an alternative, rock may be obtained from an off-site source and transported to the site via barge or truck.

Shag Slough Levee Boat Ramp

The northern slope of the northernmost breach along the Shag Slough Levee would include a boat ramp to allow vehicles to back boats into the open water habitat at the breach location. This boat ramp would have an approximate 14% slope and would be surfaced with articulated concrete mat. Access to this boat ramp would be gated and only available for use by authorized personnel, including but not limited to, DWR and CDFW staff that would implement long-term monitoring of the Proposed Project Site and CDFW officers.

v. *Planting and Revegetation*

Tidal Marsh Revegetation

The tidal marsh areas within the Proposed Project Site are expected to revegetate through natural recruitment. The predominant plant species anticipated to colonize the site are tule (*Schoenoplectus acutus* var. *occidentalis*) and cattail (*Typha latifolia*). These plant species would establish across a range of elevations from 6.5 feet to 3.0 feet NAVD88. In some cases, these plant species might extend down to elevation 2.0 feet NAVD88, which represents the maximum depth these plants are anticipated to survive within the Proposed Project Site. Both of these species reproduce prolifically from seed dispersal, and there is an abundance of these species in the local area to provide seed for natural recruitment.

Riparian Trees and Shrubs

Approximately 27 acres of riparian trees and shrubs would be planted along selected areas of the remnant Shag Slough Levee, along the Cache/Hass Slough Training Levee, and along portions of the PG&E Access Peninsulas. Plant material would consist of cuttings and containerized plants. The plants would be planted within two feet in elevation of MHHW to facilitate establishment without irrigation by ensuring that their root systems have access to groundwater.

Riparian trees species would include white alder (*Alnus rhombifolia*, 20-foot spacing), valley oak (*Quercus lobata*, 20-foot spacing), polished willow (*Salix laevigata*, 15-foot spacing), and Goodding's willow (*Salix gooddingii*, 15-foot spacing). Riparian scrub species, including California

mugwort (*Artemisia douglasiana*, 4-foot spacing), common buttonbush (*Cephalanthus occidentalis*, 10-foot spacing), California blackberry (*Rubus ursinus*, 6-foot spacing), and arroyo willow (*Salix lasiolepis*, 10-foot spacing) would be planted below the canopy layer.

e. Construction Schedule

The purposes of providing an implementation schedule for the Proposed Project are to determine the time frames during which construction activities would take place, to inform the CEQA and NEPA evaluation, and to optimize sequencing and seasonality of construction activities to allow for the shortest viable construction duration. Table III-3 provides the estimated construction implementation schedule.

Table III-3. Tentative Construction Schedule

Project Stage	Task Name	Duration (Days)	Estimated Start	Estimated Finish
Site Preparation Activities (Interior of Corps Levees)	Construction Surveys	30	6/1/2020	6/30/2020
	Vegetation Removal	120	6/30/2020	10/27/2020
	Strip Organic Top Layer of Soils	60	7/14/2020	9/11/2020
Habitat Restoration Activities (Interior of Corps Levees)	Site Excavation and Rough Grading	325	7/28/2020	6/18/2021
	Duck Slough Setback Levee – Construction and Road Surfacing	60	8/27/2020	1/7/2021
	PG&E Access Road Construction	120	9/26/2020	1/23/2021
	Final Grading	60	6/18/2021	8/16/2021
Levee Improvement Activities (On and Exterior to Corps Levees)	Breach Locations Cofferdam Installation During In-Water Work Window	120	6/1/2020	10/31/2020
	Cache/Hass Training Levee Construction	120	1/21/2021	5/20/2021
	Shag Slough Levee Degrade	60	1/21/2021	3/21/2021
	Shag Slough and Vogel Levee Breach Excavations (Behind Cofferdams)	90	3/21/2021	6/18/2021
	Infrastructure Removal along Cache/Hass Slough Training Levee	153	6/1/2021	10/31/2021
	Shag Slough Boat Ramp Construction	30	6/1/2021	7/1/2021
	Breaching/Cofferdam Removal During In-Water Work Window	77	8/16/2021	10/31/2021
Riparian Planting	Riparian Planting or Erosion Control Seeding along Levees and Access Roads	90	10/15/2021	1/13/2022
Demobilization	Cleanup/Demobilization	30	1/13/2022	2/12/2022
Post-Construction	Prepare Construction Documentation Report and Record Drawings	60	2/13/2022	4/14/2022

*Work schedule may be subject to change to accommodate work windows for special-status species.

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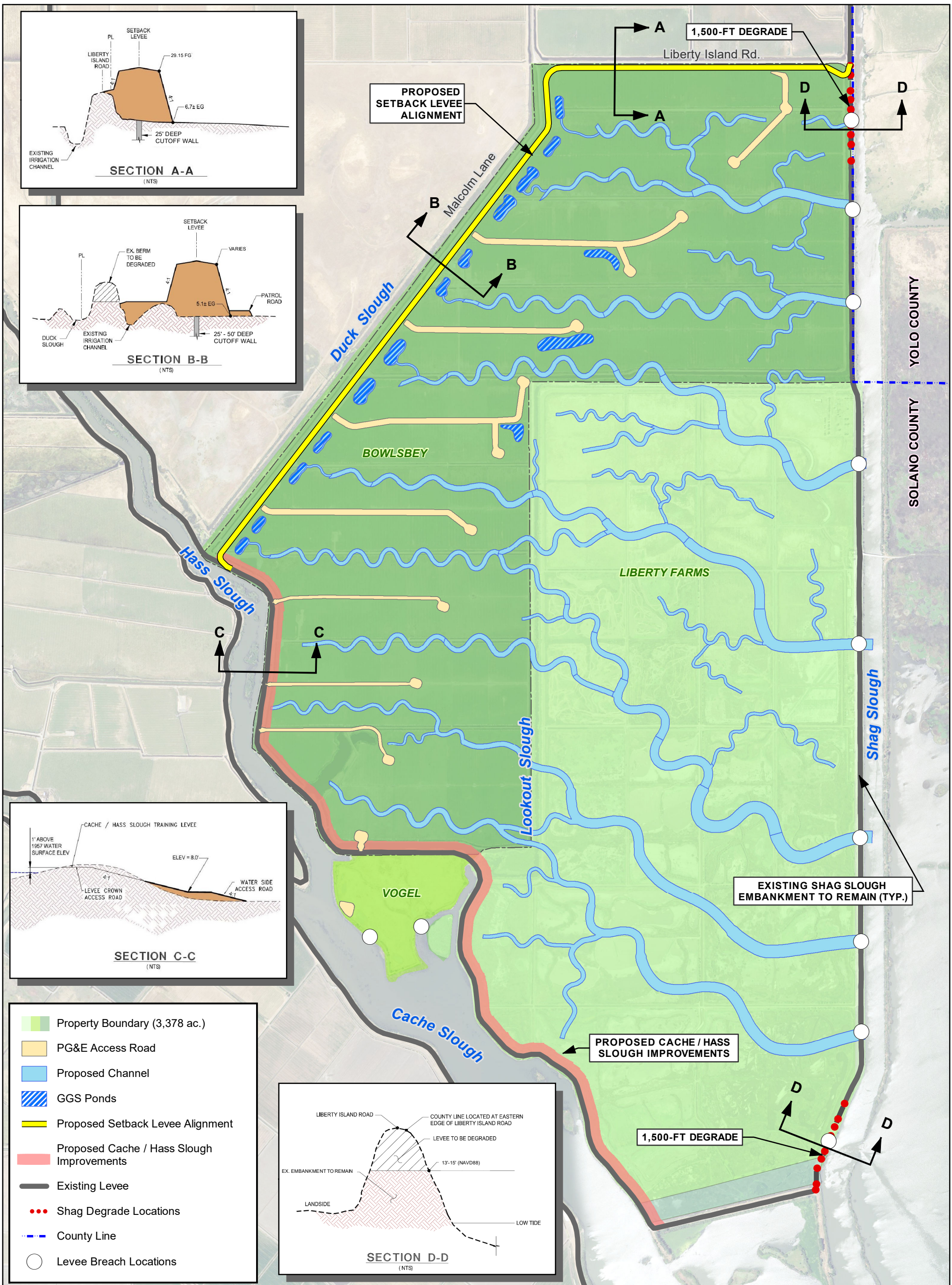
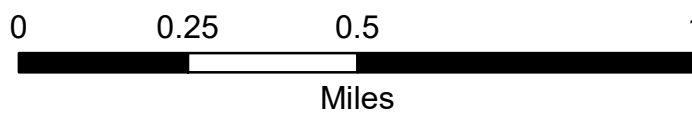


Figure III-10. Levee Concept

Lookout Slough Tidal Habitat Restoration and Flood Improvement Project



Map Prepared Date: 11/14/2019
 Map Prepared By: clopez
 Base Source: Wood Rogers
 Base Date: 10/24/17
 Data Source(s):

Prepared by:
 WOOD ROGERS

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f. Post-Construction Operations and Maintenance

The Proposed Project would include operations and maintenance (O&M) activities. RD 2098 would be responsible for implementing long-term operations and management of the Duck Slough Setback Levee and DWR would be responsible for implementing long-term management and monitoring activities of the remainder of the Proposed Project Site. PG&E would have the ability to maintain the transmission towers and lines, and the road base of the access roads to their towers.

A supplemental operations and maintenance manual (Supplement to Unit No. 109 Operation and Maintenance Manual - Duck Slough Setback Levee and Cache/Hass Slough Training Levee) would be prepared for the Duck Slough Setback levee under the responsibility of RD 2098 and Cache/Hass Slough Training Levee under responsibility of DWR and would be designed to meet the State and federal standards for levee maintenance. O&M requirements are anticipated to be similar to existing requirements based on the U.S. Code of Federal Regulations, Title 33, Section 208.10—Local flood protection works; maintenance and operation of structures and facilities. O&M standards for the existing levees are described in the Corps Unit 109, West Levee of Yolo Bypass and East Levee of the Cache Slough O&M Manual.

Levee O&M activities would include annual inspections/evaluations, levee restoration and damage repair, levee crown roadway maintenance/damage repair, rodent abatement and damage repair, vegetation management, levee debris/trash cleanup, and emergency operations. These components, as well as O&M measures for giant garter snake habitat, are described below.

i. Annual Inspections/Evaluations

Inspections are intended to identify any levee deficiencies and direct any operations, maintenance, repair, replacement, or rehabilitation work required to correct the noted deficiencies. Annual levee inspections would be required up to approximately four times per year. Inspections would be made prior to the beginning of the flood season, following each major high-water period, and otherwise at intervals not exceeding 90 days, and such intermediate times as may be necessary to ensure the best possible care of the levee.

During flood periods the Duck Slough Setback Levee would be patrolled to locate possible sand boils or unusual wetness of the landward slope and to be certain that:

- There are no indications of slides or sloughs developing;
- Wave wash or scouring action is not occurring;
- No low reaches of levee exist which may be overtopped; and
- No other conditions exist which might endanger the structure.

ii. Levee Restoration and Damage Repair

Restoration of levee slopes to design/construction condition on an as-needed basis would be required. Areas of damaged/disturbed levee slope including rock revetment materials must be repaired promptly. High water conditions, especially after wave wash events, could result in damage requiring levee restoration and repair. Vegetation management (including slope burning) may be required prior to damage identification and restoration/repair.

iii. Levee Crown Roadway Maintenance/Damage Repair

The crown road would be maintained by dragging/grading, spraying (see vegetation management) and re-gravelling. Potential wave wash related overtopping events (i.e. splash over) along the Cache/Hass Slough Training Levee could degrade crown roadway gravel. Import of new gravel and placement would be required as needed to restore the levee crown to design/construction conditions. Periodic levee crown surveys would be needed to ensure the levee crown elevation and grade is consistently maintained. Identified areas of settlement, depressions, rutting and related issues must be appropriately and promptly addressed. Splash-over/overtopping events are not expected to occur along the Duck Slough Setback Levee.

iv. Rodent Abatement and Damage Repair

Ground squirrels (*Marmotini* spp.), beaver (*Castor* spp.), nutria (*Myocastor coypus*), and other burrowing species pose a threat to levee integrity. An appropriate rodent abatement and damage repair program would minimize impacts to levee integrity. Removal of problematic species through such means as baiting, trapping, or other necessary and appropriate methods could be needed. Where burrowing animal damage is identified, holes would require filling through various methods, including excavation and compaction, grouting with cement/bentonite grout, or other appropriate means.

v. Levee Vegetation Management

Consistent with the Appendix D-Vegetation Management Strategy of the Central Valley Flood Protection Plan, Duck Slough Setback Levee vegetation would be limited to native grass species on levee crowns, slopes, and within 15 feet of the landside toe. Grass mowing is typically completed between March and October and performed once per year; however, certain weeds may require management actions more than once per year. Grass and weed burning may be used to control grasses and would be conducted in summer or early fall.

Woody vegetation on levees with stems greater than four inches in diameter pose a threat to levee integrity. This type of woody vegetation would be removed. Unwanted vegetation would be managed by goat grazing, mowing, spraying, burning and hand cutting or removal. All work necessary to ensure the levee (crown, slopes, toes, toe roads) meets design and maintenance standards and conditions related to vegetation would be conducted at least annually and timed appropriately to minimize potential for weed and invasive species growth. Vegetation management may include any or all the following: herbicide spraying, burning, mechanized equipment operations, hand clearing, goat grazing, and other possible methods. Fire guarding to minimize fire hazards should be incorporated into the annual vegetation management cycle.

vi. Levee Debris/Trash Cleanup

Woody debris and trash are expected to settle and accumulate on the levee crown, slopes, and toe/toe roads, especially after high water events. Woody debris can generally be piled and burned (pending air quality requirements and approvals) or collected, loaded, and disposed at an appropriate landfill/disposal facility. Trash and other debris would routinely require collection and removal/disposal at an appropriate landfill/disposal facility.

vii. Emergency Operations

In the event of a flood emergency, protocols established in the RD 2098 Emergency Operations Plan would be followed. Immediate steps would be taken to correct dangerous conditions disclosed by inspections. Appropriate advanced measures would be taken to ensure the availability of adequate labor and materials to meet all contingencies. Immediate steps may be taken to control conditions that may endanger the levee and/or to repair the damaged sections.

viii. Vegetation Maintenance for Giant Garter Snake

Open grasslands are ideal for summer basking habitat for giant garter snake. Trees and large shrubs can degrade summer basking habitat by displacing grasslands, creating too much shade, and obstructing access from adjacent aquatic foraging habitat. Large woody vegetation within 200 feet of giant garter snake foraging ponds would be removed to prevent the degradation of summer basking habitat for giant garter snake. Removal of vegetation would be performed using the methods described above in the Vegetation Management section.

ix. Long Term Maintenance for Channels and Tidal Marsh Plain

Maintenance for channels and tidal marsh plain would be based on the post construction monitoring and adaptive management described below. Flood debris would be monitored for adverse effects to channel stability and would be removed if determined to cause an impact.

x. Long Term Management of Aquatic Invasive Plant Species

Aquatic invasive plant species would be removed or control throughout the upland and aquatic areas of the Proposed Project. Target species would be mechanically removed and/or sprayed. Targeted invasive species include but are not necessarily limited to: Common reed (*Phragmites australis*), pampas grass (*Cortaderia selloana*), giant reed (*Arundo donax*), Brazilian waterweed (*Egeria densa*), water hyacinth (*Eichhornia crassipes*), spongeplant (*Limnobium laevigatum*), red sesbania (*Sesbania punicea*), and water primrose (*Ludwigia* spp.).

g. Post-Construction Monitoring, and Adaptive Management Activities

Upon completion of Proposed Project construction, a series of monitoring, and adaptive management activities would ensure the long-term viability of the newly restored ecosystem. In keeping with the requirements of the Delta Plan, post-construction site monitoring and management is designed to be flexible and adaptive based on changing conditions in the Delta, using the best available science to inform decision-making. A similar science-based decision-making process was used in designing the Proposed Project, particularly regarding sea level rise, regional and local hydrology and water quality, food web production and transport, and sediment deposition.

To assess the Proposed Project's restoration effectiveness, DWR and CDFW would implement compliance monitoring and routine effectiveness monitoring. Compliance monitoring would verify whether planned acreage, topography, hydrology, etc. match final on-site conditions using the set of performance measures that would be detailed in the Proposed Project's Restoration Plan.

Compliance monitoring would also verify whether permitting requirements and mitigation measures are fulfilled.

Effectiveness monitoring would track progress towards objectives by measuring indicators of ecological status and function and comparing the measurements to expected or hypothesized outcomes. Sampling techniques would include terrestrial surveys of vegetation, hydrology and water quality monitoring, aquatic food web components sampling, and fish sampling, where permitted. Measurements of physical and biological components would be used to evaluate the on-site evolution of habitat, including tidal channel and marsh morphology, vegetation response to reconnected tidal influence (including invasive plants), habitat component contributions to the food web, and identification of occupied fish habitat.

4. REQUIRED PERMITS AND APPROVALS

This Draft EIR is intended to provide information for state, regional, and/or local government approvals that may be required to develop the Proposed Project, whether or not they are explicitly listed below. The federal, state, regional, and local agencies that may have jurisdiction over aspects of the Proposed Project may require certain permits and approvals that include but are not necessarily limited to those outlined in Table III-4 below.

Table III-4. Required Approvals, Permits, and Consultations

Approval, Permit, Agreement or Consultation	Agency(ies)
Section 408 Letter of Permission	Corps and CVFPB
CCR, Title 23 Water Code, Floodway Encroachment Permit	
Clean Water Act (CWA) Section 404 Nationwide Permit No. 27 and Rivers and Harbors Section 10 approval	Corps
NEPA Compliance	Corps/USFWS/ NMFS
CEQA Compliance	DWR
AB-52 Tribal Consultation	DWR
Federal Endangered Species Act (FESA) Section 7 informal Consultation	USFWS and NMFS
Essential Fish Habitat Consultation	NMFS
California Endangered Species Act (CESA) Section 2081 Incidental Take Permit	CDFW
Certification of Wetland Reserve Program (WRP) Compliance	USDA and NRCS
Fish and Game Code Section 1602 streambed alteration agreement	CDFW
CWA Section 401 water quality certification	RWQCB
CWA Section 402 National Pollutant Discharge Elimination System (NPDES) Statewide Construction General Permit enrollment	
Section 106	SHPO
Certification of Consistency with Delta Plan	Delta Stewardship Council
Flood Coordination	RD 2068, 2098, 2104, SAFCA
Conditional Letter of Map Revision/ Letter of Map Revision	FEMA
Electrical Infrastructure Agreement, and local electrical/ oil/gas easement removal	PG&E/ California Public Utilities Commission
Consultation regarding proposed use of the Proposed Project	State Lands Commission

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IV. ENVIRONMENTAL IMPACT ANALYSIS

A. IMPACTS FOUND TO BE LESS THAN SIGNIFICANT

An Initial Study was prepared for the Lookout Slough Tidal Habitat Restoration and Flood Improvement Project. In the course of this evaluation, certain impacts were found to be less than significant for the reasons discussed throughout this chapter. This section provides a brief description of environmental effects for resource areas where the Proposed Project was found to have no impact or less-than-significant impacts based on the Initial Study. These include:

- | | |
|--------------------------|----------------------------------|
| a) Aesthetics | f) Noise |
| b) Energy | g) Population/Housing |
| c) Geology/Soils | h) Transportation |
| d) Greenhouse Gases | i) Utilities and Service Systems |
| e) Land Use and Planning | j) Wildfire |

This analysis incorporates information from technical reports and background documents prepared for the Proposed Project, including:

- Appendix B – Greenhouse Gas Emissions Calculations and Summary, Baseline Environmental Consultants 2019
- Appendix C – Lookout Slough Tidal Habitat Restoration and Flood Improvement Project: 65% Geotechnical Basis of Design Report, Blackburn Consulting 2019
- Appendix D – Lookout Slough Tidal Habitat Restoration and Flood Improvement Project: 65% Basis of Design Report, Wood Rodgers 2019

These documents and other appendices outlined in Chapter I, Introduction, are available upon request from FRPA@water.ca.gov. Please include a subject line of “Lookout Slough Information Request”.

1. ANALYSIS OF IMPACTS FOUND TO BE LESS THAN SIGNIFICANT

a. Aesthetics

i. Adverse effects on scenic vistas

The Solano County General Plan outlines several scenic resources and viewsheds important to the County. According to General Plan Page RS-36, “[the] County’s agricultural landscapes, the [Delta] and marshlands, and the oak and grass covered hills offer an abundance of scenic vistas”. Therefore, agricultural lands, the Delta, marshlands, and oak grassland covered hills are considered scenic vistas for the purposes of this analysis.

The Proposed Project Site is currently a blend of agricultural open space and managed wetlands. Both uses would be converted to Delta marshland through Proposed Project activities. Conversion of agricultural land to marshland would alter a scenic vista, but it would be converted

to another type of scenic vista that is also of value to Solano County. Moreover, conversion of managed wetland to Delta marshland would create new scenic vistas. Impacts to scenic vistas would therefore be less than significant.

ii. Damage of scenic resources, including but not limited to, trees, rock outcroppings, and historical buildings within a state scenic highway

The Proposed Project Site is not located within or near a state scenic highway. There are no currently designated state scenic highways in Solano County; the only eligible scenic highway is in Western Solano County while the Proposed Project Site is in Eastern Solano County. Because the Proposed Project is not proximate to any state scenic highways, there would be no impacts to trees, rock outcroppings, historic buildings, or other scenic resources within a state scenic highway.

iii. The Proposed Project would not substantially degrade the existing visual character or quality of public views of the site and its surroundings.

The Proposed Project is in a non-urbanized area with limited public views available. Public views of the site are mostly limited to views from Liberty Island Road, a two-lane road experiencing limited traffic. Liberty Island Road is located along the northern end of the Proposed Project Site before turning south and running along Shag Slough until it reaches the Liberty Farms Duck Club, from which point the road is gated and inaccessible to the public. Public views available to motorists are therefore restricted to the northern portion of the Proposed Project Site. Public views of the southern, western, and eastern portions of the Proposed Project Site are generally limited to views of levees from the water around the Proposed Project Site perimeter due to the area's elevation profile and levee heights.

Presently, the Proposed Project Site has three distinctive visual characters, one within each property. The Bowlsbey Property is irrigated pasture and is visually defined by expansive, grassy fields. These fields are divided by east-west concrete irrigation ditches and contain grazing livestock such as cattle. The Vogel Property is presently abandoned and is visually dominated by the vegetation which has overgrown the property. The Liberty Farms Property is maintained as managed wetlands and is visually dominated by the grid of wetland cells that are divided by dirt access roads and internally contain wetland vegetation and irrigation infrastructure. The Proposed Project Site is bounded to the south, west, and east by Delta waters and marshland. These waterways are nestled amid a highly agricultural landscape, with farmland neighboring the Proposed Project Site to the north, south, and west.

The Proposed Project Site's visual quality would be temporarily degraded during construction by the presence of disturbed earth and construction equipment. Dewatering activities, excavation of tidal channels throughout the Proposed Project Site, and infrastructure removal would temporarily convert lands vegetated with irrigated pasture and managed wetland vegetation to disturbed areas. However, views of this transient state would be limited given the temporary nature of construction and the lack of public views of the Proposed Project Site.

In the long-term, the Proposed Project would yield permanently protected marshland that would be consistent with the area's existing visual character, which is largely defined by nearby open space and agricultural areas.

Agricultural lands and Delta waters/marshlands are both highlighted as important aesthetic resources by the Solano County General Plan. Conversion from one important resource type to another would not constitute a significant degradation of visual character or quality. Furthermore, agriculture and Delta waters are both prominent throughout the Cache Slough Complex, so the proposed visual changes are consistent with existing aesthetic conditions.

In summary, the Proposed Project's visual impacts during construction would be minimal due to the temporary nature of construction, the limited availability of public views of the site, and because some of the visual character within the project vicinity would be replicated. The Proposed Project would not substantially degrade the existing visual character or quality of the site or its surroundings. Impacts would be less than significant.

iv. New sources of substantial light or glare, which would adversely affect day or nighttime views in the area

Following project construction, the Proposed Project would expand the footprint of nearby waterbodies into the Proposed Project Site. While this would not produce any additional light, some additional daytime glare from new waterways may result. Such glare would not be sufficiently bright as to have an adverse impact on area views and would be of similar magnitude to existing sources of glare. Moreover, much of the Proposed Project Site would contain wetland vegetation rather than tidal channels or open water, which would minimize the area which could serve as a source of glare. During project construction, there would be occasional nighttime fueling and repairing of construction equipment, requiring nighttime lighting. Fueling would occur at a staging area approximately 1,320 feet from the nearest residence, or at more distant locations throughout the Proposed Project Site. The staging area distance would be sufficient to ensure that no light trespass occurs onto the nearest residence. Thus, the Proposed Project would not result in the creation of a substantial light or glare which would adversely affect day or nighttime views in the area. Impacts would be less than significant.

b. Energy

i. Potentially significant environmental impacts due to wasteful, inefficient, or unnecessary consumption of energy resources during construction or operation

On-site baseline energy consists of energy used to power agricultural vehicles and infrastructure and energy associated with transportation of duck club users to and from the site. Energy use associated with the Proposed Project is limited to construction-related energy such as fuel use to power equipment and to move workers to and from the site, as well as maintaining electrical power to existing pumps to dewater the site during construction. No permanent energy-using structures would exist on-site after construction with the exception of maintained power to an existing pump in Duck Slough, and energy consumption associated with the Proposed Project would be limited to fuel use for vehicles supporting maintenance and monitoring activities during the post-construction management and monitoring period.

The Proposed Project would result in a short-term increase in energy use during construction. Any such increase would not be unnecessary, wasteful, or inefficient, as measures to minimize the need for material transportation and consequently, fuel use, are built into the Proposed Project design. In the long-term, the Proposed Project is not anticipated to lead to a substantial change

in energy use, as agricultural operations would shift next door (see Chapter IV.B, Agriculture and Forestry), duck club use would cease, and ecosystem and levee maintenance would only require occasional (approximately once monthly) trips to the site by mostly light-duty vehicles, as detailed in the Project Description. As construction energy use would not be wasteful, inefficient, or unnecessary and there would be negligible operational energy use, there would be a less-than-significant impact.

ii. Conflict with or obstruction of a state or local plan for renewable energy or energy efficiency.

Aside from the Solano County Climate Action Plan, which is Solano County's primary planning document guiding greenhouse gas and energy use reductions throughout the County's various land uses and economic sectors, there are no other state or local plans for renewable energy or energy efficiency that would apply to the Proposed Project.

Although the Solano County Climate Action Plan Energy and Efficiency Section aims to outline a framework to minimize energy consumption, increase energy efficiency, and transition to clean, renewable energy sources, there are few requirements from state-wide plans and policies, such as Title 24 (the California Energy Commission's Building Energy Efficiency Standards), that apply to open space projects as opposed to development projects. As no other local and state programs and policies relating to renewable energy or energy efficiency apply to the Proposed Project, there would be no conflict with any such programs and policies. Impacts would be less than significant.

c. Geology/Soils

i. Direct or indirect substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning map issued by the State Geologist

There are no active faults on the Proposed Project Site that would create risk of loss, injury, or death through their rupture. The nearest fault at risk of rupture on the State Geologist's Alquist-Priolo Fault Zoning map is the Cordelia fault,¹ which is over 23 miles west of the Proposed Project Site. The Proposed Project will have no humans living on the site, therefore the risk of loss, injury or death due to earthquakes is de minimus. Thus, the Proposed Project would not cause substantial adverse effects involving rupture of a known earthquake fault. Impacts would be less than significant.

ii. Direct or indirect substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking

USGS 2012 data mapped by the Association of Bay Area Governments categorizes the Proposed Project Site as likely having strong to very strong shaking in the event of a major earthquake. This is consistent with most of the Bay Area, where probable shaking severity ranges from strong to violent.² The Proposed Project would alter levees and other facilities on-site that could be exposed to potential adverse impacts during ground shaking; but the modified levee system would

¹ Association of Bay Area Governments, "Association of Bay Area Governments Resilience Program," accessed June 20, 2018, <http://gis.abag.ca.gov/website/Hazards/?hlyr=concordGV&co=6013>.

² Association of Bay Area Governments.

be more resilient to earthquakes than the current levees , which were constructed in the mid-1900s and do not reflect more contemporary design and safety guidelines.

Relative to other Proposed Project components, the Duck Slough Setback Levee is of particular importance for protecting nearby life and property in the event of strong seismic groundshaking. Duck Slough Setback Levee construction would follow Corps' engineering guidelines and the California Code of Regulations (CCR) Title 23, which include provisions for levee construction where there is earthquake risk. The following guidance documents were incorporated into the Duck Slough Setback Levee design:

- California Code of Regulations, Title 23, Section 120 – Levees
- Corps Engineering Manual No. 110-2-1913 – Engineering and Design – Design and Construction of Levees
- Corps Design Guidance for Levee Under-Seepage – Engineer Technical Letter 110-2-569, May 1, 2005
- Code of Federal Regulations, Title 44, Section 65.10 – Mapping of Areas Protected by Levee Systems

The above documents set forth engineering requirements and geotechnical tests that must be performed during levee design when constructing in a seismically active zone. These include seismic analyses to determine liquefaction susceptibility, soil compaction requirements during construction, and other methodologies to attenuate earthquake risk. As these guidance documents and their requirements were incorporated into the Duck Slough Setback Levee design and no other structures would be constructed, the Proposed Project would not directly or indirectly cause potential substantial adverse effects including the risk of loss, injury, or death involving strong seismic ground shaking. Impacts would be less than significant.

iii. Direct or indirect substantial adverse effects, including the risk of loss, injury, or death involving seismic-related ground failure, involving liquefaction

The only new structure proposed as part of the Proposed Project is the Duck Slough Setback Levee, a setback levee that would be part of the State-Federal Levee System and is therefore subject to the building regulations of the Corps and the California Code of Regulations. The Corps' levee design standards contain provisions requiring studies and providing for liquefaction risk in earthquake-prone areas. As the levee would be constructed to the Corps' standards, which account for liquefaction risk, the Proposed Project would not cause potential substantial adverse effects related to liquefaction. Impacts would be less than significant.

iv. Direct or indirect substantial adverse effects, including the risk of loss, injury, or death involving landslides.

The potential for adverse effects related to landslides is low because the Proposed Project Site and its surroundings are flat, with minimal changes in elevation and no nearby potential debris flow sources or history of landslides.³ The Proposed Project would therefore not cause direct or indirect substantial adverse effects involving landslides. Impacts would be less than significant.

³ Association of Bay Area Governments.

v. Substantial soil erosion or loss of topsoil

During construction, the Proposed Project Site would be incrementally denuded inboard of perimeter levees to allow channel excavation and soil borrow. During this period, there could be potential for erosion and loss of topsoil due to the exposure of bare soils to wind and other erosive elements. The Proposed Project Site sits atop relatively moist soils due to the locally high groundwater table, and some soil moisture would be maintained during the dewatering process to improve soil cohesion for levee construction and minimize the potential for dust and erosion during construction. Furthermore, this unvegetated state would be transient, and the marsh plain would be designed to re-vegetate through natural recruitment. The Proposed Project Site interior would therefore not be at risk of substantial erosion or loss of topsoil, and impacts would be less than significant.

The potential for erosion along the levees bounding the Proposed Project Site is discussed in Chapter IV.F, Hydrology and Water Quality. In summary, RD 2098 and DWR would maintain the Duck Slough Levee and the Cache/Hass Slough Training Levee, respectively. DWR would implement O&M measures to minimize the impact of erosion on the Cache/Hass Slough Training Levee and assure long-term stability. Moreover, anti-erosion measures are included as part of the strengthening measures proposed for the Cache/Hass Slough Training Levee; and the Duck Slough Setback Levee and Cache/Hass Slough Training Levees were both designed with appropriate erosion control measures. Impacts would be less than significant.

vi. Location on a geologic unit or soil that is unstable or that would become unstable as a result of the Proposed Project and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse

Risk of soil instability due to landslide and liquefaction is discussed in further detail above. In summary, risk to structural elements such as the Duck Slough Setback Levee due to liquefaction would be minimal with application of Corps levee design guidelines and risk of landslide is negligible due to the area's generally flat topography, lack of landslide history, and lack of potential debris flow sources.

As lateral spreading is generally associated with liquefaction, impacts related to lateral spreading would also be minimal with compliance with Corps design standards. The Proposed Project would have a positive effect on subsidence by inundating organic soils on the site and slowing the oxidative processes that have led to widespread subsidence throughout the Delta. Thus, the Proposed Project would not be located on a geologic unit or soil that is unstable or that would become unstable and result in landslide, lateral spreading, subsidence, liquefaction, or collapse. Impacts would be less than significant.

vii. Location on expansive soil, creating substantial direct or indirect risks to life or property.

Soil expansion tends to occur in areas with poorly drained, clay-like soils with a high shrink-swell capacity. Such soils may change in volume upon changes in soil moisture, causing cracking and foundation damage. Geotechnical soil explorations outlined in the Geotechnical Basis of Design Report reveal a thick clay blanket underlying portions of the site, including the proposed Duck

Slough Setback Levee alignment and the existing Cache/Hass Slough Levee.⁴ While such soils have the potential to change volume upon changes in moisture content, soils underlying the Proposed Project Site would undergo few changes in moisture content which could induce such a change due to the relatively high groundwater table and the site's regular tidal inundation. Furthermore, geotechnical explorations informed proposed construction elements, borrow areas locations, and other Proposed Project elements. Accordingly, the Proposed Project would not be located on expansive soil which would create substantial direct or indirect risks to life or property. Impacts would be less than significant.

viii. Soil adequacy for supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water

Although on-site soil types have been demonstrated to be adequate to support alternative wastewater systems through geotechnical sampling, existing septic tanks on the Proposed Project Site would be removed and would not be replaced. The small residential/agricultural population would vacate the site prior to construction, so there would be no continued need for septic tanks or wastewater treatment systems. As such, the Proposed Project Site does not have the need for soils capable of adequately supporting alternative wastewater disposal systems.

ix. Direct or indirect destruction of a unique paleontological resource or site or unique geological feature

A survey of the Proposed Project Site's history indicates that it has been extensively disturbed and the probability of undiscovered unique paleontological or geological resources being buried under the site is minimal.⁵ In the unlikely event of accidental discovery of unique paleontological resources or geologic features during excavation, PRC Section 5097.5 states that a person shall not knowingly and willfully excavate upon, or remove, destroy, injure, or deface, any historic or prehistoric ruins, burial grounds, archaeological or vertebrate paleontological site, including fossilized footprints, inscriptions made by human agency, rock art, or any other archaeological, paleontological or historical feature, situated on public lands, except with the express permission of the public agency having jurisdiction over the lands. Thus, with compliance to PRC § 5097.5, the Proposed Project would not directly or indirectly destroy a unique paleontological resource or site or unique geological feature. Impacts would be less than significant.

d. Greenhouse Gas Emissions

i. The Proposed Project would not generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.

In May 2012, DWR adopted the DWR Climate Action Plan – Phase 1: Greenhouse Gas Emissions Reduction Plan, which details DWR's efforts to reduce its greenhouse gas emissions consistent with Executive Order S-3-05 and the Global Warming Solutions Act of 2006. DWR also adopted the Initial Study/Negative Declaration prepared for the Greenhouse Gas Emissions Reduction

⁴ Wood Rodgers, Inc., "Lookout Slough Tidal Habitat Restoration and Flood Improvement Project: 65% Design Basis of Design Report" (Sacramento, CA, September 2019).

⁵ Environmental Science Associates, "Lookout Slough Tidal Habitat Restoration and Flood Improvement Project - Cultural Resources Inventory and Evaluation Report," August 2019.

Plan in accordance with the CEQA Guidelines review and public process. Both the Greenhouse Gas Emissions Reduction Plan and Initial Study/Negative Declaration are incorporated herein by reference.⁶

Consistent with the steps required of each DWR project per the Greenhouse Gas Emissions Reduction Plan, a greenhouse gas emissions inventory was created for the Proposed Project by Baseline Environmental Consulting (Baseline) and may be found in Appendix B. Baseline found that operation of the Proposed Project would not generate any maintenance or business activities that were not previously inventoried in DWR's verified emissions reporting. Thus, the Proposed Project's operational emissions need not be accounted for again for CEQA purposes. Impacts would be less than significant.

ii. The Proposed Project would not conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

Consistent with the steps required of each DWR project pursuant to the Greenhouse Gas Emissions Reduction Plan, a greenhouse gas emissions inventory was created for the Proposed Project by Baseline. As further detailed in Baseline's air and greenhouse gas emissions inventory, operation of the Proposed Project would not generate any maintenance or business activities that were not previously inventoried in DWR's verified emissions reporting. Thus, the Proposed Project's operational emissions need not be accounted for again for CEQA purposes. Impacts would be less than significant.

e. Land Use / Planning

i. Physical division of an established community

The area surrounding the Proposed Project Site is a mix of wetlands and agricultural lands. Review of aerial imagery of the region reveals few residential structures on adjacent parcels, with large areas of pasture, wetland, and other open space and agricultural uses sitting between each residence. Circulation throughout the area is provided via local-serving, two-lane roadways.

The Proposed Project would include vacating a section of the terminus of Liberty Island Road. The Proposed Project would vacate the north-south section of Liberty Island Road and the eastern half of the east-west section. The Proposed Project would maintain access to the Rasmussen property at their existing driveway, which is located approximate halfway along the east-west section of the terminus of Liberty Island Road. Liberty Island Road vacation would therefore not divide an established community. Potential recreational impacts of road vacation due to impacts to pedestrian access to the Liberty Island Ecological Reserve are discussed in Chapter IV.J, Recreation.

Other Proposed Project elements include constructing the Duck Slough Setback Levee, improving the Cache/Hass Slough Levee, and modifying the Proposed Project Site interior. These modifications would not affect any roadways presently open to the public that provide community connectivity, as levee-top roadways proposed for modification are not open to the public.

⁶ California Department of Water Resources, "Climate Action Plan Phase 1: Greenhouse Gas Emissions Reduction Plan," May 2012, <https://water.ca.gov/LegacyFiles/climatechange/docs/Final-DWR-ClimateActionPlan.pdf>.

Similarly, modifications to the Proposed Project Site interior would not introduce any new barriers to movement within the community, since these would occur within private property that is presently gated off and inaccessible to the public. As such, the Proposed Project would not physically divide an established community. Impacts would be less than significant.

ii. Significant environmental impacts due to conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental impact

Land use documents providing guidance for development within the Delta and Solano County are the Delta Stewardship Council's (DSC) Delta Plan, the Delta Protection Commission's (DPC) Delta Land Use and Resource Management Plan and the Solano County General Plan. As illustrated throughout this EIR in the resource chapters relevant to each policy, the Proposed Project is generally consistent with the land use plans outlined above. Policies from regional plans such as the Delta Plan and the Delta Land Use and Resource Management Plan that were adopted for the purposes of avoiding or mitigating an environmental impact and are relevant to the Proposed Project are provided in Table IV.A-1 below. DWR is planning to submit a statement of consistency with the DSC Plan at a later date which will include a discussion of the relevant policies.

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Table IV.A-1. Relevant Delta Plan and Delta Land Use and Resource Management Plan Policies

Policy #	Policy Summary	Consistency Discussion
Delta Plan (Delta Stewardship Council)		
G P1	This policy outlines consistency determination requirements and procedures. It stipulates that mitigation measures provided in CEQA should be sourced from the Delta Plan Program EIR or substitute equally or more effective measures. Best available science and adaptive management should be used in project planning.	The Proposed Project would restore native ecosystem and enable DWR to partially fulfill the State Water Project/Central Valley Project’s restoration obligations, directly supporting both of the co-equal goals (ecosystem health and water supply reliability). Scientific literature, technical reports, and Proposed Project-specific design and engineering studies used best available science and informed design and environmental impact analysis. An adaptive management and monitoring plan will prepared for the Proposed Project.
ER P1	Projects that could significantly affect flow in the Delta must use State Water Resources Control Board (State Water Board) flow objectives to determine consistency with the Delta Plan.	Potential changes to Delta flows and water levels were modeled under the with-project conditions, and are discussed in Chapter IV.G, Hydrology and Water Quality. State Water Board flow objectives were used to assess potential environmental impacts to water quality associated with changes in Delta flows.
ER P2	Habitat restoration must be carried out consistent with Appendix 3 (Section II of the Draft Conservation Strategy for Restoration of the Sacramento-San Joaquin Delta Ecological Management Zone and the Sacramento and San Joaquin Valley Regions ⁷), which outlines appropriate elevations for ecosystem restoration, among other factors which should be considered when siting restoration projects.	Elevation was a key consideration in selecting the Proposed Project Site, which has an elevation profile such that the site would be subject to daily tidal inundation if not excluded from surrounding waters by levees. Other factors considered in the site selection process included water quality parameters such as salinity, turbidity, and temperature, as well as the known range of target species.

⁷ [CDFW] California Department of Fish and Wildlife, [USFWS] United States Fish and Wildlife Service, and [NOAA] National Oceanic and Atmospheric Administration, “Ecosystem Restoration Program Conservation Strategy for Restoration of the Sacramento-San Joaquin Delta, Sacramento Valley and San Joaquin Valley Regions,” May 2014, <https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=31232>.

ER P4	Projects proposed to construct, rehabilitate, or reconstruct new levees must evaluate and where feasible incorporate alternatives to increase floodplains and riparian habitat. Example techniques include use of setback levees.	Flood improvement, including floodplain expansion, is a primary objective of the Proposed Project. The Duck Slough Setback Levee is proposed to locally expand the Yolo Bypass floodplain and reduce upstream flood stages.
ER P5	Potential to introduce or improve habitat conditions for invasive, non-native species must be fully considered and avoided or mitigated.	Prior to construction, invasive plant species would be controlled as part of site preparation activities. Invasive species control for non-native plant and fish species was considered during Proposed Project design and is considered in Chapter IV.D, Biological Resources.
ER R2	Prioritize and Implement Projects that Restore Delta Habitat	The Proposed Project (Chapter III, Project Description) would help satisfy DWR's obligation to restore 8,000 acres of tidal marsh per the 2008 USFWS BiOp and the 2009 NMFS BiOp by restoring approximately 3,400 acres.
ER R7	Prioritize and Implement Actions to Control Nonnative Invasive Species	The Proposed Project (Chapter III, Project Description) would perform invasive plant species control with the areas of disturbance, for the purpose of reducing the potential for ecological impairment caused by invasive species within the restoration site and surrounding areas.
DP P2	Projects including flood management infrastructure and ecosystem restorations must be sited to avoid or reduce conflicts with existing uses or uses described in local general plans, considering comments from local agencies and the Commission.	Local land use policies and potential impacts are considered throughout this EIR in this table and in the appropriate resource chapters. Additionally, DWR's "Good Neighbor Checklist" was used to assess potential effects on neighboring properties outside the context of CEQA. The Good Neighbor Checklist is in Appendix E. With implementation of various "Good Neighbor" gestures outlined in the Good Neighbor Checklist and mitigation measures described in Chapter IV.B of this EIR, conflict with existing agricultural land uses would be minimal.

RR P1	Discretionary levee improvement funding should preferentially be awarded at “very high priority” islands or tracts before approving projects at “high priority” or “other priority” tracts. DWR must certify projects’ consistency with this regulatory policy and report annually to the Council about its decisions to award State funds for Delta levee improvements. When DWR’s contributions towards levee improvements vary from these priorities, it must identify how the funding is inconsistent with this guidance, describe why variation from the priorities is necessary, and explain how the funding nevertheless protects lives, property, and the State’s interests in water supply reliability and ecosystem health while considering the Delta’s unique agricultural, natural, historic, and cultural values.	The Proposed Project Site is in the Cache/Hass Slough area, which is designated in the Delta Plan as “other priority”. Ecological considerations warrant levee improvements on the Proposed Project Site, which has a strong potential to create high-quality, contiguous habitat for aquatic special-status species. Furthermore, flood control infrastructure in the Proposed Project Site such as the Cache Slough Levee lacks adequate freeboard and is subsiding and would therefore benefit from levee improvements. By expanding the Yolo Bypass floodplain, constructing the Duck Slough Setback Levee, and improving the Cache/Hass Slough Levee, the Proposed Project would provide stronger protection to life and property north of Duck Slough as well as throughout the area that depends on the Yolo Bypass for flood protection.
Delta Land Use & Resource Management Plan (Delta Protection Commission)		
Land Use P-2	Local Government General Plans shall continue to promote and facilitate agriculture and agriculturally- supporting commercial and industrial uses as the primary land uses in the Primary Zone	As stated in Chapter IV.B, Agricultural and Forestry Resources, purchase of an agricultural easement within Solano County is proposed in Mitigation Measure AG-1 to reduce impacts related to the loss farmland.
Land Use P-10	Maintain sites for the storage of dredged material from channels within the Delta and discourage the conversion of existing sites to other uses, as appropriate.	As stated in Chapter III, Project Description, some of the material from the degradation of the Shag Slough Levee and the excavation of the tidal channels would be placed within the proposed marsh plain to eliminate hauling the material over long distances
Land Use P-14	Conversion of agricultural parcels for wetland development should not result in seepage onto or under adjacent parcels.	The possibility of seepage onto adjacent parcels was studied in the 65% Geotechnical Basis of Design Report and is discussed in further detail in Chapter IV.I, Public Services. In summary, geotechnical studies concluded that seepage would not result from Proposed Project implementation.

Agriculture P-2	Conversion of land to non-agricultural use should occur first where productivity and agricultural values are lowest.	The Proposed Project would convert prime farmland to non-agricultural use. This impact and its associated mitigation measure are discussed in further detail in Chapter IV.C, Agriculture and Forestry Resources.
Agriculture P-6	Acquisition of agricultural conservation easements should be encouraged as mitigation for projects within each county.	As described in Chapter IV.B, Agricultural and Forestry Resources, purchase of an agricultural easement within Solano County is proposed in Mitigation Measure AG-1 to reduce impacts related to the loss farmland.
Natural Resources P-4	Support the non-native invasive species control measures being implemented by the California Department of Fish and Game, the California Department of Boating and Waterways, the California Emergency Management Agency, the California Department of Food and Agriculture, the State Water Resources Control Board, the Central Valley and San Francisco Bay Regional Water Quality Control Boards, and the Agricultural Commissioners for the five Delta Counties.	Prior to construction, invasive plant species would be controlled as part of site preparation activities. Invasive species control for non-native plant and fish species was considered during Proposed Project design and is considered in Chapter IV.D, Biological Resources.
Natural Resources P-5	Preserve and protect the viability of agricultural areas by including an adequate financial mechanism in any planned conversion of agricultural lands to wildlife habitat for conservation purposes. The financial mechanism shall specifically offset the loss of local government and special district revenues necessary to support public services and infrastructure.	As described in Chapter IV.B, Agricultural and Forestry Resources, purchase of an agricultural easement within Solano County is proposed in Mitigation Measure AG-1 to reduce impacts related to the loss farmland.
Water P-1	State, federal and local agencies shall be strongly encouraged to preserve and protect the water quality of the Delta both for in-stream purposes and for human use and consumption.	As described in Chapter IV.G, Hydrology and Water Quality, the Proposed Project would not impact salinity levels.
Levee P-7	Encourage the beneficial reuse of dredged material, as appropriate, for levee maintenance and rehabilitation, and the	Refer to response to LU-P10 above.

	<p>maintenance of instream flows. Support and advocate for the Delta Long-Term Management Strategy (LTMS).</p>	
<p>Utilities and Infrastructure P-1</p>	<p>Impacts associated with construction of transmission lines and utilities can be mitigated by locating new construction in existing utility or transportation corridors, or along property lines</p>	<p>PG&E transmission lines would be relocated from their current location along the southern side of Liberty Island road to the northern side of Liberty Island road to accommodate construction of Duck Slough Setback Levee (Chapter III, Project Description).</p>

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Relevant policies from the DPC Delta Land Use and Resource Management Plan and Solano County General Plan are discussed in applicable resource chapters. While the Proposed Project is a State-sponsored project that for most purposes is exempt from local ordinances and policies, these ordinance and policies have been considered in the analysis of potential impacts and identification of mitigation, as appropriate.

iii. Conflict with Existing Conservation Easements

In 2005, NRCS provided \$470,000 for the creation of habitat for migratory waterfowl at the Liberty Farms Property. The funding agreement with the NRCS included the establishment of a wetland conservation easement on a portion of the Liberty Farms Property. NRCS has confirmed that it considers the restoration of tidal marsh habitat for the Proposed Project is a compatible use in the context of the existing wetland conservation easement.

Also, in 2005, the California Waterfowl Association (CWA) applied for and received grant funds in the amount of \$135,000 from the Wildlife Conservation Board (WCB) for the same purpose – the creation of habitat for migrating waterfowl at the Liberty Farms Property. The grant agreement between CWA and WCB requires that the created habitat remain for a duration of 25 years and specifies that a pro-rata portion of the funding would be returned if this habitat did not remain for the 25-year period. The grant agreement with CWA did not include the purchase of a conservation easement on the Liberty Farms Property separate from or in addition to the NRCS conservation easement.

The previous landowner of the Liberty Farms Property used funding from the NRCS and CWA to create habitat for migrating waterfowl within the property and has maintained this habitat since the completion of that project. The Proposed Project would start construction in 2020 and proposes to convert this habitat to tidal marsh. This would occur approximately ten years before the end of required 25-year period. EIP would comply with the terms of grant agreement by returning a pro-rata portion of the funding to CWA and WCB, consistent with the agreement terms unless CWA and WCB request that the pro-rata portion of the grant funds be re-programmed to another property/project in the region that would benefit habitat for migrating waterfowl.

Currently, the Liberty Farms Duck Club is a private duck club and provides waterfowl hunting opportunities to a limited number of people. The Proposed Project would create natural tidal marsh habitat suitable for diving and dabbling ducks (Figure IV.A-1) and opportunities for the general public to engage in waterfowl hunting. The restored tidal marsh areas would be state-owned lands and therefore open to the general public for duck hunting by boat. Boat access would include access to tidal channels and the large open water areas in the southeastern portions of the Proposed Project Site.

The Proposed Project would not result in conflicts with existing conservation easements and impacts would be less than significant.

f. Noise

- i. Substantial temporary or permanent increase in ambient noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies*

The Solano County noise ordinance imposes a maximum noise level at receiving agricultural and residential properties of 55 dBA from 7:00 a.m. to 7:00 p.m. and 50 dBA from 7:00 p.m. to 7:00 a.m., with a separate, less stringent set of standards for construction noise. The Proposed Project would not create noise in the long term and would therefore not exceed Solano County's non-construction noise standards.

During construction, the County noise ordinance prohibits noise above 90 dBA at any time and noise in excess of the standards discussed above plus 20 dBA for more than two minutes. As construction would not occur during nighttime hours, the applicable standard for the Proposed Project is 75 dBA. The nearest receiving residence is roughly 0.25 miles (1,320 feet) from the Proposed Project Site, and the nearest agricultural property line is approximately 125 feet away. Heavy machinery used during construction would include pile drivers, bulldozers, and excavators. Of these, pile drivers are the noisiest, generating noise of approximately 101 dBA at a distance of 50 feet.⁸ Noise reduces by roughly 6 dBA with every doubling of distance from the source, putting pile driving noise at roughly 95 dBA at receiving agricultural property lines and less than 76 dBA at the nearest residence.

However, re-fueling and repairing of construction equipment would sometimes occur at night, and would require the use of generators for nighttime lighting. Generators for nighttime lighting will generate noise ranging from 70 to 80 dBA at 50 feet, and noise attenuates at 6 dBA for doubling of distance from the noise source. Given that the nearest residence is approximately 1,320 feet from the re-fueling area, noise at the residence would range from less than 56 dBA to 46 dBA, depending on the size of the generator. As such noise standards would not be exceeded at residential properties.

Neighboring landowners were informed of the Proposed Project through the EIR NOP process. Notices soliciting feedback on the scope of environmental analysis and inviting interested parties to attend a public meeting were mailed to neighboring landowners via certified mail in March 2019. DWR received several comment letters from neighboring landowners, Reclamation Districts, and agricultural operators during the public comment period on the scope of the EIR. Each private individual who commented during the EIR scoping period was contacted to set up meetings with the project managers and commenters to discuss commenters' concerns on the Proposed Project. Neighboring landowners and operators will continue to be notified as the Draft and Final EIR become available and when there are opportunities to comment on the Proposed Project and its potential impacts.

⁸ Federal Highway Administration, "9.0 Construction Equipment Noise Levels and Ranges - Handbook - Construction Noise - Noise - Environment - FHWA."

The current agricultural operator of the Proposed Project Site has been engaged throughout the project planning process and played an active role in developing the planned mitigation for the Proposed Project's conversion of the Bowsbey Property to non-agricultural use. This collaborative effort took place over the course of two years and included adjacent landowners with the intent of assuring the operator's continued productivity.

As residential properties will not be affected and neighboring agricultural operators have been actively engaged, no violation of noise standards would occur, and impacts would be less than significant.

ii. Generation of excessive groundborne vibration or groundborne noise levels

Levee breaching activities would require the use of construction equipment which would generate groundborne vibration, including excavators with vibratory hammer piles. Given the short duration of breaching activities, which are anticipated to occur over a span of 45 days, and the transient nature of pile driving activities, groundborne vibration due to the use of vibratory hammer piles would not constitute excessive groundborne noise or vibration. Further, noise and vibration would dampen as they travel towards the nearest receptors, which are situated over 0.25 mile away. Following construction, the Proposed Project would not generate any groundborne vibration or noise. Thus, the Proposed Project would not generate excessive groundborne vibration or noise, and impacts would be less than significant.

iii. Exposure of people residing or working in the vicinity of a private airstrip or public use airport or within an airport land use plan to excessive noise

There are few people living in the vicinity of the Proposed Project Site, which is located more than 10 miles from the nearest airport, Travis Air Force Base. There are no private airstrips in the vicinity of the Proposed Project Site. Given the lack of nearby receptors and the distance to the nearest airport, the Proposed Project would not expose people residing in the vicinity of an airport to excessive noise levels. Thus, although it is located within the jurisdiction of the Travis Air Force Base Airport Land Use Compatibility Plan, the Proposed Project would not expose people residing or working in the vicinity of airports to excessive noise. Impacts would be less than significant.

g. Population / Housing

i. Direct and indirect inducement of substantial unplanned population growth

EIP proposes levee modifications, tidal channel excavation, and other activities which would restore tidal marsh complex and improve Yolo Bypass flood conveyance within the Proposed Project Site. The Proposed Project does not include any elements which would directly induce unplanned population growth such as businesses, housing, or places of employment. Ecosystem restoration activities would inundate the Proposed Project Site with tidal waters and floodwaters. Accordingly, project design features have been incorporated to assure the continued operation of infrastructure serving nearby populations such as PG&E regional transmission lines. These design features would protect existing infrastructure and assure its continued use and would not expand the capacity of any such infrastructure in a manner which could induce unplanned population growth. Similarly, floodplain expansion would improve conveyance in the Yolo Bypass, improving flood protection for the existing population. The Proposed Project would not open up

any new areas to population growth or otherwise indirectly induce population growth. As such, the Proposed Project would not directly or indirectly induce substantial unplanned population growth. Impacts would be less than significant.

ii. Displacement of substantial numbers of people or existing housing, necessitating the construction of replacement housing elsewhere

There are currently three housing units at the Proposed Project Site. There are two mobile homes located within the Bowsbey Property, which provide housing for the ranch hands. There is one home located within the Liberty Farms Property, which provides housing for the caretaker of the private duck club. The loss of three housing units does not represent a significant number of displaced persons or housing units, and no replacement housing would need to be constructed.

h. Transportation

i. Conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadways, or bicycle and pedestrian facilities

During construction, hauling debris, equipment, and solid waste off-site would require the use of heavy-duty trucks. It is estimated that approximately 900 haul trips would be required over the span of construction. Further, extra vehicle trips would be generated by construction worker commutes. It is estimated that there would be a maximum of 26 construction workers on-site at any given time. These haul and commute trips would lead to greater road usage than baseline levels. However, extra vehicle trips would be temporary and would be spread out throughout the construction period, making the possibility of road damage relatively low. This is especially true given that roads in the vicinity of the site are designed for and regularly accommodate agricultural equipment, which may include large trucks and farm equipment.

In the long-term, there would be little vehicle traffic associated with the Proposed Project because no new roads, employment sources, housing, or other human-serving facilities are proposed. Medium- and long-term traffic associated with the Proposed Project is limited to occasional scientific monitoring and security trips to and from the site. Further, there are no existing or planned public transit, bicycle, or pedestrian facilities in the vicinity of the Proposed Project Site; and the Proposed Project would not conflict with or impede plans, policies, performance, or quality thereof. Thus, the Proposed Project would not conflict with or impede plans, policies, programs, or ordinances addressing the circulation system, and impacts would be less than significant.

ii. Conflict with or be inconsistent with CEQA Guidelines Section 15064.3, subdivision (b)

CEQA Guidelines Section 15064.3, subdivision (b) requires consideration of vehicle miles traveled (VMT) when assessing a project's transportation impacts. The Proposed Project would have VMT associated with short-term construction activities and has the potential to affect VMT through proposed roadway modifications.

VMT would increase during construction due to the use of equipment within and transportation of workers to and from the Proposed Project Site. Project design features such as on-site equipment staging and on-site soil balance would partially offset this effect and assure that VMT increases during construction are reduced to the extent feasible. Due to the temporary nature of VMT

increases and the incorporation of project design features to minimize VMT, short-term changes to VMT would result in less-than-significant impacts.

In the long-term, VMT would generally be limited to maintenance and monitoring activities, levee O&M, and potentially site visits by CDFW officers. Ecosystem and levee maintenance activities would generate relatively few vehicle trips at a relatively low frequency (approximately once per month, and once per 90 days, respectively). Given the relatively low frequency with which the Proposed Project would generate VMT in the long-term, impacts to VMT and conflict with CEQA Guidelines Section 15064.3, subdivision (b) would be less than significant.

iii. Substantially increase in hazards due to a geometric design feature or incompatible uses

Although portions of Liberty Island Road will be vacated, the vacation will not change the geometry of the existing road. Small portions of Liberty Island Road immediately adjacent to the northern portion of Duck Slough Setback Levee may need to be re-sloped or reshaped to provide for proper drainage, but these changes would require adjusting the crown from the center to the Duck Slough Setback Levee side of the road, not increasing hazards due to geometric design. During construction, vehicles carrying construction equipment and solid waste to and from the site would potentially travel slowly to accommodate for their heavy load. While this may increase traffic on area roadways, it does not constitute an incompatible use, as the rural roads in the vicinity of the Proposed Project Site are frequented by slow moving, heavy trucks carrying agricultural goods and equipment. Thus, the Proposed Project would not substantially increase hazards due to a geometric design feature or incompatible use. Impacts would be less than significant.

iv. Inadequate emergency access.

The Proposed Project would not physically or permanently alter publicly accessible roadways in a manner that might result in inadequate emergency access. Liberty Island Road presently dead ends on the western side of the Liberty Farms Property and does not serve any populated areas which require emergency access. The only property that would see a potential decrease in emergency access is the Liberty Island Ecological Reserve. The sole terrestrial access point to the Reserve is the Shag Slough Bridge, which is currently not accessible by vehicles (foot traffic only) and would no longer be accessible following Liberty Island Road Vacation. Potential impacts to emergency access to the Reserve are discussed in further detail in Chapter IV.H, Public Services. Impacts would be less than significant.

i. Utilities / Service Systems

i. Relocation or construction of new or expanded water, wastewater treatment or stormwater drainage, electrical power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects

The Proposed Project would relocate electrical power service for the Rasmussen property from the south side of Liberty Island Road to the north side of Liberty Island Road or along an alignment with in Rasmussen's agricultural fields. The alignment of the relocated power lines would be incorporated to the upland areas and would not impact any environmental sensitive habitats. The relocation of electrical service for the Rasmussen property is not anticipated to cause adverse environmental effects.

The Proposed Project Site would not need water, wastewater, stormwater drainage, electrical power, natural gas or telecommunication facilities constructed since no housing would be constructed. However, conversion of the site to a tidal marsh complex would have the potential to indirectly affect off-site utilities such as drainage system or on-site utilities such as electrical and natural gas facilities. Each possibility is discussed below.

The Proposed Project's potential indirect impacts to off-site utilities generally result from changes to flooding and drainage patterns. Through levee modifications such as setback, breach, and degradation, floodwaters from the Yolo Bypass would be conveyed through the Proposed Project Site during flooding events, increasing local flood storage during bypass flooding events. Hydraulic models discussed in further detail in Chapter IV.F, Hydrology and Water Quality, indicate that this would not lead to any off-site increases in water surface elevations. This would therefore not lead to any off-site flooding which might necessitate expanded stormwater drainage facilities.

Locally-serving PG&E distribution lines serving building and pumps within the Proposed Project Site would be removed due to the fact that they would no longer be needed to provide electricity within the Proposed Project Site. Regional transmission towers and lines would remain in place, requiring construction of elevated peninsulas to assure the lines' continued long-term operation and facilitate maintenance and repair, for which PG&E holds an access easement. These peninsulas are included as part of the Proposed Project and were designed to provide maintenance access to transmission infrastructure as well as to provide upland habitat for giant garter snake. Peninsula construction would assure that PG&E may continue to access its infrastructure on the site and that there would be no disruption of regional electrical service associated with the Proposed Project or inundation of the site. Environmental impacts associated with the construction of these peninsulas are considered throughout this EIR.

Adjacent to the Proposed Project Site to the north are power lines that convey power to the neighboring property owner. These power lines are located on the south side of Liberty Island Road. The existing alignment would be in conflict with the footprint of the proposed Duck Slough Setback Levee and the Proposed Project would relocate these power lines to the north side of Liberty Island Road.

Natural gas extraction and distribution facilities such as wells and pipelines within the Proposed Project Site are not active. No extraction has been documented in the last decade, and all known oil and gas infrastructure has been documented to be plugged and abandoned in accordance with applicable regulatory guidelines. To assure there is no likelihood of future extraction, which would necessitate the construction, expansion, or relocation of existing natural gas facilities, a State-licensed geologist assessed the likelihood of future natural gas extraction within the Proposed Project Site. This analysis is discussed in further detail in Chapter IV.G, Mineral Resources, and concluded that the likelihood of future extraction is negligible. There would therefore be no need to replace or expand the existing facilities, or to construct new facilities.

In summary, the Proposed Project is not growth-inducing, so no new or expanded facilities would be required due to increased demand. The Proposed Project would not require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, natural gas, or telecommunications facilities that would cause significant environmental effects. A

series of local electrical distribution electrical lines would be relocated or removed. Less than significant impacts would occur.

ii. Sufficient water supplies available to serve the Proposed Project and reasonably foreseeable future development during normal, dry, and multiple dry years

Proposed Project construction would use surface water sourced from existing entitlements from adjacent sloughs, which would be adequate to serve the Proposed Project's water needs, including during dry and multiple dry years. Following completion of construction, the Proposed Project would be native ecosystem which would not require application of water and would be resilient to changes in precipitation. The tidal marsh plain would be constructed at elevations which would facilitate regular inundation by tidal waters, and the proposed tidal channel system would convey water throughout the site. Riparian plantings would be planted within two feet in elevation of the MHHW line, assuring they have adequate access to groundwater. There would therefore be no need to manually apply water to the Proposed Project, and on-site Delta waters would be sufficient.

Furthermore, the Proposed Project would have minimal, if any, impact on water availability for nearby development. As further detailed in Chapter IV.F, Hydrology and Water Quality, changes to the area's flood regime and tidal prism have the potential to alter Delta water levels in a manner which could influence the use of diversions. Hydraulic models were constructed to assess the likelihood of such an occurrence and found that changes to water levels were unlikely to affect diversion use, and consequently would have little effect on water availability for nearby properties. Nearby agricultural operations and municipal water facilities' use of existing pumps and diversions would therefore be unchanged and existing water entitlements and resources are therefore sufficient to serve the Proposed Project and reasonably foreseeable future development during normal, dry, and multiple dry years. Impacts would be less than significant.

iii. The wastewater treatment provider which serves the Proposed Project would have adequate capacity to serve the Proposed Project's projected demand in addition to existing commitments.

The Proposed Project does not include any wastewater generating or growth-inducing components. No service would be required from the local wastewater treatment provider and the wastewater treatment provider serving the area would have adequate capacity for the Proposed Project's projected demand in addition to existing commitments. No impacts would occur.

iv. Solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals.

The Proposed Project would be served by the Hay Road Landfill, which had approximately 30,433,000 cubic yards of remaining capacity as of 2013. According to CalRecycle, it is projected to have capacity until 2077.⁹ The Proposed Project would generate solid waste through demolition of on-site infrastructure, including concrete from drainage ditches and pads, fencing,

⁹ CalRecycle, "SWIS Facility Detail: Recology Hay Road 48-AA-0002," accessed August 30, 2019, <https://www2.calrecycle.ca.gov/SWFacilities/Directory/48-aa-0002/Detail/>.

pumps, tanks, trash/material piles, buildings, and utility poles. Solid waste would be disposed of in accordance with applicable laws and regulations and would be reduced to the extent practical. Moreover, the landfill most likely to serve Proposed Project construction has projected capacity for approximately 57 more years. As such, the Proposed Project would not generate solid waste in excess of state or local standards or in excess of the capacity of local infrastructure, impair solid waste reduction attainment, or conflict with any local, state, or federal regulations on solid waste reduction. Impacts would be less than significant.

v. The Proposed Project would comply with federal, state, and local management and reduction statutes and regulations related to solid waste.

Chapter 23 of the Solano County code regulates refuse and garbage. Chapter 23 generally provides requirements of solid waste collectors and does not establish any waste reduction requirements. Similarly, the USEPA encourages solid waste reduction, but does not impose any substantive requirements. The State of California has a goal of 75% recycling, composting, or source reduction of solid waste by 2020, which is to be attained using a statewide approach. Solid waste would be reduced to the extent practical and otherwise disposed of in accordance with all applicable laws and regulations. Thus, the Proposed Project would comply with federal, state, and local management and reduction statutes and regulations related to solid waste. Impacts would be less than significant.

j. Wildfire

i. Substantial impairment of an adopted emergency response plan or emergency evacuation plan

The Proposed Project would not physically or permanently alter publicly accessible roadways in a manner that might impede emergency response. Roadways atop levees within the Proposed Project Site would be affected by levee breach, but these roads do not serve as thru roads for evacuation. Alterations to levee top roads along Cache and Shag Sloughs would therefore not affect emergency response.

During construction, there would be a temporary increase in traffic due to trucks hauling equipment. This increase in traffic would be insufficient to impede emergency response because traffic would be minimized through on-site equipment staging, on-site deposit and reuse of excavated soils and vegetation to the extent feasible, and preferential use of barges over trucks where possible for solid waste hauling, and construction truck traffic will be only incrementally more than the current agricultural truck traffic. Traffic would return to baseline conditions following construction. As the Proposed Project would not physically impede or alter roads needed for emergency response and traffic increases would be temporary, the Proposed Project would not substantially impair an emergency response or evacuation plan. Impacts would be less than significant.

ii. Exposure of project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire due to exacerbation of wildfire risk

During construction, fire risk would increase due to the presence of fuels and construction equipment within the Proposed Project Site. Long Term, the Proposed Project would lead to a

long-term reduction in fire risk by converting grasslands which could serve as a fuel source during a wildfire into a tidal marsh complex which poses less severe risks during a fire. Therefore, the Proposed Project would not exacerbate wildfire risks and expose occupants to pollutant concentrations from wildfire or the uncontrolled spread of wildfire. Impacts would be less than significant.

iii. Installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines, or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment

The Proposed Project would not exacerbate long-term fire risk in the Proposed Project Site or its vicinity and would not attract more people to the area. No new roads, fuel breaks, emergency water sources, power lines, or other utilities that may exacerbate fire risk are proposed. The Proposed Project would therefore not require the installation or maintenance of associated infrastructure that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment. Impacts would be less than significant.

iv. Exposure of people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes

The Proposed Project Site and its surroundings are generally flat, so the Proposed Project would not expose people or structures to risk of downslope flooding or landslide. The Proposed Project would decrease on-site fire risk. Thus, the Proposed Project would not expose people or structure to significant risks as a result of runoff, post-fire slope instability, or drainage changes. Impacts would be **less than significant**.

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IV. ENVIRONMENTAL IMPACT ANALYSIS

B. AGRICULTURE AND FORESTRY

1. INTRODUCTION

The information and analysis in this section describes potential impacts to agricultural and forestry resources resulting from the Lookout Slough Tidal Habitat Restoration and Flood Improvement Project. Proposed Project elements are evaluated for potential to directly and indirectly convert agricultural land to non-agricultural use, and/or conflict with agricultural zoning and Williamson Act contracts, or involve other changes in the existing environment that, due to their location or nature, could result in conversion of agricultural land to non-agricultural use. Forestry resources are qualitatively evaluated because there are no forest resources on the site.

DWR developed a Good Neighbor Checklist based on information from the Agricultural and Land Stewardship Framework and Strategies and can be obtained from <https://water.ca.gov/Programs/California-Water-Plan/Water-Resource-Management-Strategies/Agriculture-and-Land-Stewardship-Framework>). The Checklist was developed to assist project managers in considering issues that may be of concern to neighbors close to a proposed project site regarding potential impacts. This tool is not required by CEQA and includes several points that are not related to environmental impacts. The Checklist is advisory only and does not require or trigger any specific action or mitigation measures pursuant to CEQA. A Checklist was prepared for the Proposed Project and is included in Appendix B of this Draft EIR.

2. ENVIRONMENTAL SETTING

a. Regional Setting

The Cache Slough Complex is home to a variety of agricultural operations, with 15 types of crops grown on approximately 38,133 acres. Of these, roughly 18,302 acres are pastureland.¹ The Proposed Project Site's immediate surroundings to the west and north are largely agricultural and mostly consist of livestock grazing operations, with some wetlands and conservation areas. The California Department of Conservation Farmland Mapping and Monitoring Program (FMMP), which is described in the Regulatory Setting below, designates most properties immediately bordering the Proposed Project Site as grazing land and prime farmland. The Liberty Island Ecological Reserve (Reserve), immediately due east of the Proposed Project Site, presents an exception to the generally agricultural nature of the area, as it is comprised of a 4,450-acre partially submerged open space/conservation area managed by CDFW.

¹ Agricultural Impact Associates, "Economic Effects of Solano County Agriculture: Baseline Assessment and Cache Slough Case Study," June 2017, <http://www.solanocounty.com/civicax/filebank/blobdload.aspx?blobid=27084>.

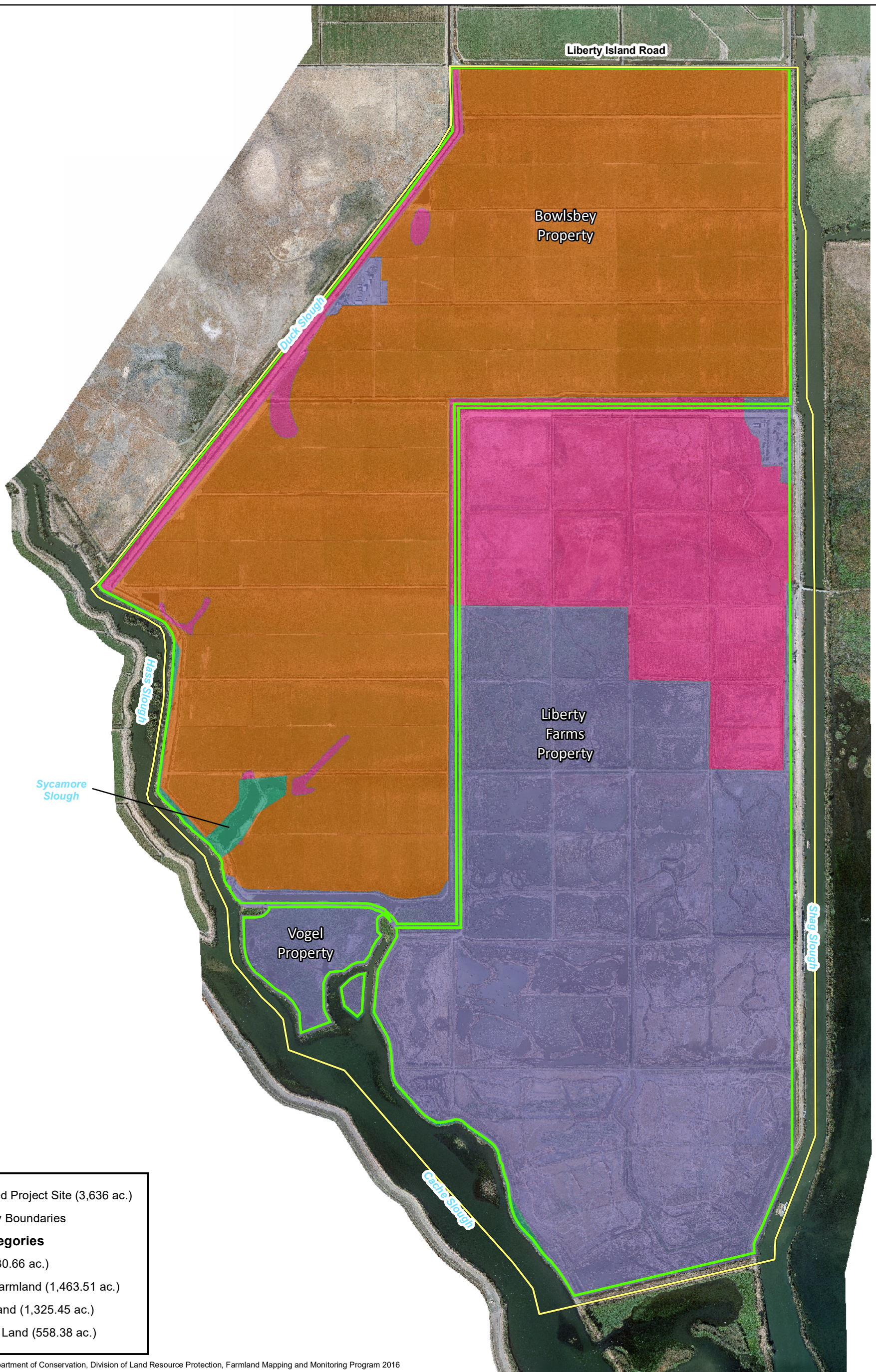
b. Proposed Project Site

The Proposed Project Site is located in unincorporated Solano County with a small portion of work extending into unincorporated Yolo County (Figure III-1). The site consists of approximately 3,400 acres currently divided into three properties—the Bowlsbey Property, the Vogel Property, and the Liberty Farms Property. The Proposed Project Site and neighboring properties are designated by Solano County as agricultural land and are zoned for agricultural use. All three properties within the Proposed Project Site are under Williamson Act contracts with Solano County. These contracts limit uses of the Proposed Project Site to agricultural and open space uses. Proposed Project Site FMMP designations are depicted in Figure IV.B-1.

Historically, the Bowlsbey Property has been used in the production of irrigated pastures for livestock, alfalfa, corn, and sugar beets. The property is largely flat and has been mechanically leveled, except for the irrigation canals that flank the east-west roads running through the property. The roads and canals divide the property into nine fields. The property has been used for cattle grazing for approximately the last 45 years. Per the FMMP, nearly all of the property is designated as prime farmland with small areas, largely on the western side of the property, designated as either “grazing land” or “other land”, as described in the Regulatory Setting below.

The Liberty Farms Property was historically used as agricultural land. Aerial photographs dated as early as 1937 show the property with grid-like irrigation canals consistent with agricultural use. In 2005, such photographs show a transition from agricultural use to managed wetlands. Today, the property is maintained as managed wetlands as part of the National Resource Conservation Service (NRCS) Wetland Reserve Program (WRP) and is used for private recreational waterfowl hunting. It is divided into cells by low berms and ditches, which facilitate flooding and drainage of the managed wetlands. The FMMP designates most of the property as “other land”, with some of the northern half of the property designated as “grazing land”. The Wetland Reserve Program easements, however, prohibit grazing on the property.

Although previously used for waterfowl hunting, today the Vogel Property is unused. FMMP designates the Vogel Property as “other land”.

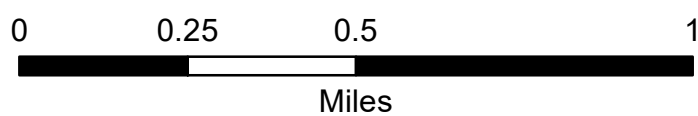


	Proposed Project Site (3,636 ac.)
	Property Boundaries
Mapping Categories	
	Water (30.66 ac.)
	Prime Farmland (1,463.51 ac.)
	Other Land (1,325.45 ac.)
	Grazing Land (558.38 ac.)

Data Source: California Department of Conservation, Division of Land Resource Protection, Farmland Mapping and Monitoring Program 2016

Figure IV.B-1. Proposed Project Site Farmland Mapping and Monitoring Program Classification

Lookout Slough Tidal Habitat Restoration and Flood Improvement Project



Map Prepared Date: 12/6/2019
 Map Prepared By: njander
 Base Source: Wood Rogers
 Base Date: 10/24/17

Prepared by:



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3. REGULATORY FRAMEWORK

a. Federal Regulations

- i. *United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Wetland Reserve Program (WRP)*

The NRCS' WRP provided technical and financial support for wetland restoration efforts. The Liberty Farms Property was enrolled in a permanent WRP easement following a 2005 restoration project that created approximately 975 acres of seasonal and semi-permanent wetlands. Although the WRP was superseded by new legislation in 2014, the terms of WRP easements set before this time remain intact.

The WRP easements prohibit certain activities from occurring within the Liberty Farms Property. These prohibited activities include but are not limited to the following agricultural activities: haying, harvesting wood products, grazing, and planting or harvesting any crop. The landowner of the easement areas retains the right to use the property for their own enjoyment, including recreation activities such as hunting and fishing. The WRP easements allow certain other compatible uses so long as the proposed uses are "consistent with the long-term protection and enhancement of the wetland and other natural values of the easement area".

b. State Regulations

- i. *Williamson Act*

The California Land Conservation Act of 1965 (Williamson Act; California Government Code Section 51200 et seq.) allows local governments to create agricultural preserves and enter into contracts with private property owners to protect land for agricultural and open space purposes. This voluntary program offers preferential tax rates requiring assessment of contracted lands to be based on the lowest of: 1) the value of the actual use (agricultural or open space), 2) the Proposition 13 assessed value, or 3) "full cash value."² This method of assessment usually results in a financial incentive to maintain farmland and open space. The Williamson Act program uses rolling 10-year contracts that renew annually until either party files a "notice of non-renewal", which may be filed by the landowner at any time. If an owner decides to opt out, the land is still protected for 10 years while the tax liability increases in annual increments up to its full market value.

² *The county assessor's appraised value of real property when purchased, newly constructed, or a change in ownership has occurred.*

Proposed uses of Williamson Act contracted lands must be compatible with the terms of the contract for that land. The Government Code defines compatible uses and provides for the adoption of local principles of compatibility. However, pursuant to Government Code Section 51238.3, any Williamson Act contract in place prior to June 7, 1994 is not required to comply with the principles of compatibility requirements listed in Government Code Section 51238.1-51238.2 and reflected in the County's Guidelines discussed in more detail in section 3.d.ii below. For contracts predating June 7, 1994, uses are compatible if expressly provided for in the contract and previously constituted a compatible use.

ii. California Farmland Mapping and Monitoring Program (FMMP)

The California Department of Conservation's FMMP produces maps and statistical data used for analyzing impacts on California's agricultural resources. Agricultural land is rated according to soil quality and irrigation status; the best quality land is called Prime Farmland. The maps are updated every two years with the use of a computer mapping system, aerial imagery, public review, and field reconnaissance.

"Prime farmland" is defined as farmland with "the best combination of physical and chemical features able to sustain long-term agricultural production". A number of factors are considered in designating prime farmland, including soil quality, growing season, and moisture supply. Additionally, the land must have been used for irrigated agricultural production at some time during the four years prior to mapping. "Grazing land" is land where existing vegetation is suitable for grazing livestock. "Other land" is land not included in other FMMP categories and can include a range of land uses such as wetland and riparian areas not suitable for grazing, low density rural development, timberland, etc.

c. Regional Regulations

i. Land Use and Resource Management Plan - Delta Protection Commission (Commission)

The Commission's goal is to ensure orderly, balanced conservation and development of Delta land resources, including agriculture, wildlife habitat, and recreational activities, and improved flood protection. As called for in the Delta Protection Act, a Land Use and Resource Management Plan for the Primary Zone of the Delta was prepared and adopted by the Commission in 1995 and revised in 2002 and 2010. The Land Use and Resource Management Plan outlines the long-term land use requirements for the Primary Zone of the Delta, which includes Lookout Slough.

The Land Use and Resource Management Plan promotes the maintenance of Delta agriculture. The Plan notes that continued agricultural viability in the Delta requires the protection of sufficient farmland and fresh water to support commercially viable operations and provide ways for agriculture to coexist with habitat restoration. The Plan notes that farming in the Delta will have to respond to changing conditions and new challenges in the coming years, including shifting commodity markets and consumer demand, changes in climate and water supplies, and subsidence of reclaimed agricultural lands. To support both Delta agriculture and species recovery, farmers in the Delta are encouraged to implement "wildlife-friendly" management

practices to maximize habitat value. Relevant agricultural policies of the Land Use and Resource Management Plan include:

P-1: Support and encourage agriculture in the Delta as a key element in the state's economy and in providing the food supply needed to sustain the increasing population of the state, the nation, and the world.

P-2: Conversion of land to non-agriculturally-oriented uses should occur first where productivity and agricultural values are lowest.

P-6: Encourage acquisition of agricultural conservation easements from willing sellers as mitigation for projects within each county. Promote use of environmental mitigation in agricultural areas only when it is consistent and compatible with ongoing agricultural operations and when developed in appropriate locations designated on a countywide or Delta-wide habitat management plan.

P-7: Encourage management of agricultural lands which maximize wildlife habitat seasonally and year-round, through techniques such as fall and winter flooding, leaving crop residue, creation of mosaic of small grains and flooded areas, wildlife friendly farming, controlling predators, controlling poaching, controlling public access, and others.

P-8: Encourage the protection of agricultural areas, recreational resources and sensitive biological habitats, and the reclamation of those areas from the destruction caused by inundation.

ii. Delta Plan – Delta Stewardship Council (Council)

In November 2009, the California Legislature enacted the Sacramento–San Joaquin Delta Reform Act. The Act created the Delta Stewardship Council and gave this body broad oversight of Delta planning and resource management. The Council adopted a long-term plan (the Delta Plan) in 2013. The Delta Plan sets forth regulatory policies and recommendations.

Chapter five of the Delta Plan outlines recommendations and policies for Delta agriculture, stating that the continued viability of agriculture in the Delta would require the protection of sufficient farmland and fresh water to support commercially viable operations and provide ways for agriculture to coexist with habitat restoration. The Plan does not contain any regulatory policies with respect to agriculture, but offers three recommendations: promote value-added crop processing, encourage agritourism, and encourage wildlife-friendly farming.

d. Local Regulations

While the Proposed Project is a State-sponsored project that for most purposes is exempt from local ordinances and policies, the following have been considered in the analysis of potential impacts and identification of mitigation, as appropriate.

i. Solano County General Plan

The Solano County General Plan's Agricultural Resources Element delineates goals and policies for the protection of agricultural resources in Solano County. The Plan states that agricultural

resources are vital to the County's well-being, as they are a primary source of jobs and tax revenue. The following Solano County General Plan policies and goals on agricultural resources are relevant to the Proposed Project:

AR.G-1: Recognize, value, and support the critical roles of all agricultural lands in the stability and economic well-being of the county.

AR.G-2: Preserve and protect the county's agricultural lands as irreplaceable resources for present and future generations.

AR.G-5: Reduce conflict between agricultural and nonagricultural uses in agriculture-designated areas.

AR.G-7: Encourage consolidation of the fragmented pattern of agricultural preserves and contracts established under the Land Conservation Act (Williamson Act) and the retention of agricultural preserves and contracts in agricultural, watershed, and marshland areas.

AG.P-4: Require farmland conversion mitigation for either of the following actions:

- a. A General Plan amendment that changes the designation of any land from an agricultural to a nonagricultural use or
- b. An application for a development permit that changes the use of land from production agriculture to a nonagricultural use, regardless of the General Plan designation.

AG.P-8: Maintain water resource quality and quantity for the irrigation of productive farmland so as to prevent the loss of agriculture related to competition from urban water conduction internal or external to the county.

AG.P-18: Support long-term viability of commercial agriculture and discourage inappropriate development of agricultural lands within the Delta.

AG.P-25: Facilitate partnerships between agricultural operations and habitat conservation efforts to create mutually beneficial outcomes. Although such partnerships are to be encouraged throughout the county, additional emphasis should be focused in locations where the Resources Conservation Overlay and Agricultural Reserve Overlay coincide.

AG.P-35: Lands within the Agriculture designations may be re-designated to Watershed or Marsh.

Additionally, the General Plan outlines plans for a farmland mitigation program where there is development of agricultural land into non-agricultural use. The General Plan suggests the use of conservation easements and the purchase of agricultural properties for protection as preferred methods of mitigation, subject to the County enacting an ordinance in the future as required to enact the program.

ii. Solano County Williamson Act Guidelines

Key provisions of Solano County's Williamson Act guidelines include requirements that non-agricultural uses within contracted land should not significantly compromise the long-term productive agricultural or open space capacity of the contracted property and should be consistent

with the purpose of conserving agricultural and open space land. These guidelines were enacted in 2012. The Bowsbey, Liberty Island, and Vogel Properties' Williamson Act contracts allow for both agricultural uses and open space uses, and all were contracted in the 1970s and 1980s.

The Solano County Williamson Act guidelines state that wetland restoration using approved sediments, including tidal wetland restoration, is considered a compatible use—provided that it has been considered whether mitigation has been incorporated to make the use more consistent with agricultural production, agricultural productive capacity has been considered, the use is consistent with the purposes of preserving agricultural and open-space land, and the use does not include a residential subdivision.

In addition to agricultural preserves, the county outlines circumstances under which open space preserves may be established within contracted lands. Permitted and compatible uses for these preserves are determined at the time of application for preserve establishment.

iii. Solano County Right-to-Farm Ordinance

Chapter 2.2 of the Solano County Code protects farm operations from nuisance complaints associated with residential uses located next to active agricultural operations. This “right-to farm ordinance”, as it is commonly known, guarantees the right to continue agricultural operations, including, but not limited to, cultivating and tilling the soil, burning agricultural byproducts, irrigating, raising crops and/or livestock, and applying approved chemicals to fields and farmland in a proper manner. This ordinance limits the circumstances under which agriculture may be considered a nuisance. To prevent future conflicts, notice of this ordinance is given to purchasers of real property in the County.

4. ENVIRONMENTAL IMPACTS

a. Thresholds of Significance

In accordance with Appendix G of Title 14, Chapter 3 of the California Code of Regulations, as modified by DWR under the authority granted by CEQA Guidelines Section 15064.7(b), the Proposed Project would have a significant environmental impact if it would:

- a) Convert a substantial amount of prime farmland, unique farmland, or farmland of statewide importance, as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use;
- b) Conflict with existing zoning for agricultural use, a Williamson Act Contract;
- c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g));
- d) Result in the loss of a substantial amount of forest land or conversion of forest land to non-forest use; or

- e) Involve other changes in the existing environment, which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use.

b. Methodology

The Proposed Project Site was mapped using the California Department of Conservation's FMMP and the Solano County Williamson Act Map for Fiscal Year 2013/2014 (the most recent available). After determining the quantity of prime farmland, unique farmland, and farmland of state/local importance and farmland under Williamson Act contracts in the Proposed Project Site and evaluating each property's Williamson Act contract, impacts were evaluated under the assumption that all land would be permanently converted from agricultural to habitat conservation land use.

c. Project Impacts and Mitigation Measures

i. Conversion of a Substantial Amount of Prime Farmland to Non-Agricultural Use

Proposed Project elements include levee breaches and degradation along the Shag Slough and Vogel Levees. These changes would restore the Proposed Project Site to tidal connectivity and facilitate inundation during high tide events and flooding during Yolo Bypass flooding events. These changes would prevent further agricultural production on the Proposed Project Site, converting farmland to a non-agricultural use.

As previously discussed, the Vogel Property is classified as "other land" by FMMP and the Liberty Farms Property is classified as "grazing land" and "other land". Furthermore, agriculture (including grazing) is a prohibited use on the Liberty Farms Property due to the WRP easement. Conversion of these properties to tidal marsh and seasonal floodplain would therefore not result in any conversion of prime farmland to non-agricultural use.

In contrast, the Bowsbey Property is classified as prime farmland by the FMMP. The property would permanently be converted from irrigated grazing land to tidal marsh and floodplain, yielding an approximate 1,460-acre loss of prime farmland. As the Proposed Project would permanently convert prime farmland to non-agricultural use, impacts would be potentially significant unless mitigated.

Mitigation Measure AG-1a would require funding of agricultural improvements on a nearby property. This would enhance the grazing capability of the current operator of the Bowsbey Property on nearby lands to assure their continued operation in the same region of Solano County. Proposed off-site improvements have been developed in collaboration with the current operator on the Bowsbey Property and would enhance the operator's grazing capacity on the adjacent Zanetti Property, a 762-acre property which is located immediately west of the proposed Duck Slough Setback Levee. The mitigation would benefit all 762 acres of the Zanetti property and is designed to convert 440 of the property's 762 acres to irrigated farmland. Other proposed improvements include enhancements to worker housing and the septic system and would promote the productive capacity of the property.

Currently, all but 100 acres of this property contain suitable soil characteristics to be considered prime farmland but do not contain the requisite irrigation infrastructure and history (FMMP requires a property to have been used for irrigated agriculture at some point in the four years prior to classification). Irrigation and agriculture-related infrastructure are among the improvements to be funded as part of Mitigation Measure AG-1. These improvements will improve the capability of the operator to irrigate a 320-acre portion of the Zanetti Property and add an additional 440 acres of irrigated farmland, approximately 340 of which contain prime agricultural soils.

Additionally, the new infrastructure will improve drainage on a portion of 960 acres of non-irrigated rangeland on the Wineman Property, located to the south of the Zanetti Property and adjacent to Duck Slough. These improvements will increase the agricultural value and productivity of approximately 1,700 acres, 320 acres of which are existing prime farmland, and 340 acres of which will qualify for re-classification to prime farmland. The improvements funded through this measure enhance the economic viability of agricultural operations on these properties, increasing the likelihood of continued agricultural land uses.

Additionally, Mitigation Measure AG-1b would require the purchase of one or more agricultural conservation easements on at least 1,000 acres of land of comparable agricultural quality to the Bowsbey Property within Solano County. Protected acreage will consist of irrigated farm or pasture and will be protected with a permanent easement. These new agricultural easements would permanently contribute to the County's goal of maintaining long-term agricultural viability in Solano County. Impacts and mitigation amounts are summarized in Table IV.B-1.

Table IV.B-1. Agricultural Impacts and Mitigation

	Impact (acres)	Prime Farmland Mitigation (acres)	Non-Prime Farmland Mitigation (acres)
Bowsbey Property Prime Farmland to Habitat	1,460	-	-
Zanetti Property			
Prime Farmland improved irrigation	-	320	-
Conversion of non-irrigated farmland to Prime Farmland	-	340	-
New irrigation infrastructure for farmland with non-prime soils	-	-	100
Wineman Property			
Improved drainage of non-irrigated rangeland	-	-	960

Offsite Agriculture Preserve			
Prime Farmland Agriculture Conservation Easement in Solano County	-	1,000	-
Subtotal	1,460	1,660	1,060
Total	1,460	2,720	

As noted on the table above, the improvements and conservation measures required per Mitigation Measure AG-1 would result in Prime Farmland irrigation improvements of 320 acres; creation of 340 acres of Prime Farmland; new irrigation infrastructure for 100 acres; improved drainage of non-irrigated rangeland for 960 acres; and preservation of 1,000 acres of Prime Farmland. Thus, the Proposed Project's impacts on prime farmland would be ***less than significant with mitigation incorporated.***

Mitigation Measure AG-1a: Off-Site Agricultural Improvements

Prior to commencement of construction, improvements beneficial to agricultural productivity shall be installed to improve the irrigation capability and extent of the Zanetti Property and improve drainage of the Wineman Property. Improvements shall include irrigation infrastructure with potential to convert all or part of the property to Prime Farmland; these may include, but are not limited to, power drops, pumps, and pipelines. Other improvements may include, but are not limited to, farm buildings such as barns, workshops, corrals and fencing, and worker housing with an associated septic system.

Mitigation Measure AG-1b: Agricultural Conservation Easement

The Applicant shall establish an off-site agricultural preserve by placing a conservation easement on a minimum of 1,000 acres of Prime Farmland. The property to be placed under an agricultural conservation easement shall be located in Solano County and shall be of similar quality. Mitigation lands shall meet all of the following criteria to qualify as agricultural mitigation:

- The soil quality of agricultural mitigation land shall have a farmland classification of Prime Farmland, or Prime Farmland if Irrigated according to the USDA Soil Survey;
- The land shall have an adequate water supply for the purposes of irrigation. The water supply shall be sufficient to support ongoing agricultural uses;
- The mitigation land may not have been previously encumbered by any other agricultural conservation easement or have been used for agricultural mitigation;

- The mitigation land may also provide compensatory mitigation for special-status species such as Swainson's hawk, so long as agricultural uses can be implemented in a manner that is consistent with the needs of the species.

ii. Conflict with a Williamson Act Contract

According to the California Department of Conservation's Solano County Williamson Act Map for Fiscal Year 2013/2014 and real estate documents, all three properties within the Proposed Project Site are under Williamson Act contracts. The terms of each contract state that the land within these properties "shall not be used for any purpose other than 'an agricultural use'; or 'open space use', as provided in Section 51205 of the Government Code. The Proposed Project satisfies several compatible open space uses described in the Williamson Act, including wildlife habitat and submerged area, both of which may be included in an agricultural preserve pursuant to Government Code Section 51205.³ Furthermore, Government Code Section 51205 states that, for the purposes of the Williamson Act, "the term 'agricultural use'...shall be deemed to include recreational and open space use." For example, the Proposed Project may satisfy the Williamson Act principles of compatibility via open space use, since the project will not "significantly compromise the long-term productive [open space] capability of the subject contracted parcel." (Cal. Gov. Code § 51238.1, subd. (a)(1).) Thus, the Proposed Project would introduce land uses consistent with the requirements of the subject properties' Williamson Act contracts.

The Solano County Guidelines Governing Agricultural Preserves and Land Conservation Contracts were revised in May 2012. Table A indicates that habitat land uses are not permitted on prime farmlands under contract. However, the Williamson Act contracts for the Proposed Project Site were executed in 1970 (Bowlsbey), 1979 (Liberty Farms), and 1984 (Vogel). Pursuant to Government Code Section 51238.3, any Williamson Act contract in place prior to June 7, 1994, is not required to comply with the principles of compatibility requirements listed in Government Code Section 51238.1-51238.2 and reflected in the County's Rules, if the proposed compatible uses are listed in the contracts themselves. Here, all of the contracts referenced specifically list open space as a compatible use which is consistent with how the land has been managed. Thus, the Proposed Project would be a compatible use under all three contracts. Although the Proposed Project is exempt from the local ordinances and policies, the Solano County Williamson Act Guidelines have been considered in the analysis of potential impacts and identification of mitigation, as appropriate.

Under Solano County provisions regarding Williamson Act contracts, when marsh re-establishment is proposed within an agricultural preserve, it should be considered whether: 1) conditions are incorporated to mitigate impacts to long-term agricultural productivity, 2) the productive capacity of the land has been considered, 3) the use is consistent with the purpose of preserving agricultural and open space land, and 4) the use does not include a residential subdivision.

³ "Agricultural Land," Pub. L. No. Title 5, Division 1, Part 1, Chapter 7, § 51201-51207, California Government Code January 1 (n.d.), https://leginfo.ca.gov/faces/codes_displaySection.xhtml?lawCode=GOV§ionNum=51201.

In the case of the Liberty Farms Property, these criteria have been met. The property is presently maintained in managed wetland use as a duck club and a compatible use under the existing Williamson Act contract and the WRP easement. The Proposed Project would facilitate a shift from the existing open space land use to another type of compatible open space land use. This would have no impact on the site's long-term open space viability and would be consistent with the purpose of preserving agricultural and open space land. The property's current state is not conducive to agricultural production, so the proposed modifications would not alter the property's long-term agricultural viability.

The Vogel Property was historically used for waterfowl hunting. Vogel Property infrastructure is limited to a duck blind and a tide gate. The property does not have a history of agricultural production and does not contain agricultural infrastructure. Removal of this infrastructure and tidal inundation of the property would therefore not impact the property's long-term agricultural viability. Additionally, the Proposed Project would not compromise the long-term productivity of the open space site or displace or impair open space uses. Proposed uses on the Vogel Property are consistent with the purpose of preserving agricultural and open space land, as the property would be permanently maintained as an open space tidal wetland.

Similarly, although the Bowlsbey Property is presently maintained as irrigated pasture and contains the corresponding infrastructure, conversion of this site to a tidal wetland would be consistent with the purpose of preserving open space and agricultural land. Although the Proposed Project would not affect this property's long-term productivity as an open space area, mitigation proposed in response to Impact AG-1 would minimize adverse effects on long-term agricultural viability by improving nearby agricultural lands and placing an easement on other Solano County farmland.

In summary, the entire Project Site is subject to Williamson Act contracts, which have been executed separately for each of the three properties. All three contracts require that their subject property be maintained in agricultural or open space use and recognize that the lands in question have "substantial public value as open space". As defined by California law and the existing contracts, all three properties would be under open space use as submerged land and/or wildlife habitat upon Proposed Project completion.⁴ Therefore, all three properties would maintain land uses consistent with their respective Williamson Act contracts. In addition, conditions have been incorporated into the Proposed Project to mitigate impacts to long-term agricultural productivity within the County, the productive capacity of the land has been considered, the Proposed Project's uses are consistent with the purpose of preserving agricultural and open space land, and no residential subdivisions are proposed. Thus, the Proposed Project would not conflict with a Williamson Act contract; and a **less-than-significant impact** would occur.

iii. Changes to the Existing Environment which Could Result in Conversion of Farmland to Non-Agricultural Use

As discussed under threshold i) of this analysis, upon Proposed Project completion all three properties within the Proposed Project Site would be subject to tidal inundation and would not be suitable for agricultural production. As Liberty Farms is not used as farmland, this property's

⁴ Govt. Code § 51205.

conversion to tidal marsh would not lead to the conversion of farmland to non-agricultural use. Changes to the Vogel and Bowsbey Properties, would lead to the permanent conversion of farmland to non-agricultural use; however, Mitigation Measures AG-1a and AG-1b require the Applicant to invest in productivity-enhancing infrastructure on nearby agricultural operations and purchase a conservation easement on agricultural lands in Solano County, respectively. The Proposed Project's effects on hydrology, biology, and noise are covered under the appropriate resources impact analysis. No other changes to the environment have been identified that could result in additional conversion of farmland to non-agricultural use. This impact is **less-than-significant with mitigation incorporated**.

iv. Conflict with Existing Zoning for or Rezoning of Forest Land, Timberland, or Timberland Zoned Timberland Production

Solano County has zoned the Proposed Project Site as agricultural 80 acres (A-80). There is no forest land, timberland, or timberland zoned Timberland Production present in the Proposed Project Site. As such, the Proposed Project would not conflict with existing zoning for, or cause rezoning of, forest land, timberland, or timberland zoned Timberland Production. **No impact** would result.

v. Loss of Forest Land or Conversion of Forest Land to Non-Forest Use

No forest land is present within the Proposed Project Site. The Proposed Project Site is not zoned for forestry or other forest-related uses. Some riparian trees are present in isolated portions of the Proposed Project Site. Due to their scattered nature, these are not considered forest land. Moreover, while some riparian trees would be removed during site preparation, replacement trees would be planted and there would be a long-term net gain of riparian vegetation. The Proposed Project would therefore not result in the loss of forest land or conversion of forest land to non-forest use and would consequently result in **no impact**.

5. LEVEL OF SIGNIFICANCE AFTER MITIGATION

With implementation of Mitigation Measures AG-1, impacts to agriculture and forestry resources would be less than significant. As such, impacts to agriculture and forestry resources would be **less than significant with mitigation incorporated**.

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IV. ENVIRONMENTAL IMPACT ANALYSIS

C. AIR QUALITY

1. INTRODUCTION

This section describes the existing air quality conditions in the vicinity of the Proposed Project Site; discusses the federal, state, and local regulations and policies pertinent to air quality; and assesses potentially significant impacts to air quality as a result of implementation of the Proposed Project. The analysis in this section was prepared in accordance with the Yolo-Solano Air Quality Management District (YSAQMD) Handbook for Assessing and Mitigating Air Quality Impacts (Handbook).¹ This analysis incorporates information from technical studies prepared for the Proposed Project, which are outlined in Chapter I, Introduction. Relevant studies to this chapter are available upon request from FRPA@water.ca.gov with a subject line of “Lookout Slough Information Request”, and include:

- Appendix B – Air Quality and Greenhouse Gas Emissions Calculations and Summary, Baseline Environmental Consultants 2019

2. ENVIRONMENTAL SETTING

a. Background

Ambient air quality is measured by the concentrations of air pollutants in the outdoor air and is a function of both local climate/weather and local sources of air pollution. National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS) define the maximum concentrations of a pollutant that can be present in outdoor air within a given air basin, and have been established for several common and widespread air pollutants that can harm human health and the environment and cause property damage. These include ozone (O₃), carbon monoxide (CO), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), respirable particulate matter (i.e., particles less than 10 microns in diameter, PM₁₀), fine particulate matter (particles less than 2.5 microns in diameter, PM_{2.5}), and lead (Pb). CAAQS are also established for visibility reducing particles, sulfates, hydrogen sulfide (H₂S), and vinyl chloride. NAAQS and CAAQS were established for the above pollutants to meet public health and welfare criteria; therefore, these pollutants are called “criteria” air pollutants.

Additional air pollutants known or suspected to adversely affect human health include toxic air contaminants (TACs). Unlike criteria air pollutants, which generally affect regional air quality, TAC emissions are evaluated based on estimations of localized concentrations and health risk assessments. The adverse health effects a person may experience following exposure to any

¹ *Yolo-Solano Air Quality Management District (YSAQMD), 2007. Handbook for Assessing and Mitigating Air Quality Impacts. Adopted on July 11.*

chemical depend on several factors, including the amount (dose), duration, chemical form, and any simultaneous exposure to other chemicals. Diesel particulate matter (DPM) is a type of TAC that could cause adverse air quality impacts. DPM, generated when an engine burns diesel fuel, is a complex mixture of soot, ash particulates, metallic abrasion particles, volatile organic compounds, and other components that can penetrate deeply into the lungs and contribute to a range of health problems. In 1998, the California Air Resources Board (CARB) identified DPM from diesel-powered engines as a TAC based on its potential health effects.²

b. Current Air Quality

The Proposed Project is located in eastern Solano County, which is in the Sacramento Valley Air Basin (SVAB) and is under the jurisdiction of the YSAQMD. The SVAB includes Butte, Colusa, Glenn, Sacramento, Shasta, Sutter, Tehama, Yolo and portions of Placer and Solano Counties. The SVAB climate is characterized by hot, dry summers and cool, wet winters. Solano County's annual average temperature is 60 degrees Fahrenheit, with average summer highs in the 80s and winter lows in the 40s. Rainfall averages about 21 inches per year and winds annually average about 16 miles per hour. The mountains surrounding the SVAB create a barrier to airflow that, under certain meteorological conditions, trap pollutants in the valley.

Depending on whether the standards for a particular criteria air pollutant have been met or exceeded, the local air basin is classified as being in "attainment" or "nonattainment". Due to the meteorological and geographic conditions described above, among other factors, the SVAB is currently designated a "nonattainment" area for the 1-hour state O₃ standard, the 8-hour state and federal O₃ standards, and the 24-hour and annual state PM₁₀ standards. The SVAB is presently designated as nonattainment for the PM_{2.5} federal standard but achieved the standard for the 2010-2012 period; and a request to the USEPA for re-designation was filed. In 2017, EPA found that the area attained the 2006 PM_{2.5} standard by the attainment date of December 31, 2015 (82FR21711). The project region is designated as attainment or is not classified for all other NAAQS and CAAQS for the other criteria pollutants discussed above.

CARB requires the YSAQMD to operate a network of ambient air monitoring stations throughout Yolo and portions of Solano Counties. The nearest monitors to the Proposed Project Site are the Vacaville – Ulatis Drive Station (O₃, PM_{2.5}) and the Vacaville – Merchant Street Station (PM₁₀). Table IV.C-1 summarizes the most recent three years of available air monitoring data (2016 through 2018) published by CARB for the stations near the Proposed Project Site for criteria pollutants for which the region is in nonattainment.

Pollutants described in Table IV.C-1 are pollutants with potential to be generated by Proposed Project activities and/or pollutants for which the project region is designated as nonattainment for

² California Air Resources Board (CARB), 1998. *Initial Statement of Reasons for Rulemaking; Proposed Identification of Diesel Exhaust as a Toxic Air Contaminant*, June.

one or more of the NAAQS or CAAQS. The physical characteristics and health effects of O₃ and PM criteria air pollutants are summarized in Table IV.C-2.

Table IV.C-1. Annual Air Quality Monitoring Data

Pollutant	Standard	Site	Number of Days Standard Exceeded		
			2016	2017	2018
O ₃	State 1-Hour Standard	Vacaville – Ulatis Drive	1	0	1
	State 8-Hour Standard		2	3	1
	National 8-Hour Standard		0	2	1
PM ₁₀	National 24-Hour Standard	Vacaville – Merchant Street	0	1	0
	State 24-Hour Standard		0	2	0
PM _{2.5}	National 24-Hour Standard	Vacaville – Ulatis Drive	0	3	10

Source: CARB, 2019. Air Quality Data Query Tool. <https://www.arb.ca.gov/aqmis2/aqdselect.php>. Accessed on January 24, 2019.

Table IV.C-2. Physical Characteristics and Health Effects of Criteria Air Pollutants

Criteria Air Pollutant	Physical Characteristics/Health Effects
Ozone (O ₃), Reactive Organic Gases (ROG), and Nitrogen Oxides (NO _x)	O ₃ can cause respiratory irritation and damage vegetation and other materials. It is not emitted directly into the atmosphere but is a secondary air pollutant produced through a series of chemical reactions involving ROG and NO _x . O ₃ concentrations tend to be higher in the late spring, summer, and fall, when the long sunny days combine with climatic conditions to create circumstances conducive to the formation and accumulation of O ₃ .
Carbon Monoxide (CO)	CO is a non-reactive pollutant that is mostly associated with motor vehicle traffic. High CO concentrations develop primarily during winter, when periods of light winds combine with ground level temperature inversions (typically from evening through early morning) resulting in reduced dispersion of vehicle emissions. In high concentrations, it can cause physical changes interfering with oxygen transport in the blood.
Particulate Matter (PM ₁₀ and PM _{2.5})	Particulate matter represents fractions of small particles that can be inhaled, causing adverse health effects. Particulate matter results from many kinds of dust and fumes produced from industrial and agricultural operations, fuel combustion, and atmospheric reactions. Some sources of particulate matter, such as demolition and construction activities, are more local in nature, while others, such as vehicular traffic, have a more regional effect. Very small particles can be injurious to health, damage materials, and reduce visibility.
Sulfur Dioxide (SO ₂)	SO ₂ is a combustion product of sulfur or sulfur-containing fuels such as coal. SO ₂ is a precursor to the formation of atmospheric sulfate and PM (both PM ₁₀ and PM _{2.5}) and can contribute to acid rain.
Lead	Lead has a range of adverse health effects on the nervous system and was historically released into the atmosphere primarily via leaded gasoline. The phasing out of leaded gasoline in California has resulted in decreasing levels of atmospheric lead.
<i>Source: YSAQMD. 2007: Handbook for Assessing and Mitigating Air Quality Impacts</i>	

3. REGULATORY FRAMEWORK

a. Federal Regulations

i. Federal Clean Air Act (CAA)

The Federal CAA (42 United States Code, Section 7401), which was passed in 1970 and last amended in 1990, is designed to control air pollution on a national level. Basic elements of the Federal CAA include NAAQS and state attainment plans for criteria air pollutants, Hazardous Air Pollutants standards, motor vehicle emissions standards, stationary source emissions standards and permits, acid rain control measures, stratospheric ozone protection, and enforcement provisions.

NAAQS for Criteria Air Pollutants

As required by Federal CAA, the United States Environmental Protection Agency (USEPA) established the NAAQS criteria for six air pollutants (O₃, CO, NO₂, SO₂, PM, and Pb) and also set deadlines for their attainment. NAAQS include both primary and secondary standards. Primary standards set limits to protect public health, including the health of sensitive receptors, such as asthmatics, children, and the elderly. Land uses (sites) where sensitive receptors are typically located include: schools, playgrounds and childcare centers; long-term health care facilities; rehabilitation centers; convalescent centers; hospitals; retirement homes; and residences. Secondary standards set limits to protect public welfare, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

The USEPA classifies air basins (or portions thereof) as “attainment” or “nonattainment” for each criteria air pollutant based on whether or not the NAAQS have been achieved. The Federal CAA requires each state to prepare an air quality control plan referred to as the State Implementation Plan (SIP). The Federal CAA 1990 Amendments added requirements for states with nonattainment areas to revise their SIPs to incorporate additional control measures to reduce air pollution. The USEPA has responsibility to review all state SIPs to determine if they conform to the mandates of the Federal CAA and will achieve air quality goals when implemented.

Hazardous Air Pollutants (HAPs)

Section 112(b) of the Federal CAA listed over 180 HAPs that need to be controlled, and the HAPs list has since gone through several revisions and updates. Most HAPs originate from human-made sources, including mobile sources (e.g., cars, trucks, buses) and stationary sources (e.g., factories, refineries, power plants), as well as sources related to buildings (e.g., building materials and activities such as cleaning). USEPA, working with state and local governments, has reduced the release of HAPs from stationary sources by issuing rules covering over 80 categories of industrial and commercial sources ranging from chemical plants and oil refineries to dry cleaners and chromium electroplating facilities. Reduction of HAPs from motor vehicle exhaust has been achieved by requiring the use of cleaner fuel such as reformulated gasoline and by placing limits on tailpipe emissions.

b. State Regulations*i. California Clean Air Act (CAA)*

The California CAA, Health and Safety Code, Section 42302.1, 42311, and 42352 (1988, as amended), was adopted in 1988 to establish a statewide air pollution control program. As required by the California CAA, CARB has established more stringent standards for the six criteria pollutants that are covered by NAAQS, and has additionally set standards for sulfates, hydrogen sulfide, vinyl chloride, and visibility reducing particles pollutants.

CARB also identifies and classifies each air basin in the state on a pollutant-by-pollutant basis and has designated areas in California as nonattainment based on violations of the CAAQS. The California CAA requires all air districts in California to meet the CAAQS by the earliest practical date. Each nonattainment district is required to adopt a plan to achieve a 5% annual reduction averaged over consecutive 3-year periods, in district-wide emissions of each nonattainment pollutant or its precursors. A Clean Air Plan shows how a district would reduce emissions to achieve air quality standards.

ii. California Toxic Air Contaminants (TAC) Regulations

California state law defines TACs as air pollutants that may cause or contribute to increases in serious illness or death, or that may pose a present or potential hazard to human health. In accordance with Assembly Bill (AB) 2728, all federal HAPs are TACs under California law. A total of 243 substances have been designated as TACs under California law.

California regulates TACs primarily through Toxic Air Contaminant Identification and Control Act (AB 1807, Tanner 1983) and the Air Toxics "Hot Spots" Information and Assessment Act (AB 2588, Connelly 1987). AB 1807 created California's program to reduce exposure to air toxics. AB 2588 supplements the AB 1807 program by requiring a statewide air toxics inventory, notification of people exposed to a significant health risk, and facility plans to reduce these risks.

c. Local Regulations*i. Yolo-Solano Air Quality Management District*

The YSAQMD is the primary agency responsible for assuring that the NAAQS and CAAQS are attained and maintained in the vicinity of the Proposed Project Site. The Federal and California CAAs require air districts to prepare a plan for air quality improvement for criteria pollutants for which the SVAB is in nonattainment. The YSAQMD is part of the USEPA's greater Sacramento Federal Nonattainment Area for O₃ and PM_{2.5}. As such, the YSAQMD has prepared joint planning documents with other air districts in the Sacramento Region to work towards attainment of O₃ and PM_{2.5} standards dictated by the Federal CAA. The most recent such documents include the Sacramento Regional 8-Hour O₃ Attainment and Reasonable Further Progress Plan³ (2013) and the Proposed PM_{2.5} Implementation/Maintenance Plan and Redesignation Request for

³ *El Dorado County Air Quality Management District et al., "Sacramento Regional 8-Hour Ozone Attainment and Reasonable Further Progress Plan (2013 SIP Revisions)."*

Sacramento PM_{2.5} Nonattainment Area⁴ (2013). For the purposes of the California CAA, the District adopted a Triennial Assessment and Plan Update⁵ to regulate O₃, PM_{2.5}, and PM₁₀ emissions. These planning documents are the basis for YSAQMD's functional strategy to meet federal and state AAQS.

Relevant YSAQMD rules include the following:

Rule 2.5, Nuisance. A person shall not discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public or which endanger the comfort, repose, health, or safety of any such persons or the public or which cause to have a natural tendency to cause injury or damage to business or property.

Rule 2.11, Particulate Matter Concentration. A person shall not release or discharge into the atmosphere from any single source operation, dust, fumes, or total suspended particulate matter emissions in excess of 0.1 grain per cubic foot of gas at dry standard conditions.

Additionally, in 2007, YSAQMD issued guidelines for assessing and mitigating air quality impacts for projects being evaluated under CEQA in its Handbook for Assessing and Mitigating Air Quality Impacts.⁶ The purpose of the guidelines is to ensure that projects are properly evaluated for consistency with ambient air quality standards and plans. These guidelines outline thresholds of significance for criteria pollutants and other relevant impacts, as well as project sizes and screening criteria where further analysis related to air quality impacts is merited.

ii. Solano County General Plan

The following have been considered in the analysis of potential impacts and identification of mitigation, as appropriate.

The Solano County General Plan Public Health and Safety Element includes a section on air quality and its impacts on public health. The Plan outlines a variety of goals and policies to improve air quality and protect public health. These include:

HS.P-47: Promote greenhouse gas emission reductions by supporting carbon-efficient farming methods (e.g., methane capture systems, no-till farming, crop rotation, cover cropping, residue farming); installation of renewable energy technologies; protection of grasslands, open space, and farmlands from conversion to other uses; and encouraging development of energy-efficient structures.

HS.I-52 – Require that when development proposals introduce new significant sources of toxic air pollutants, they prepare a health risk assessment as required under the Air Toxics “Hot Spots” Act (AB 2588, Connelly 1987) and, based on the results of the assessment,

⁴ *El Dorado County Air Quality Management District et al., “Proposed PM_{2.5} Implementation/Maintenance Plan and Redesignation Request for Sacramento PM_{2.5} Nonattainment Area.”*

⁵ *Yolo-Solano Air Quality Management District, “Triennial Assessment and Plan Update.”*

⁶ *Yolo-Solano Air Quality Management District, “Handbook for Assessing and Mitigating Air Quality Impacts.”*

establish appropriate land use buffer zones around those areas posing substantial health risks.

HS.I-54: Require the implementation of best management practices to reduce air pollutant emissions associated with the construction of all development and infrastructure projects.

HS.I-56 – Comply with the California Air Resources Board and Bay Area or Yolo-Solano Air Quality Management District rules, regulations, and recommendations for Solano County facilities and operations. Such operations shall comply with mandated measures to reduce emissions from fuel consumption, energy consumption, surface coating operations, and solvent usage.

4. ENVIRONMENTAL IMPACTS

a. Thresholds of Significance

In accordance with Appendix G of the CEQA Guidelines, the Proposed Project would have a significant environmental impact if it would:

- a) Conflict with or obstruct implementation of the applicable air quality plan;
- b) Result in a cumulatively considerable net increase of any criteria pollutant for which the Proposed Project region is nonattainment under an applicable federal or state ambient air quality standard;
- c) Expose sensitive receptors to substantial pollutant concentrations; or
- d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.

i. Air Quality Issues Not Further Discussed

The discussion of air quality impacts primarily addresses construction emissions. The nature of proposed restoration and flood improvement activities present a low potential for substantial long-term emissions. Therefore, long-term impacts on air quality are only discussed qualitatively.

The SVAB is in nonattainment of the PM₁₀, PM_{2.5}, and O₃ NAAQS and CAAQS, and these pollutants are the primary subjects of applicable air quality plans. The analysis of the Proposed Project's potential effects on applicable air quality plans and nonattainment criteria pollutants therefore focuses on these pollutants. PM_{2.5} modeling results are not presented in this section since YSAQMD does not have a standard for this pollutant. Other criteria pollutant emissions were modeled and verified to result in less-than-significant impacts.⁷

⁷ Baseline Environmental Consultants, "California Emissions Estimator Model (CalEEMod Version 2016.3.2) Air Quality and Greenhouse Gas Emissions Calculations."

b. Methodology

The YSAQCD was provided a list of off-road construction equipment and the associated total hours of operation for each proposed construction activity. It was also provided with an estimate of off-haul tonnage,⁸ the maximum number of workdays per year, and the maximum number of workers on site.⁹ The construction equipment and vehicle estimates are representative of the most intensive construction scenario, and include conservative contingencies for possible equipment changes during construction, such as the possible use of barges for hauling piles from a small portion of the Proposed Project Site.¹⁰

The most recent version of the CalEEMod (version 2016.3.2) was used to estimate construction emissions of criteria air pollutants from Proposed Project construction. CalEEMod uses widely accepted models for emissions estimates combined with appropriate default data for a variety of land use projects that can be used if site-specific information is not available. The default data (e.g., fleet-average emission factors) are supported by substantial evidence from regulatory agencies and a combination of statewide and regional surveys of existing land uses. Modeled construction emissions were compared against YSAQMD screening criteria and thresholds of significance provided in the YSAQMD Handbook for Assessing and Mitigating Air Quality Impacts.

c. Project Impacts and Mitigation Measures

i. Conflict with or obstruct implementation of the applicable air quality plan

The YSAQMD's Handbook established project-level thresholds of significance for ROG, NO_x, PM₁₀, and CO based on the significance criteria from CEQA Guidelines Appendix G. A project in the jurisdiction of YSAQMD would conflict with implementation of the applicable air quality plan if, after the implementation of mitigation measures, construction and/or operational emissions from the project would exceed project-level thresholds of significance for criteria pollutants.

Operation of the Proposed Project would include post-construction site operations, maintenance, monitoring, and adaptive management activities. Levee maintenance would generate vehicle trips to the site at least once every 90 days for site inspection and ecosystem monitoring would require visits up to once every two months for a ten-year period following construction. These activities would only generate a small number of trips in light-duty vehicles and possible minor construction vehicle operations for repairs and maintenance. Criteria pollutant emissions generated from these activities are minor and would be negligible when compared to the thresholds of significance. Therefore, operation of the Proposed Project would not conflict with implementation of the applicable air quality plan in the YSAQMD.

⁸ Baseline Environmental Consulting, 2019. Email communication with Audrey Smith at WRA Environmental Consultants. Lookout Slough – Clarifications on some RFI items. January 17.

⁹ Baseline Environmental Consulting, 2019. Email communication with Audrey Smith at WRA Environmental Consultants. Lookout Slough – Clarifications on some RFI items. January 16.

¹⁰ Baseline Environmental Consulting, 2019. Email communication with Audrey Smith at WRA Environmental Consultants. Lookout Slough – Tweaks to Models. October 16.

Proposed Project construction would generate criteria air pollutant emissions that could affect regional air quality. Proposed Project construction activities would include demolition, site preparation, grading, levee and cutoff wall construction, road surfacing, and levee breaching. Main construction activities are anticipated to occur approximately from July 2020 to December 2022. The primary pollutant emissions of concern during Proposed Project construction include ROG, NO_x, and PM₁₀ from exhaust of off-road construction equipment and on-road vehicles (worker vehicles and haul trucks). In addition, fugitive dust emissions of PM₁₀ would be generated by earthwork and demolition activities.

Relatively equal amounts of off-road construction activity are expected to occur during the first and second years of construction. To estimate maximum annual construction emissions, it was conservatively assumed that construction activities would occur within a two-year timeframe, and that half of the total hours of operation for off-road equipment would occur in 2020 and all on-road equipment operations associated with haul trips would occur in 2020. Additional data and assumptions used to estimate construction emissions are summarized in Table IV.C-3.

According to the conservative estimates for construction equipment and truck uses, more than 99 percent of NO_x emissions would be from the operation of off-road diesel construction equipment. Therefore, NO_x emissions can be reduced by using off-road construction equipment equipped with Tier 4 engines that meet the USEPA's most stringent emission standards. Tier 4 (i.e. low-emitting) engines are commercially available for most of the off-road equipment that would be used for the Proposed Project, including barges that may be used for hauling. Because NO_x emissions from material transport activities contribute to less than 1% of total construction emissions, possible substitution of trucks by barges for material transport would not result in any substantial change in the total construction emissions, despite the differences in emission factors between these two modes for material transport.

Implementation of Mitigation Measure AIR-1 would ensure that the Proposed Project's annual NO_x emissions during construction would be reduced below the YSAQMD's threshold of significance by using the highest tier engines readily available to the construction contractor(s). In addition, the YSAQMD recommends that all projects implement BMPs to reduce dust emissions, including projects that do not exceed the PM₁₀ threshold. Mitigation Measure AIR-2 would ensure that the Proposed Project applies BMPs to reduce dust, such as maintaining soil moisture to avoid fugitive dust and covering all trucks hauling dirt, sand, and loose materials. With the implementation of Mitigation Measure AIR-1 and Mitigation Measure AIR-2, the Proposed Project's NO_x and PM₁₀ emissions would be below the thresholds of significance.

Table IV.C-3. Summary of Construction Input Parameters for CalEEMod

CalEEMod Input	Construction Assumptions and Changes to Default Data
Construction Phase	The default construction duration was modified to include all the construction hours for 2020 and 2021 into two separate work years to calculate the total annual emissions.
Off-Road Construction Equipment	The default off-road construction equipment and associated engine horsepower were modified so that the daily hours of operation for each piece of equipment equaled the corresponding annual hours of operation for 2020.
Material Movement	The estimated volumes of material (i.e., soil, concrete, debris) to be removed from the site and transported off-site include 5,700 tons of concrete, 8,400 tons of concrete v-ditch, and 1,700 tons of demolition debris. Materials would be hauled off-site mostly by trucks, but barges may also be used for a small portion of the site. The estimated volume of rock to be imported to project site would be up to 10,000 tons. The assumptions for material movement are the most conservative.
Total Acres Graded	Total acres graded were calculated based on the total operation hours for dozers, graders, and scrapers using the CalEEMod default methodology.
Soil Moisture Content	Existing surface soils are very moist or saturated and dewatering may be required prior to excavation activities. Based on the nature of the Proposed Project Site, the soil moisture content was assumed to be at least 20%.
Haul Trips	Assuming each haul truck has a 20-ton capacity, approximately 1,370 haul trips would be required to import and export various types of materials during construction. A conservative trip length of 200 miles per trip was chosen because the various import and export destinations are unknown at the time of preparation of this document.
Worker Trips	A maximum number of 26 workers would be on-site during construction, for a maximum number of 150 workdays per year. The average worker would travel 210 miles per round trip.
On-Road Trips	It was assumed that haul trucks and worker vehicles would travel on paved roads 99.5% of the time.
<i>Source: Appendix C, Air Quality Calculations.</i>	
Haul Trips	Assuming each haul truck has a 20-ton capacity, 865 haul trips would be required to transport materials off-site during construction.

Table IV.C-4. Estimated Unmitigated and Mitigated Construction Emissions

Project Emissions	Annual Emissions, tons/year		Average Daily Emissions, lbs/day		
	ROG	NOx	Fugitive PM ₁₀	Exhaust PM ₁₀	Total PM ₁₀
2020 Unmitigated Emissions	2.3	24.7*	51	12	63
2020 Mitigated Emissions	1.0	8.9	51	4	55
2021 Unmitigated Emissions	2.1	20.7*	38	11	49
2021 Mitigated Emissions	1.0	7.2	38	4	42
YSAQMD Thresholds	10	10	NA	NA	80

* Value exceeds threshold of significance.
Source: Appendix C, Air Quality Calculations.

The annual construction emissions estimated for 2020 and 2021 were averaged over the total working days per year (150 days) and compared to the YSAQMD's thresholds of significance in Table IV.C-4. The Proposed Project's estimated annual emissions of ROG and average daily emissions of PM₁₀ are below the thresholds of significance. However, the Proposed Project's estimated annual emissions of NO_x for both 2020 and 2021 are above the thresholds of significance.

YSAQMD does not provide a quantitative annual or daily average emission threshold for CO or PM_{2.5}. According to the YSAQMD's Handbook, the Proposed Project would have a significant impact if the Proposed Project's CO emissions would result in ambient CO concentrations that violate the CAAQS.

The vehicle trips generated by Proposed Project construction could increase localized CO concentrations (also known as hotspots), which would affect sensitive receptors located in the vicinity of the Proposed Project Site. The source of local CO concentrations is often associated with heavy traffic congestion, which most frequently occurs in urban areas, at signalized intersections of high-volume roadways. The Proposed Project Site is located in a rural setting with few signalized intersections. Additionally, barges could be used to haul material on- and off-site as water access is available. Barges are not anticipated to generate more CO and NO_x than trucks. Therefore, regardless of whatever combination of trucks or barges that could be used, the Proposed Project would not result in a significant increase in additional vehicle trips and vehicle idling at the nearby intersections that could contribute CO emissions to the existing conditions. The Proposed Project would not result in elevated ambient CO concentrations and therefore would not violate the CAAQS. Therefore, with the implementation of Mitigation Measure AIR-1 and Mitigation Measure AIR-2, impacts of the Proposed Project would not exceed the applicable threshold of significance related to consistency with the air quality plan and the Proposed Project's impact with regard to this threshold would be **less than significant with mitigation incorporated**.

Mitigation Measure AIR-1: Construction Equipment Standards

Contractors for construction of the Proposed Project shall implement the following emission control measures, as applicable:

a) Operation Requirements

- Idling times on all diesel-fueled off-road construction equipment over 25 horsepower shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to five consecutive minutes, as required by CCR, Title 13, section 2449.
- All construction equipment shall be maintained and properly tuned in accordance with the manufacturer's specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation. Equipment check documentation should be kept at the construction site and be available for review.

b) Engine Requirements

- If commercially available, the engines of the diesel off-road equipment shall meet the USEPA or CARB Tier 4 Final off-road emission standards. The equipment that shall use Tier 4 Final engines may include, but are not limited to: compactors, rollers, bulldozers, excavators, motor graders, scrapers equivalent to the Caterpillar 631K Wheel Tractor-Scraper model, and off-road haul trucks.
- Equipment requirements above may be waived by the project director of EIP or DWR, but only under any of the following unusual circumstances: if a particular piece of off-road equipment with Tier 4 Final standards or Tier 3 standards is technically not feasible; or there is a compelling emergency need to use off-road equipment that does not meet the equipment requirements, above. If the project director of EIP or DWR grants the waiver, the contractor shall use the next cleanest piece of off-road equipment available, in the following order: Tier 4 Interim, Tier 3, and then Tier 2 engines.

Mitigation Measure AIR-2: Dust Control

Contractors for construction of the Proposed Project shall implement all of the following applicable dust control measures:

- Water all exposed surfaces of active construction areas where the soil moisture content is low enough to produce visible dust emissions upon soil disturbance. Increased watering frequency may be necessary whenever wind speed exceeds 15 miles per hour.

- Cover all trucks hauling soil, sand, and other loose materials.
 - All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
 - All demolition activities shall be suspended when average wind speeds exceed 20 miles per hour.
 - Monitor moisture content of exposed areas after cut and fill. Apply non-toxic binders (e.g., latex acrylic copolymer) to exposed areas if needed and consistent with the goals of the restoration project.
 - Apply chemical soil stabilizers on exposed stockpiles if consistent with the goals of the restoration project.
- ii. *Cumulatively considerable net increase of any criteria pollutant for which the Proposed Project region is non-attainment under an applicable federal and state ambient air quality standard*

Therefore, as discussed under Impact AIR-1, with the implementation of Mitigation Measure AIR-1 and Mitigation Measure AIR-2, emissions of the Proposed Project would not exceed the applicable threshold of significance related to cumulative considerable net increases of criteria pollutants and the Proposed Project's impact with regard to this threshold would be ***less than significant with mitigation incorporated***.

iii. *Expose sensitive receptors to substantial pollutant concentrations*

The Proposed Project Site is surrounded by agricultural land, managed wetlands, and other open spaces. The area is used for agricultural and conservation purposes, with no residential subdivisions, schools, hospitals, or other sensitive land uses or receptors located nearby. The nearest home is roughly 1,400 feet from the Proposed Project Site, the nearest schools 9-10 miles, and the nearest hospital 13 miles. While there may be a temporary increase in TAC emissions in the area during construction due to the operation of off-road diesel construction equipment, there are no sensitive receptors in the vicinity of the Proposed Project Site to be exposed to such an increase.

Construction of the Proposed Project would also generate TAC emissions from on-road mobile sources such as haul trucks and worker vehicles and could potentially expose sensitive receptors along the roadways to temporary elevated levels of TACs. Construction of the Proposed Project would generate up to 26 worker trips a day, and about 900 haul trips during the period of construction. For a screening-level health risk analysis, the California Air Resources Board generally considers roadways with more than 10,000 annual average daily traffic a potential source of substantial TAC exposure for sensitive receptors located within 1,000 feet of the

roadway. Proposed Project construction would not result in over 10,000 annual average daily traffic on local roadways near the Proposed Project. Therefore, impacts of the Proposed Project would not exceed the applicable threshold of significance related to the exposure of nearby sensitive receptors to substantial pollutant concentrations and the Proposed Project's impact with regard to this threshold would be ***less than significant with mitigation incorporated***.

iv. Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people

The YSAQMD suggests that other emissions (such as those leading to odors) but analyzed for common odor-generating facilities used for wastewater treatment, chemical manufacturing, landfills, fiberglass manufacturing, transfer stations, painting/coating operations, composting, food processing, petroleum refining, feed lots, asphalt batch, and rendering. The YSAQMD is especially concerned with incompatible land uses located in close proximity to each other and odor impacts on residential areas and other sensitive receptors. There are no residential areas nearby, with the nearest home existing roughly 1,400 feet from the Proposed Project Site. Further, the Proposed Project would not create an odor-generating facility including but not limited to those listed above. The conservation area resulting from the completed project would be compatible with existing land uses in the area. Therefore, impacts of the Proposed Project would not exceed that applicable threshold of significance related to other emissions (such as those leading to odors) adversely affecting a substantial number of people and the Proposed Project's impact with regard to this threshold would be ***less than significant***.

5. LEVEL OF SIGNIFICANCE AFTER MITIGATION

With the implementation of Mitigation Measures AIR-1 and AIR-2, the Proposed Project's impacts on air quality would be ***less than significant***.

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IV. ENVIRONMENTAL IMPACT ANALYSIS

D. BIOLOGICAL RESOURCES

1. INTRODUCTION

This section of the Draft EIR addresses biological resource issues related to implementation of the Proposed Project. The information presented in this section is based on the following technical reports prepared by WRA, Inc. (WRA). These documents are in the Appendix and available upon request from FRPA@water.ca.gov. Please include a subject line of “Lookout Slough Information Request”.

- Appendix F – Biological Resources Assessment (BRA): Lookout Slough Tidal Habitat Restoration and Flood Improvement Project, Revised December 2019.
- Appendix G – Aquatic Resources Delineation Report: Lookout Slough Restoration Project, Updated October 2019.
- Appendix H – Fish Study Restoration Basis of Design: Lookout Slough Restoration Project, WRA Inc., January 2019.

2. ENVIRONMENTAL SETTING

The analysis of potential biological impacts has incorporated information from several site visits conducted by WRA between January 2017 and July 2018 and the BRA. The purpose of the site visits and BRA was to identify, describe, and map the current biotic and abiotic baseline conditions within the Proposed Project Site and adjacent areas reasonably anticipated to be affected by the Proposed Project to inform habitat restoration and related improvements.

a. BRA Methods

During the site visits, shown below in Table IV.D-1, the Proposed Project Site was traversed on foot to determine: (1) plant communities present within the Proposed Project Site; (2) if existing conditions provided suitable habitat for any special-status plant or wildlife species; and (3) if sensitive habitats are present. Plant nomenclature follows Baldwin et al. (2012) and subsequent revisions by the Jepson Flora Project (2018), except where noted. Relevant synonyms are provided in brackets due to recent changes in classification for many of the taxa by Baldwin et al. and the Jepson Flora Project. For cases in which regulatory agencies, the California Native Plant Society (CNPS), or other entities base rarity on older taxonomic classifications, precedence was given to the classifications used by those entities.

Table IV.D-1. Biological Surveys in the Proposed Project Site

Survey Date	Survey Effort
1/6/17 & 1/13/17	Bowlsbey Property and Vogel Property general biological reconnaissance survey
7/28/17	Giant garter snake Assessment and environmental DNA (eDNA) reconnaissance survey and western pond turtle assessment
9/19/17	Liberty Farms general biological reconnaissance surveys
9/20/17 – 9/22/17	Protocol-level special-status plant surveys
10/2/17	Protocol-level special-status plant surveys
3/8/18 – 3/9/18	General fish assemblage
4/4/18 – 4/5/18	Delineation of aquatic resources
3/23/18 – 4/18/18	Swainson's hawk and nesting raptors surveys
4/18/18	California Black Rail reconnaissance survey and Habitat Evaluation
5/9/18	Delineation of aquatic resources
8/27/18	Valley Elderberry Longhorn Beetle survey
7/20/18	Delineation of aquatic resources

b. Biological Communities

Prior to site visits, USDA's 1977 Soil Survey of Solano County was examined to determine if any unique soil types that could support sensitive plant communities were present. Biological communities were classified based on existing plant community descriptions in the *Preliminary Descriptions of the Terrestrial Natural Communities of California*.¹ However, in some cases it is necessary to identify variants of community types or to describe unvegetated areas that are not described in the literature. Biological communities were classified as sensitive or non-sensitive as defined by CEQA and other applicable laws and regulations.

¹ Holland, RF. 1986. *Preliminary Descriptions of the Terrestrial Natural Communities of California*. Prepared for the California Department of Fish and Game, Sacramento, CA.

Sensitive biological communities are defined as those communities that are given special protection under CEQA and other applicable federal, state, and local laws, regulations and ordinances. Non-sensitive biological communities are those communities that are not afforded special protection under CEQA, or other state, federal, and local laws, regulations and ordinances. These communities may, however, provide suitable habitat for special-status plant or wildlife species.

c. Jurisdictional Aquatic Resources

The Proposed Project Site was surveyed to determine if any aquatic features (i.e., wetlands and non-wetland waters) potentially subject to jurisdiction by the Corps, RWQCB, or CDFW were present. A wetland delineation was performed concurrently during BRA surveys and was based primarily on the presence of wetland plant indicators; however, it also included observed indicators of wetland hydrology and wetland soils. Any potential wetland areas were identified as areas dominated by plant species with a wetland indicator status of obligate (OBL), facultative wetland (FACW), or facultative (FAC). Evidence of wetland hydrology can include direct evidence (primary indicators), such as visible inundation or saturation, algal mats, and oxidized root channels, or indirect (secondary) indicators, such as a water table between one and two feet of the soil surface during the dry season.

The results of the aquatic resource delineation were verified by the Corps on December 20, 2018.

d. Special-Status Species

i. Literature Review

The potential occurrence of special-status species was evaluated by first determining which special-status species occur in the vicinity of the Proposed Project Site through a literature and database search. Database searches for known occurrences of special-status species focused on the Liberty Island 7.5-minute United States Geologic Survey (USGS) quadrangle and the eight surrounding USGS quadrangles (Birds Landing, Clarksburg, Courtland, Dixon, Dozier, Isleton, Rio Vista and Saxon). All wildlife and plant evaluations and background research are included in the Proposed Project's BRA (Appendix F).

ii. Site Assessment

Site visits were subsequently made to the Proposed Project Site to search for suitable habitats for special-status species. Habitat conditions observed in the Proposed Project Site were used to evaluate the potential for presence of special-status species based on these searches and the professional expertise of the investigating biologists. The potential for each special-status species to occur in the Proposed Project Site was then evaluated according to the following criteria:

- **No Potential.** Habitat on and adjacent to the site is clearly unsuitable for the species requirements (foraging, breeding, cover, substrate, elevation, hydrology, plant community, site history, disturbance regime).

- Unlikely. Few of the habitat components meeting the species requirements are present, and/or the majority of habitat on and adjacent to the site is unsuitable or of very poor quality. The species is not likely to be found on the site.
- Moderate Potential. Some of the habitat components meeting the species requirements are present, and/or only some of the habitat on or adjacent to the site is unsuitable. The species has a moderate probability of being found on the site.
- High Potential. All of the habitat components meeting the species requirements are present and/or most of the habitat on or adjacent to the site is highly suitable. The species has a high probability of being found on the site.
- Present. Species is observed on the site or has been recorded (i.e., CNDDDB, other reports) on the site recently.

In cases where little information is known about species occurrences and habitat requirements, species evaluation was based on best professional judgment of WRA biologists with experience working with the species and habitats. If necessary, recognized experts in individual species biology were contacted to obtain the most up-to-date information regarding species biology and ecology. The table containing the evaluation of each species is included in the BRA (Appendix F). Only species found to be present, or those that have a high or moderate potential to occur at the Proposed Project Site, are discussed below. Any justifications for species, which were found to have No Potential or are Unlikely to Occur, are discussed in the BRA.

iii. Special-Status Plant Surveys

Special-status plant surveys followed protocol described by CDFW, CNPS, and USFWS guidance. Special-status plant survey dates corresponded to the peak blooming periods for observing and accurately identifying hundreds of plant species in Solano County, including the 12 special-status species with moderate or high potential to occur in the Proposed Project Site. The surveys employed wandering transects across the entirety of the Proposed Project Site, with additional effort given to areas thought to be suitable for special-status species and sensitive natural communities.

All plants were identified to the taxonomic level necessary to determine whether or not they were special-status using the Jepson eFlora. Sensitive communities were identified following *A Manual of California Vegetation, Online Edition*, the California Fish and Game Code, or other applicable regulations (such as the CWA). Plant surveys were floristic in nature. All observed species were recorded and are included on a comprehensive species list provided in the BRA.

Protocol level surveys were conducted on September 20-22 and October 2, 2017, which corresponds to the blooming period for special-status plant species with moderate and high potential to occur within the Proposed Project Site. Based on site conditions and habitats observed during these surveys and during wetland delineation surveys conducted April 4 and 5 and May 9, 2019, it was determined that the 17 spring-blooming special-status plant species documented in database searches of the Liberty Island 7.5-minute USGS quadrangle and the eight surrounding USGS quadrangles were unlikely or had no potential to occur within the Proposed Project Site. As such, spring special-status plant surveys were determined to be

unnecessary and were not conducted. See the BRA for additional discussion of the assessment of habitat suitability for special-status plant species within the Proposed Project Site.

iv. Special-Status Wildlife Surveys

Following the general wildlife assessment and biological reconnaissance surveys, several focused wildlife and fisheries surveys were performed to better evaluate the potential for special-status wildlife species to occur within the Proposed Project Site. Methodology used for focused wildlife surveys is included in the BRA.

e. Results

i. Biological Communities

Three non-sensitive biological communities were identified within the Proposed Project Site—irrigated pasture, non-native grassland, and developed land. Three sensitive biological communities were identified, including Great Valley mixed riparian forest, Coastal and Valley freshwater marsh, and open water. These biological communities and their acreages are summarized in Table IV.D-2 and depicted in Figure IV.D-1.

Non-Sensitive Biological Communities

Irrigated Pasture

Irrigated pastures are areas that include land used primarily for the production of food, fiber, and livestock. This land cover type occurs throughout the Bowsbey Property. Plant species observed within irrigated pasture in the Proposed Project Site include dallis grass (*Paspalum dilatatum*), barley (*Hordeum* spp.), clover (*Trifolium* spp.), rabbitsfoot grass (*Polypogon monspeliensis*), Italian ryegrass (*Festuca perennis*), tall fescue (*Festuca arundinacea*), Bermuda grass (*Cynodon dactylon*), bird's-foot trefoil (*Lotus corniculatus*), perennial pepperweed (*Lepidium latifolium*), narrowleaf plantain (*Plantago lanceolata*), smut grass (*Sporobolus indicus*), wild radish (*Raphanus sativus*), wild fennel (*Foeniculum vulgare*), and bristly ox-tongue (*Helminthotheca echioides*). Occasional generalist native species are present and are sometimes dominant in the wettest portions of irrigated pastures, including iris leaved rush (*Juncus xiphioides*), meadow barley (*Hordeum brachyantherum*), knot grass (*Paspalum distichum*), salt grass (*Distichlis spicata*), and cocklebur (*Xanthium strumarium*).

This biological community does not support floristic communities ranked as sensitive by CDFW and is therefore not considered sensitive under CEQA. However, some irrigated pasture in the Proposed Project Site is considered irrigated wetland subject to the jurisdiction of the Corps and RWQCB. These areas are considered sensitive under CEQA and are discussed below.

Table IV.D-2 Summary of Biological Communities within the Proposed Project Site

Structure	Community¹	Vegetation Alliance	Sensitive	% of Site	Acres²
Tree / Shrub	Great Valley mixed riparian forest	Black willow thickets; Arroyo willow thickets; Valley oak woodland	Yes	<1%	36
Herb	Coastal & Valley freshwater marsh	Hardstem bulrush marsh; California bulrush marsh; Cattail marshes	Yes	31%	1,127
	Irrigated pasture	Perennial rye grass fields; Bent grass-tall fescue meadows	No	38%	1,364
	Non-native grassland	Wild oats grasslands; Annual brome grasslands; Perennial rye grass fields; Bent grass-tall fescue meadows	No	13%	487
Open Water	Open water	N/A	Yes	9%	330
N/A / Herb	Developed	Perennial rye grass fields	No	8%	293
Total					3,637

¹ Portions of these biological communities have been delineated as features subject to the jurisdiction of the Corps and RWQCB and therefore are considered sensitive under CEQA. See the discussion below and the Aquatic Resources Delineation Report for more information.

² This table summarizes biological communities within the Proposed Project Site and includes areas outside of the property boundary; acreages may not match the aquatic resource delineation that followed property boundaries.

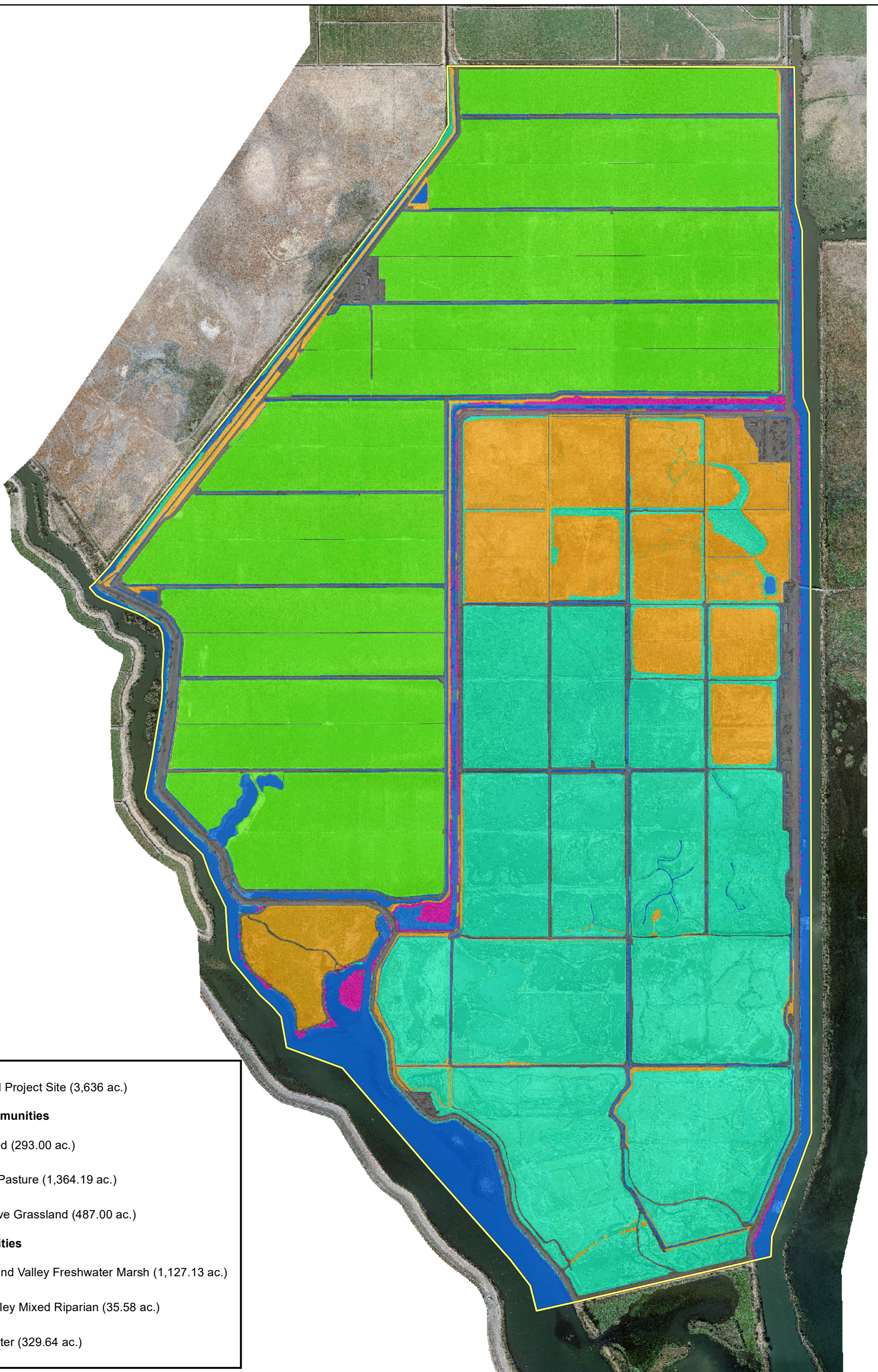
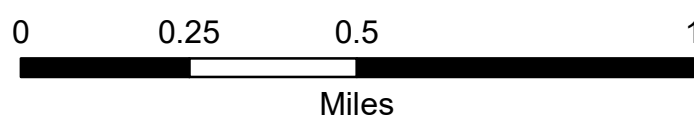


Figure IV.D-1. Biological Communities within the Proposed Project Site

Lookout Slough Tidal Habitat Restoration and Flood Improvement Project



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Non-Native Grassland

This biological community contains elements of four herbaceous alliances, including perennial rye grass fields (*Lolium perenne* [*Festuca perennis*] Herbaceous Semi-Natural alliance), annual brome grasslands (*Bromus diandrus*, *B. hordeaceus*-*Brachypodium distachyon* Herbaceous Semi-Natural Alliance), wild oats grasslands (*Avena* [*barbata*, *fatua*] Herbaceous Semi-Natural Alliance), and bent grass-tall fescue meadows (*Agrostis* [*gigantea*, *stolonifera*]-*Festuca arundinacea* Herbaceous Semi-Natural Alliance).

This community occurs in the northern portion of the Liberty Farms Property, along levee roads, and throughout the Vogel Property. Non-native grassland in the Proposed Project Site is dominated by non-native annual grasses, such as Italian ryegrass, ripgut brome (*B. diandrus*), and soft chess (*B. hordeaceus*). Additional species within non-native grassland in the Proposed Project Site include: bull thistle (*Cirsium vulgare*), broad leaf filaree (*Erodium botrys*), spring vetch (*Vicia sativa*), wild carrot (*Daucus carota*), wild radish, milk thistle (*Silybum marianum*), Italian thistle (*Carduus pycnocephalus*), red stemmed filaree (*E. cicutarium*), mallow (*Malva* sp.), and Canada horseweed (*Erigeron canadensis*).

This biological community does not support floristic communities ranked as sensitive by CDFW and is therefore not considered sensitive under CEQA. However, within the Vogel Property and northern portions of the Liberty Farms Property, some non-native grassland is considered managed wetland subject to the jurisdiction of the Corps and RWQCB. Managed wetlands are considered sensitive under CEQA and are discussed below.

Developed

The developed land cover type includes portions of the Proposed Project Site that have been highly disturbed or impacted through development, including the Bowsbey Property facilities such as a barn, livestock complex, and ranch roads. Additional developed land exists within the eastern portion of the Liberty Farms Property associated with active and abandoned duck club facilities. Roads situated atop levees are also classified as developed land cover. Vegetation is often sparse, and where present, is characterized by non-native species of disturbed conditions such as Italian rye grass, bird's-foot trefoil, Mediterranean barley (*Hordeum um* ssp. *gussoneanum*), ripgut brome, wild radish, and Italian thistle. This biological community does not support floristic communities ranked as sensitive by CDFW and is therefore not considered sensitive under CEQA. However, some developed land is considered irrigation ditch or seasonal wetland and is subject to the jurisdiction of the Corps and RWQCB. These areas are considered sensitive under CEQA and are discussed below.

Sensitive Biological Communities

Great Valley Mixed Riparian Forest

Within the Proposed Project Site, Great Valley mixed riparian forest contains elements of several alliances, including arroyo willow thickets (*Salix lasiolepis* Shrubland Alliance), valley oak woodland (*Quercus lobata* Woodland Alliance), and black willow thickets (*Salix gooddingii* Woodland Alliance). This biological community occurs on an island in Cache

Slough between the Vogel Property and the Liberty Farms Property, as well as along the higher-elevation margins of channels and outboard levees within the Proposed Project Site. Particularly, Great Valley mixed riparian forest has established along Lookout Slough. The overstory of this community is dominated by white alder (*Alnus rhombifolia*) or valley oak (*Quercus lobata*), and willows (*Salix* spp.). The canopy of this community ranges from open to closed configurations. Himalayan blackberry (*Rubus armeniacus*) and California wild rose (*Rosa californica*) dominate the understory of this community.

Coastal and Valley Freshwater Marsh

Within the Proposed Project Site, vegetation mapped as Coastal and Valley freshwater marsh contains elements of several vegetation alliances including hardstem and California bulrush marshes (*Schoenoplectus [acutus, californicus]* Herbaceous Alliance), hardstem bulrush marsh (*Schoenoplectus acutus* Herbaceous Alliance), California bulrush marsh (*Schoenoplectus californicus* Herbaceous Alliance), and cattail marshes (*Typha [angustifolia, domingensis, latifolia]* Herbaceous Alliance).

Coastal and Valley freshwater marsh is situated within the southern portion of the Liberty Farms Property and is actively flooded and drained to support waterfowl. These areas are flooded on an annual basis and the vegetation is managed to provide food sources for waterfowl through actions including scraping or plowing to create contiguous, heterogeneous habitat.

In late 2005 to early 2006, a variety of willow tree species (*Salix* spp.) were planted along irrigation ditches in the Liberty Farms Property. These trees may have been installed as wind rows and do not represent natural historic conditions in the area. Within this community, hardstem bulrush (*Schoenoplectus acutus*) is dominant or co-dominant with broadleaf cattail (*Typha latifolia*), flat sedge (*Cyperus* spp.), common reed grass (*Phragmites australis*), and Himalayan blackberry. In areas of still water, Pacific mosquito fern (*Azolla filiculoides*) occurs on the water's surface.

Open Water

Within the Proposed Project Site, open water exists in several different forms, including drainage ditches, irrigation ponds, and sloughs (tidal/non-tidal).

Drainage ditches within the Proposed Project Site are earthen ditches used to drain agricultural fields on the Bowsbey Property and convey water to the southern portion of the Liberty Farms Property. These ditches have varying water regimes, with some ditches being permanently inundated and others carrying water for only a portion of the year. All ditches are manmade, excavated features connected through a complex network of screw gates and pumps. Although many of the ditches are lined with cattails and hardstem bulrush, they were classified as open water due to the small amount of vegetation relative to the overall size of the features and because vegetation within the ditches is regularly removed through current land use management.

Irrigation ponds within the Proposed Project Site include two raised, earthen-lined ponds located on the western side of the Bowsbey Property and are supported by earthen

berms. Water is pumped into these ponds from Duck Slough then gravity-fed into a network of concrete-lined irrigation ditches. The ponds are regularly maintained and did not contain vegetation at the time of the surveys.

Sloughs within the Proposed Project Site include tidal perennial and non-tidal perennial open water habitat. Tidal perennial open water habitat occurs in the southern portion of the Proposed Project Site within Cache and Hass Sloughs, and in the eastern portion of the Proposed Project Site within Shag Slough. Non-tidal perennial open water habitat occurs within Duck, Lookout, and Sycamore Sloughs. Both tidal and non-tidal sloughs contain emergent vegetation, such as cattails and hardstem bulrush.

ii. Jurisdictional Aquatic Features

Twelve aquatic feature types under the jurisdiction of the Corps and the RWQCB were delineated within the Proposed Project Site by WRA over multiple dates in 2018, and the map was verified by the Corps on December 20, 2018. Because these features are under the jurisdiction of the Corps and RWQCB, they are considered sensitive under CEQA. Jurisdictional aquatic features and their Corps-jurisdictional acreages are summarized in Table IV.D-3 below and are depicted in Figure IV.D-2.

Wetlands

Irrigated Wetlands

Features in the irrigated wetland category were mapped primarily in the pastures on the Bowsbey Property. These wetlands occur in the lowest portion of most fields, on the opposite of the field from the concrete-lined irrigation ditches from which the fields are flood irrigated. The fields are actively flood irrigated on a rotating basis by siphoning water from the concrete-lined irrigation ditches onto each field where it drains into earthen-lined drainage ditches on the opposite side of the field. In some fields, water drains quickly and no wetland conditions have formed. However, in many fields drainage is slow and water backs up in the lower portions of the fields, resulting in wetland conditions.

Table IV.D-3. Summary of Jurisdictional Aquatic Resources

Feature Type	Acres	Linear Feet
Wetlands		
Irrigated Wetlands	309	-
Managed Wetlands	1,339	-
Perennial Marsh (Non-Tidal)	8	-
Perennial Marsh (Tidal)	4	-
Scrub-Shrub Wetland	8	-
Seasonal Wetland	0.2	-
Subtotal	1,669	-
Non-Wetland Waters		
Drainage Ditch	84	203,938
Irrigation Ditch	6	46,917
Irrigation Pond	2	-
Pond	10	-
Slough (Non-Tidal)	41	22,178
Slough (Tidal)	201	34,025
Subtotal	344	307,058
Total	2,013	307,058

Managed Wetlands

Features in the managed wetland category correspond to the wetlands on the Liberty Farms Property that are managed for winter waterfowl and the managed wetlands on the Vogel Property. These features are passively flooded using screw gates in the levees that allow tidal water to passively enter the site.

Perennial Marsh (Non-Tidal)

Features in the non-tidal perennial marsh category correspond to areas of cattail and bulrush marsh in Duck Slough. Duck Slough is an excavated, non-tidal slough that passively fills via a screw gate in the levee at its southern end at Hass Slough. Areas mapped as non-tidal perennial marsh appear in the same locations over numerous years of aerial imagery. This suggests they are relatively permanent.

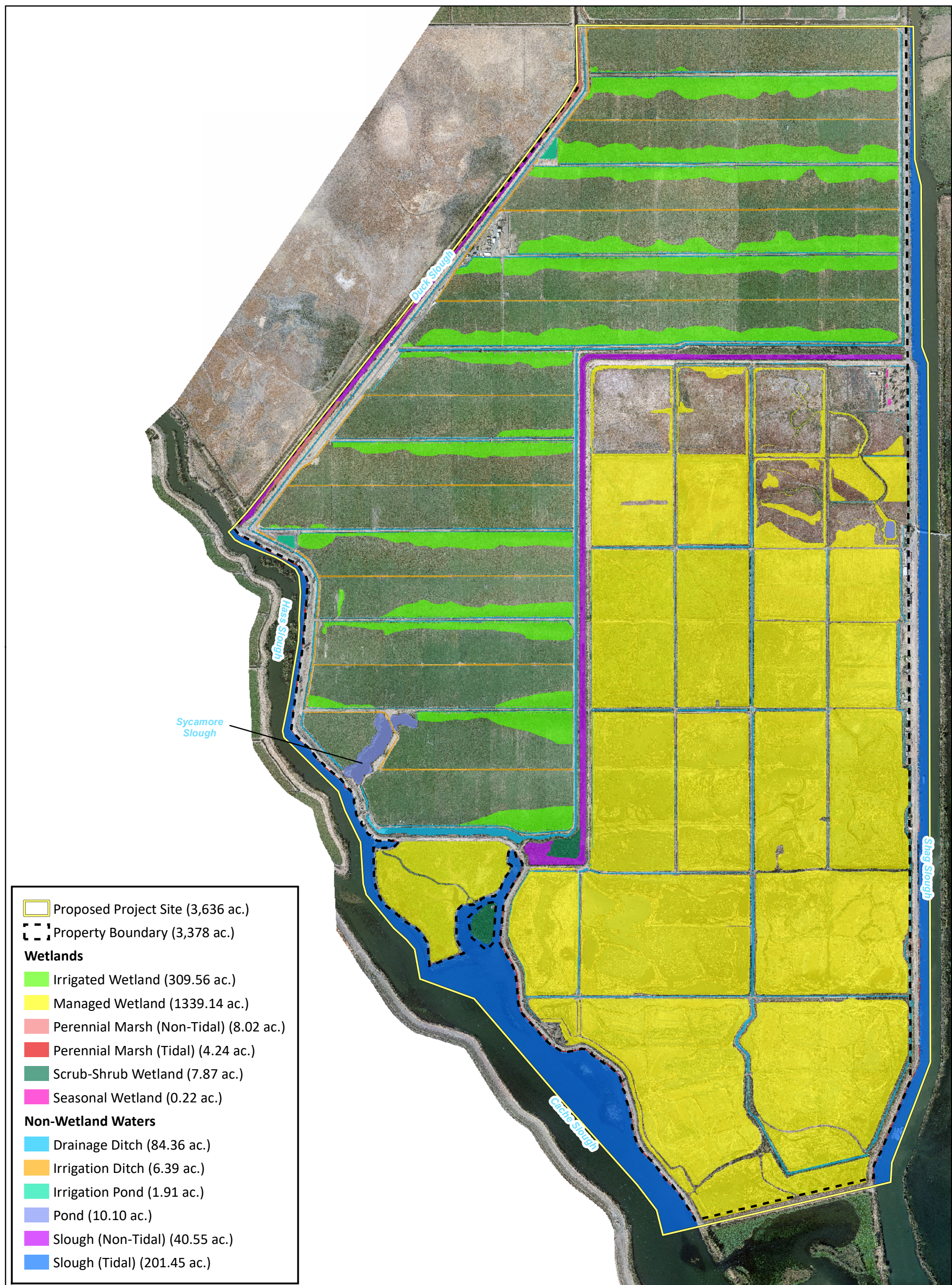


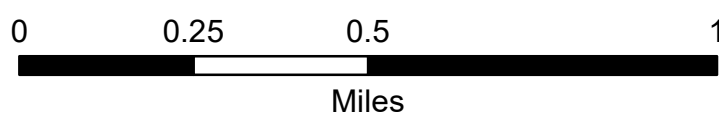
Figure IV.D-2. Overview of Aquatic Resources within the Proposed Project Site



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Lookout Slough Tidal Habitat Restoration and Flood Improvement Project



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Perennial Marsh (Tidal)

Features in the tidal perennial marsh category correspond to areas of cattail, tule, and California bulrush above the high tide line (7.26 feet NAVD88) within tidal sloughs outboard of levees along Hass Slough, Cache Slough, and Shag Slough. These wetlands have the same vegetation as non-tidal perennial marsh.

Scrub-Shrub Wetlands

Features in the scrub-shrub wetland category correspond to a stand of arroyo willow (*Salix lasiolepis*) at the southern end of Lookout Slough and a small stand that occupies an island in Cache Slough to the east of the Vogel Property. Unlike other stands of willows (*Salix* spp.) that occur along the upper margins of Lookout Slough, these stands occur at lower elevations and are assumed to experience periodic to regular flooding and/or high water tables.

Seasonal Wetlands

Features in the seasonal wetland category correspond to several depressional features in the northern portion of the Liberty Farms Property that collect precipitation and runoff from surrounding areas but are not supported by artificial hydrology. These features resemble classic seasonal wetlands, with non-native herbaceous vegetation and a relatively short hydroperiod compared to managed wetlands elsewhere on the site. No vernal pool indicator species were observed within seasonal wetlands.

Non-Wetland Waters**Drainage Ditches**

Features in the drainage ditch category correspond to earthen ditches within the Bowsbey and Liberty Farms Properties. These ditches vary in size from approximately five feet in width to over 20 feet in width and have varying water regimes, with some ditches being permanently inundated and others carrying water for only a portion of the year. All ditches are manmade, excavated features connected through a complex network of culverts and slide gates. On the Bowsbey Property, drainage ditches drain to the southwestern portion of the property where the water is pumped into Hass Slough at two locations. The ditches on the Liberty Farms Property drain to the southern portion of the site, and water can be actively pumped into Shag Slough at three locations along the eastern side of the site.

Irrigation Ditches

Features in the irrigation ditch category correspond to concrete-lined ditches on the Bowsbey Property that are used to transport water from two earthen-lined irrigation ponds on the western side of the site to the pastures. The approximately four-foot-wide ditches are connected through a network of culverts and slide gates. The ditches carry water only when actively being used for irrigation and are dry most of the time. Water is siphoned from the concrete-lined ditches onto individual pastures using siphon tubes and allowed to passively flow to earthen-lined drainage ditches. No vegetation or sediment

accumulation is present in the ditches. The location and extent of these features across Proposed Project Site was digitized from aerial imagery.

Irrigation Ponds

Features in the irrigation pond category correspond to two raised, earthen irrigation ponds located on the western side of the Bowsbey Property. The ponds are supported by earthen berms with a crest elevation of 14 feet NAVD88. Water is pumped into these ponds from Duck Slough and Hass Slough then gravity fed into a network of concrete-lined irrigation ditches, where it is diverted to individual pastures for flood irrigation. The ponds are regularly maintained and do not contain vegetation. The extent of these features was digitized from high water levels observed in aerial imagery.

Ponds

Features in the pond category correspond to Sycamore Slough on the Bowsbey Property and an unnamed pond excavated on the eastern side of Liberty Farms. Sycamore Slough is connected to Cache Slough via a screw gate and is also likely supported by groundwater and irrigation runoff. Sycamore Slough contains patches of emergent vegetation growing below the ordinary high water mark (OHWM), which was indicated by scour and shelving along the pond edge. The extent of Sycamore Slough was digitized based on the extent of the OHWM visible in aerial imagery.

The pond located on the Liberty Farms Property was created in the summer of 2007, as can be seen in historic aerial imagery available from Google Earth. The pond appears to have been excavated as part of the wetland management system and is connected to the rest of the system by several excavated channels. Water levels in the pond appear to be maintained by a combination of groundwater and water from an adjacent ditch. The pond contains dense emergent vegetation around most of its length and a small dock located at its eastern edge.

Slough (Non-Tidal)

Features in the non-tidal slough category correspond to Duck Slough and Lookout Slough, both of which are manmade, excavated sloughs that are disconnected from tidal activity by the levee surrounding the site. Both sloughs are connected to the adjacent, tidal sloughs via screw gates, with Duck Slough connected to Hass Slough and Lookout Slough connected to Cache Slough. These sloughs may have muted tidal activity when the screw gates are open but are otherwise non-tidal. Both sloughs contain cattails and tules along their margins which were lumped into the extent of the sloughs for mapping purposes, with Duck Slough also containing substantial stands of emergent vegetation within portions of the slough channel that were mapped separately as non-tidal perennial marsh. The extent of non-tidal sloughs within the Proposed Project Site was based on the OHWM, which was identified based on indicators such as scour and shelving along the edges of the sloughs and was digitized using a combination of aerial imagery and elevation data.

Slough (Tidal)

Features in the tidal slough category correspond to the portions of Hass Slough, Cache Slough, and Shag Slough that occur within the Proposed Project Site. These sloughs are a combination of natural and manmade features that are directly connected to the Sacramento River and receive the full range of tidal activity experienced in this area of the Delta. The extent of Corps jurisdiction in tidal sloughs was based on the high tide line. To filter out artificial high water events from flooding in the Yolo Bypass, the high tide line was estimated by averaging the highest observed water level for every non-flood month between 2010 and 2017 at the DWR Yolo Bypass Liberty Island tide gauge. The high tide line was approximated to be 7.26 feet NAVD88, and all areas below this elevation on the outboard side of the levees were mapped as tidal slough. Tidal sloughs were lined with concrete riprap and contained only limited patches of emergent vegetation consisting of cattails or tules and other herbaceous species. Some areas contain trees along the bank, consisting primarily of arroyo willow or valley oak.

iii. Special-Status Species

Plants

Based on a review using the methods described above, 36 special-status plant species have been documented in the Liberty Island 7.5-minute USGS quadrangle and the eight surrounding USGS quadrangles. The potential for these species to occur within the Proposed Project Site was evaluated prior to site visits. In total, 12 of the 36 species were determined to have moderate or high potential to occur in the Proposed Project Site. These species include the following:

- Watershield (*Brasenia schreberi*); CNPS Rank 2B.3
- Bristly sedge (*Carex comosa*); CNPS Rank 2B.1
- Pappose tarplant (*Centromadia parryi* ssp. *parryi*); CNPS Rank 1B.2
- Parry's rough tarplant (*Centromadia parryi* ssp. *rudis*); CNPS Rank 4.2
- Bolander's water-hemlock (*Cicuta maculata* var. *bolanderi*); CNPS Rank 2B.1
- San Joaquin spearscale (*Extriplex joaquinana*); CNPS Rank 1B.2
- Woolly rose-mallow (*Hibiscus lasiocarpus* var. *occidentalis*); CNPS Rank 1B.2
- Delta tule pea (*Lathyrus jepsonii* var. *jepsonii*); CNPS Rank 1B.2
- Mason's lilaepsis (*Lilaeopsis masonii*); State Listed Rare, CNPS Rank 1B.1
- Delta mudwort (*Limosella australis*); CNPS Rank 2B.1
- Sanford's arrowhead (*Sagittaria sanfordii*); CNPS Rank 1B.2
- Suisun Marsh aster (*Symphotrichum lentum*); CNPS Rank 1B.2

Prior to the site visits, the other 24 special-status species documented in the vicinity of the Proposed Project Site were determined to have unlikely or no potential to occur based on the poor quality or lack of the following habitats or site conditions:

Meadows and Seeps

As described by Holland (1986)², meadows are characterized by typically short, perennial grasses and other grass-like, herbaceous plants (graminoids). They may be wet perennially or seasonally. Within the Proposed Project Site, irrigated pasture may seem superficially similar to a meadow. However, irrigated pasture differs substantially from native meadows in its hydrologic regime. The year-round, rotating flood irrigation does not mimic any natural system to which native meadow species would be adapted. The landscape is highly altered in that it was once almost entirely Delta marshland and has since been diked and drained and then graded, greatly reducing the likelihood that native meadow species would be present in the seed bank. Additionally, pastures are seeded with forage species rather than natural meadow species. As a result, the habitat is characterized by primarily non-native species that can tolerate the disturbed habitat and irregular hydrology. Irrigated pastures are unlikely to support special-status species that occur in meadow habitats.

Seeps are characterized by short, perennial herbs in permanently moist seeps. Seeps are absent from the Proposed Project Site.

Valley or Foothill Grasslands

Non-native grassland areas within the Proposed Project Site are not remnants of naturally occurring grassland systems with special soil conditions or plant communities that might have supported sensitive grassland species or their seedbank. In all cases, they occur in highly disturbed, manipulated landscapes. This community designation is applied to ruderal vegetation within the Liberty Farms Property, which was formerly tidal freshwater and brackish marsh prior to being diked and drained. Current land uses that likely preclude colonization of sensitive grassland species include artificial flooding from late summer to spring and other vegetation management activities such as discing and burning.

At the Bowsbey Property, grassland occurs as narrow strips only along roads and levees. On the Vogel Property, grassland occurs on what historically was diked, drained marshland on levee roads and in flat fields. It historically was artificially flooded for winter duck hunting, providing an unnatural hydrologic regime that native grassland species are not adapted to. Though artificial flooding has not occurred for several years, the levees are still occasionally overtopped during naturally occurring, elevated water flows.

Because of the irregular hydrologic regime, current site management activities, disturbed conditions, and general lack of historic habitat (i.e. historic marshland, not disturbed-but-recovering historic grassland, which is unlikely to have a seed bank containing native special-status grassland species), non-native grassland provides poor quality habitat and is unlikely to support special-status grassland species except for those that are disturbance-adapted (such as Parry's rough tarplant).

² Holland, RF. 1986. *Preliminary Descriptions of the Terrestrial Natural Communities of California*. Prepared for the California Department of Fish and Game, Sacramento, CA.

Vernal Pools and Alkaline Wetlands

Although seasonally inundated areas are present, nearly all occur under managed and irregular hydrologic regimes (e.g. summer-to-spring flooding and year-round rotational flooding) that native special-status vernal pool species are not adapted to. As such, these seasonally inundated areas do not provide high-quality habitat and are characterized by primarily non-native species that can tolerate such conditions. As stated above, almost the entirety of the Proposed Project Site historically was diked, drained marshland and is unlikely to have a seed bank containing native special-status vernal pool or alkaline wetland plant species. Indeed, after site visits during the spring and summer, no vernal pool indicator species³ were observed. Several species were observed that can occur in vernal pools, but they also commonly occur outside of vernal pools (e.g. Mediterranean barley, swamp grass, and tall cyperus [*Cyperus eragrostis*]), and their presence is not indicative of vernal pool or alkaline wetland habitat.

The northeastern portion of the Liberty Farms Property contains a few small seasonal wetlands that have a natural hydrologic regime supported only by precipitation. However, these wetlands are located within a highly disturbed area that, like most of the site, historically was diked, drained marshland and is unlikely to have a seed bank containing native special-status plant species. They are dominated by non-native species, and no vernal pool indicator species were observed.

Chaparral

Chaparral habitat is absent from the Proposed Project Site.

Protocol-level special-status plant surveys determined that four of 12 species with high or moderate potential to occur are present in the Proposed Project Site. These species are:

- Parry's rough tarplant; CNPS Rank 4.2
- Woolly rose-mallow; CNPS Rank 1B.2
- Mason's lilaepsis; State Listed Rare, CNPS Rank 1B.1
- Suisun Marsh aster; CNPS Rank 1B.2

The other eight species were not observed during appropriately timed special-status plant surveys. The 12 special-status plant species that were originally believed to have moderate or high potential to occur in the Proposed Project Site are discussed below. A table summarizing the potential for occurrence for each special-status plant species in the vicinity of the Proposed Project Site is included with the BRA.

³ Keeler-Wolf, T., D.R. Elam, K. Lewis, and S.A. Flint. 1998 California Vernal Pool Assessment Preliminary Report. The Resources Agency, California Department of Fish and Game, Sacramento, CA. 161 pp. with appendices.

Special-Status Plant Species Determined to Have Moderate or High Potential to Occur within the Proposed Project Site That Were Not Found to be Present

Watershield (*Brasenia schreberi*). CNPS Rank 2B.3. Watershield is a perennial herb in the watershield family (Cabombaceae) that blooms from June to September. It typically occurs in freshwater marshes and swamps at elevations ranging from 99 to 7,260 feet.⁴ This species always occurs in wetlands and is known to occur in marshes, swamps, and wetlands. Known associated species include rushes (*Juncus* spp.), tule (*Schoenoplectus acutus* var. *occidentalis*), pondweed (*Potamogeton* spp.), and great yellow pond lily (*Nuphar polysepala*).

This species has been recorded throughout 17 different counties within California, including Sacramento and San Joaquin. There are no occurrences of watershield within the vicinity of the Proposed Project Site.

Although potentially suitable habitat marsh is present, watershield was not observed during protocol-level special-status plant surveys that were performed within this species' blooming period. Additionally, this species has distinctive foliage and is readily identifiable vegetatively. Thus, because this distinctive, perennial species was not observed, it is assumed to be absent from the Proposed Project Site.

Bristly sedge (*Carex comosa*). CNPS Rank 2B.1. Bristly sedge is a perennial herb in the sedge family (Cyperaceae) that blooms from May to September. It has been observed at locations classified as coastal prairies, lake margins, marshes, swamps, and valley and foothill grasslands at elevations ranging from 0 to 2,060 feet. This species only occurs within wetlands in areas classified as coastal prairie or valley and foothill grassland. Known associated species include wetland species such as tall flatsedge, willows, tule, and cattail.

Bristly sedge has been recorded throughout ten different counties within California, including Sacramento, and San Joaquin Counties. There are no recorded occurrences of bristly sedge within the vicinity of the Proposed Project Site.

Although potentially suitable marsh habitat was present, bristly sedge was not observed during protocol-level special-status plant surveys that occurred within this species' blooming period during times when it would not have been obscured by high tides. It is a relatively large, perennial species that would have been evident at the time of the surveys. Thus, this species is assumed to be absent from the Proposed Project Site.

Pappose tarplant (*Centromadia parryi* spp. *parryi*). CNPS Rank 1B.2. Pappose tarplant is an annual herb in the sunflower family (Asteraceae) that blooms from May to November. It typically occurs in alkaline soils in chaparral, coastal prairie, meadows, seeps, coastal salt marshes and swamps, and vernal mesic foothill and valley grasslands at elevations ranging from 0 to 1,386 feet. This taxon has not been assigned

⁴ California Native Plant Society. 2018b. *Inventory of Rare and Endangered Plants* (online edition, v8-02). Sacramento, California. Online at: <http://rareplants.cnps.org/>; most recently accessed: August 2018

a wetland indicator status. Known associated species include Italian rye grass, saltgrass, Mediterranean barley, perennial pepperweed, yellow star thistle (*Centaurea solstitialis*), alkali heath (*Frankenia salina*), and brass buttons.

This taxon has been recorded in eight different counties within California, such as Napa, and Solano Counties. There are no occurrences of this species within the vicinity of the Proposed Project Site.

Pappose tarplant was not observed during protocol-level special-status plant surveys that occurred within this taxon's blooming period. Although this taxon is disturbance-adapted, and although potentially suitable habitat was present along fence-lines, roads, and levees only the closely related Parry's rough tarplant was observed. As such, pappose tarplant is assumed to be absent.

Bolander's water-hemlock (*Cicuta maculata* var. *bolanderi*). CNPS Rank 2B.1. Bolander's water-hemlock is a perennial herb in the carrot family (Apiaceae) that blooms from July to September. It typically occurs in coastal brackish or freshwater marshes and swamps at elevations ranging from 0 to 660 feet. This species is only found in wetlands. Known associated species include rushes, slough sedge (*Carex obnupta*), bulrush (*Scirpus* spp.), and tule.

This species has been recorded in five different counties within California, including Sacramento, and Solano Counties. There is one CNDDDB occurrence record located approximately six miles west of the Proposed Project Site.

Although potentially suitable marsh habitat was present, Bolander's water-hemlock was not observed during protocol-level special-status plant surveys that occurred within this species' blooming period. This large, conspicuous, perennial species would have been readily identifiable during the survey. As such, this species is assumed to be absent from the Proposed Project Site.

San Joaquin spearscale (*Extriplex joaquinana*). CNPS Rank 1B.2. San Joaquin spearscale is an annual herb in the goosefoot family (Chenopodiaceae) that blooms from April to October. It typically occurs in seasonal alkali sink scrub and wetlands in chenopod scrub, alkali meadow, and valley and foothill grassland habitat at elevations ranging from 0 to 2740 feet. This species almost always occurs in wetlands. Known associated species include salt grass, alkali heath, docks (*Rumex crispus*, *R. pulcher*), tarplants (*Centromadia parryi*, *C. pungens*), pickleweed (*Salicornia pacifica*), and fat hen (*Atriplex triangularis*).

This species has been recorded in 15 different counties. There is one CNDDDB occurrence record within a 5-mile radius of the Proposed Project Site, with the closest occurrence (#26) located approximately 1.5 miles west of the Proposed Project Site.

Although this taxon is disturbance-adapted, and although potentially suitable habitat was present along fence-lines, roads, and levees outside of irregular, managed hydrology, San Joaquin spearscale was not observed during protocol-level special-status plant surveys that occurred within the period of time this species would have been identifiable. As such, this species is assumed to be absent from the Proposed Project Site.

Delta tule pea (*Lathyrus jepsonii* var. *jepsonii*). **CNPS Rank 1B.2.** Delta tule pea is a perennial herb in the pea family (Fabaceae) that blooms from May to July. It typically occurs in freshwater and brackish marshes and swamps at elevations ranging from 0 to 16 feet. This species only occurs in wetlands. Known associated species include bulrushes, willows, Mason's lilaepsis, perennial pepperweed, California wild rose, and tall flatsedge.

This taxon has been recorded in seven different counties within California, including Napa, Sacramento, San Joaquin, Solano, and Yolo Counties. There are eight CNDDDB occurrence records within a 5-mile radius of the Proposed Project Site, with the closest located approximately 1.8 miles west.

Delta tule pea was not observed during protocol-level special-status plant surveys that occurred within this taxon's blooming period. Instead, only the common variety of this species, California tule pea (*L. jepsonii* var. *californicus*), which occurs in similar habitats as Delta tule pea, was observed. Because this conspicuous, perennial taxon was not observed, it is assumed to be absent from the Proposed Project Site.

Delta mudwort (*Limosella australis*). **CNPS Rank 2B.1.** Delta mudwort is a perennial herb in the figwort family (Scrophulariaceae) that blooms from May to August. It typically occurs in riparian scrub, mud banks, marshes and swamps (freshwater or brackish) at elevations ranging from 0 to 10 feet. This species has not been assigned a wetland indicator status. Known associated species include Mason's lilaepsis, bulrushes, willows, rushes, whorled pennywort (*Hydrocotyle verticillata*), and spikerushes (*Eleocharis* spp.).

This species has been recorded in four different counties within California, including Sacramento, San Joaquin, and Solano Counties. There are three CNDDDB occurrence records in the vicinity of the Proposed Project Site. The nearest documented occurrence is from August 1986 at the confluence of Miner Slough and Cache Slough south of Liberty Island.

Delta mudwort was not observed during protocol-level special-status plant surveys that occurred during the period of time when this species would have been identifiable and would not have been submerged by the tide. This species occurs on muddy banks in the intertidal zone, and the only potential habitat would be on the outboard side of the Vogel Levee, where it could be expected to co-occur with Mason's lilaepsis. Because the perennial species was not observed, it is assumed to be absent.

Sanford's arrowhead (*Sagittaria sanfordii*). **CNPS Rank 1B.2.** Sanford's arrowhead is a perennial herb in the water plantain family (Alismataceae) that blooms from May to October. It typically occurs in assorted shallow freshwater habitats, such as marshes and swamps at elevations ranging from 0 to 1,430 feet. This species only occurs in wetlands. Known associated species include hardstem bulrush, common rush, willows, floating primrose-willow (*Ludwigia peploides*), flat sedge, cockspur grass (*Echinochloa crus-galli*), and sprangletop (*Leptochloa fusca*).

This species has been recorded in 19 different counties within California. There are four CNDDDB occurrence records in the vicinity of the Proposed Project Site. The nearest documented occurrence is from August 2005, located in Miner Slough on the east side of Prospect Island.

Although potentially suitable habitat was present, Sanford's arrowhead was not observed during protocol-level special-status plant surveys that occurred within this species' blooming period at times when it would not have been obscured by the tide. Because this conspicuous, perennial species was not observed, it assumed to be absent.

Special-Status Plant Species Observed within the Proposed Project Site

Parry's rough tarplant (*Centromadia parryi* ssp. *rudis*). CNPS Rank 4.2. Parry's rough tarplant is an annual herb in the sunflower family (Asteraceae) that blooms from May to October. It typically occurs in alkaline, vernal mesic valley and foothill grasslands and vernal pools and seeps, and sometimes along roadsides at elevations ranging from 0 to 330 feet. This taxon is almost always found in wetlands. Associated species include pappose tarplant, yellow dock, hayfield tarplant (*Hemizonia congesta*), Mediterranean barley (*Hordeum murinum*), common lippia (*Phyla nodiflora*), saltgrass, narrowleaf milkweed (*Asclepias fascicularis*), alkali mallow (*Malvella leprosa*), cutleaf plantain (*Plantago coronopus*), and sundry annual grasses.

This taxon has been recorded in ten counties within California, including Sacramento, San Joaquin, Solano, and Yolo Counties. Rank 4 taxa are not displayed in CNDDDB database search results; however, this species has been recorded within five of the surrounding eight quadrangles by the CNPS.

Parry's rough tarplant was present within the Proposed Project Site. Approximately 348 individuals were observed on and adjacent to levee roads within the non-native grassland community on the Bowsbey Property and ten individuals at were observed at one location (alongside a levee road in the same biological community) on the Vogel Property. Individuals were found along fence lines and along both gravel and dirt access roads. The BRA includes a figure that depicts the locations of this taxon within the Proposed Project Site.

Woolly rose-mallow (*Hibiscus lasiocarpus* var. *occidentalis*). CNPS Rank 1B.2. Woolly rose-mallow is a perennial herb in the mallow family (Malvaceae) that blooms from June to September. It typically occurs in freshwater marshes and swamps, often within riprap on the sides of levees at elevations ranging from 0 to 394 feet. This species always occurs in wetlands. Associated species include cattail, club-rush, knotweeds, and willows.

This species has been recorded in nine counties within California, including Sacramento, San Joaquin, Solano, Yolo Counties. There are two CNDDDB records located within a 5-mile radius of the Proposed Project Site. The nearest documented occurrence was last observed in August of 2005 and is located along the southern edge of Hass Slough.

Woolly rose-mallow was present within the Proposed Project Site. In total, approximately 80 individuals were observed among emergent vegetation on the eastern bank of Sycamore Slough in the southwestern portion of the Bowlsbey Property. The BRA includes a figure that depicts the locations of this species within the Proposed Project Site.

Mason's lillaeopsis (*Lillaeopsis masonii*). State Listed Rare. CNPS Rank 1B.1. Mason's lillaeopsis is a perennial forb in the carrot family (Apiaceae) that blooms from April to November. It typically occurs in areas within the direct tidal or splash zones on mud banks of sloughs and channels in riparian scrub and freshwater and brackish marsh habitat at elevations ranging from 0 to 35 feet. This species always occurs in wetlands. Associated species include Baltic rush, low bulrush (*Isolepis cernua*), tule, cattails, common reed, fleshy jaumea (*Jaumea carnosa*), salt grass, fat hen (*Chenopodium album*), arrow grasses (*Triglochin* spp.), water parsley (*Oenanthe sarmentosa*), gumweed (*Grindelia* spp.), and pickleweed (*Salicornia virginica*).

This species has been recorded in eight different counties within California, including Napa, Sacramento, San Joaquin, Solano, and Yolo Counties. There are 19 CNDDDB occurrence records in the vicinity of the Proposed Project Site. The nearest documented occurrence was observed in August of 2005 and is located at the confluence of Cache and Hass Slough.

Mason's lillaeopsis was present within the Proposed Project Site. Approximately 12 colonies were observed on the outboard side of levees within the tidal zone of the Vogel Property. Mason's lillaeopsis was observed growing in dense and dominant patches, sometimes alongside other species, such as Suisun Marsh aster. The BRA includes a figure that depicts the locations of this species within the Proposed Project Site.

Suisun Marsh aster (*Symphotrichum lentum*). CNPS Rank 1B.2. Suisun Marsh aster is a perennial forb in the sunflower family (Asteraceae) that blooms from May to November. It typically occurs along sloughs and channels in dense marsh vegetation in freshwater and coastal brackish marsh habitat at elevations ranging from 0 to 10 feet. This species always occurs in wetlands.⁵ Known associated species include gumweed, western goldenrod (*Euthamia occidentalis*), Delta tule pea, cattails, hardstem bulrush, Olney's bulrush (*Schoenoplectus americanus*), California tule, Baltic rush, marsh fleabane (*Pluchea odorata*), California wild rose, and common reed.

This species has been recorded in six different counties within California, including Napa, Sacramento, San Joaquin, Solano, and Yolo counties. Thirty CNDDDB occurrence records exist in the vicinity of the Proposed Project Site. The nearest is located approximately 0.4 mile southwest. This occurrence was last observed in 2008 and contained three robust patches of individuals. Additionally, two colonies of Suisun Marsh aster are located approximately 0.6 and 0.7 mile northwest of the Proposed Project Site, respectively. These colonies are located among emergent tidal marsh vegetation along Hass Slough

⁵ Lichvar, R.W., D.L. Banks, W.N. Kirchner, and N.C. Melvin. 2016. *The National Wetland Plant List: 2016 wetland ratings. Phytoneuron 2016-30: 1-17.*

and are presumed extant (though abundance estimations in these colonies were not recorded).

Suisun Marsh aster was present within the Proposed Project Site. Approximately 241 individuals of Suisun Marsh aster were observed in the Proposed Project Site. In total, 216 individuals were observed on the outboard side of the Shag Slough Levee. The remaining 27 individuals of Suisun Marsh aster were observed on the outboard side of the Vogel Levee, where it was found alongside Mason's lilaopsis. The BRA includes a Figure that depicts the locations of this species within the Proposed Project Site.

Wildlife

Based upon a review of the available resources, 90 special-status wildlife species have been documented in the vicinity of the Proposed Project Site. Of these, 25 special-status wildlife species were observed within, or have a moderate or high potential to occur in the Proposed Project Site. All species with potential to occur, or that are known to occur, are discussed below. Of the 90 special-status wildlife species documented in the vicinity of the Proposed Project Site, the majority of species have no potential or are unlikely to occur due to a lack of suitable habitat or habitat components. Some of those habitats and components, which are not present within the Proposed Project Site, include:

- vernal pools
- ground squirrels or their burrows
- caves or rock outcroppings
- oak woodlands
- suitable soils to support host plants
- species-specific host plants
- beaches or dune habitats
- salt marsh
- suitable old growth riparian forest

In addition to reviewing the aforementioned resources, WRA also conducted a series of wildlife surveys (Table IV.D-4).

Table IV.D-4. Wildlife Surveys Conducted within the Proposed Project Site

Target Species or Taxa	Survey Dates	Results
General Fish Assemblage	March 8 and 9, 2018	No federal or state listed species observed. One individual Splittail was the only special-status fish documented in the Proposed Project Site. Aquatic features were dominated by non-native fish.
Swainson's Hawk and Nesting Raptors	March 23 – April 18, 2018	Two nests were observed within the Proposed Project Site and two nests were observed outside of it (within 500 feet of the boundary).
Giant Garter Snake eDNA Reconnaissance Survey	July 28, 2017	eDNA for this species was detected in Lookout Slough and Sycamore Slough.
California Black Rail Habitat Assessment and Reconnaissance Survey	April 18, 2018	No individuals were detected during a reconnaissance survey. Following onsite evaluation and a literature review, the species was determined to be not likely to occur.
Valley Elderberry Longhorn Beetle	August 27 and September 7, 2018	Five elderberry shrubs and two samplings were found on the outboard side of the levee. Plants were not part of a continuous or remnant riparian corridor; the area is subject to levee maintenance. No exit holes or beetles were observed on stems.

Species that were determined to have a moderate or high potential to occur or that are known to occur within the Proposed Project Site are discussed below. Special-status species unlikely to occur within the Proposed Project Site but known to occur in its vicinity are discussed in the BRA.

Special-Status Wildlife Species Determined to Have Moderate Potential to Occur

White Sturgeon (*Acipenser transmontanus*). CDFW Species of Special Concern.

This sturgeon is found in most estuaries along the Pacific Coast and is known to the San Francisco Bay Estuary. Adults in the San Francisco Bay Estuary system spawn in the Sacramento River and are not known to enter freshwater or non-tidal reaches of estuary streams. White Sturgeon typically spawn in May through June. Their diet consists of crustaceans, mollusks, and some fish.

White Sturgeon are known to use the Sacramento Deep Water Ship Channel to migrate from spawning grounds in the Sacramento and Feather Rivers out to the San Francisco

Bay⁶. During these migrations, or during general foraging, individuals are anticipated to occur within sloughs surrounding the Proposed Project Site. Considering the known distributions of the species, and the location of the Proposed Project Site, the species was determined to have moderate potential to be present in waters surrounding the Proposed Project Site throughout the year.

Tricolored blackbird (*Agelaius tricolor*). State Threatened, CDFW Species of Special Concern, USFWS Bird of Conservation Concern. The tricolored blackbird is a locally common resident in the Central Valley and along coastal California. Most tricolored blackbirds reside in the Central Valley from March through August, then move into the Sacramento-San Joaquin Delta, and east to Merced County and coastal locations during winter⁷. This species breeds adjacent to freshwater, preferring emergent wetlands with tall, dense cattails or tules, thickets of willow or blackberry, and/or cereal grains. Flooded agricultural fields with dense vegetation are also used⁸. This species is highly colonial; nesting habitat must be large enough to support a minimum of 30 pairs, and colonies are commonly substantially larger (up to thousands of pairs). The tricolored blackbird often intermingles with other blackbird species during the non-breeding season. Individuals typically forage up to 5.6 miles from their colonies; although, in most cases only a small part of the area within this range provides suitable foraging⁹.

There are records of tricolored blackbird within five miles of the Proposed Project Site, and likely breeding colonies within 10 miles¹⁰. Although the majority of the Proposed Project Site does not provide suitable habitat for the species, freshwater marshes with dense emergent vegetation on the margins of the Proposed Project Site, especially in the south, could potentially support habitat for a breeding colony. Current maintenance of the Liberty Farms Property requires dry habitat in the summer. This could limit food availability and reduce potential for nesting in a majority of the Proposed Project Site. However, some portions are not successfully dried out each summer and may provide nesting habitat; therefore, there is a moderate potential for nesting in the Proposed Project Site.

⁷ Meese, R.J., E.C. Beedy and W.J. Hamilton, III. 2014. *Tricolored Blackbird (*Agelaius tricolor*)*, *The Birds of North America Online* (A Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the *Birds of North America Online*: <http://bna.birds.cornell.edu/bna/species/423>.

⁷ Meese, R.J., E.C. Beedy and W.J. Hamilton, III. 2014. *Tricolored Blackbird (*Agelaius tricolor*)*, *The Birds of North America Online* (A Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the *Birds of North America Online*: <http://bna.birds.cornell.edu/bna/species/423>.

⁸ Shuford, WD, and T Gardali (eds). 2008. *California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California*. *Studies of Western Birds 1*. Western Field Ornithologists, Camarillo, California, and CDFG, Sacramento.

⁹ Hamilton III, WJ and RJ Meese. 2006. *Habitat and population characteristics of Tricolored Blackbird colonies in California. 2005 final report*. U.C. Davis for California Department of Fish and Game.

¹⁰ CDFW. 2018a. *California Natural Diversity Database*. California Department of Fish and Wildlife. Biogeographic Data Branch, Vegetation Classification and Mapping Program, Sacramento, CA. Accessed: August 2018.

Grasshopper sparrow (*Ammodramus savannarum*). **CDFW Species of Special Concern.** Grasshopper sparrow is a summer resident in California, wintering in Mexico and Central America. This species occurs in open grassland and prairie-like habitats with short- to moderate-statured vegetation, and often in scattered shrubs. Both perennial and non-native annual grasslands are used. Nests are placed on the ground and are well concealed, often adjacent to grass clumps. Grasshopper sparrows are evasive and are generally detected by voice. Insects comprise the majority of their diet.

Nesting by this species has been recorded in Maine Prairie near the Proposed Project Site.¹¹ Primary land use within the Bowsbey Property is irrigated pasture, which maintains short-statured, open grassland; however, the grazing regime reduces grass height such that it does not support nesting. The non-native annual grassland within the Liberty Farms Property provides suitable nesting structure for this species and limited areas of the Vogel Property may provide suitable nesting habitat. Based on nearby occurrences, this species was determined to have moderate potential to nest within the non-native annual grassland areas of the Proposed Project Site; although, it may be observed foraging on occasion in other portions of the Proposed Project Site.

Lesser sandhill crane (*Antigone canadensis canadensis*), **CDFW Special of Special Concern.** This subspecies breeds in Alaska but winters in California within the Central and Imperial Valleys. In winter, grains and seeds are the dominant food source for lesser sandhill crane (Shuford and Gardali 2008). Pastures, moist grasslands, and shallow wetlands or flooded fields are used for loafing and roosting.

The Proposed Project Site is comprised of irrigated pastures and marsh, both of which may provide winter foraging habitat when cranes seasonally migrate to the region. As neither subspecies of sandhill crane breeds or nests in the Delta or the Central Valley, any occurrence of the subspecies is anticipated to be associated with winter foraging and non-breeding activity. This species has not been documented on-site, and records of this species in the areas surrounding the Proposed Project Site are very sparse (Sullivan et al. 2018). Therefore, while the Proposed Project Site does contain irrigated pasture with the potential to be used by this species, it is only rarely expected to be present in winter. This species was determined to have moderate potential to occur as a winter migrant.

Greater sandhill crane (*Antigone canadensis tabida*). **State Threatened, CDFW Fully Protected Species [Winter Foraging Habitat Only].** This subspecies breeds only in Siskiyou, Modoc Lassen, Plumas, and Sierra Counties¹². In summer, this subspecies occurs in and near wet meadows, shallow lacustrine, and fresh emergent wetland habitats. It winters primarily in the Sacramento and San Joaquin valleys, where it frequents annual and perennial grassland habitats, moist croplands with rice or corn stubble, and open, emergent wetlands. Sandhill cranes will roost in flocks at night primarily in areas with

¹¹ M. Rippey, M. Berner, and R. Leong, *Breeding Birds of Solano County*.

¹² USFWS, *City of Sacramento, and Sutter County. 2002. Natomas Basin Habitat Conservation Plan: Environmental Impact Statement. Prepared by CH2M HILL. Sacramento, California. 4600 pp*

shallow standing water, and will return to croplands to forage during the day. It prefers relatively treeless plains.

The Proposed Project Site may provide winter foraging habitat when the greater sandhill crane seasonally migrate to the region. As the greater sandhill crane does not breed or nest in the Delta or the Central Valley, any occurrence of the subspecies is anticipated to be associated with foraging and non-breeding activity. While the species has not been documented on-site; there is potential foraging habitat in and adjacent to the irrigated pasture. Therefore, the greater sandhill crane was determined to have a moderate potential to occur.

Pallid bat (*Antrozous pallidus*). CDFW Species of Special Concern, WBWG High Priority. Pallid bats are distributed from southern British Columbia and Montana to central Mexico, and east to Texas, Oklahoma, and Kansas. This species occurs in a number of habitats ranging from rocky, arid deserts to grasslands, and into higher-elevation coniferous forests. They are most abundant in the arid Sonoran life zones below 6,000 feet but have been found up to 10,000 feet in the Sierra Nevada Mountains. Pallid bats often roost in colonies of between 20 and several hundred individuals. Roosts are typically located in rock crevices, tree hollows, mines, caves, and a variety of man-made structures, including vacant and occupied buildings. Tree roosting has been documented in large conifer snags (e.g., ponderosa pine), inside basal hollows of redwoods and giant sequoias, and within bole cavities in oak trees. They have also been reported roosting in stacks of burlap sacks and stone piles. The typical maternity season for pallid bat is from mid-April through late August with the primary factor in maternity roost selection being the ability of the roost to maintain warm ambient temperatures throughout the day and night. Roosts with low insulative capabilities, drafts or access by predators are not suitable for maternity roosting. Pallid bats are primarily insectivorous, feeding on large prey that is usually taken on the ground but sometimes in flight.

Typically, this species has been found in attics, crawl spaces of buildings, barns or even rock piles which offer thermal refugia while still having close access to water and foraging opportunities such as marshes. The Proposed Project Site contains some farm buildings (e.g. barns) as well as other structures that may support roosting while nearby freshwater marshes can support drinking and foraging needs by the species. Because of the presence of potential roosting structures and the proximity of water and foraging locations this species was determined to have moderate potential to occur.

Least bittern (*Ixobrychus exilis*). CDFW Species of Special Concern, USFWS Bird of Conservation Concern. California populations of least bittern are concentrated in low-lying areas of the Central Valley and Modoc Plateau, along the Colorado River, and coastal southern California, south of San Luis Obispo County. Colonial nesters are found in fresh and brackish marshlands and along margins of ponds and reservoirs which provide ample cover. Nests are usually placed low in hardstem bulrush, over water, and are constructed from emergent aquatic vegetation and sticks.

Marshes around the southern edge of the Liberty Farms Property within the Proposed

Project Site have been historically maintained as winter duck ponds for hunting. Such habitats are also likely to provide suitable nesting and foraging habitat for this species. This species has been observed in the vicinity of the Proposed Project Site, but recent surveys have not documented nesting within Solano County. Due to the presence of potentially suitable habitat and observations of least bittern nearby, this species was determined to have moderate potential to nest within the Proposed Project Site.

Black-crowned night heron (*Nycticorax nycticorax*). No status; nesting sites (rookeries) monitored by the CDFW. The black-crowned night heron is a year-round resident in California, and like other herons is associated with aquatic habitats. Nesting occurs colonially (often with other heron or waterbird species). Nesting substrates include trees (many types and sizes), shrubbery, emergent and herbaceous vegetation, and the ground. This species is generally nocturnal and forages primarily for fish and aquatic invertebrates.

This species has been observed foraging and perching during surveys. In addition, a rookery of egrets and cormorants is located on a series of small islands within Hass Slough outside of the Proposed Project Site. Potential rookery habitat was observed within the northern riparian portion of Lookout Slough; however, no nesting was confirmed. Therefore, this species is present, but only considered to have a moderate potential to nest within the Proposed Project Site.

Yellow warbler (*Setophaga (Dendroica) petechia brewsteri*). CDFW Species of Special Concern, USFWS Bird of Conservation Concern. The yellow warbler is a widespread in North America, but it has declined throughout much of its California breeding range. The Brewster's (*brewsteri*) subspecies is a summer resident and represents the vast majority of yellow warblers that breed in California. West of the Central Valley, typical yellow warbler breeding habitat consists of dense riparian vegetation along watercourses, including wet meadows, with willow growth being favored. Insects comprise the majority of this species' diet.

Willow riparian areas lining the banks of Lookout Slough and windrows within the Liberty Farms Property provide potential nesting habitat for this species. Potential foraging habitat is also supported throughout the riparian along perimeter levees as well. While potential foraging and nesting habitat are present and this species has been observed in Liberty Island near the Proposed Project Site, the species has not been observed on-site during multiple surveys and is uncommon in the region. This species was therefore determined to have moderate potential to nest within the Proposed Project Site.

Special-Status Wildlife Species Determined to Have High Potential to Occur

Green Sturgeon - Southern DPS (*Acipenser medirostris*). Federal Threatened. The southernmost spawning population of Green Sturgeon is in the Sacramento River, with the principal spawning area located in the lower Feather River. Spawning populations of Green Sturgeon in the San Joaquin River are presumed to have been extirpated in the past 25-30 years.

Green Sturgeon are primarily e species, entering into freshwater rivers mainly to spawn, although early life stages may reside in freshwater for up to two years. Adults typically migrate into freshwater from late February through late July. The spawning period occurs from March to July, with peak spawning occurring from mid-April to mid-June. Green Sturgeon prefer deep pools in large, turbulent, freshwater river mainstems to spawn. Juvenile Green Sturgeon migrate to the ocean primarily during the summer and fall before the end of their second year. Green Sturgeon adults, subadults, and juveniles are widely distributed throughout the Delta and estuary.

Adults typically migrate upstream on the western edge of the Delta, returning to the ocean when river temperatures decrease and flows increase during the fall and early winter. They may hold in low gradient or off-channel sloughs or coves where temperatures are within acceptable thresholds. Larvae prefer open aquatic habitats for foraging but utilize structure habitat during the day. Juvenile rearing habitats for Green Sturgeon include spawning areas and migration corridors. Rearing habitat utilization varies depending on seasonal flows and temperatures. Juvenile Green Sturgeon are found year-round in the Delta and use the region as a migration corridor, feeding area, and juvenile rearing area. Green Sturgeon are salvaged at the Central Valley Project and State Water Project pumping plants on an irregular basis throughout the year.

Juvenile Green Sturgeon use the Delta as a migration corridor, as well as for feeding and rearing habitat. The primary migration corridors for this species include the Sacramento River, the Deep Water Ship Channel, and the Yolo Bypass, all of which converge near the southern end of the Proposed Project Site. Due to difficulties associated with catching, tagging, and tracking this species, records are difficult to obtain. However, during flooding within the Yolo Bypass, Green Sturgeon are typically stranded and rescued, therefore this represents the nearest confirmed occurrence of the species. The Proposed Project Site is hydrologically connected to the adjacent Yolo Bypass, and given the proximity to the primary migration corridor for this species, it is anticipated that the Cache Slough Complex is also used by juveniles of the species for passage, rearing, and foraging. Given the location of the Proposed Project Site in relation to known occurrences of the species, the distance to the species migration corridor, and the presence of suitable rearing and foraging habitat in sloughs surrounding the Proposed Project Site, this species was determined to have high potential to occur seasonally within tidal habitats surrounding the Proposed Project Site and may occur within the Vogel Property during flooding.

White-tailed kite (*Elanus leucurus*). CDFW Fully Protected Species. The white-tailed kite is a resident in open to semi-open habitats throughout the lower-elevation areas of California, including grasslands, savannahs, woodlands, agricultural areas, and wetlands. Vegetative structure and prey availability seem to be more important habitat elements for this species than associations with specific plants or vegetative communities. Nests are constructed mostly of twigs and are placed in trees, often at habitat edges. Nest trees are highly variable in size, structure, and immediate surroundings, ranging from shrubs to trees greater than 150 feet tall. This species preys on a variety of small mammals, as well as other vertebrates and invertebrates.

This species has been observed within the local area and frequents agricultural areas where grasses are short and hunting for small mammals is aided by farm activities. While the Proposed Project Site has been regularly flood-irrigated, open grasslands along levees and areas cleared for residential use are likely to support a prey base of small mammals, such as mice and voles as well as non-flooded annual grasslands. Large trees along levees also have sufficient structure to support nesting by this species. The species has not been observed on-site during multiple surveys despite the high potential for it to nest within the Proposed Project Site.

Delta Smelt (*Hypomesus transpacificus*). Federal Endangered, State Threatened.

Delta Smelt are a pelagic species (i.e., they spend their lives within the water column and are not associated with a structural physical habitat). All life stages of Delta Smelt generally occur within 78 inches (two meters) of the surface and tend to concentrate near the mixing zone where salinities of 2 parts per 1,000 (ppt) occur. The point in the estuary where the average daily salinity at the bottom of the water is two ppt is referred to as the X2. This is the distance from the Low Salinity Zone (about 0.6 to 3.0 ppt) to the Golden Gate Bridge, measured in kilometers. This distance changes over the course of the year based on freshwater inflow through the Delta, and during years when the X2 is centered around the shallows of Suisun Bay during the spring generally result in high abundance of Delta Smelt in the fall.

The only known structural feature used by Delta Smelt are sandy substrates required for spawning. Suitable spawning habitat is composed of open, unvegetated, shallow subtidal (less than 9 feet) waters with sand or pebble-sized substrate within freshwater sloughs. Most spawning is believed to occur at temperatures between 44 and 59°F. Delta Smelt are broadcast spawners with sinking, fertilized eggs that adhere to pebble or sand substrate to keep them from washing away and to allow them to "tumble incubate" with wave movement. Spawning generally occurs during the late winter and spring months, with peak spawning activity occurring in April and May. Adults migrate to more freshwater environments of the upper Delta, where they seek sloughs and shallow edge areas. Most spawning occurs within the upper Delta and in the Sacramento River above Rio Vista. Spawning locations are inferred by the locations of captured gravid females, spent females, and larvae in trawl samples. Wet years, in which higher levels of freshwater are moving through the Delta system, appear to result in a greater abundance and distribution of smelt in the following year. Larvae hatch in 10 to 14 days, are planktonic (float with the water currents), and are washed downstream until they reach areas near the X2. Delta Smelt are fast-growing and short-lived, with the majority of growth occurring within the first 7 to 9 months of life. Throughout their lifespan, this species feeds entirely on zooplankton.

In addition to salinity and stationary substrates when spawning, Delta smelt are also strongly associated with turbidity. Turbidity gradients are important for foraging efficiency, as well as concealment from predators. Turbid conditions are also typically associated with the "first flush" following winter rains and act as a cue for spawning, making turbidity a key factor for the species year round.

The area surrounding Liberty Island, as well as the Cache Slough Complex, are known to support Delta Smelt spawning and rearing habitat. A small portion of the Delta Smelt population is believed to inhabit the Cache Slough Complex year-round. Data from CDFW trawls also support this information. Trawl Station 716 is located at the southern end of Liberty Island and data collected from this location confirm that adult, juvenile, and larval smelt have been consistently detected in this area. Given the confirmed presence of the species immediately downstream of the Proposed Project Site, as well as at Liberty Island which borders the Proposed Project Site to the east, this species is considered present in the surrounding sloughs and was determined to have high potential to occur adjacent to and within the Vogel Property of the Proposed Project Site during flood events.

Steelhead - Central Valley Distinct Population Segment (DPS; *Oncorhynchus mykiss*). Federal Threatened. The Central Valley DPS includes all naturally spawned populations (and their progeny) in the Sacramento and San Joaquin Rivers and their tributaries, excluding San Francisco and San Pablo Bays and their tributaries. Preferred spawning habitat for Steelhead is in perennial streams with cool to cold water temperatures, high dissolved oxygen levels, and fast flowing water. During the winter or early spring, the spawning fish reach suitable gravel riffles (shallow areas with gravel or cobble substrate) in the upper sections of streams, where they dig their redds. Abundant riffle areas for spawning and deeper pools with sufficient riparian cover for rearing are necessary for successful breeding. When Steelhead spawn, they nearly always return to the stream in which they were hatched.

The Proposed Project Site is located directly adjacent to the primary migration corridor (the Sacramento River and the Deep Water Ship Channel) for this species. While adults do not typically use sloughs, marshes, or off-channel habitats like those surrounding the Proposed Project Site, juvenile salmonids require such habitat for rearing, and as cover during outmigration. Juvenile Steelhead have been regularly encountered by CDFW within the Yolo Bypass during fish rescue operations following flood events. The Yolo Bypass is hydrologically connected to the Proposed Project Site; therefore, it is likely that the Cache Slough Complex also serves as rearing habitat for the species. Therefore, due to the presence of habitat within and surrounding the Proposed Project Site, the proximity to migration corridors used by the species, and the presence of Steelhead in adjacent habitats during salvage operations, this species was determined to have high potential to be seasonally present, particularly during the juvenile outmigration period. The Proposed Project Site is located directly adjacent to the primary migration corridor (the Sacramento River and the deep water shipping channel) for this species. While adults do not typically use sloughs, marshes, or off-channel habitats like those surrounding the Proposed Project Site, juvenile salmonids require such habitat for rearing, and as cover during outmigration. Juvenile Steelhead have been regularly encountered by the CDFW within the Yolo Bypass during fish salvage operations following flood events. The Yolo Bypass is hydrologically connected to the Proposed Project Site; therefore, it is likely that the Cache Slough Complex also serves as rearing habitat for the species. Therefore, due to the presence of habitat within and surrounding the Proposed Project Site, the proximity to migration

corridors used by the species, and the presence of Steelhead in adjacent habitats during salvage operations, this species was determined to have high potential to be seasonally present.

Chinook Salmon - Central Valley Fall/late fall-run, Evolutionarily Significant Unit (ESU) (*Oncorhynchus tshawytscha*). NMFS Species of Concern, CDFW Species of Special Concern. The Central Valley fall/late fall-run ESU includes all naturally spawned spring-run Chinook Salmon populations from the Sacramento/San Joaquin River mainstem and its tributaries. Late-fall run Chinook Salmon are morphologically similar to spring-run Chinook Salmon. They are large salmonids, reaching 30 to 40 inches (75 to 100 cm) standard length, and weighing up to 20 to 22 pounds (9 to 10 kilograms) or more.

The vast majority of late-fall Chinook Salmon appear to spawn in the mainstem of the Sacramento River, which they enter from October through February. Spawning occurs in January, February, and March, although it may extend into April in some years. Eggs are laid in large depressions (redds) hollowed out in gravel beds. The embryos hatch following a 3-4 month incubation period and the alevins (sac-fry) remain in the gravel for another 2-3 weeks. Once their yolk sac is absorbed, the fry emerge and begin feeding on aquatic insects. All fry emerge by early June. The juveniles hold in the river for nearly a year before migrating to the ocean the following December through March. Once in the ocean, Chinook Salmon are largely piscivorous and grow rapidly.

The specific habitat requirements of late-fall Chinook Salmon have not been determined, but they are presumably similar to other Chinook Salmon runs and fall within the range of the physical and chemical characteristics of the Sacramento River above Red Bluff.

The Proposed Project Site is located directly off of the primary migration corridors (the Sacramento River and the Sacramento River Deep Water Shipping Channel) used by this species when migrating to the American, Sacramento, or Fall River spawning grounds. While adults do not typically use sloughs or marshes like those surrounding the Proposed Project Site during migration, juvenile salmonids require such habitats for rearing, and as cover during outmigration. Fish rescue operations conducted by CDFW at the Yolo Bypass following flood events have identified this species as being present in the local area¹³. Therefore, due to the presence of habitat within and surrounding the Proposed Project Site, as well as the proximity to the migration corridors used by salmonids moving through the Sacramento River, this species was determined to have high potential to be seasonally present, particularly during the outmigration period of juvenile fish.

¹³ California Department of Fish and Wildlife (CDFW) 2017a. *Summary of 2016-2017 Season Fish Rescues Conducted within the Yolo Bypass. Prepared for the U.S. Bureau of Reclamation. August 2017*

Chinook Salmon - Central Valley Spring-run ESU (*Oncorhynchus tshawytscha*). **Federal Threatened, State Threatened.** The Central Valley Spring-run ESU includes all naturally spawned spring-run populations from the Sacramento/San Joaquin River mainstem and its tributaries. Chinook Salmon are anadromous (adults migrate from a e environment into the freshwater streams and rivers of their birth) and semelparous (spawn only once and then die).

Spring-run Chinook Salmon enter the Sacramento River between February and June. They move upstream and enter tributary streams from February through July, peaking in May-June. These fish migrate into the headwaters, hold in pools until they spawn, starting as early as mid-August and ending in mid-October, peaking in September. They are fairly faithful to the home streams in which they were spawned, using visual and chemical cues to locate these streams. While migrating and holding in the river, spring chinook do not feed, relying instead on stored body fat reserves for maintenance and gonadal maturation. Eggs are laid in large depressions (redds) hollowed out in gravel beds. Some fish remain in the stream until the following October and emigrate as "yearlings", usually at the onset of storms starting in October and lasting through the following March (peaking in November-December). Large pools with cold water provide essential over-summering habitat for this species.

The Proposed Project Site is located directly adjacent to the primary migration corridors (the Sacramento River and the deep water shipping channel) used by this species. While adults do not typically use sloughs and marshes like those surrounding the Proposed Project Site during migration, juvenile salmonids require such habitat for rearing, and as cover during outmigration. Spring trawl data from the CDFW operations south of Liberty Island as well as fish rescue operations in the Yolo Bypass have confirmed the presence of this species throughout the local area.

Therefore, due to: (1) the presence of suitable rearing and foraging habitat within and surrounding the Proposed Project Site, (2) the proximity to primary migration corridors used by Chinook Salmon moving through the Sacramento River, and (3) confirmed occurrences of Chinook Salmon in the local area, this species was determined to have a high potential to be seasonally present, particularly during the outmigration period of juvenile fish.

Chinook Salmon - Sacramento River Winter-run ESU (*Oncorhynchus tshawytscha*). **Federal Endangered, State Endangered.** The ESU includes all naturally spawned populations of winter-run Chinook Salmon in the Sacramento River and its tributaries in California, as well as two artificial propagation programs: winter-run Chinook Salmon from the Livingston Stone National Fish Hatchery (NFH), and winter-run Chinook Salmon in a captive broodstock program maintained at Livingston Stone NFH and at the University of California Bodega Marine Laboratory. Winter-run Chinook Salmon are unique because they spawn during summer months when air temperatures usually approach their yearly maximum. As a result, these salmon require stream reaches with cold water sources that

will protect embryos and juveniles from the warm ambient conditions in summer. Winter-run Chinook Salmon are primarily restricted to the mainstem Sacramento River.

The Proposed Project Site is located directly off of the primary migration corridors (the Sacramento River and the deep water shipping channel) used by this species. While adults do not typically use sloughs and marshes like those surrounding the Proposed Project Site during migration, juvenile salmonids require such habitat for rearing, and as cover during outmigration. This species has been detected during CDFW trawls south of Liberty Island, as well as during fish salvage operations within the Yolo Bypass. Therefore, due to the presence of rearing and foraging habitat within and surrounding the Proposed Project Site, as well as the proximity to this species' primary migration corridor, and the recorded occurrences of the species within adjacent waters, this species was determined to have high potential to be seasonally present, particularly during the outmigration period of juvenile fishes.

Nuttall's woodpecker (*Picoides nuttallii*). USFWS Bird of Conservation Concern.

Nuttall's woodpecker, common in much of its range, is a year-round resident throughout most of California, west of the Sierra Nevada Mountains. Typical habitat for this species is oak or mixed woodland and riparian areas. Nesting occurs in tree cavities, principally those of oaks and larger riparian trees. Nuttall's woodpecker also occurs in older residential settings and on orchards, where trees provide suitable foraging and nesting habitat. This species forages on a variety of arboreal invertebrates.

In this portion of Solano County, this species is fairly common, and nesting has been confirmed north of the Proposed Project Site¹⁴. During multiple site visits, woodpecker cavities were observed in trees. Based on the evidence of previous use of the area by woodpeckers and documented occurrences nearby, this species has high potential to occur in the Proposed Project Site.

Longfin Smelt (*Spirinchus thaleichthys*). Federal Candidate, State Threatened, CDFW Species of Special Concern.

The Longfin Smelt is an anadromous fish found in California's bay, estuary, and nearshore coastal environments. Its range extends along the Pacific Coast of North America from the Sacramento-San Joaquin Estuary in California, north to the Gulf of Alaska. The San Francisco Estuary supports the largest, and southern-most population in California. Longfin Smelt are known to inhabit the entire San Francisco Estuary, including portions of the Napa River, Suisun Marsh, and the Delta. The species is also currently proposed for listing under the federal Endangered Species Act (FESA).

Juvenile Longfin Smelt feed on zooplankton. With subsequent growth, their diet expands to include small crustaceans. Longfin Smelt are an important prey species and are fed upon by many native and non-native species of predatory fish. However, invasive Striped

¹⁵ California Department of Fish and Wildlife, Environmental Services Division (CDFW ESD) (1994). *A Field Guide to Lake and Streambed Alteration Agreements, Sections 1600-1607, California Fish and Wildlife Code. Sacramento, CA.*

Bass (*Morone saxatilis*) are a dominant predator of Longfin Smelt in the Delta. The other primary threats to the species are due to the effects of water diversions from the Delta.

Longfin Smelt typically use backwater sloughs and channels like those within the Cache Slough Complex for both feeding and rearing. This species has been documented immediately downstream of the Proposed Project Site near Liberty Island during CDFW trawl surveys. Focused surveys within the Cache Slough Complex and Yolo Bypass conducted by University of California, Davis have documented this species in Cache, Hass, and Shag Sloughs.

Given that the Proposed Project Site is surrounded by documented occurrences of this species, and suitable habitat for rearing and foraging is present, the species is considered present within the surrounding tidal sloughs and was determined to have high potential to occur within the waters immediately adjacent to the Proposed Project Site and potentially within the Vogel Property during periods of flooding.

Special-Status Wildlife Species Observed within the Proposed Project Site

Western pond turtle (*Actinemys [Emys] marmorata*). CDFW Species of Special Concern. This turtle can be found in suitable aquatic habitat throughout California, west of the Sierra-Cascade crest and Transverse Ranges. Western pond turtles inhabit perennial and seasonal aquatic habitats, such as lakes, ponds, rivers, streams, and canals that provide submerged cover and suitable basking structures, such as rocks and logs. Western pond turtles prefer to nest on unshaded upland slopes close to their aquatic habitat, and although turtles may hatch in late summer or early fall, hatchlings do not emerge until the following spring. Hatchlings require shallow water with relatively dense emergent and submerged vegetation for cover and aquatic invertebrate foraging. Within the Delta, western pond turtle is typically found where suitable basking sites, deep water, and friable soils occur together.

This species was observed within the Proposed Project Site and in the adjacent waters of the Cache Slough Complex. The presence of deep water found in irrigation ditches and in Sycamore Slough, combined with multiple sloughs surrounding the Proposed Project Site, provides an abundance of suitable habitat within and surrounding the Proposed Project Site. Additionally, the Proposed Project Site provides suitable basking sites and friable soils capable of supporting reproduction for this species. Therefore, this species is present within the Proposed Project Site.

Swainson's hawk (*Buteo swainsoni*). USFWS Bird of Conservation Concern, State Threatened. Swainson's hawk is a summer resident and migrant in California's Central Valley and in scattered portions of the southern California interior. Nests are constructed of sticks and are placed in trees located in otherwise largely open areas. Areas typically used for nesting include the edge of narrow bands of riparian vegetation, isolated patches of oak woodland, lone trees, and both planted and natural trees associated with roads, farmyards, and sometimes adjacent residential areas. Swainson's hawk show nest site fidelity and will return to the nest territory each year to nest in the same or proximate tree.

Foraging occurs in open habitats, including grasslands, open woodlands, and agricultural areas. While breeding, adults feed primarily on rodents and other vertebrates. For the remainder of the year, large insects (e.g., grasshoppers, dragonflies) comprise most of this species' diet. In many areas, Swainson's hawks have adapted to foraging primarily in and around agricultural plots (particularly alfalfa, wheat, and row crops), as prey are both numerous and conspicuous at harvest and/or during flooding or burning.

In spring 2018, two nests associated with this species were observed within the Proposed Project Site. Additionally, two nests were observed outside of the Proposed Project Site but were within approximately 500 feet of the site boundary. A nest for this species was also recorded from 2001-2005 and in 2007. One of the nests detected during 2018 surveys is immediately adjacent to the 2001-2005/2007 location (occurrence #1148, CDFW 2018a) and is assumed to be the current nest location for this hawk territory and CNDDB nest occurrence. During the appropriate migratory season, this species is present in the Proposed Project Site.

Northern harrier (*Circus cyaneus*). **CDFW Species of Special Concern.** The northern harrier is a resident within and winter visitor to open habitats throughout most of California, including freshwater and brackish marshes, grasslands and fields, agricultural areas, and deserts. Harriers typically nest in open areas within patches of dense, relatively tall shrubby vegetation. Nests are constructed on the ground and are often located near water or within wetlands. Harriers are birds of prey that subsist on a variety of small mammals and other vertebrates.

While agricultural disturbance may degrade portions of the nesting habitat, the ungrazed, non-native annual grassland within the Liberty Farms Property provides a high potential for this species to nest. This species has been observed foraging in and adjacent to the Proposed Project Site.

Loggerhead shrike (*Lanius ludovicianus*). **USFWS Bird of Conservation Concern, CDFW Species of Special Concern.** The loggerhead shrike is a year-round resident and winter visitor in lowlands and foothills throughout California. This species is associated with open country with short vegetation and scattered trees, shrubs, fences, utility lines, and/or other perches. Although they are songbirds, shrikes are predatory and forage on a variety of invertebrates and small vertebrates. Captured prey items are often impaled on suitable substrates for storage purposes, including thorns or spikes on vegetation, and barbed wire fences. Nests are located in trees and large shrubs. Nests are usually placed 3 to 10 feet off the ground.

This species was observed within the Proposed Project Site during the January 6, 2017 site visit. The Proposed Project Site contains short-statured grasslands suitable for foraging by the species. In addition, trees, shrubs, and other suitable vegetation is present along levees or in scattered patches around the Proposed Project Site, which may support nesting by the species. This species is present in the Proposed Project Site.

Song sparrow - Modesto Population (*Melospiza melodia*). CDFW Species of Special Concern. The Modesto song sparrow population only occurs in the north-central portion of the Central Valley. The highest densities of this species occur in the Butte Sink area. This song sparrow has an affinity for emergent freshwater marshes, but will also nest in willow thickets, valley oak riparian forests, and along vegetated irrigation ditches and levees.

This species has been recorded in marshes within 5-miles south of the Proposed Project Site (CDFW 2018a), and song sparrows have been observed during several site visits. Additionally, marshes within the southern section of the Proposed Project Site have been managed as a duck hunting club and may provide suitable nesting and foraging habitat for the species. Therefore, due to the proximity of occurrences and observations on site, as well as the presence of marsh habitat, this species was determined to be present within the Proposed Project Site.

Sacramento Splittail (*Pogonichthys macrolepidotus*). CDFW Species of Special Concern. Splittail are primarily freshwater fish that have been found mostly in slow-moving sections of rivers and sloughs. In the Delta and Suisun Marsh, they often congregate in dead end sloughs. Splittail are feed extensively on opossum shrimp (*Neomysis mercedis*) but will feed opportunistically on earthworms, clams, insect larvae, and other invertebrates. They are preyed upon by Striped and other predatory fish. Splittail ostensibly require flooded vegetation for spawning and as foraging areas for young, hence they are found in habitat subject to periodic flooding during the breeding season.

Aquatic habitat surrounding the Proposed Project Site is composed of slow-moving tidal sloughs, which are suitable for both foraging and spawning by the species. Surveys conducted by University of California, Davis have documented this species within the surrounding Cache Slough Complex. Additionally, during aquatic surveys throughout the irrigation ditches of the Proposed Project Site, an individual of this species was observed. Therefore, Sacramento Splittail is present within and around the Proposed Project Site.

Giant garter snake (*Thamnophis gigas*). Federal Threatened, State Threatened. This snake species is found only in the Sacramento and San Joaquin Valleys. Giant garter snake prefers freshwater marshes and low gradient streams but has adapted to drainage channels and irrigation ditches. Giant garter snake inhabits agricultural wetlands and other waterways, such as irrigation and drainage canals, sloughs, ponds, small lakes, low gradient streams, and immediately adjacent uplands in the Central Valley.

Giant garter snake is active when water temperatures are approximately 20°C (68°F) or more. It is dormant underground in winter, but also uses underground refugia throughout its active season. Fish and frogs form a large portion of the diet of this species. This highly aquatic snake is active during daylight and rarely at night, temperatures permitting. It uses vegetation in or near water for basking but is evasive and difficult to approach or detect. Giant garter snake will quickly submerge into the water from its basking site when

startled. This species hibernates in animal burrows in the winter and typically emerges from overwintering sites in March to April based on air temperatures and breeds upon emergence, typically through May. It does not typically enter water for foraging or other activities until mid-April or May when water has warmed to a sufficient temperature.

The larger open water habitats, surrounding wetlands and upland areas provide suitable habitat for giant garter snake within the Proposed Project Site. This species was previously believed to be extirpated from the adjacent Liberty Island area of the Delta. However, this species was detected in eDNA sampling in Lookout and Sycamore Sloughs on July 28, 2017. Additionally, a specimen was recorded along the southeastern border of the Proposed Project Site in 2017. In 2018 and 2019, the USGS conducted trapping surveys for giant garter snake within the Proposed Project Site. Although the survey results have not been finalized or released publicly at this time, WRA biologists accompanied the USGS on several days during trapping and it was confirmed that giant garter snakes had been captured in both years. Therefore, this species is present within the Proposed Project Site.

iv. Critical Habitat

A review of the background literature showed that the Proposed Project Site is located within or adjacent to critical habitat for four special-status fish species including: Delta Smelt, Central Valley Spring-run Chinook Salmon, Central Valley Steelhead, and Southern DPS Green Sturgeon. Currently, flood control levees exclude the majority of the Proposed Project Site from providing biological or physical components of these species' critical habitat. The exception would be the exterior (outer) levee and the Vogel Property, which affords some habitat to each species during flood events.

v. Essential Fish Habitat

A review of the background literature revealed that the Proposed Project Site is located within or adjacent to Essential Fish Habitat (EFH) for two fisheries management plans: Pacific Groundfish and Pacific Salmon. The Pacific Groundfish Fisheries Management Plan is designed to protect habitat for approximately 80 species of fish, including various species of flatfish, rockfish, groundfish, and several species of sharks and skates. The Pacific Salmon Fisheries Management Plan is designed to protect habitat for commercially important salmonid species. Chinook Salmon is the primary species that would be seasonally present within waters surrounding the Proposed Project Site.

The waters of Cache, Hass, and Shag Sloughs are identified as EFH for Pacific Groundfish, while the entire watershed encompassing the Proposed Project Site is located within the Lower Sacramento unit of EFH for Pacific Salmonids. Similar to critical habitat discussed above, the majority of the Proposed Project Site is isolated from waters and habitat that form EFH due to flood control levees; the exception being the exterior (outer) levee area and the Vogel Property during flood events.

3. REGULATORY FRAMEWORK

a. Federal Regulations

i. Federal Endangered Species Act (FESA)

FESA (16 United States Code Section 1531 et seq.) provides a program for the conservation of threatened and endangered plants and animals and the habitats in which they are found. The law requires federal agencies (and other public agencies seeking approval, funding, and/or permitting through federal agencies), in consultation with USFWS and/or NMFS, to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of designated critical habitat of such species.

FESA Section 7 requires that federal agencies consult with USFWS or NMFS if their actions may affect a federally-listed species or destroy or adversely modify critical habitat. This section also prohibits any federal agency from taking actions likely to jeopardize the survival and recovery of listed species. Issuance of a federal permit is one type of action that may trigger Section 7 consultation.

USFWS or NMFS concludes formal Section 7 consultation with the issuance of a BiOp, which may also include an incidental take statement. The statement provides authorization for incidental take (e.g., indirect killing, harm, harassment, injury) of listed fish or wildlife species that is otherwise prohibited by Section 9 of the FESA. USFWS and NMFS may also conclude informal consultation with the issuance of a letter of concurrence that incidental take is unlikely to occur and no authorization from these regulatory agencies is needed. However, if take authorization is not granted, and the species is observed during Proposed Project activities, consultation must occur to advise of next steps.

Section 9 of the FESA and its regulations prohibit the take of federally-listed species. An incidental take permit under FESA Section 10(a) or federal consultation under Section 7 of the FESA is required if the Proposed Project might affect a federally listed species.

USFWS released a BiOp for coordinated operations of the State Water Project and the Central Valley Project for Delta Smelt on December 15, 2008. This BiOp includes the requirement that DWR restore 8,000 acres of tidal marsh.

NMFS released its latest BiOp for coordinated operations of the State Water Project and the Central Valley Project in 2009, concluding that operations would jeopardize the continued existence of endangered Sacramento River winter-run Chinook Salmon, threatened Central Valley spring-run Chinook Salmon, threatened Central Valley Steelhead, and threatened Southern DPS of the North American Green Sturgeon. The NMFS BiOp includes by reference the 8,000-acre tidal restoration requirement contained in the USFWS BiOp.

ii. Magnuson-Stevens Fishery Conservation and Management Act

The federal Magnuson-Stevens Fishery Conservation and Management Act (United States Code Title 16 Section 1801 et seq.) is the primary law governing marine fisheries management in the

United States. The purpose of this federal law is sevenfold: conserve fishery resources, support enforcement of international fishing agreements, promote fishing in line with conservation principles, provide for the implementation of fishery management plans to achieve optimal yield, establish regional fishery management councils to steward fishery resources, develop underutilized fisheries, and protect EFH.

The act requires federal agencies to consult with NMFS when a project has the potential to adversely affect EFH. States are not required to consult with NMFS; however, NMFS is required to develop EFH conservation recommendations for any state agency activity that would affect EFH. Similar in concept to critical habitat for FESA, EFH protection measures recommended by NMFS or a regional fisheries management council are advisory and not prescriptive.

iii. Clean Water Act (CWA)

The federal CWA amendments establish the basic structure for the USEPA to regulate discharges of pollutants into waters of the United States. Under the CWA, the USEPA sets water quality standards for contaminants in surface waters and implements the pollutant control programs, as discussed below. Discussion of the CWA below primarily focuses on protection of wetlands. Section 303(d) and 402 of the CWA are discussed in Chapter IV.G, Hydrology and Water Quality).

Clean Water Act Section 404

The Corps and the USEPA regulate the discharge of dredged or fill material into waters of the U.S., including wetlands, under Section 404 of the CWA (United States Code, Title 33, Section 1344). Waters of the U.S. are defined in Title 33 Code of Federal Regulations Part 328.3(a) and include a range of wet environments such as lakes, rivers, streams, mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds. The lateral limits of jurisdiction in those waters may be divided into three categories – territorial seas, tidal waters, and non-tidal waters – and is determined depending on which type of waters is present (Code of Federal Regulations, Title 33, Part 328.4(a), (b), (c)). Activities in waters of the United States regulated under Section 404 include water resource projects (e.g., dams and levees), among others. Section 404 of the CWA requires a federal permit before dredged or fill material may be discharged into waters of the United States, unless the activity is exempt from Section 404 regulation.

Clean Water Act Section 401

Section 401 of the CWA (United States Code, Section 33, Title 1341) requires an applicant for a federal license or permit to conduct any activity that may result in a discharge of a pollutant into waters of the United States to obtain a water quality certification from the state in which the discharge originates. The discharge is required to comply with the applicable water quality standards. A certification obtained for the construction of any facility must also pertain to the subsequent operation of the facility. The responsibility for the protection of water quality in California rests with the State Water Resources Control Board (SWRCB) and its nine RWQCBs.

iv. Migratory Bird Treaty Act (MBTA)

The federal MBTA of 1918, as amended (United States Code, Title 16, Section 703 - 711) provides for the protection of migratory birds by making it illegal to possess, hunt, pursue, or kill any migratory bird, or any transaction pertaining to any wild migratory bird, part, nest, egg or product, manufactured or not, unless specifically authorized by the Secretary of the Interior. Currently, there are roughly 1,007 species on the list of migratory birds.

v. Executive Orders (EOs)

Executive orders are directives issued by the President of the United States. These directives instruct the internal affairs of how the federal government operates and influence the way in which policies are implemented.

EO No. 11990 (Protection of Wetlands)

This EO requires federal agencies to provide leadership to protect the natural and beneficial values served by wetlands. Federal agencies are directed to minimize the destruction or degradation of wetlands.

Executive Order No. 13112 (Invasive Species)

EO 13112 inaugurated the National Invasive Species Management Plan and provided policy direction to promote coordination between federal, state, and local agencies to prevent the introduction of invasive species, provide for their control, and minimize the economic, ecological, and human health impacts of invasive species. The EO calls on all federal agencies to identify their actions which may affect the status of invasive species and use relevant programs and authorities to prevent introduction, detect and respond to invasive species, monitor invasive species populations, provide for restoration of native species, and promote public education. In addition, the EO provides that an agency should not authorize, fund, or carry out actions it believes are likely to cause or promote introduction or spread of invasive species unless the benefits of such actions clearly outweigh the potential harm caused by invasive species.

b. State Regulations*i. California Endangered Species Act (CESA)*

The state counterpart to FESA, CESA (California Fish and Game Code Section 2050 et seq.) has similar, but distinct requirements and goals. CESA requires state agencies to coordinate with CDFW to ensure that state-authorized or state-funded actions do not jeopardize a state-listed species. The state list of species classified as rare, threatened, or endangered does not necessarily correspond with the federal list of threatened and endangered species.

ii. California Fish and Game Code Section 1600

Streams, lakes, and riparian vegetation as habitat for fish and wildlife, are subject to CDFW jurisdiction under Section 1602 of the California Fish and Game Code. A 1602 Lake and Streambed Alteration Agreement is generally required for any activity that will have one or more of the following effects: (1) substantially obstruct or divert the natural flow of a river, stream, or lake; (2) substantially change or use any material from the bed, channel, or bank of a river, stream, or lake; or (3) deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it can pass into a river, stream, or lake. The term “stream”, which includes creeks and rivers, is defined in the California Code of Regulations as follows: “a body of water that flows at least periodically or intermittently through a bed or channel having banks and supports fish or other aquatic life”. This includes watercourses having a surface or subsurface flow that supports or has supported riparian vegetation” (California Code of Regulations Title 14, Section 1.72). In addition, the term stream can include ephemeral streams, dry washes, watercourses with subsurface flows, canals, aqueducts, irrigation ditches, and other means of water conveyance if they support aquatic life, riparian vegetation, or stream-dependent terrestrial wildlife.¹⁵ Riparian is defined as “on, or pertaining to, the banks of a stream;” therefore, riparian vegetation is defined as, “vegetation which occurs in and/or adjacent to a stream and is dependent on, and occurs because of, the stream itself”.¹⁶ Removal of riparian vegetation also requires a Section 1602 Lake and Streambed Alteration Agreement from the CDFW.

iii. California Fish and Game Code Sections 3503 & 3513

According to Section 3503 of the California Fish and Game Code, it is generally unlawful to take, possess, or needlessly destroy the nest or eggs of any bird. Section 3503.5 protects birds-of-prey. Section 3513 essentially overlaps with the MBTA, prohibiting the take or possession of any migratory non-game bird. Disturbance that causes nest abandonment and/or loss of reproductive effort is considered “take” by CDFW.

iv. Native Plant Protection Act

The Native Plant Protection Act (California Fish and Game Code Section 1900 et seq.) designates 64 species, subspecies, and varieties of native California plants as rare. The Native Plant Protection Act prohibits take of rare native plants but includes some exceptions for agricultural and nursery operations; emergencies; and after properly notifying CDFW for vegetation removal from canals, roads, and other sites, changes in land use, and in certain other situations.

¹⁵ California Department of Fish and Wildlife, Environmental Services Division (CDFW ESD) (1994). *A Field Guide to Lake and Streambed Alteration Agreements, Sections 1600-1607, California Fish and Wildlife Code.* Sacramento, CA.

¹⁶ *Ibid.*

v. *Other Sensitive Plants - California Native Plant Society (CNPS)*

CNPS, a non-profit plant conservation organization, publishes and maintains an Inventory of Rare and Endangered Vascular Plants of California in both hard copy and electronic version (www.cnps.org/rareplants/inventory/). The Inventory assigns plants to the following categories:

- Rank 1A – Presumed extinct in California;
- Rank 1B – Rare, threatened, or endangered in California and elsewhere;
- Rank 2A: – Plants presumed extirpated in California, but more common elsewhere;
- Rank 2B: – Rare, threatened, or endangered in California, but more common elsewhere;
- Rank 3 – Plants for which more information is needed – A review list; and
- Rank 4 – Plants of limited distribution – A watch list.

Additional threat ranks are assigned to each taxon or group as follows:

- .1 – Seriously endangered in California (over 80% of occurrences threatened/high degree of immediacy of threat).
- .2 – Fairly endangered in California (20-80% occurrences threatened).
- .3 – Not very endangered in California (<20% of occurrences threatened or no current threats known).

Plants on Rank 1A, 1B, 2A, 2B of the CNPS Inventory consist of plants that may qualify for listing. CDFW, as well as other state agencies, and the CNPS recommend these plants be given special consideration during project review. In addition, CDFW and CNPS recommend, consideration of plants on List 3 and 4 during project review.

vi. *Porter-Cologne Water Quality Control Act*

The Porter-Cologne Water Quality Control Act (Porter-Cologne, California Water Code Title 23) protects California waters. The act gives the State Water Resources Control Board, through the Central Valley RWQCB, the authority to regulate discharges of waste, including dredged or fill material, to any state waters within its jurisdiction. Biological beneficial uses of state waters are subject to regulation through various means, including conditions attached to the certification of federal CWA (Section 401) authorizations (see Section IV.G. Hydrology/Water Quality).

vii. *State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State*

Earlier in 2019, the State Water Resources Control Board approved a formal state wetland definition, as part of the State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State. The definition will be effective May 28, 2020. A state wetland is defined as follows:

An area is a wetland if, under normal circumstances, (1) the area has continuous or recurrent saturation of the upper substrate caused by groundwater, or shallow surface water, or both; (2) the duration of such saturation is sufficient to cause anaerobic conditions in the upper substrate; and (3) the area's vegetation is dominated by hydrophytes or the area lacks vegetation.

Methods for delineating state wetlands follow the same protocols as those used for Waters of the U.S., with the exception that areas lacking vegetation, but meeting both wetland hydrology and soils indicators, are mapped as wetlands. Areas lacking vegetation but supporting hydrology are commonly mapped as “unvegetated waters” under the federal definition and delineation procedures. The new policy also updates permit processing requirements for placement of dredge or fill material into all “waters of the state”, including alternatives analysis requirements, mitigation requirements, and focused requirements specific to restoration projects. The state wetland definition and new permitting procedures will not be effective until May 2020; as such, these policies are not anticipated to apply to the Proposed Project.

c. Regional Regulations

i. Delta Plan – Delta Stewardship Council (Council)

The following policies from the Delta Plan are pertinent to the protection of biological resources:

General Policy 1 (G P1): Detailed Findings to Establish Consistency with the Delta Plan

Specifies what must be addressed in a certification of consistency by a project proponent for a covered action. The following is a subset of G P1 requirements that a project must fulfill to be demonstrate consistency with the Delta Plan:

Mitigation Measures

Delta Plan Policy G P1, subsection (b)(2), (23 CCR Section 5002(b)(2)) requires that actions not exempt from CEQA and subject to Delta Plan regulations must include applicable feasible mitigation measures consistent with those identified in the Delta Plan Program EIR or substitute mitigation measures that are equally or more effective.

Best Available Science

Requires covered actions to document use of best available science as relevant to the purpose and nature of the project. Best available science is defined in the Delta Plan as the best scientific information and data for informing management and policy decisions, which must be consistent with the guidelines and criteria found in Appendix 1A of the Delta Plan. Six criteria are used to define best available science: relevance, inclusiveness, objectivity, transparency and openness, timeliness, and peer review. This policy generally requires that the lead agency clearly document and communicate the process for analyzing project alternatives, impacts, and mitigation measures of proposed projects, in order to foster improved understanding and decision making.

Adaptive Management

Requires that ecosystem restoration and water management covered actions include adequate provisions for continued implementation of adaptive management, appropriate to the scope of the action. This requirement is satisfied through: a) the development of an adaptive management plan that is consistent with the framework described in Appendix 1B of the Delta Plan; and b) documentation of adequate resources to implement the proposed adaptive management plan.

Ecosystem Restoration Policy 2 (ER P2): Restore Habitats at Appropriate Elevations

Requires habitat restoration to be consistent with Delta Plan Appendix 3, which describes the many ecosystem benefits related to restoring floodplains and provides guidance on the types of appropriate habitats given a restoration project site's location and elevation. The elevation map included in the Delta Plan as Figure 4-6 and Appendix 4 should be used as a guide for determining appropriate habitat restoration actions based on an area's elevation.

Ecosystem Restoration Policy 3 (ER P3): Protect Opportunities to Restore Habitat Delta

Plan States that within priority habitat restoration areas depicted in Appendix 5 of the Delta Plan, significant adverse impacts to the opportunity to restore habitat at appropriate locations must be avoided or mitigated.

Ecosystem Restoration Policy 5 (ER P5): Avoid Introductions of and Habitat Improvements for Invasive Nonnative Species

Calls for avoiding introduction of and habitat improvements for invasive, non-native species or for mitigating these potential impacts in a manner that appropriately protects the ecosystem.

d. Local Regulations

The following have been considered in the analysis of potential impacts and identification of mitigation, as appropriate:

i. Solano County General Plan

The Solano County General Plan contains the following goals and policies on biological resources:

RS.G-2: Ensure continued presence and viability of the county's various natural resources.

RS.G-3: Repair environmental degradation that has occurred, and seek an optimum balance between the economic and social benefits of the county's natural resources.

RS.G-4: Preserve, conserve, and enhance valuable open space lands that provide wildlife habitat; conserve natural and visual resources; convey cultural identity; and improve public safety.

RS.P-1: Protect and enhance the county's natural habitats and diverse plant and animal communities, particularly occurrences of special-status species, wetlands, sensitive natural communities, and habitat connections.

RS.P-2 – Manage the habitat found in natural areas and ensure its ecological health and ability to sustain diverse flora and fauna.

RS.P-4: Together with property owners and federal and state agencies, identify feasible and economically viable methods of protecting and enhancing natural habitats and biological resources.

RS.P-5: Protect and enhance wildlife movement corridors to ensure the health and long-term survival of local animal and plant populations. Preserve continuous habitat areas to increase habitat value and to lower land management costs.

RS.P-6 Protect oak woodlands and heritage trees and encourage the planting of native tree species in new developments and along road rights-of-way

RS.I-1 – Establish a resource mitigation overlay district within the Zoning Ordinance to site and permit mitigation banks. The ordinance should include incentives to focus mitigation banks within the Resource Conservation Overlay areas.

RS.I-2: Use the Resource Conservation Overlay on the Land Use Diagram to identify areas of the county with high-priority needs for biological resource management. Areas covered by the Resource Conservation Overlay are intended to provide options to establish mitigation banks for biological impacts generated outside the overlay district. The Resource Conservation overlay contains the following resources:

- California red-legged frog critical habitat and core recovery areas
- Callippe butterfly priority conservation areas
- Giant garter snake priority conservation areas
- Priority habitat corridors
- Vernal pool conservation areas
- Suisun Marsh Protection Plan primary management zone

RS.I-3: Develop and protect an ordinance to protect oak woodlands as defined in Senate Bill (SB) 1334 and heritage oak trees. Define heritage trees as the following: (a) trees with at trunk diameter of 15 inches or more measured at 54 inches above natural grade, (b) any oak tree native to California, with a diameter of 10 inches above natural grade, or (c) any tree or group of trees specifically designated by the County for protection because of its historical significance, special character or community benefit. As regards heritage oak trees, this ordinance should include:

- rules regarding the removal, pruning, or disturbance of the critical root zone of a heritage tree;
- replacement ratio for healthy tree removal; and
- enforcement mechanisms for unlawful removal of trees;

As regards oak woodlands, the ordinance should include:

- lists of targeted tree species and age classes;

- guidance to minimize the fragmentation of oak woodlands and provide linkages and corridors between stands; and
- requirements for the preparation of oak woodland management plans, which will be required for all development, agricultural uses (including grazing), and timber/fire wood collection within the county's oak woodlands.

RS.I-6: Require all discretionary development proposals (with the exception of agricultural uses) within the Resource Conservation Overlay to submit an assessment that evaluates site conditions and potential Proposed Project-related impacts on the targeted resource(s) of concern. The site assessment shall be prepared by a qualified professional approved by Solano County. The assessment shall be paid for by the applicant. The assessment will be used to (1) determine if the Proposed Project will create negative impacts on the viability of the targeted resource and (2) determine the appropriate measures to avoid or mitigate such impacts.

RS.I-11: Together with landowners, land trusts, and agencies, explore habitat preservation alternatives, such as:

- Voluntary acquisition of development rights or conservation easements;
- Developing mitigation banks, especially within Resource Conservation Overlay areas;
- Providing outreach to landowners within the Resource Conservation overlay regarding benefits of conservation easements;
- Promoting agricultural practices compatible with habitat protection;
- Allowing income-generating uses on agricultural lands that can support farmers who protect habitat lands; and
- Promoting eco-tourism to generate revenues to support habitat protection and keep agriculture viable

RS.P-7: Preserve and enhance the diversity of habitats in marshes, delta to maintain these unique wildlife resources.

RS.P-8 Protect marsh waterways, managed wetlands, tidal marshes, seasonal marshes, and lowland and grasslands because they are critical habitats for marsh-related wildlife and are essential to the integrity of the marshes.

RS.P-9 Encourage restoration of historic marshes to wetland status, either as tidal marshes or managed wetlands. When managed wetlands are no longer used for waterfowl hunting, restore them as tidal marshes.

RS.P-20 – The goals, policies, and provisions of the Land Use and Resource Management Plan for the Primary Zone of the Delta are incorporated by reference. Ensure that all public and private management and development activities within the Primary Zone of the Delta are consistent with the goals, policies, and provisions of the Land Use and Resource Management Plan for the Primary Zone of the Delta as adopted and as may be amended by the Delta Protection Commission.

RS.P-22 – Preserve and protect the natural resources of the Delta including soils and riparian habitat. Lands managed primarily for wildlife habitat should be managed to provide inter-related habitats.

RS.I-39 – Restrict construction and drilling in tidal marsh and managed wetland areas to occur only during the dry months of the years to ensure these activities will not disturb wintering waterfowl.

4. ENVIRONMENTAL IMPACTS

a. Thresholds of Significance

In accordance with CEQA Guidelines Appendix G, the Proposed Project would have a significant environmental impact if it would:

- Have a substantial adverse effect, either directly or through habitat modification, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations by the California Department of Fish and Game or U.S. Fish and Wildlife Service;
- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in the local or regional plans, policies, regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service;
- Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means;
- Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;
- Conflict with any local policies or ordinances protecting biological resources, such as tree preservation policy or ordinance; or
- Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

b. Methods

The presence of sensitive natural communities, wetlands, and special-status plant, fish, and wildlife species was assessed through database searches, literature reviews, and on-site surveys. The findings of these studies are presented above, and further detail on findings and methodology can be found in the Proposed Project's BRA. Upon establishing the presence of biological resources, the Proposed Project was assessed for potential to affect these resources in the short- and long-term through construction activity and alteration of on-site conditions, respectively. Whether effects on biological resources are considered substantial was determined based on the best available science, regulatory and administrative precedent, and best professional judgement of biologists familiar with the resources in question, as described below.

c. Proposed Project Impacts and Mitigation Measures

i. Substantial Adverse Effect on Riparian Habitat or Other Sensitive Natural Communities

Loss of Riparian Habitat

Levee maintenance and agricultural practices limit the area of the Proposed Project Site with existing riparian habitat. This biological community occurs on an island along Cache Slough and scattered along the higher-elevation margins of channels and outboard levees within the Proposed Project Site, including along the non-tidal waters of Lookout Slough that bisect the Proposed Project Site.

The Proposed Project would result in impacts to approximately 24.8 acres of sensitive Great Valley mixed riparian forest through grading, levee breaching, and conversion to tidal marsh. These habitats may be subject to regulations administered by the California Department of Fish and Game and RWQCB. Impacts would involve the removal of vegetation, and the filling of interior non-tidal sloughs to establish appropriate tidal marsh elevations, as well as the excavation of new tidal sloughs to restore regular tidal flooding and re-connect wetlands to the Cache Slough Complex. These impacts would represent a temporary loss of this biological community during and immediately following the construction period, as planted riparian habitat matures. Implementation of Mitigation Measure BIO-1, which requires a minimum 1.1:1 replacement ratio for riparian vegetation removal, would result in an approximate 10% increase in riparian acreage. This would assure no net loss of Great Valley mixed riparian and mitigate for its short-term loss. Therefore, with the implementation of Mitigation Measure BIO-1, impacts of the Proposed Project would not exceed the applicable threshold of significance related to a substantial adverse effect on any riparian habitat or other sensitive natural community and the Proposed Project's impact with regard to this threshold would be ***less than significant with mitigation incorporated***.

Mitigation Measure BIO-1. Re-Plant Riparian Vegetation at a 1.1:1 Ratio

To compensate for Proposed Project impacts to riparian habitat the Proposed Project shall:

- 1) Avoid a long-term net loss of riparian habitat, and
- 2) Mitigate for direct impacts to riparian at a 1.1:1 ratio.

ii. Substantial Adverse Effects on State or Federally Protected Wetlands

The Proposed Project would restore historic tidal floodplain hydrology by excavation of channels and levee breaches and removal of existing water control structures. These activities would result in permanent impacts to state and federal waters through conversion to wetland and non-wetland water types and a limited amount of conversion to upland. Most existing wetlands and non-wetland waters within the perimeter levees of the Proposed Project Site would be rehabilitated by the restoration of unrestricted tidal and floodplain hydrology. The relocation of an existing flood control levee and transmission line access roads would result in permanent conversion of federal and state wetlands and non-wetland waters to uplands.

Overall, the Proposed Project would result in a net increase in state and federal waters through a combination of establishment, re-establishment, rehabilitation, and enhancement of wetlands and non-wetland waters. The Proposed Project would restore contiguous subtidal, emergent tidal wetland, and open water habitat suitable for native tidal marsh plant and wildlife species, not limited to Delta Smelt, salmonids, and Green Sturgeon.

Within the Proposed Project Site, existing jurisdictional wetlands and non-wetland waters encompass approximately 1,700 and 340 acres, respectively. Most of these aquatic feature types would be rehabilitated into subtidal open water and intertidal mudflats and emergent marsh. Additionally, existing non-native grassland and irrigated pasture upland areas would be converted into tidal and floodplain habitats. Upon completion of the Proposed Project, there would be approximately 3,170 acres of intertidal, and subtidal marsh present within the site. There would therefore be a net gain in protected wetlands.

The Proposed Project would provide natural tidal inundation and create a mosaic of tidal marsh habitats relative to existing conditions, and result in an overall increase in Waters of the U.S and Waters of the State. Therefore, impacts of the Proposed Project would not exceed the applicable threshold of significance related to a substantial adverse effect on state or federally protected wetlands and the Proposed Project's impacts with regard to this threshold would be ***less than significant***.

iii. Direct Substantial Adverse Effects on Special-Status Plant Species

Four special-status plant species have potential to be directly impacted by Proposed Project activities. Parry's rough tarplant, woolly rose-mallow, Mason's lilaepsis, and Suisun Marsh aster were present within the Proposed Project Site.

Approximately 348 individuals of Parry's rough tarplant were observed in the Proposed Project Site: 334 on and adjacent to levee roads on the Bowsbey Property where levee roads transition to irrigated pasture habitat, 10 outboard of the Vogel Levee, and four along the northeastern portion of Liberty Island Road on the Shag Slough Levee. Construction activities would potentially impact all individuals through conversion of uplands to emergent tidal marsh habitat, or through proposed work on the Shag Slough Levee, except those that occur on the Vogel Property.

Approximately 80 individuals of woolly rose-mallow were observed along the eastern bank of Sycamore Slough in the southwestern portion of Bowsbey Ranch. These individuals would be impacted during dewatering, clearing, and grading activities.

Approximately 216 individuals of Suisun Marsh aster were observed on the outboard side of the Shag Slough Levee and 39 of these individuals would be impacted during clearing and grading activities where the Shag Slough Levee breaches would occur.

Approximately 12 colonies of Mason's lilaepsis were observed on the outboard side of levees within the tidal zone of the Vogel Property. There is no construction that would occur outboard of Vogel Levee where these individuals were observed, and the levee breaches have been located to avoid impacts to Mason's lilaepsis.

Per the above discussion, dewatering, clearing, and/or grading activities would result in direct impacts to Parry's rough tarplant, woolly rose-mallow, and Suisun marsh aster and occupied habitat and would avoid impacts to Mason's lilaepsis. The Proposed Project would re-establish emergent tidal marsh habitat with microhabitats suitable for future Suisun Marsh aster, woolly rose-mallow, and Mason's lilaepsis establishment and growth and non-tidal waters of Duck Slough would provide additional suitable habitat for woolly rose mallow. Upland habitat along the proposed PG&E access roads and Duck Slough Setback Levee would provide habitat for Parry's rough tarplant.

Nonetheless, direct loss of special-status plants from grading activities, or loss of plant habitat, would be considered a potentially significant effect. Mitigation Measure BIO-2 requires EIP to collect seeds and propagules from the potentially affected special-status plant species and to establish planting areas that would result in a replacement of the presently occupied acreage at a comparable plant density to pre-project conditions. This would assure that affected species are re-established at a quantity comparable to baseline conditions and ensure any potential impacts are less than significant. Indirect impacts to special-status plant species through invasive species establishment are discussed below and were reduced to less-than-significant levels with implementation of invasive species control measures during construction. Therefore, with the implementation of Mitigation Measure BIO-2, direct impacts of the Proposed Project would not exceed the applicable threshold of significance related to special-status plant species and the Proposed Project's direct impact with regard to this threshold would be ***less than significant with mitigation incorporated.***

Mitigation Measure BIO-2. Special-Status Plant Avoidance, Preservation, and Re-Planting

A Restoration Plan shall be prepared that includes the following elements to avoid and mitigate for potential impacts to Mason's lilaepsis, woolly rose mallow, Suisun Marsh aster, and Parry's rough tarplant. The Plan shall be prepared and provided to DWR prior to the start of construction and may be included as part of the Proposed Project's Adaptive Management and Monitoring Plan or Long-Term Management Plan.

- 1) Within one year prior to the start of construction, a qualified botanist shall re-survey all areas to be disturbed as part of Proposed Project activities. Special-status plant species identified shall be flagged and the location re-mapped if locations have changed.
- 2) To the maximum extent feasible, impacts to new locations of the other special-status plant species mapped during pre-construction surveys shall be avoided, and habitat that supports these special-status plant species shall be preserved.
- 3) Seed, propagules, and/or rhizomes of impacted special-status plant species shall be collected, as appropriate, under the direction of the qualified botanist from at

least 50 percent of plants impacted. Harvested plant seeds shall be stored in a manner suited to the species, as outlined by seed propagation experts¹⁷.

- 4) Seeds and propagules shall be planted into suitable habitat after restoration activities are complete. Planting areas shall be adequate to ensure a minimum of 1:1 replacement of occupied habitat for each of the impacted special-status species. Planted habitat shall be maintained and adaptively managed for three years to ensure successful species establishment.
- 5) Performance shall be monitored to evaluate success of replacement of special-status species habitat. Target replacement shall be at a minimum 1:1 ratio of impacted to established habitat acreage for each of the directly impacted special-status plant species. Success would be considered achieved when an equal area of habitat is occupied at a plant density similar to pre-project conditions. Monitoring shall be conducted for a minimum of three growing seasons following initial planting or until performance has been achieved.

If individuals of Mason's lilaeopsis are newly detected during pre-construction surveys in areas to be impacted by Proposed Project activities and complete avoidance is not feasible, EIP shall consult with CDFW prior to the start of construction to obtain authorization for project implementation and develop an appropriate type and amount of compensatory mitigation. Mitigation shall be provided at a minimum 1:1 ratio of impacted individuals to replanted; final mitigation ratios and other specific compensatory requirements shall be determined through consultation with CDFW.

iv. Substantial Adverse Effects on Special-Status Species through Habitat Modification

A total of four special-status plant and 25 special-status animal species are present, or have moderate to high potential to occur within the Proposed Project Site. The Proposed Project Site is also located in or adjacent to EFH for Pacific Groundfish and Pacific Salmonids.

The Proposed Project would generally have long-term, positive impacts on special-status species by restoring native tidal and subtidal marsh habitat as well as associated upland habitat. This would provide suitable habitat for several special-status plant and wildlife species. However, construction activities have the potential to temporarily make the Proposed Project Site less suitable for special-status species through noise, dust, accidental spills, and other nuisance conditions. Mitigation Measure BIO-3 provides construction measures that would reduce adverse environmental effects through habitat protection and avoidance, water quality protection and erosion control, and general Best Management Practices (BMPs). These measures would minimize the risk of direct injury and indirect adverse habitat modification for special-status species during construction. Therefore, with the implementation of Mitigation Measure BIO-3 and other species specific mitigation measures discussed individually below, impacts of the Proposed

¹⁷ Emery, D.E., 1988. *Seed propagation of native California plants. Santa Barbara Botanic Garden Seed Propagation of native California Plants.*

Project would not exceed the applicable threshold significance related to substantial adverse effects on special-status species through habitat modification and the Proposed Project's impact with regard to this threshold would be ***less than significant with mitigation incorporated***. Species-specific measures are discussed individually below.

Mitigation Measure BIO-3. Habitat Protection and Avoidance

General Habitat Protection and Avoidance

A project-specific Worker Environmental Awareness Program (WEAP) for construction personnel shall be conducted by a qualified biologist approved by USFWS and CDFW before commencement of construction activities and as appropriate when new personnel begin work on the Proposed Project. The program shall inform all construction personnel about the life history and status of all special-status wildlife species with potential to occur on-site; the need to avoid damage to suitable habitat and species harm, injury, or mortality; measures to avoid and minimize impacts on species and associated habitats; the conditions of relevant regulatory permits, and the possible penalties for not complying with these requirements. The training could consist of a recorded presentation to be reused for new personnel throughout the duration of construction. The WEAP training shall also generally include:

- 1) Applicable State and federal laws, environmental regulations, Proposed Project permit conditions, and penalties for non-compliance. A physical description of special-status plant and wildlife species with potential to occur on or in the vicinity of the Proposed Project Site, avoidance and minimization measures, and protocol for encountering such species including communication chain;
- 2) BMPs for erosion control and their location on the Proposed Project Site.
- 3) Contractors shall be required to sign documentation stating that they have read, agree to, and understand the required avoidance measures.
- 4) Field identification of any Proposed Project Site boundaries, egress points and routes to be used for work. Work shall not be conducted outside of the Proposed Project Site.
- 5) Wildlife exclusion fencing shall be installed in several locations throughout the Proposed Project Site. Fencing shall be strategically placed to prevent wildlife from entering staged equipment or active construction areas adjacent to potential habitats. Those areas where wildlife exclusion fencing must be placed include the perimeter of any designated staging areas and along Duck Slough.
- 6) Any vehicles or equipment left overnight inside of fenced areas shall be inspected for wildlife prior to moving by trained construction personnel. Equipment left outside of staging areas, in unfenced areas shall be inspected for wildlife prior to moving. Operators and construction personnel may conduct fence and vehicle inspections if they have received training on how to conduct the inspections by the qualified biologist. Fencing shall be checked on a regular basis (e.g. daily) by a biologist or trained construction personnel to assure it is fully functional.
- 7) Escape routes or coverings shall be provided at any temporary open excavations with steep-sided walls or open pipes that have potential to entrap wildlife. For

excavations determined to be sufficiently steep that wildlife may become stranded, an escape ramp shall be installed, or an adjustment to the slope of the wall to be less steep shall be made in a location to allow escape, or the feature shall be completely covered to prevent entrapment of wildlife. If questions occur about excavations, a qualified biologist shall be available to determine if a ramp is necessary and advise on potential solutions for ramp design to allow animal escape.

- 8) Escape ramps do not apply to the cutoff wall excavation due to the combination of fencing, and bare ground which would be sufficient to deter wildlife from the vicinity.
- 9) Plastic, monofilament, jute netting, or similar temporary erosion control matting that could entangle snakes shall not be placed on the site. Possible substitutes include coconut coir or matting, burlap wrapped straw wattles, tackified hydroseeding compounds, or other materials.
- 10) To eliminate attraction of predators of special-status wildlife species, all food-related trash items, such as wrappers, cans, bottles, and food scraps, shall be disposed of in closed containers and hauled off-site on a regular basis.

Invasive Species

Proposed Project activities, including clearing, grading, and creation of additional aquatic habitat, could facilitate the introduction and establishment of invasive species, including submersed aquatic vegetation and emergent vegetation that could degrade the value of habitat for native special-status plants and wildlife. Mitigation Measure BIO-4 would require establishing weed control protocols prior to construction, thereby minimizing the potential for habitat degradation due to invasive species establishment and reducing this impact to a less-than-significant level. Therefore, with the implementation of Mitigation Measure BIO-4, impacts of the Proposed Project would not exceed the applicable threshold of significance related to the impact of invasive species on special-status species and the Proposed Project's impact with regard to this threshold would therefore be ***less than significant with mitigation incorporated***.

Mitigation Measure BIO-4. Invasive Species Abatement

Prior to the start of construction activities, protocols shall be developed for targeted invasive weed abatement, which shall include at a minimum, the following:

- 1) Identify target weeds that are rated High or Moderate for negative ecological impact in the California Invasive Plant Database (Cal-IPC) within the Proposed Project Site that have potential to spread off-site and/or sustain on-site following the Proposed Project's restoration actions.
- 2) Where determined necessary, target weed infestations shall be treated according to control methods and practices considered appropriate for those species.
- 3) Weed control treatments shall include all legally permitted herbicide, manual, and mechanical methods. The application of herbicides shall be in compliance with all state and federal laws and regulations under the prescription of a Pest Control Advisor and implemented by a Licensed Qualified Applicator.

- 4) The timing of weed control treatment shall be determined for each target plant species with the goal of controlling populations.
- v. *Substantial Adverse Effects on Special-Status Wildlife Species, either Directly or through Habitat Modification.*

Nesting Birds

The Proposed Project has the potential to impact native nesting birds, including the special-status bird species discussed above and other non-special-status birds protected by the MBTA and California Fish and Game Code. If special-status species have specific surveys or protocols, they are discussed in a species-specific context below. This discussion pertains to those which do not require specific survey protocols (e.g. yellow warbler or black crowned night heron) as well as non-status species (e.g. native blackbirds, hawks, etc.).

Over half of the Proposed Project Site is comprised of annual grasslands, irrigated pasture, and riparian forest, which can serve as nesting habitat for both special-status and non-special-status nesting birds. Approximately 1,850 acres of grassland/pasture and 25 acres of riparian forest would be directly impacted by Proposed Project activities. Riparian vegetation would be replanted; however, pasture would be converted to wetland and aquatic habitat. Although the Proposed Project would result in a change in habitat acreages, upland, riparian, and wetland habitats would still be present and support nesting and foraging habitat following restoration.

Following restoration, re-vegetation of riparian areas would offset losses of riparian areas converted into tidal marsh, though it would take several years for vegetation to reach maturity. Mitigation for temporary loss of mature riparian vegetation is provided below under discussion of sensitive biological communities. Emergent marsh and subtidal and intertidal areas would provide foraging habitat for a variety of birds that occur regionally within and adjacent to the Proposed Project Site. Creation of foraging habitat in close proximity to the replanted riparian areas would increase the overall utility of these nesting areas for various bird species. Overall, the improvement in habitat condition through natural tidal inundation and creation of a mosaic of tidal and marsh habitats would be beneficial to foraging habitat for nesting birds.

Although the Proposed Project would have long-term benefits for some bird species, adverse impacts to nesting birds are possible. Short-term impacts could occur during site preparation or construction activities including vegetation removal, grading, channel creation, or other construction activities that require the use of heavy machinery. These activities could cause direct removal or destruction of active nests, or indirectly cause nest abandonment through audible, vibratory, and/or visual disturbances. Mitigation Measure BIO-5A would require the use of pre-construction surveys, disturbance buffers, and other measures which would facilitate the avoidance of impacts to nesting birds during construction. Therefore, with the implementation of Mitigation Measure BIO-5 and other mitigation measures discussed in this section, impacts of the Proposed Project would not exceed the applicable threshold of significance related to a substantial adverse effect on special-status wildlife species and the Proposed Project's impact with regard to this threshold would be ***less than significant with mitigation incorporated.***

Mitigation Measure BIO-5A. Nesting Birds

The following measures shall be implemented prior to construction to avoid or minimize impacts to nesting birds:

- 1) Implement Mitigation Measure BIO-3: Habitat Protection and Avoidance,
- 2) To the extent feasible, vegetation removal and initial ground disturbance shall occur from September 1 through January 31 so that initial ground disturbing work occurs outside of the general nesting bird season.
- 3) For vegetation removal and ground disturbance within the Proposed Project footprint that is conducted within the general nesting bird season (February 1 through August 31), pre-construction nesting bird surveys shall be conducted within an appropriate radius of vegetation removal or ground disturbance within 14 days of the initiation of these activities to avoid disturbance to active nests, eggs, and/or young.
- 4) All active nests of native birds found during the survey shall be protected by a no-disturbance buffer until all young from each nest fledge or the nest otherwise becomes inactive. The size of each buffer shall be determined by a qualified biologist dependent upon extant conditions and may require consultation with the CDFW. Buffers are typically a minimum of 50 feet for non-special-status birds and may be larger for special-status or raptor species.

Swainson's Hawk Nesting and Foraging Habitat

The Proposed Project Site and its surroundings contain suitable nesting and foraging habitat for Swainson's hawk. Swainson's hawk pairs return to the same area to nest territory annually but may use different nest trees between years. A nest occurrence is assumed active if documented within the previous five years. In 2018, two active Swainson's hawk nests were detected in the Proposed Project Site, and an additional two active Swainson's hawk nests were observed within approximately 500 feet of the Proposed Project Site. One of the nests within the Proposed Project Site is assumed to be the same territory as one of the detected nearby off-site nest occurrences (#1148)¹⁸, and one adjacent nest in Hass Slough is assumed to be the same as off-site occurrence #2741. The 2018 survey confirmed both occurrences are still active. No other documented occurrences are within 0.25 mile of the Proposed Project Site.

Tree removal would occur in the non-nesting season for Swainson's hawk (September 1 – February 28), and no direct adverse impacts to nesting Swainson's hawk individuals would occur. Based on 2018 nest surveys, no currently occupied nest trees are anticipated to be removed.

¹⁸ CDFW. 2018. *California Natural Diversity Database. California Department of Fish and Wildlife. Biogeographic Data Branch, Vegetation Classification and Mapping Program, Sacramento, CA. Accessed: August 2018.*

Because Swainson's hawk may use different trees within the same territory, removal of an Active Nest Tree (nesting documented in the tree within the previous 5 years) is considered a potentially significant impact. Moreover, Mitigation Measure BIO-5B requires replanting at a 3:1 ratio if any Active Nest Trees are removed, which would increase the long-term availability of on-site Swainson's hawk nesting habitat and reduce impacts related to loss of Swainson's hawk nesting habitat to less-than-significant levels. This requirement is in addition to the riparian planting proposed as part of the project, which would also increase the availability of riparian habitat for nesting Swainson's hawk.

In addition to the potential for direct impacts discussed above, indirect impacts to Swainson's hawk nesting habitat are possible during construction. Construction-related stimuli such as noise, visual disturbance, and dust have the potential to make habitat less suitable and trigger nest abandonment. Nest abandonment as a result of Proposed Project activities (which could include adults being driven from the nest due to Proposed Project disturbances), would constitute take under CESA and would be considered a significant impact. Surveys and appropriate avoidable buffers are required per Mitigation Measure BIO-5B to confirm nest locations. Typically, a 0.25-mile avoidance buffer around Swainson's hawk nests is sufficient to protect against nest abandonment when the species is exposed to stimuli such as construction-related noise, visual disturbance, and dust.

In addition to potential impacts to nesting habitat, the Proposed Project would result in conversion of approximately 1,850 acres of Swainson's hawk foraging habitat consisting of irrigated pasture and non-native grassland to tidal and subtidal marsh. Swainson's hawk forage on a variety of species; however, in the breeding season voles and pocket gophers are a high percentage of their diets. Foraging habitat for Swainson's hawk is limited to those areas with both high prey production and high prey availability. Currently, irrigated pasture and non-native grassland within the Proposed Project Site are suitable foraging habitat for Swainson's hawk, while Coastal and Valley freshwater marsh are not. Although marsh habitat is not considered to be typical foraging habitat for Swainson's hawk, the species is known to hunt for both vertebrate and invertebrate prey in marshes and is therefore likely to use edge habitats consisting of uplands and higher marsh for foraging¹⁹ under existing conditions and following restoration. Additionally, following restoration, Swainson's hawk are anticipated to forage on the Shag Slough Levee, the PG&E access roads, and in the non-native grassland areas adjacent to Duck Slough.

While the Proposed Project would reduce the amount and quality of available foraging habitat for Swainson's hawk, some foraging opportunities would remain following restoration. Loss of foraging habitat for Swainson's hawk is a potentially significant impact but would be reduced to a less-than-significant level through implementation of Mitigation Measure BIO-5B, which requires establishment of an off-site preserve with suitable foraging habitat for Swainson's hawk. An off-site conservation easement would therefore be purchased on lands of high-quality forage for Swainson's hawk pursuant to Mitigation Measure BIO-5B. A minimum of 1,000 acres would be

¹⁹ Bechard, M. J., C. S. Houston, J. H. Saransola, and A. S. England (2010). Swainson's Hawk (*Buteo swainsoni*), version 2.0. In *The Birds of North America* (A. F. Poole, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. <https://doi.org/10.2173/bna.265>

placed under easement on lands of equal or greater foraging value for Swainson's hawk than irrigated pasture (e.g., grassland, alfalfa, tomato, or beets). Although this constitutes a lesser acreage than the acreage to be impacted, forage would be of equal or higher quality than irrigated pasture and non-native grassland. This would assure the permanent presence of high-quality Swainson's hawk foraging habitat in the vicinity of the Proposed Project Site. Therefore, with the implementation of Mitigation Measure BIO-5B and other mitigation measures discussed in this section, impacts of the Proposed Project would not exceed the applicable threshold of significance related to a substantial adverse effect on the special-status species, Swainson's hawk, and the Proposed Project's impact with regard to this threshold **would be less than significant with mitigation incorporated.**

Mitigation Measure BIO-5B. Swainson's Hawk Nesting and Foraging Habitat

Due to the potential for adverse impacts to Swainson's hawk, consultation and permitting with CDFW may be required if reduced buffers during the nesting season are necessary for construction activities. If permitting for potential take of Swainson's hawk is determined to be necessary, EIP shall consult with CDFW and implement all avoidance and minimization measures as required in the Proposed Project Incidental Take Permit and Lake and Streambed Alteration Agreements. In addition, the following measures shall be implemented prior to and during construction to avoid or minimize impacts to Swainson's hawk:

- 1) In each year that Proposed Project activities occur during Swainson's hawk nesting season, two surveys shall be conducted within each of nest season Phases II and III²⁰ as described below:
 - a) In the first year of construction:
 - i) If work has been initiated prior to March 20 (prior to the nesting season for Swainson's hawk), two surveys each shall be conducted within Phases II (March 20-April 5) and Phase III of the nesting season (April 5 - May 20) to determine if nests have established during Proposed Project activities.
 - ii) If work begins between March 20 and April 5 (Phase II) at least one of the two surveys within Phase II shall be conducted prior to the start of ground disturbing activities. Two surveys shall also be conducted between April 5 – April 20 (Phase III).
 - iii) If work begins in Phase III, two surveys shall be conducted in Phase II and at least one survey in Phase III shall be conducted prior to start of ground disturbing activities.
 - b) In the second year of construction, two surveys shall be conducted within each of the Phases II and III windows identified above.
 - c) Surveys shall be conducted within 0.25-mile of planned work areas during the nesting season.

²⁰ California Department of Fish and Game, Swainson's Hawk Technical Advisory Committee, "Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley" (Sacramento, May 31, 2000), <https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=83990&inline>.

- i) If a nest is determined to be active and ground disturbance has not yet been initiated, a 0.25-mile (1,320-foot) buffer shall be established. If ground disturbance has been initiated and a Swainson's hawk establishes a nest after construction has been initiated, a 500-foot buffer shall be established around the nest tree.
 - d) Following surveys, monthly checks shall be conducted in May, June, and July to provide status updates on any active nests. If a nest is determined to have become inactive, the nest buffer would be removed.
 - e) If a smaller buffer is sought, CDFW shall be consulted and the methods described below (Item 2) shall be instituted in addition to any measures requested by CDFW in approving the reduced buffer.
 - 2) Reduced buffer: If construction will occur within 0.25-mile of an active Swainson's hawk nest site (and the nest was established prior to initial construction in the area) or within 500 feet of an active Swainson's hawk nest established during construction, the following additional measures shall be implemented:
 - a) Staging areas for equipment, materials, and work personnel shall be located 0.25-mile away from active Swainson's hawk nest sites. These areas shall be flagged and identified to all work personnel during employee orientation.
 - b) For nests established during construction, if construction needs to occur within 500 feet of an active Swainson's hawk nest, no construction shall occur prior to 8:00 AM, and shall be discontinued by 5:00 PM each day.
 - c) If work needs to occur temporarily within any buffer, a qualified biologist shall monitor active nests daily for signs of disturbance for the duration of the construction activity. If it is determined that Proposed Project-related activities are resulting in nest disturbance, then work in those sensitive areas shall cease immediately and the 0.25-mile buffer or 500-foot buffer (for nests in ongoing work areas) shall be re-established. CDFW shall then be contacted for further guidance.
 - 3) Potential Swainson's hawk nest trees shall be removed during the non-nesting season. If potential Swainson's hawk nest trees must be removed during the nesting season, no potential nest trees shall be removed until surveys are completed and trees are determined to not have active Swainson's hawk nests.
 - 4) While trees with active nests would not be removed, Active Nest Trees (trees that have had active nests within the last 5 years) may need to be removed if Swainson's hawk nest within the Proposed Project Site prior to construction. Active Nest Trees are determined from pre-construction surveys and the most recent surveys in 2018, which also captured all documented occurrences within 500 feet. In the event an Active Nest Tree cannot be avoided, EIP shall plant three trees for every Active Nest Tree removed.
 - 5) The loss of approximately 1,850 acres of foraging habitat shall be mitigated through establishment of an off-site easement and/or purchase of credits at a CDFW-approved mitigation bank. The mitigation shall permanently conserve a minimum of approximately 1,000 acres of Swainson's hawk foraging habitat of

equal or greater forage quality than irrigated pasture (a 0.54:1 mitigation ratio). This may include perennial grassland, tomatoes, alfalfa, beets, dryland pasture, or irrigated pasture.

Tricolored Blackbird Nesting and Foraging

The Proposed Project has the potential to impact tricolored blackbird during the nesting season (February 1 to August 31). Short-term impacts could occur during site preparation or construction activities including vegetation removal, grading, or other construction activities that require the use of heavy machinery. These activities could cause direct removal or destruction of active nests, or indirectly cause nest abandonment through audible, vibratory, and/or visual disturbances. In addition, construction could remove suitable foraging habitat in proximity to a colony, decreasing foraging efficiency and impacting food availability for young birds. This species prefers large stands of dense vegetation such as cereal crops, blackberry thickets, cattails or tule marsh for nesting. The only areas within the Proposed Project Site that are suitable for nesting are within the southern portions of the Liberty Farms Property, where lands have been managed for tule marsh and waterfowl production.

Following restoration, emergent marsh is expected to recolonize the Proposed Project Site. Though it would take several years for vegetation to reach maturity, marsh dominated by tule is likely to remain present throughout construction in the southern portions of the Liberty Farms Property, where a refuge would be established for giant garter snake, thus maintaining availability of suitable habitat for marsh nesting species. Additionally, vegetation in the rest of the restoration area would support a variety of emergent marsh habitats, including tules. Following the completion of the Proposed Project, restored marsh would likely provide suitable nesting and foraging habitat in areas that do not currently have potential to support tricolored blackbird nesting. However, Mitigation Measure BIO-5C would reduce impacts that could result from initial construction. Therefore, with the implementation of Mitigation Measure BIO-5C and other mitigation measures discussed in this section, impacts of the Proposed Project would not exceed the applicable threshold of significance related to a substantial adverse effect on the special-status species, tricolored blackbird, and the Proposed Project's impact with regard to this threshold would be ***less than significant with mitigation incorporated***.

Mitigation Measure BIO-5C. Tricolored Blackbird Nesting

The following measures shall be implemented prior to construction to avoid or minimize impacts to nesting tricolored blackbirds:

- 1) If construction is to commence during the nesting season (February 1 - August 31), two pre-construction surveys, the first no more than 14 days prior to, and the second within 48 hours of initial ground disturbance, shall be performed by a qualified biologist. If ground disturbance lapses for more than 14 days during the nesting season, the surveys shall be repeated before construction activities resume. Surveys shall include the extent of ground disturbance and the surrounding 250 feet.

- 2) If an active nesting colony is found within the survey area, the colony shall be avoided by a buffer of at least 250 feet. The buffer shall remain in place until a qualified biologist confirms the colony is no longer active and has dispersed.

Sandhill Crane Winter Roosting and Foraging Habitat

Both the greater and lesser sandhill crane are known to occur in the Central Valley near Sacramento as winter migrants.²¹ Both subspecies have been recorded in high numbers to the east and south of the Proposed Project Site, but only one observation has been documented in the Cache Slough Complex where the Proposed Project is located²². There are no known roost or flock sites for either subspecies of sandhill crane in the vicinity of the Proposed Project Site.

As winter migrants, individuals of both subspecies of cranes are not likely to be directly impacted by ground disturbing activities since birds are mature and can freely leave if disturbed by construction related noise, movement, or other activities. Prior to the start of the Proposed Project water would be systematically drained from the site to allow for restoration, and vegetation removal activities would be initiated prior to the arrival of sandhill cranes in winter. As a result, suitable roosting and foraging habitat will not be present and sandhill cranes would not be expected to utilize the Proposed Project Site. Given the rarity of observations for either species in the vicinity of the Proposed Project Site, coupled with the absence of flooded habitats to support either winter roosting or foraging during construction, the only potential impact anticipated would be to the reduction in availability of future winter foraging habitat. Currently nearby agricultural land include grazing pastures and flood irrigated fields, leaving no shortage in foraging habitat in the vicinity of the Proposed Project Site. The Proposed Project Site is comprised of two habitat types that may support foraging cranes: flood irrigated pasture (1,364 acres), and non-native grassland (487 acres). Coastal or Valley Freshwater Marsh currently comprises the southern portion of the Liberty Farms Property but is not suitable for crane foraging due to the tall tules and deep waters. The Proposed Project would restore much of the on-site habitat to shallow tidal marsh (2,739 acres), as well as uplands (194 acres), both of which would be available to cranes for winter foraging. Currently 1,851 acres of potential crane foraging habitat is available, but following restoration up to 2,933 acres of potential foraging habitat may be available, dependent upon daily tidal inundation and final vegetative growth.

Therefore, up to an additional 1,082 acres of potential crane foraging habitat would be available within the Proposed Project Site. The increase in potential crane foraging habitat would provide a permanent benefit to the species. In the short-term, construction-related habitat loss would be minimal related to the abundance of available habitat in the vicinity of the Proposed Project Site. The Proposed Project Site is not a known winter roost or flock foraging site, and none are known or documented in the vicinity. Winter roost sites are predominantly east of the Sacramento River, at least 5 miles east of the Proposed Project Site. Due to the minimal nature of temporary impacts and the long-term gain in suitable habitat, the Proposed Project would not exceed the applicable

²¹ Sullivan, B.L., C.L. Wood, M.J. Iliff, R.E. Bonney, D. Fink, and S. Kelling. 2019. eBird: a citizen-based bird observation network in the biological sciences. *Biological Conservation* 142: 2282-2292. [USDA] U.S. Department of Agriculture. 1977. *Soil Survey of Solano County, California*. 120 pp.

threshold of significance related to a substantial adverse effect on the special-status species, sandhill crane, and the Proposed Project's impact with regard to this threshold would be ***less than significant***.

Giant Garter Snake

The Proposed Project Site presently contains approximately 164 acres of aquatic and foraging habitat, 561 acres of summer upland and basking habitat, of which 127 acres provides winter brumation habitat for giant garter snake. Upon completion of the Proposed Project, there would be approximately 2,363 acres of aquatic or emergent foraging habitat, and approximately 228 acres of summer and upland basking habitat, of which 24 acres of managed winter brumation habitat, and 46 acres would be non-managed winter refugia habitat (Figure IV.D-3). Managed winter brumation habitat is located in areas which have vegetation maintenance to have minimal shrub or tree cover, and no control of burrowing mammals. Unmanaged winter refugia habitat are areas above the two year flood elevations which are anticipated to support burrowing mammals or other winter refugia for the species but would not be specifically managed for shrub cover. No rodent control is planned in the unmanaged winter refugia habitat.

Foraging Habitat. Temporary loss of suitable foraging habitat would result from conversion of agricultural ditches and non-tidal sloughs to tidal marsh habitat. Nearly all existing aquatic habitat features are linear features associated with agricultural and private duck club operations. Such features have limited value as cover as they have little natural vegetation or habitat complexity, which may result in increased predation success and mortality of giant garter snakes. Distribution and quality of habitat components seems to correlate positively with range size, with snakes moving more in habitats with fewer or disparate resources. Valcarcel (2011) found that giant garter snake home ranges in agricultural habitat was 80% smaller, had less variation than those in constructed wetlands, and had more overlap in habitat use.²² Temporarily affected aquatic habitat would be restored to a more naturally contoured, vegetated, and heterogeneous habitat with a mosaic of aquatic, emergent and upland habitats. This more natural mosaic would provide improved giant garter snake foraging habitat compared to pre-project conditions. The Proposed Project is not conducting activities in a majority of the southern end of the Proposed Project Site, and this is anticipated to limit temporary impacts to no more than 100 acres of foraging habitat. The construction of the Proposed Project would also be conducted in phases such that not all foraging habitat would be inaccessible for the entirety of the multi-year construction schedule. In addition, the southern end of the Proposed Project Site would be managed as a Temporary Relocation Area to support foraging and upland refugia for giant garter snake during Proposed Project activities.

²² Valcarcel, P. M. 2011. *Giant garter snake spatial ecology in agricultural and constructed wetlands*. Master of Science Thesis.

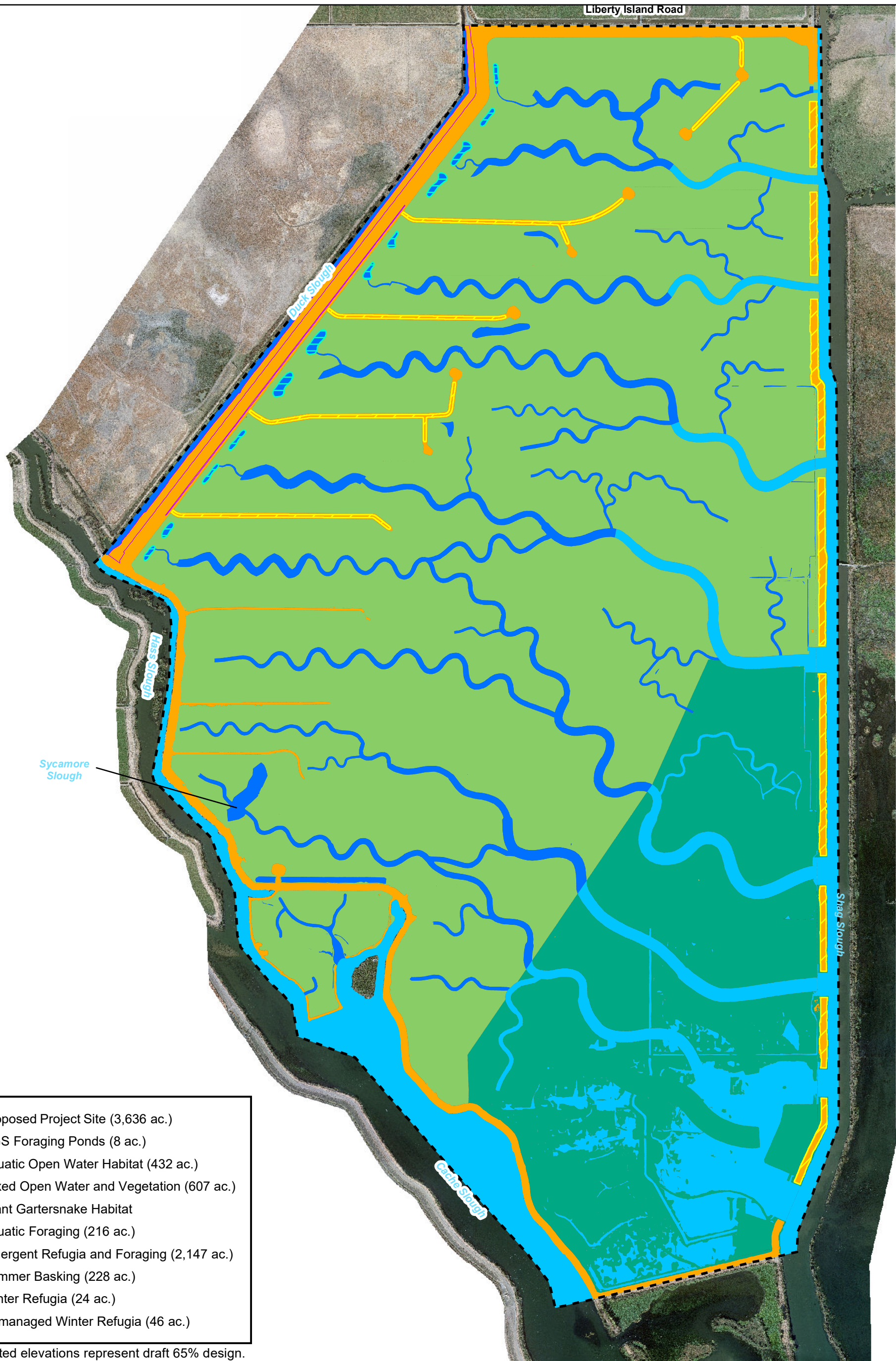
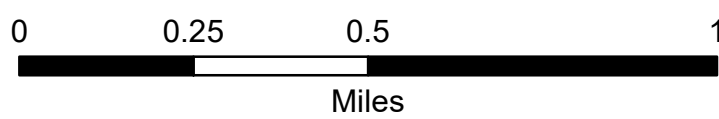


Figure IV.D-3. Design Concept for Giant Gartersnake Habitat

Lookout Slough Tidal Habitat Restoration and Flood Improvement Project



Prepared by:

Map Prepared Date: 12/2/2019
Map Prepared By: pkobylarz
Base Source: Wood Rogers
Base Date: 10/24/17
Data Source(s): WRA



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Approximately eight acres of foraging habitat specific for giant garter snake would be created by excavating a series of 12 open water tidal ponds, which would provide habitat for prey species of giant garter snake. Giant garter snakes are also likely to utilize other created ponds and channels for foraging within the Proposed Project Site. In total, there would be a net gain of approximately 2,200 acres of aquatic foraging habitat for giant garter snake, providing a long-term benefit for the species.

Summer Upland and Basking Habitat. Disturbance of up to approximately 561 acres of existing summer upland and basking habitat would occur during construction in areas which are currently irrigated pastures, annual grasslands, and berms adjacent to suitable aquatic habitat. Approximately 228 acres of terrestrial summer upland and basking habitat would be constructed throughout the Proposed Project Site. Temporarily affected upland habitat would be restored to a state superior to the existing condition through increased habitat complexity (e.g. topographic variability, vegetation structure), increased acreage of nearby foraging habitat, reduced disturbance (e.g. through the removal of regularly occurring land management practices associated with farming, and waterfowl management) and by the establishment of native vegetation over currently managed crops or other non-native plants.

As described in the previous paragraph, there will be a loss of terrestrial upland habitat, although the remaining habitat would be higher quality. However, summer upland habitat is not anticipated to be lost overall because giant garter snake use emergent wetland vegetation for basking as well as upland areas in the summer.

Following restoration, approximately 2,147 acres of emergent wetlands would be present throughout the Proposed Project Site. This may reflect historical habitat for giant garter snake in the region and would provide more habitat complexity than is currently present. These areas are heterogeneous in topography and vegetation structure and are anticipated to serve as both emergent foraging and basking habitat. Therefore, it is not anticipated that loss in basking habitat would be significant. The habitat complexity provided by the restored emergent marsh vegetation is also likely to increase thermal quality for giant garter snake and may improve cover as well as subsequent predator avoidance. With this increase in habitat quality and the potential for giant garter snake to use emergent marsh to bask as well as forage, impacts to basking habitat would be **less than significant**.

Winter Refugia/Brumation. Winter refugia habitat is limited to approximately 127 acres within the Proposed Project Site in its current state. As described in the summary of the species above, winter refugia requires underground habitats for snake brumation and these can include burrows, riprap, and cracks between soil and infrastructure. Levees may on occasion provide or support this habitat through cracks or gaps in riprap; however, typical maintenance regimes for levees reduce potential for this habitat by repairing cracks, managing ground squirrels, as well as eliminating their burrows. Therefore, levees were not considered winter brumation habitat and are not included in the 127 acres of existing winter refugia. The Proposed Project Site interior of the SPFC levees is currently protected from Yolo Bypass flooding in the winter; however, habitats which are periodically flooded (e.g. flood irrigated pasture or winter waterfowl management ponds) and subject to land management practices such as disking can have reduced small

mammal presence and distribution. Areas which are typically flooded for irrigation or winter waterfowl and areas which are disked were not included in winter/brumation habitat based on a presumed lack of burrows from reduced small mammal activity in these conditions or consistently flooded habitat which precludes use for brumation. A total 127 acres of the summer basking habitat was considered suitable to provide winter refugia for giant garter snake due to both elevations and lack of activities or conditions described above. These areas contain conditions suitable for small mammal activity and no destruction of burrows or other refugia available to giant garter snake.

Upon completion of the Proposed Project, of the approximately 228 acres of terrestrial summer upland habitat discussed above, approximately 70 acres would also provide winter refugia/brumation habitat— 24 acres of this would be maintained as grassland habitat with no burrowing mammal control and 46 acres would be unmanaged outboard of the Duck Slough Setback Levee in areas above the 2-year flood elevation. The approximately 24 acres of managed winter refugia/brumation habitat would be maintained along Duck Slough. Management activities would focus on vegetation maintenance to reduce shrub and tree growth in these areas and promote grassland habitat. No management of small mammal activity would occur in these areas, which is an improvement from existing conditions and would allow creation of burrow habitat.

Outboard of the proposed Duck Slough Setback Levee, approximately 46 acres of unmanaged habitat would provide suitable elevations for potential winter refugia/brumation habitat, located on PG&E access peninsulas and along the remnant portions of the Shag Slough Levee. Small mammals would not be controlled in the unmanaged winter refugia habitat, which would enable creation of burrows for winter refugia.

Similar to current conditions, Corps levees that will be maintained and controlled for small mammals are not included as potential winter refugia based on the presumed lack of burrows or management to remove burrows. Although winter brumation habitat would be reduced in quantity, it is not anticipated to be detrimental to giant garter snake brumation, as the quality of habitat would be improved. In some areas, the removal of maintenance activities along levees, or removal of road traffic along the Shag Slough Levee would increase habitat suitability and reduce the potential for disturbance or vehicle strikes which decrease amount and quality of upland habitat including brumation. Agricultural operations, canal dredging, and berm maintenance would end, as would removal of small mammals along various portions of wintering habitats. Cessation of these activities would contribute to improved habitat conditions for brumation.

The post-restoration reduction in winter refugia habitat is not anticipated to restrict giant garter snake winter survivorship in the Proposed Project Site based on the availability of upland habitat above 2-year flood elevation outboard of the SPFC levees in addition to the 24 acres inboard of the new Duck Slough Setback Levee. An extant population north of the Proposed Project Site is known within the Yolo Bypass, which occasionally floods in winter similar to the conditions anticipated within the Proposed Project Site post-restoration. The overall acreage of brumation habitat would decrease; however, the quality of the habitat is expected to increase and this species has been documented to share winter refugia (Britt 2016), although it is not known how

common this is in comparison to other garter snake species. Thus, the loss of winter refugia habitat is a **less than significant** impact.²³

Construction Impacts. A variety of vehicles and heavy equipment (e.g., bulldozers, excavators, graders) would be used on the Proposed Project Site. This could result in the injury, mortality, or disturbance of giant garter snake. If individuals take refuge in, under, or around construction equipment when it is not in use, they could be injured or crushed when the equipment is started up and moved. Construction vehicles and equipment traveling through the Proposed Project Site could also kill snakes. Injury and mortality of giant garter snake could also result from equipment clearing vegetation, or from equipment grading in areas that have already been cleared. Giant garter snake could be injured or crushed by construction equipment working in aquatic habitat if soil or other materials are side-cast or fall. Giant garter snake could be harmed in upland habitat if individuals in underground burrows are exposed during excavation activities or entombed during grading. Oil or fuel spills that enter waterways could affect prey availability for giant garter snake. Risk of spills is discussed in Chapter IV.F, Hazards and Hazardous Materials. Other construction-related risks to giant garter snake would be minimized by measures described below to less than significant levels by implementing construction practices that would minimize the risk of direct injury and harm to giant garter snake.

During site preparation, dewatering activities would be conducted in such a way as to systematically remove water across the site from north to south. This systematic dewatering process would allow giant garter snake to slowly relocate to more southerly habitats as the water is drawn down. As this occurs, giant garter snake would concentrate within the southern portion of Liberty Farms where water, vegetation, and uplands would remain undisturbed for the remainder of construction. The on-site refugia would be fenced to keep giant garter snake from entering the active portions of the construction area while allowing individuals to remain on-site or disperse into Cache Slough. During the dewatering process, giant garter snake may be captured, handled, or relocated by agency-approved qualified biologists, which could result in injury to individuals, exposure to predators, or stress and disorientation.

Other potential construction-related impacts to giant garter snake include the following:

- 1) During the winter brumation period and during the summer when giant garter snakes are utilizing underground burrows, they have the potential to be disturbed or harmed if upland habitat is temporarily or permanently flooded.
- 2) During construction activities, new channels and pools would be excavated. These depressions could fill passively with groundwater, which could lure snakes to the area, but provide no actual foraging value, causing a loss in energy and a reduction in foraging efficiency.

²³ *Britt, E. 2016. Giant garter snakes encountered during construction of water canals for the Gray Lodge Wildlife Area Water Supply Project, assessing the effectiveness of avoidance and mitigation measures. Swaim Biological Inc. Presentation at the Wildlife Society Western Section Giant Garter Snake Workshop. Sacramento, California. September 21.*

- 3) Finally, temporary changes in habitat (e.g., clearing, waste storage) could draw in predators of giant garter snake and artificially increase predation pressure.

In all of the aforementioned cases, waters would be drained to the southern end of the Liberty Farms Property where the water levels would be actively managed to maintain suitable water levels throughout the duration of construction of the Proposed Project.

Mitigation Measure BIO-5D provides various water management and species-specific measures to minimize the above effects on giant garter snake.

The Proposed Project would result in changes to hydrology within the Proposed Project Site, which may have the potential to negatively impact giant garter snake. The removal of vegetation and widening of minor slough channels within the Proposed Project Site may make them less attractive foraging habitat for GGS, and may also allow large predatory fish (which prey on juvenile GGS) to access the interior of the Proposed Project Site. Negative effects of these changes are likely to be minimal because of the increased quantity and quality of GGS foraging, basking, and emergent vegetation shelter habitat throughout the Proposed Project Site. Tidal velocities in areas close to Shag Slough may wash individuals (especially juveniles) out of the Proposed Project Site and into adjacent sloughs in certain seasons; however, high tidal velocities are not anticipated to occur in areas farther from Shag Slough such as the central, western, and northern regions of the Proposed Project Site, based on hydrological modeling²⁴. A majority of the Proposed Project Site would be suitable and accessible habitat and the Proposed Project would result in an increase in suitable habitat from existing conditions. Impacts to giant garter snake as a result of changes in hydrology are **less-than-significant**.

The Proposed Project would create approximately eight acres of ponds designed to be suitable for giant garter snake foraging in areas of lowest tidal velocities and close to the new Duck Slough Setback Levee. The ponds would be permanently inundated but receive some water exchange daily at high tides. The ponds are designed in pairs, one connected to tidal channels and one not in direct connection to channels, to provide an opportunity to study the comparison of the two habitat types. All ponds would exchange enough tidal water at a frequency to maintain water quality. For ponds designed with a direct connection to tidal channels, the ponds would be greater in depth than the channel to maintain open water at low tides. Ponds would vary in size and shape, but in general would be between 150 and 500 feet in length, 50 to 200 feet in width, and approximately five to six feet in depth. The ponds would be surrounded by emergent vegetation to provide a foraging base for giant garter snake and are designed to be located adjacent to upland areas which provide basking and winter refugia. The ponds are designed to be perennial and are anticipated to be primary foraging habitat as tidal fluctuation would be limited. The eight acres of ponds along the levee would be maintained specifically for giant garter snake, and upland habitat within 200 feet of these ponds would be maintained as basking habitat and managed to

²⁴ Environmental Science Associates, "Draft Hydrologic and Hydraulic System Analysis: Lookout Slough Restoration Project," March 2019.

prevent tree and shrub growth, if observed establishing along the banks. Upland habitat along Duck Slough would also be managed to provide suitable upland habitat for giant garter snake.

The Proposed Project would lead to a substantial increase in the total amount and quality of giant garter snake foraging habitat in the Proposed Project Site. Both terrestrial basking and brumation habitat are expected to decrease in overall extent, but due to the removal of harmful land management practices associated with waterfowl management and agriculture, as well as removal of general disturbance by humans who occupy and work on lands within the Proposed Project Site, the quality of those resulting habitats is increased, thereby improving overall habitat function and value. In addition, summer basking would be provided in the emergent marsh vegetation; thus, no loss of summer basking habitat is anticipated.

The Proposed Project would increase habitat complexity, which is likely to benefit giant garter snake in quality of habitat, predator avoidance, and reflection of historical habitat used by this species. The large increase in habitat, including foraging ponds for giant garter snake, would result in an improvement in overall habitat quality and benefit the species. While the result of the Proposed Project is beneficial, the temporary impacts associated with construction have the potential to injure, kill, and harm giant garter snake. With the implementation of Mitigation Measure BIO-5D and other mitigation measures discussed in this section, impacts of the Proposed Project would not exceed the applicable threshold of significance related to a substantial adverse effect on the special-status species, giant garter snake, and the Proposed Project's impact with regard to this threshold would be ***less than significant with mitigation incorporated***.

Mitigation Measure BIO-3. Habitat Protection and Avoidance

Please see above.

Mitigation Measure BIO-5D. Giant Garter Snake

Due to the potential for adverse impacts to giant garter snake, consultation and permitting with the USFWS and CDFW are required. As part of the permitting process, EIP shall consult with USFWS and CDFW and implement all avoidance and minimization measures as required in the Proposed Project's Biological Opinion, Incidental Take Permit, and Lake and Streambed Alteration Agreements. In addition, the following measures shall be implemented prior to and during construction to avoid or minimize impacts to giant garter snake:

- 1) Implement Mitigation Measure BIO-3.
- 2) If new construction or ground clearing is proposed within 200 feet of suitable giant garter snake habitat between October 31 and February 28, a qualified biologist shall survey the area for potential winter refugia habitat. Any winter refugia habitat identified shall be flagged with a 50-foot buffer for avoidance. Work in areas with no winter refugia habitat and outside of any buffers may be conducted without additional surveys.
- 3) One or more qualified biologist(s) shall be on site during all project construction within 200 feet of suitable giant garter snake habitat during the extended active

season (March 1 to October 31). The qualified biologist shall monitor work in this area.

- 4) A speed limit of 15 mph shall be observed in areas within 200 feet of areas designated as suitable giant garter snake aquatic habitat by a qualified biologist.
- 5) If a giant gartersnake is observed in the construction area, all activities within the immediate area of the snake will cease, and the qualified biologist will be notified immediately. The qualified biologist will follow procedures for relocation approved by USFWS and CDFW.

Western Pond Turtle

The Proposed Project would temporarily impact western pond turtle through the loss and disturbance of aquatic and nesting habitat during dewatering, site preparation, and construction. It is expected that approximately 151 acres of perennial aquatic habitats in the form of non-tidal sloughs, ponds, and drainage channels would be temporarily unavailable to western pond turtle following dewatering activities. Additionally, western pond turtles and their nests could be displaced, injured, or killed by construction activities. Construction could also negatively impact turtles by obstructing movement corridors, reducing prey base, or attracting predators.

In the long term, the Proposed Project would increase the quality and quantity of western pond turtle aquatic habitat on the Proposed Project Site, and the Proposed Project would result in the creation of over 429 acres of freshwater tidal channels and eight acres of ponds. Western pond turtle eggs hatch in the late summer and early fall; however, hatchlings remain in the nest over the winter and do not emerge until the following spring. Therefore, areas outside of typical winter flood levels are necessary for successful hatching and emergence of the hatchlings. These areas are located on the upper portion of the levees with grassland surface, grassland along Duck Slough and behind the new Duck Slough Setback Levee, and on some PG&E access roads which are elevated above the 2-year flood elevation. These access roads may not provide nest habitat in every year, but likely would provide nest habitat in most years as exposure in winter flood events is typically brief and may not result in nest failure. Overall, the quantity of nesting habitat would be reduced based on exposure to winter flooding upon Proposed Project Site connection with the Yolo Bypass Floodplain. However, the quality of habitat would be improved through reduced human disturbance and management activities. Road traffic, habitat maintenance including dredging and berm maintenance, and small mammal management would be less than current management regimes. The potential impacts to western pond turtle are primarily construction-related and would be minimized with implementation of Mitigation Measure BIO-5E, which provides measures that would relocate western pond turtle away from active construction areas and protect this species during construction. Therefore, with the implementation of Mitigation Measure BIO-5E and other mitigation measures discussed in this section, impacts of the Proposed Project would not exceed the applicable threshold of significance related to a substantial adverse effect on the special-status species, western pond turtle, and the Proposed Project's impact with regard to this threshold would be ***less than significant with mitigation incorporated.***

Mitigation Measure BIO-5E. Western Pond Turtle

The following measures shall be implemented prior to and during construction to avoid or minimize impacts to western pond turtle:

- 1) Implement Mitigation Measure BIO-3.
- 2) A qualified biologist shall monitor areas in suitable western pond turtle aquatic habitat prior to and during work that has the potential to disturb or harm western pond turtle. Western pond turtle individuals found in harm's way shall be moved by a qualified biologist to a safe location outside of the work area in a manner consistent with applicable CDFW regulations.
- 3) During dewatering activity of suitable western pond turtle habitat, a qualified biologist shall be present on-site to capture and relocate western pond turtles out of the work area.
- 4) Any viable western pond turtle nests encountered including those with eggs or hatchlings shall be flagged and a 100-ft buffer around the nest shall be designated. If construction activity cannot avoid the nest area, the nest shall be relocated either off site or to an appropriate wildlife care facility.
- 5) In areas where surveys for western pond turtle have been completed and turtles have been relocated but continue to move back into the area, exclusion fencing or a similar deterrent may be used to prevent turtles from returning to the active work area. Western pond turtles found inside exclusion fencing shall be moved by a qualified biologist to a safe location outside of the work area.

Roosting Bats

Roosting bats could be negatively impacted by construction-related activities via mortality, injury, or disturbance during roosting and/or breeding season. Bats are anticipated to roost and forage in the Proposed Project Site and may use portions of the site for breeding during the maternity season (typically May to August). While mobile adults have the ability to relocate and avoid construction activities, bats roosting during the maternity season are more vulnerable to disturbance and impacts when young cannot yet fly and adults cannot relocate.

Large trees within the Proposed Project Site would be removed in preparation for the restoration. During the removal process, bats may be disturbed, displaced, and potentially injured or killed if they do not or are unable to vacate the supporting roosting structure. Mechanical and chemical control or removal of vegetation could also negatively impact bats. General disruption from construction activities including audible, vibratory, and visual disturbance could wake roosting bats, interfere with foraging bats, or cause females to abandon maternity roosts, creating a potentially significant impact.

The Proposed Project would result in temporary and permanent losses of roosting habitat and would likely reduce the utilization of the Proposed Project Site by some species. The removal of old and dilapidated structures represents a loss of roost habitat for species such as the pallid bat. During baseline biological surveys and assessments, many of the abandoned structures were reviewed and bats were not directly observed or the structures were determined to be unsuitable.

Bats are, however, highly mobile and may use different roost sites for day or night roosting. Therefore, the removal of dilapidated structures is likely to have more of an impact on some bat species than others. If bats were found roosting within structures, injury, mortality, and removal of roost habitat would be a significant impact.

For species that roost in trees, such as the pallid bat, Proposed Project tree removal activities could remove suitable roosting habitat. It is assumed that some bats seasonally and opportunistically roost in large riparian trees. There are currently approximately 36 acres of riparian forest present within the Proposed Project Site, most of which may be temporarily impacted, except for four acres on the Riparian Preservation Area. The availability of open freshwater aquatic features in and around the Proposed Project Site would provide a drinking/water source and foraging areas for bats. Therefore, it is assumed that bats would still seasonally occur within the Proposed Project Site. As the Proposed Project would mitigate for the removal of riparian vegetation with replacement plantings, it is anticipated that there would only be a temporary loss of roosting habitat while the plantings mature (which may take three to ten years depending on species). Replacing riparian vegetation at a 1.1:1 ratio would reduce impacts associated with temporary loss of mature riparian vegetation, as discussed below under discussion of sensitive biological communities.

Although habitat disturbance is considered temporary, bats roosting in trees could be injured or killed during the tree removal process, presenting a potentially significant impact. With implementation of Mitigation Measure BIO-5F, pre-tree removal bat surveys and phased approaches to tree removal, would minimize the risks of injury to roosting bats and abandonment of maternity habitat. Therefore, with the implementation of Mitigation Measure BIO-5F and other mitigation measures discussed in this section, impacts of the Proposed Project would not exceed the applicable threshold of significance related to a substantial adverse effect on the special-status species, roosting bats, and the Proposed Project's impact with regard to this threshold would be ***less than significant with mitigation incorporated***.

Mitigation Measure BIO-5F. Roosting Bats

The following measures shall be implemented prior to construction to avoid or minimize impacts to roosting bats:

- 1) Implement Mitigation Measure BIO-3 (WEAP).
- 2) Prior to any building demolition, a bat roost assessment shall be conducted at least 30 days beforehand by a qualified biologist to determine if roost habitat is present.
 - a) If the structure has no potential to support bats, the structure may be demolished with no further measures required to protect roosting bats.
 - b) If a potential bat roost is present, and work is occurring outside the maternity season, the qualified biologist shall survey the potentially suitable structure the morning of demolition to confirm if bats are present. If bats are not present, the structure may be demolished. If bats are present, the qualified biologist shall exclude bats from the structure (e.g. with the use of one way exits). Once the qualified biologist confirms bats are no longer present, the structure may be demolished.

- c) If a potential bat roost is present and work is occurring during the maternity season, and a maternity roost is present, the structure shall be given a 100-foot buffer and demolition shall be delayed until after the young are capable of flying and able to leave on their own. Once the young have reached sufficient age to leave the roost, the structure may then be excluded, and subsequently demolished.
- 3) Prior to the removal of any large trees (DBH>16 inches) a bat roost assessment shall be conducted by a qualified biologist at least 30 days beforehand to determine if potential roost habitat is present.
- a) If the tree has no potential to support roosting bats (e.g. no large basal cavities, exfoliating bark or interstitial spaces), the tree may be removed with no further measures required to protect roosting bats.
 - b) If potential bat habitat is present, and work is occurring outside the maternity season, the qualified biologist may either 1.) Conduct an emergence survey to determine if the roost is occupied; or 2.) The tree may be felled using a two-phased cut.
 - i) If the emergence survey confirms the roost is inactive, the tree may be felled normally.
 - ii) If the roost is confirmed active, or is assumed to be active, a two-phased cut shall be employed to remove the tree. On day one the qualified biologist shall oversee removal of branches and small limbs not containing potential bat roost habitat using hand tools such as chainsaws or handsaws only. The next day, the rest of the tree may be removed.
 - c) If potential bat roosting habitat is present and work is occurring during the maternity season, the qualified biologist may either 1.) Conduct an emergence survey to determine if the roost is occupied; or 2.) Assume the roost is occupied and a buffer shall be implemented.
 - i) If the roost assessment does not detect bats, the tree may be removed normally. If roosting bats are detected, or the tree is assumed to be an active roost, the tree shall be given a 100-foot buffer and shall be avoided until after the maternity roosting season is complete.

Valley Elderberry Longhorn Beetle

There are no records of valley elderberry longhorn beetle within five miles of the Proposed Project Site. Focused surveys for valley elderberry longhorn beetle and the species host plant were conducted and were supplemented with additional special-status plant surveys. Surveys followed USFWS 2017 *Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle*, which included the preliminary surveys to identify elderberry host plants within the Proposed Project Site, a survey of all habitat and elderberry plants within 50 meters (165 feet) of host plants found within the Proposed Project Site, and an examination of elderberry stems for exit holes and presence of the beetle. Elderberry host plants were photographed and their locations were recorded.

Land management, grazing practices, and levee maintenance result in frequent disturbance and alteration of vegetation within the Proposed Project Site, and only one small isolated group of five elderberry shrubs and two saplings were found on the outboard of the Shag Slough Levee. The patch was located in an area containing riprap, subject to flooding, and devoid of a dominant riparian canopy vegetation. No exit holes of any type were observed in the elderberry shrubs, and no valley elderberry longhorn beetles were observed.

Due to the limited number of elderberry shrubs and the isolation of the Proposed Project Site from documented occurrences, limited host plant availability, and absence of observed exit holes, it is unlikely that the species would occur in the Proposed Project Site. Furthermore, the species is unlikely to establish and occupy the area prior to construction based on isolation from other off-site elderberry shrubs or suitable habitat. Site preparation and construction activities are anticipated to require the removal of the elderberry shrubs on-site, which are located at the southernmost breach on Shag Slough Levee.

Although the existing host plants are of relatively poor quality, there is no evidence valley elderberry longhorn beetles currently occupy the Proposed Project Site, and habitat conditions are anticipated to improve through improved habitat connectivity, any host plant removal within the species range is considered a significant impact as the species would be unable to move into the area in the future should the area lack host plants. Mitigation Measure BIO-5F requires replanting elderberry plants at ratios that would assure the continued existence of potential valley elderberry longhorn beetle habitat in the Proposed Project Site. Therefore, with the implementation of Mitigation Measure BIO-5F and other mitigation measures discussed in this section, impacts of the Proposed Project would not exceed the applicable threshold of significance related to a substantial adverse effect on the special-status species, Valley elderberry longhorn beetle, and the Proposed Project's impact with regard to this threshold would be ***less than significant with mitigation incorporated***.

Mitigation Measure BIO-5F. Valley Elderberry Longhorn Beetle

Prior to Proposed Project Activities that would directly impact elderberry shrubs EIP shall implement the following to avoid impacts to Valley elderberry longhorn beetle (adapted from USFWS 2017²⁵):

- 1) Avoidance and Minimization: To the extent feasible, project activities within 165 feet of elderberry shrubs shall be avoided. For all activities that occur within 165 feet of elderberry shrubs, the following measures shall be implemented to ensure that avoidance activities completely avoid impacting elderberry shrub habitat for valley elderberry longhorn beetle:
 - a) Fencing: All areas to be avoided during project activities shall be fenced and/or flagged near project activity limits.

²⁵ United States Fish and Wildlife Service, "Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle (*Desmocerus Californicus Dimorphus*)" (Sacramento, CA, 2017).

- b) Avoidance area: Trenching, paving, or similar activities that may damage or kill elderberry shrubs shall have an avoidance area of at least 20 feet from the drip-line of the shrub.
 - c) Worker education: A qualified biologist shall provide training for all contractors, work crews, and any on-site personnel on the status of the valley elderberry longhorn beetle, its host plant and habitat, the need to avoid damaging the elderberry shrubs, and the possible penalties for non-compliance.
 - d) Construction monitoring: A qualified biologist shall monitor the project at appropriate intervals to ensure avoidance and minimization measures are implemented.
 - e) Timing: As feasible, all activities that would occur within 165 feet of an elderberry shrub shall be conducted outside of valley elderberry longhorn beetle flight season (March - July).
 - f) Trimming: Trimming of elderberry shrubs shall occur between November and February and shall avoid removing any branches or stems that are ≥ 1 inch in diameter. Measures to address regular and/or large-scale maintenance (trimming) shall be established in consultation with the Service.
 - g) Chemical Usage: Herbicides shall not be used within the drip-line of an elderberry shrub. Insecticides shall not be used within 98 feet of an elderberry shrub. All chemicals shall be applied using a backpack sprayer or similar direct application method.
 - h) Mowing: Mechanical weed removal within the drip-line of an elderberry shrub shall be limited to the season when adults are not active (August - February) and shall avoid damaging the elderberry shrub.
- 2) Transplanting: Where elderberry shrubs cannot be avoided or indirect impacts nearby would result in the death of stems or entire shrubs, EIP shall transplant all elderberry shrubs with stems greater than 1 inch in diameter, where feasible, to protect potential valley elderberry longhorn beetle larvae. In addition, EIP shall use the following guidelines when transplanting elderberry shrubs to a USFWS-approved location:
- a) Monitor: A qualified biologist shall be on-site for the duration of transplanting activities to ensure compliance with avoidance and minimization measures, in addition to other conservation measures.
 - b) Exit holes: Exit-hole surveys shall be completed immediately before transplanting. Details of the survey including number of exit holes observed, the GPS location of the plant to be transplanted, and the GPS location of the final position of the transplanted shrub shall be recorded and reported to the Service and to CNDDDB.
 - c) Timing: Elderberry shrubs shall be transplanted while shrubs are dormant (from November through the first two weeks in February) and after shrubs have lost their leaves to reduce shock to the shrub and increase transplantation success.

- d) Transplanting Procedure: Transplanting shall follow the most current version of ANSI A300 (Part 6) guidelines for transplanting.
- e) Trimming Procedure: Any trimming of elderberry shrubs shall occur between November and February and should minimize removal of branches and/or stems that exceed one (1) inch in diameter.
- f) Regardless of whether exit holes are detected, if direct impacts cannot be avoided to elderberry shrubs or transplanting is not feasible, elderberry shrubs shall be replanted at a 3:1 ratio in riparian areas and a 1:1 ratio in non-riparian areas, in accordance with USFWS guidelines²⁶.

vi. *Substantial Adverse Effects on Special-Status Fish Species, either Directly or through Habitat Modification.*

Special-Status Fish Species

Fish species listed for protection under FESA or CESA, including Delta Smelt, Longfin Smelt, Chinook Salmon, Steelhead, and Green Sturgeon would potentially be impacted by the Proposed Project. In addition to these listed species, native fish species that are considered special status by CDFW, including White Sturgeon and Sacramento Splittail, may be impacted by the Proposed Project. During construction, potential harmful impacts include behavioral changes (such as avoidance or altered activity), elevated stress responses, and direct injury or mortality. Proposed Project-associated elements that may result in these harmful impacts are discussed in more detail in subsequent impact discussions, but include interaction with construction equipment, noise, turbidity, and dewatering.

While impacts may occur for individuals, the Proposed Project is not anticipated to harm populations of special-status fish because the majority of the construction disturbance area is inaccessible to fish (i.e. those areas inboard of SPFC levees). Additionally, the Proposed Project design has incorporated input and guidance from peer reviewed literature, current research, and regional experts to inform the design's intended benefit to listed and special-status fish species; more detail on this process can be found in the *Fish Study Basis of Design Report*.²⁷ A summary of the anticipated benefits of the restoration Proposed Project, which is intended to benefit listed fish in the Proposed Project Site, is discussed below.

Habitat within the Proposed Project Site is currently inaccessible to listed fish, with the exception of the Vogel Property, where elevated winter flows in Cache Slough may result in seasonal flooding. Once waters recede, the low-lying levees that serve to keep water out of the Vogel Property then act to trap water and fish within what becomes a temporary 65-acre lake. The remainder of the Proposed Project Site is contained within SPFC levees, and while there is a small network of screw gate culverts, these provide only a small amount of managed water movement into or out of the Proposed Project Site, making inboard areas inaccessible to fish.

²⁶ United States Fish and Wildlife Service.

²⁷ WRA, Inc., "Fish Study Restoration Basis of Design: Lookout Slough Restoration Project," January 2019.

The Proposed Project would reconnect historic habitat and create new high-quality habitat in an important location for listed and special-status fish species. Restoration activities would excavate a network of dendritic channels, re-establish an extensive wetland complex, and breach levees to re-establish tidal exchange throughout the Proposed Project Site. Direct benefits of the Proposed Project for listed and special-status fish species such as Delta Smelt, Longfin Smelt, Green Sturgeon, Chinook Salmon, and Steelhead include newly created rearing and spawning habitats, improved food web support, and increased high flow refugia.

The restoration of approximately 3,164 acres of wetland habitat would provide important nursery habitat for juvenile fish. The created channels bordered by tidal wetlands would provide foraging habitat and cover for Delta Smelt, juvenile salmonids, and Green Sturgeon. A design approach incorporating variable habitat types with seasonally deeper elevations occurring in the southern portion of the Proposed Project Site and shallower subtidal and intertidal channels occurring in the northern portion is anticipated to provide a range of rearing opportunities under different flow conditions. The Proposed Project would also result in an increase in access to federally designated critical habitat for Delta Smelt, as levee breaching would reconnect thousands of acres of critical habitat currently inaccessible to and unusable by Delta Smelt.

The Cache Slough Complex contains suitable spawning habitat for Delta Smelt, and the detection of larval Delta Smelt indicates the area is a core portion of the species' remaining spawning grounds.^{28,29,30,31} The creation of subtidal channels connected to the Cache Slough Complex and the incorporation of favorable depths, channel structures, water velocities, and substrates is anticipated to provide suitable spawning habitat for Delta Smelt. The tidal wetland and emergent marsh habitat that would occur along the constructed channels would also provide spawning habitat for Sacramento Splittail, a native species that relies on flooded emergent marshes for spawning. Under existing conditions, the Proposed Project Site provides little to no spawning habitat for these two species.

Additional benefits to listed and special-status fish species include food web support and access to high flow refugia for juvenile fishes. The Proposed Project is anticipated to provide food web support to listed and special-status fish species within the Cache Slough Complex through a combination of created wetlands and improved water residence times, and serve as an exporter of nutrients and low-level food web support during seasonal flood flows and more extreme tidal periods³². Wetlands support aquatic foodwebs by providing carbon sources that support

²⁸ Ted Sommer and Francine Mejia, "A Place to Call Home: A Synthesis of Delta Smelt Habitat in the Upper San Francisco Estuary," *San Francisco Estuary and Watershed Science* 11, no. 2 (2013), <https://escholarship.org/uc/item/32c8t244>.

²⁹ Matthew Young et al., "Fish Distribution in the Cache Slough Complex of the Sacramento-San Joaquin Delta during a Drought," IEP Newsletter, 2016.

³⁰ T. Morris and L. Damon, "2015 Smelt Larval Survey," IEP Newsletter 29, no. 1 (2016).

³¹ [CDFW] California Department of Fish and Wildlife, "California Natural Diversity Database" (Sacramento, CA: Biogeographic Data Branch, Vegetation Classification and Mapping Program, August 2018).

³² Environmental Science Associates, "Draft Basis of Design Report - Tidal Hydrology and Hydraulic Analysis: Lookout Slough Restoration Project," January 2019.

invertebrate production. Foodweb productivity would also be supported through the slowed water exchange (*i.e.*, residence time) that can enable phytoplankton and zooplankton to develop.¹⁹

The planned restoration would also open up thousands of acres of land near the terminus of the Yolo Bypass to flood waters and high flow refugia for listed and special-status fish. Multiple breach locations, dendritic channel networks, and established tidal marsh plain within the Proposed Project Site would benefit juvenile fish that seek shelter and reduced velocities that occur during seasonal flood events. Under elevated winter and spring flows, much of the Proposed Project Site would be submerged, providing increased foraging habitat for out-migrating salmonids that benefit from access to high water refugia and access to food resources.³³ These large tidal marsh and adjacent floodplain areas would provide important “on and off ramps” that allow juvenile fish to move out of channelized flood conveyance areas—reducing the potential for them to be swept downstream and out of productive rearing habitat.

Seasonal changes and annual variability in flows would positively change the accessibility of various portions of the Proposed Project Site and alter the roles these habitats can play. Restoring and reconnecting heterogeneous habitats within the Cache Slough Complex would provide Delta Smelt, Longfin Smelt, Green Sturgeon, Chinook Salmon, and Steelhead with a better chance of completing their life cycles and aid in the recovery of these species.

While the Proposed Project’s impacts would be mostly positive, temporary impacts during construction may injure or kill listed fish and therefore would be a potentially significant impact. Various construction-related impacts which could result in direct harm to special-status fish species are discussed individually below. With the implementation of Mitigation Measure BIO-6 and other mitigation measures discussed in this section, impacts of the Proposed Project would not exceed the applicable threshold of significance related to a substantial adverse effect on special-status fish species and the Proposed Project’s impact with regard to this threshold would be ***less than significant with mitigation incorporated***.

Short-Term Direct Construction-Related Injury or Mortality of Fish

Special-status and native fishes may be adversely affected by interactions with construction equipment. Injury or mortality could occur if fish are crushed by in-water work associated with cofferdam installation and removal. Adult fish are generally larger and highly mobile, making them less likely to occur within the work area associated with cofferdam installation or near in-water equipment. Smaller species or juveniles may utilize margins and aquatic cover that occur along the outboard side of the levee within the cofferdam or in-water work footprint. Additionally, noise from the operation of construction equipment within and adjacent to habitable waters of the Proposed Project Site would occur throughout much of Proposed Project construction period. While these effects are anticipated to be limited to the construction phase of the Proposed Project and would be most direct in areas immediately adjacent to in-water work, they may result in injury

³³ Carson A. Jeffres, Jeff J. Opperman, and Peter B. Moyle, “Ephemeral Floodplain Habitats Provide Best Growth Conditions for Juvenile Chinook Salmon in a California River,” *Environmental Biology of Fishes* 83, no. 4 (December 1, 2008): 449–58, <https://doi.org/10.1007/s10641-008-9367-1>.

to fish. Fish may also be injured or killed if oils, fuels, or other fluids spill and enter the surrounding waters.

The Proposed Project would also breach flood control levees to connect newly constructed habitats with adjacent waters that support native fish. The levee breaching process would include periods of time when in-water work is required, such as the construction and removal of cofferdams and the physical connecting event when water is allowed to enter the site. Because the subtidal channels which connect the site to surrounding sloughs are below MLLW, water would be present outside the cofferdam which would need to be released during the connection. If water levels outside of the cofferdam are high above the internal elevation, then there would be a large release of head pressure from water coming into the initial breach. This flush of water may sweep fish into the breach, causing injury or mortality.

Although the Proposed Project would have long-term benefits to native and special-status fish species by improving habitat conditions, short-term injury and mortality risk during construction presents a potentially significant impact. Mitigation Measures BIO-3 and BIO-6 would reduce the risk of injury to native or special-status fish to a less-than-significant level by minimizing the likelihood of fish entering in-water work areas and protecting against hazardous spills. Therefore, with the implementation of Mitigation Measure BIO-6 and other mitigation measures discussed in this section, impacts of the Proposed Project would not exceed the applicable threshold of significance related to a substantial adverse effect on special-status fish species and the Proposed Project's impact with regard to this threshold Impacts would therefore be ***less than significant with mitigation incorporated***.

Mitigation Measure BIO-3. Habitat Protection and Avoidance

Please see above.

Mitigation Measure BIO-6. Special-Status Fish Species

Due to the potential for adverse impacts to listed and special-status fish species, consultation and permitting with the USFWS, NMFS, and CDFW is required. As part of the permitting process, consultation with USFWS, NMFS, and CDFW shall be completed and all requirements in the Proposed Project Biological Opinions, Incidental Take Permit, Lake and Streambed Alteration Agreement, as well as water quality protection measures required in the Section 401 Water Quality Certification will be implemented. The following measures shall be implemented prior to and during construction to avoid or minimize impacts to protected fish species:

- 1) Implement Mitigation Measure BIO-3 (WEAP).
- 2) In-water work outboard of the SPFC levees shall be completed between June 1 and October 31. In-water work on the outboard side of existing levees shall only occur outside the work window if a cofferdam separates the work area from the channel.
- 3) If sheet piles are used to construct a cofferdam, a vibratory hammer shall be used to start the installation of each pile and shall be used as long as geotechnical conditions permit. A vibratory hammer shall be used to remove the sheet pile.

- 4) A qualified biologist shall monitor cofferdam installation, removal, and final breaching activity.
- 5) Prior to closing or dewatering the work side of a cofferdam, a qualified biologist shall lead fish exclusion and/or relocation activities as necessary to clear the work area of fish. Prior to construction, methods for fish rescue and relocation shall be approved by NMFS, USFWS, and CDFW as appropriate.
- 6) To reduce the velocity of water entering the Proposed Project Site and avoid potentially injuring fish, all final breaches (i.e., unencumbered connection to Shag or Cache Slough) shall occur within one foot or less of the daytime low tide level. If a breach cannot take place at low tide or within the work window, measures to reduce water velocity during final breaches shall be provided to NMFS, USFWS, and CDFW.
- 7) Levee excavation shall be conducted in a manner to minimize erosion and excavated material from entering Shag Slough, Cache Slough, or Hass Slough.

Noise Impediments to Fish Migration

Noise and vibrations from the operation of construction equipment within and adjacent to habitable waters of the Proposed Project Site may be sufficient to cause disruptions to migration by special-status fish. While these effects would be limited to the construction phase of the Proposed Project and would be most direct in areas immediately adjacent to the Proposed Project Site, they may result in harassment of special-status fish resulting in temporary avoidance or abandonment of these areas. Mitigation Measure BIO-6 requires in-water work to occur outside of the migratory season for special-status fish and specifies that pile driving must occur with a vibratory hammer as long as geotechnical conditions permit. This, and other measures specified by Mitigation Measure BIO-4B, would minimize the likelihood of construction-related noise posing an impediment to fish migration. Therefore, with the implementation of Mitigation Measure BIO-6 and other mitigation measures discussed in this section, impacts of the Proposed Project would not exceed the applicable threshold of significance related to a substantial adverse effect on special-status fish species and the Proposed Project's impact with regard to this threshold would be ***less than significant with mitigation incorporated***.

Mitigation Measure BIO-6. Special-Status Fish Species

Please see above.

Turbidity Impacts to Fish

Most earthwork would be located within areas separated from surrounding waters by SPFC levees and would be inaccessible to special-status fish populations. However, once grading is finished, levees would be breached and water would be allowed to enter the site. Large areas would be unvegetated at the time of breach, so the breaching process is expected to result in the sediment mobilization and turbidity plume suspension that could result in adverse effects.

Elevated turbidity levels have been shown to impair gill function, reduce oxygen availability in the water column, decrease physiological capabilities, and increase stress in fish. This effect is

anticipated to be more pronounced for salmonid species, which are more susceptible to turbidity effects than other native species which are more adapted to turbid estuarine conditions. Sediment suspension can also result in temporary changes in pH and contaminant release into the water column, both of which can result in immediate or long-term impacts for fish^{34,35}. Turbidity may also result in open water habitat within the Proposed Project Site being temporarily unsuitable for some species. Although potentially significant, this impact can be reduced to less-than-significant levels with implementation of Mitigation Measure BIO-6, which establishes tide and pressure conditions under which breach must occur to minimize turbidity impacts. Therefore, with the implementation of Mitigation Measure BIO-6 and other mitigation measures discussed in this section, impacts of the Proposed Project would not exceed the applicable threshold of significance related to a substantial adverse effect on special-status fish species and the Proposed Project's impact with regard to this threshold would be ***less than significant with mitigation incorporated***.

Mitigation Measure BIO-6. Special-Status Fish Species

Please see above.

Dewatering Fish Injury and Mortality

Once cofferdams are installed, the work-side of the cofferdam (between the cofferdam and the levee) would be dewatered to allow levee grading and sub-tidal channel establishment. If fish are present within the cofferdams when they are closed, they could be injured or killed by being sucked into pumps, or by stranding once dewatering is complete.

Interior aquatic features are generally inaccessible to listed and special-status fish populations due to the SPFC flood control levees. These areas would be dewatered as part of excavation and channel creation. While dominated by introduced non-native fish species, including bass and sunfishes, low numbers of native fishes that have been inadvertently entrained through water control structures and which have survived in the agriculturally manipulated area are also anticipated to be impacted. However, the isolation of such individuals has effectively removed them from the ecosystem and eliminated their reproductive abilities as waters within the agricultural drainage are not conducive to spawning. As such impacts to any fish inboard of the levees would be considered less than significant as they are primarily non-native species or fish which have already been effectively removed from the reproducing population within the Cache Slough Complex.

The Proposed Project would create long-term conditions benefiting special-status and native fish species upon completion. Approximately 3,164 acres of tidal marsh complex would be created that would improve habitat conditions for native fish populations over existing conditions.

³⁴ [Corps] U.S. Army Corps of Engineers, [USEPA] U.S. Environmental Protection Agency, and [LTMS] Long Term Management Strategy, "Programmatic Essential Fish Habitat (EFH) Assessment for the Long-Term Management Strategy for the Placement of Dredged Material in the San Francisco Bay Region," July 2009.

³⁵ NOAA Fisheries, "Southern Distinct Population Segment of the North American Green Sturgeon (*Acipenser medirostris*) 5-Year Review: Summary and Evaluation | NOAA Fisheries," January 29, 2018, [/resource/document/southern-distinct-population-segment-north-american-green-sturgeon-acipenser](#).

Nonetheless, injury or death of special-status fish during dewatering of the outboard side of cofferdams would be considered a potentially significant impact. This impact would be reduced to a less-than-significant level with implementation of Mitigation Measure BIO-6, which requires fish-protective activities prior to and during dewatering such as fish exclusion, rescue, and monitoring. With the implementation of Mitigation Measure BIO-6 and other mitigation measures discussed in this section, impacts of the Proposed Project would not exceed the applicable threshold of significance related to a substantial adverse effect on special-status fish species and the Proposed Project's impact with regard to this threshold would be reduced to ***less than significant with mitigation incorporated***.

Mitigation Measure BIO-6. Special-Status Fish Species

Please see above.

Increased Predation on Native Fish

Restoration of tidal wetlands and the associated subtidal channel network within the Proposed Project Site would have the beneficial effect of increasing the amount of habitat available to native fish. However, it is also expected that non-native fish such as striped bass (*Morone saxatilis*) and Mississippi silverside (*Menidia beryllina*) could occur within the new habitat and would have the opportunity to prey on native fishes. The new habitat would also provide foraging areas for wildlife species that consume fish such as egrets, herons, and otters.

While the existing conditions at the site only support suitable aquatic habitat along the outboard sides of levees, the restored interior would ultimately provide access for native fish as well as various fish predators. This may be most pronounced in the areas of the levee breaches, which could create the potential for native fish to be preyed upon by predators in these zones where flows are concentrated. Inadequately designed breaches could also create choke points that trap non-native vegetation, which aids non-native predators by providing shade cover and increasing ambush efficiency.

The Proposed Project has been designed to favor native fish species while discouraging establishment and colonization by non-native species. Nine large breaches are designed along the Shag Slough Levee, ranging in width from 300 to 575 feet. Such large breaches allow water to slowly enter and exit the site. Numerous, enlarged breaches avoid creating high velocity funnels that can disorient fish as they enter or exit the site. Proposed channel geometry also favors native fish species with dendritic channels. Constructed channels have been designed to be large and allow for tidal exchange, maximizing primary productivity while minimizing the potential for non-native species establishment.

Restored wetland habitat has been demonstrated to benefit juvenile salmonids and native fish^{36,37,38,39}. The increase in wetland habitat and high food productivity provided by the Proposed Project is expected to benefit growth rates and body sizes of these fish. Larger fish are stronger swimmers⁴⁰ and can more actively avoid predation. Additionally, larger body size is important to surpassing the mouth gape of predators.⁴¹ When native fish are faster or larger than predators, the potential for predation by piscivorous fish is thus reduced.

The only construction related effect that may support predation on native fishes would be with the addition of sheetpile cofferdams. Cofferdams installed along breach sites may provide perches for cormorants (*Phalacrocoracidae* sp.) or other predatory birds to target fish. However, these perches are likely to be in close proximity to construction which causes disturbance that is likely to flush birds away. Additionally, sheetpile cofferdams are located along the shoreline at similar heights to extant trees and woody vegetation. Therefore, the potential for sheetpiles to act as a predatory perch would be less than significant, as extant conditions already support similar perches (i.e. riparian trees) and construction-related disturbance is likely to disturb birds perching on the cofferdams, making them less effective.

The Proposed Project has been designed to provide beneficial effects to native fish while minimizing opportunities for non-native species establishment, providing an overall benefit to native fish. Impacts to special-status fish species due to increased predation would only likely exist in the form of sheetpile perches for predatory birds, which would have a less than significant impact due to the associated disturbance of construction as well as the extant natural perches which are already present. Therefore, impacts of the Proposed Project would not exceed the applicable threshold of significance related to a substantial adverse effect of non-native fish on special-status fish species and the Proposed Project's impact with regard to this threshold would be **less than significant**.

Water Temperature Changes

At the present time, a majority of the Proposed Project Site is isolated from tidal waters and has little to no effect on localized water temperatures in Shag Slough, Cache Slough, or Hass Slough.

³⁶ W.J. Junk, P.B. Bayley, and R.E. Sparks, "The Flood Pulse Concept in River-Floodplain Systems. In: Dodge, D.P., Ed., *Proceedings of the International Large River Symposium*," Canadian Journal of Fisheries and Aquatic Sciences Special Publication 106 (1989).

³⁷ T R Sommer et al., "Floodplain Rearing of Juvenile Chinook Salmon: Evidence of Enhanced Growth and Survival," Canadian Journal of Fisheries and Aquatic Sciences - CAN J FISHERIES AQUAT SCI 58 (February 1, 2001): 325-33, <https://doi.org/10.1139/cjfas-58-2-325>.

³⁸ Peter Moyle et al., "Patterns In The Use Of A Restored California Floodplain By Native And Alien Fishes," San Francisco Estuary and Watershed Science 5, no. 3 (2007).

³⁹ Matthew L. Nobriga and Frederick Feyrer, "Shallow-Water Piscivore-Prey Dynamics in California's Sacramento-San Joaquin Delta," San Francisco Estuary and Watershed Science 5, no. 2 (2007), <https://escholarship.org/uc/item/387603c0>.

⁴⁰ J. J. Videler and C. S. Wardle, "Fish Swimming Stride by Stride: Speed Limits and Endurance," Reviews in Fish Biology and Fisheries 1, no. 1 (September 1, 1991): 23-40, <https://doi.org/10.1007/BF00042660>.

⁴¹ David Lundvall et al., "Size-Dependent Predation in Piscivores: Interactions between Predator Foraging and Prey Avoidance Abilities," Canadian Journal of Fisheries and Aquatic Sciences - CAN J FISHERIES AQUAT SCI 56 (July 1, 1999): 1285-92, <https://doi.org/10.1139/cjfas-56-7-1285>.

Following restoration, the Proposed Project Site would be converted to subtidal channels and emergent marsh. Bringing water onto shallow flats and exposing it to solar radiation has the potential to raise temperatures. However, while emergent marsh absorbs more solar radiation than open waters, the presence of vegetation reduces water temperatures. In a study by Hemes *et al.* (2018), restored emergent marsh reduced surface water temperatures by as much as 5.1°C. This cooling effect was largely attributed to the shade offered by the vegetative canopy structure which minimizes heat absorption during the day, and subsequent enhanced nighttime latent heat flux.⁴²

Because emergent marsh is anticipated to provide some daytime cooling, it is anticipated that cold-water fish species within the Proposed Project Site would benefit from changes to water temperature in the long-term. In the short-term, although the Proposed Project Site may see slight increases in localized daytime temperature before vegetation matures and fully covers the marsh plain, effects would be less than significant, as tidal exchange would move large volumes of water into and out of the area, effectively neutralizing any small increases in temperature due to solar exposure. A detailed discussion of the Proposed Project's effects on hydrology including temperature is included in chapter IV.G- Hydrology and Water Quality. The long-term effects are anticipated to be positive, providing enhanced habitat for fish. Therefore, impacts of the Proposed Project would not exceed the applicable threshold of significance related to the effect of temperature increases on special-status fish species and the Proposed Project's impact with regard to this threshold would be **less than significant**.

Invasive Asian Clam Food Web Alterations

The invasive Asian clam (*Corbicula fluminea*) is a voracious filter feeder capable of significantly altering the food web for native fish species in the Delta by reducing the availability of primary productivity.^{43,44} The completed restoration project would create connectivity between the Proposed Project Site and surrounding sloughs, creating colonization opportunities for clams. Establishment of the Asian clam is not likely to be prevented through design criteria like flow velocity or water surface elevation.⁴⁵ Further, abiotic conditions including temperature and

⁴² Hemes, K. S., Eichelmann, E., Chamberlain, S. D., Knox, S. H., Oikawa, P. Y., Sturtevant, C., ... & Baldocchi, D. D. (2018). A Unique Combination of Aerodynamic and Surface Properties Contribute to Surface Cooling in Restored Wetlands of the Sacramento-San Joaquin Delta, California. *Journal of Geophysical Research: Biogeosciences*, 123(7), 2072-2090.

⁴³ Lopez, C. B., J. E. Cloern, T. S. Schraga, A. J. Little, L. V. Lucas, J. K. Thompson, and J. R. Burau. 2006. *Ecological values of shallow-water habitats: implications for the restoration of disturbed ecosystems*. *Ecosystems* 9: 422-440. DOI: <https://doi.org/10.1007/s10021-005-0113-7>

⁴⁴ Crauder, J.S., Thompson, J.K., Parchaso, F., Anduaga, R.I., Pearson, S.A., Gehrts, K., Fuller, H., and Wells, E., 2016, *Bivalve effects on the food web supporting delta smelt—A long-term study of bivalve recruitment, biomass, and grazing rate patterns with varying freshwater outflow: U.S. Geological Survey Open-File Report 2016–1005, 216 p.*, <http://dx.doi.org/10.3133/ofr20161005>.

⁴⁵ R. Sousa, C. Antunes, and L. Guilhermino, "Ecology of the Invasive Asian Clam *Corbicula Fluminea* (Müller, 1774) in Aquatic Ecosystems: An Overview," *Annales de Limnologie - International Journal of Limnology* 44, no. 2 (2008): 85–94, <https://doi.org/10.1051/limn:2008017>.

dissolved oxygen which benefit native fish can also benefit Asian clam due to similar habitat requirements.⁴⁶

Asian clam growth, density, and survival depend on numerous factors, including substrate, water quality, and flow, but how these factors contribute to the current structure of Asian clam populations in the Delta is not well understood.⁴⁷ Various studies concerning the distribution and spread of Asian clam were summarized by Kramer-Wilt but provided unclear results regarding habitat types within which Asian clams successfully establish.⁴⁸ Therefore, the extent to which this species would colonize within the restored Proposed Project Site is purely speculative.

The Proposed Project Site currently supports land uses that do not export primary productivity to the surrounding sloughs. However, following restoration, the Proposed Project Site would likely produce primary and secondary productivity similar to that of surrounding waterways, which would be expected to be exported to the surrounding systems. Even in the presence of Asian clam, there would be a net increase in export of primary and secondary productivity to surrounding sloughs compared with existing conditions, wherein no primary or secondary productivity is exported from the site. Therefore, impacts of the Proposed Project would not exceed the applicable threshold of significance related to potential invasion of the Asian clam and its impact on the food web for special-status fish species and the Proposed Project's impact with regard to this threshold would be ***less than significant impact***.

Methylmercury Food Web Accumulation

Mercury methylation is a concern for wetland restoration projects in the Bay-Delta because certain types of wetland habitats are known to support the processes that transform relatively inert forms of mercury into the bioavailable form of methylmercury. Total mercury is not anticipated to change as a result of grading or construction. However, there could be a short-term increase in methylmercury production during or immediately after construction within the Proposed Project Site, which could be transported to adjacent waterways⁴⁹. A localized increase in water column methylmercury could result in increased levels of mercury bioaccumulation in aquatic organisms, especially top predators like Striped Bass. DWR is conducting both tidal wetland and open water characterization studies to determine if tidal wetlands are a source or sink for mercury and methylmercury and further understanding of how methylmercury is produced in the Yolo Bypass under large flood events. Results of this research suggest that tidal wetlands do not export mercury or methylmercury in large amounts. Therefore, impacts of the Proposed Project would not exceed the applicable threshold of significance related to a substantial adverse effect of

⁴⁶ Sousa, Antunes, and Guilhermino.

⁴⁷ Larry R. Brown et al., "Population Density, Biomass, And Age-Class Structure Of The Invasive Clam *Corbicula Fluminea* In Rivers Of The Lower San Joaquin River Watershed, California," *Western North American Naturalist* 67, no. 4 (2007): 572–86.

⁴⁸ Errin Kramer-Wilt, "Habitat Preferences and Interactions with Macroinvertebrates of the Non-Indigenous Asian Clam, *Corbicula Fluminea*, in a Restoring Freshwater Tidal Marsh, Sacramento River Delta" (University of Washington, 2010).

⁴⁹ Valoppi, L., 2018, Phase 1 studies summary of major findings of the South Bay Salt Pond Restoration Project, South San Francisco Bay, California: U.S. Geological Survey Open-File Report 2018–1039, 58 p., plus appendixes, <https://doi.org/10.3133/ofr20181039>.

methyl-mercury food web accumulation and the Proposed Project's impact with regard to this threshold would be ***less than significant***. For further detail, please see Chapter IV.G, Hydrology and Water Quality.

vii. Interfere Substantially with the Movement of any Native Resident or Migratory Fish or Wildlife Species or with Established Native Resident or Migratory Wildlife Corridors, or Impede the use of Native Wildlife Nursery Sites

The Proposed Project Site does not currently function as a corridor for fish species (e.g., salmonids, Green Sturgeon) as it is completely diked. However, the adjacent Yolo Bypass is a valuable corridor for adult Delta Smelt, salmonids, and Green Sturgeon migrating to upstream spawning grounds, as well as larval and juvenile Delta Smelt, salmonids, and Green Sturgeon migrating downstream to rearing habitats. The Proposed Project would functionally join the Proposed Project Site to the Yolo Bypass, increasing the length of the Bypass complex by 3.75 miles, improving regional connectivity, and providing approximately 3,170 acres of shallow water foraging habitat for juvenile fish. The increase in primary productivity and presence of new off-channel rearing habitat for salmonids also increases the overall habitat value as a nursery site. Off-channel rearing and foraging areas are crucial to the successful migration of salmonids by increasing physical growth, which decreases risk of predation⁵⁰.

In its current state, the approximately 3,400-acre Proposed Project Site only provides patches of giant garter snake habitat on the property margins, and agricultural and wetland management activities likely make moving across the interior of the Proposed Project Site unsafe for giant garter snake. In addition, existing aquatic habitat for giant garter snake is linear with minimal vegetative cover along banks which may result in greater predator success and limit functional connectivity. During construction, portions of the Proposed Project Site may be even less functional as movement corridors for giant garter snake for relatively brief periods due to construction activity. However, the Proposed Project would reduce local and regional habitat fragmentation, as currently there are large tracts of space within the Proposed Project Site where no giant garter snake habitat exists, and following Proposed Project construction, the entire Proposed Project Site would represent at least one type of habitat for giant garter snake. The Proposed Project would also increase habitat complexity in addition to quantity and this may improve functional connectivity by decreasing predator effectiveness.

Under existing conditions, the Proposed Project Site provides movement corridors for common native species, particularly waterfowl and migratory birds. Post restoration, movement by common native species that currently utilize the site would be improved and the site would become available for additional migratory species including native fish. Because the Proposed Project Site would continue to function as a migratory corridor for regionally common species, and because the Proposed Project would create movement opportunities for additional species in the future, no negative impacts to the movement of wildlife species is expected following the conversion of the area to tidal marsh. Therefore, impacts of the Proposed Project would not exceed the applicable threshold of significance related to movement, corridors or nursery sites for

⁵⁰ R Sommer et al., "Floodplain Rearing of Juvenile Chinook Salmon."

resident, migratory or native fish or wildlife and the Proposed Project's impact with regard to this threshold would be **less-than-significant**.

viii. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

The Solano County General Plan calls for the protection of oak woodlands and "heritage trees" and the development of a county ordinance for the protection of these trees. The tree ordinance has not yet been developed, but the General Plan stipulates that it will delineate such regulations as a replacement ratio for healthy tree removal and enforcement mechanisms for unlawful removal of trees. Heritage trees are defined as trees with a trunk diameter of 15 inches or more measured at 54 inches above natural grade, any oak tree native to California with a diameter of 10 inches above natural grade, or any tree or group of trees specifically designated by the County for protection because of its historical significance. Heritage trees may be present in the Proposed Project Site and may be removed as part of the Proposed Project, but implementation of Mitigation Measure BIO-1 which replaces trees at a 1.1:1 ratio would be consistent with the General Plan's call for replacement of healthy heritage trees. The Proposed Project would not conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.

The Solano County General Plan includes several additional policies pertaining to the protection, or enhancement, of natural resources, special-status species occurrences, and natural habitat particularly within the Resource Conservation Overlay. The Resource Conservation Overlay is used to identify areas with high-priority needs for biological resource management, and areas where the establishment of mitigation banks is incentivized. The Proposed Project Site is located within the Resource Conservation Overlay. The Proposed Project is consistent with the Solano County General Plan policies pertaining to the protection of biological resources as the project would permanently protect natural resources, open space and natural habitats (Policies RS.G-2, RS.G-4, RS.P-1, RS.P-4, RS.P-5, RS.P-6, RS.P-7, RS.P-8, and RS.P-22) through recordation of a conservation easement. The Proposed Project would also repair environmental degradation, and restore historic marsh habitats (RS.G-3 and RS.P-9) through the restoration of the Proposed Project Site to its historic tidal marsh condition.

The Proposed Project is consistent with the Resource Conservation Overlay and Solano County General Plan policies pertaining to biological resources. Additionally, implementation of other mitigation measures discussed in this chapter will minimize impacts to special-status species, heritage trees, and natural communities covered by local plans and ordinances. Therefore, with the implementation of other mitigation measures discussed in this section, impacts of the Proposed Project would not conflict with any local policies or ordinances protecting biological resources and the Proposed Project's impact with regard to this threshold would **be less than significant**.

ix. Conflict with a Provision of an adopted Habitat Conservation Plan, or Natural Community Conservation Plan or other approved local, regional or state habitat conservation plan.

The Proposed Project Site is located within the boundaries of the Solano County Multi-Species Conservation Plan. The Solano County Multi-Species Habitat Conservation Plan places the area

within Covered Activity Zone 3. Recommended uses for this zone include habitat creation and restoration activities on existing and future reserve lands designed to contribute to the conservation requirements of Covered Species and their habitats. Covered Species include the Spring-Run Chinook Salmon and the Delta Smelt, both of which would benefit from the habitat restoration that would result from the completed Project. DWR is not a participating entity in the Solano County Multi-Species Habitat Conservation Plan but the Proposed Project does not conflict with the plan. There are no other applicable habitat conservation plans, community conservation plans, or other conservation plans. Therefore, impacts of the Proposed Project would not conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan and the Proposed Project's impact with regard to this threshold would be a ***less-than-significant impact***.

5. LEVEL OF SIGNIFICANCE AFTER MITIGATION

The Proposed Project is intended to improve ecological conditions for tidal marsh species within the Proposed Project Site in a manner that would restore native natural communities and have beneficial long-term impacts on special-status species that utilize this habitat type. Potentially significant impacts to biological resources were nonetheless identified, particularly during construction. With implementation of Mitigation Measures BIO-1 through BIO-6, the Proposed Project's impacts on biological resources would be ***less than significant***.

IV. ENVIRONMENTAL IMPACT ANALYSIS

E. CULTURAL RESOURCES

1. INTRODUCTION

This section analyzes and assesses the potential impacts of the Proposed Project on historical resources. Historical resources include districts, sites, buildings, structures, or objects generally older than 50 years and considered to be important to a culture, subculture, or community for scientific, traditional, religious, or other reasons—i.e., those cultural resources eligible to the California Register of Historical Resources. Historical resources could be any of the following:

- Archaeological resources, which are locations where human activity has measurably altered the earth or left deposits of prehistoric or historic-era physical remains (e.g., stone tools, bottles, former roads, house foundations).
- Historic-era built environment resources, which include standing buildings (e.g., houses, barns, outbuildings, cabins), and intact structures (e.g., dams, bridges, wells).
- Tribal Cultural Resources, as defined by Assembly Bill 52, Statutes of 2014, in Public Resources Code (Public Resources Code) Section 21074, are discussed in Chapter IV.I, Tribal Cultural Resources.

The information and analysis in this section is taken from, and based on, the 2019 Environmental Science Associates (ESA) report “Lookout Slough Tidal Habitat Restoration and Flood Improvement Project – Cultural Resources Inventory and Evaluation Report,” prepared for the Proposed Project (Appendix I). All sections below are drawn from this document unless otherwise cited. This document is available upon request from FRPA@water.ca.gov with a subject line of “Lookout Slough Information Request.” Confidential information has been redacted from this document.

2. ENVIRONMENTAL SETTING

This section is taken from the “Lookout Slough Tidal Habitat Restoration and Flood Improvement Project – Cultural Resources Inventory and Evaluation Report” report, prepared for the Proposed Project (Appendix I).

a. Geology

Landforms that predate the earliest estimated periods for human occupation of the region have very low potential for the presence of buried archaeological sites, while those that postdate human occupation have a higher potential for presence of buried archaeological sites. Currently,

archaeological research indicates that the earliest evidence for human occupation of California dates to the Late Pleistocene, which ended approximately 11,500 before present (BP).¹

The surficial geology of the Proposed Project Site consists of various Quaternary basin deposits, all of which postdate human occupation. The central region of the Proposed Project Site consists of fine-grained basin deposits from the Holocene to Historic-era (11,800 to 150 years). Small pockets of Latest-Pleistocene basin deposits are located at the northwestern boundary of the Proposed Project Site. The northern aspect of the Proposed Project Site consists of fine-grained Holocene alluvial fan deposits. The southern-most aspect of the Proposed Project Site consists of Holocene Delta mud deposits that are composed of estuarine silt, clay, peat, and fine sand.

Although the various Quaternary basin deposits found in the Proposed Project Site postdate human occupation, there are several factors that suggest a low likelihood of encountering buried archaeological deposits within the Proposed Project Site:

1. The Sacramento Delta began to form about 6,000 years ago. Following this formation, occupation of the landscape in the vicinity of the Proposed Project Site would have been restricted to relict, and partially drowned, sand dunes and natural levees that had formed during the Pleistocene and stood high enough to clear the rising waters.² Based on the soil report for the Proposed Project Site, these dunes and natural levees are not present within the Proposed Project Site.
2. This indicates that indigenous occupation did not likely occur here for the past 6,000 years. Rather, indigenous use of the area was likely restricted to hunting elk and waterfowl, fishing, and collecting tule and other vegetal resources for processing elsewhere. Archaeological evidence of this within the Proposed Project site is likely to be represented by isolated artifacts, which in and of themselves are traditionally not eligible to the National or California registers.
3. While the majority of soils within the Proposed Project Site are indeed alluvium, they consist of basin deposits that have formed over millennia of inundation and aquatic vegetation development, and can be expected to be quite deep. The Egbert, Clear Lake, San Ysidro, and Capay soils are all described as “very deep” and extend at least 5 feet below surface. The likelihood of extending past these soils into past land surfaces is unlikely save for those locations where the setback levee cut-off wall for Duck Slough would be constructed, which may extend down to 50 feet below surface.
4. Duck Slough has been rechanneled during the historic era and does not represent the original water course through here, and does not represent a fresh water source that would have been available to indigenous populations that may have been here prior to

¹ Meyer and Rosenthal, 2008. *A Geoarchaeological Overview and Assessment of Caltrans District 3*.

² West et al. *Late Pleistocene and Early Holocene Environments. In California Prehistory: Colonization, Culture, and Complexity*, edited by Terry L. Jones and Kathryn A. Klar, jpp. 11-34, AltaMira Press, Lanham, MD.

6,000 years ago. There is no evidence that would recommend this location to be a sensitive area for middle or early Holocene indigenous occupation.

b. Prehistory

The human prehistory of the Proposed Project Site and the Central Valley Region is typically divided into three periods: the Paleo-Indian, the Archaic, and the Emergent. The Archaic Period is further subdivided into the Lower Archaic, Middle Archaic, and Upper Archaic. This framework was developed by Rosenthal et al. 2007. The following summary draws from this work, as well as Moratto 1984 and 2004.^{3,4}

i. Paleo-Indian Period (13,550 to 10,550 BP)

Humans first entered the Central Valley sometime prior to 13,000 BP. At that time, Pleistocene glaciers had receded to the mountain crests, leaving conifer forests on the mid and upper elevations of the Sierra Nevada and a nearly contiguous conifer forest on the Coast Ranges. The Central Valley was covered with extensive grasslands and riparian forests. People were likely focused on large game hunting, although evidence remains scant, as does understanding of lifeways during this period. What evidence can be found dating to this time is represented by large, concave-based projectile points.

ii. Lower Archaic Period (10,550 to 7,550 BP)

The Paleo-Indian Period was followed by the Lower Archaic Period (10,550 to 7,550 BP). During this period, the ancient lakes, which had been the subsistence base during the Paleo-Indian Period, began to dry up as a result of changes to the climate occurring at that time. This led to the rapid expanse of oak woodland and grassland prairies across the Central Valley. It was during this period that the first evidence of milling stone technology appeared, indicating an increased reliance on processing plants for food. The appearance of milling technology may also indicate less emphasis on hunting as individuals became more familiar with the local plant resources. Most artifacts during this period were manufactured of local materials and trade was limited.

iii. Middle Archaic Period (7,550 to 2,550 BP)

After about 7,550 BP, California underwent a change in climate referred to as the Middle Holocene Altithermal, with warmer and drier conditions throughout the region. Scant evidence of human occupation from this Middle Archaic Period has been found in the Sacramento Valley or the adjacent Coast Ranges, likely a function of harsher conditions and lower populations, and of erosional events that have covered the occupational evidence from this time period.

³ Rosenthal et al., 2007. "The Central Valley: A View from the Catbird's Seat", in *California Prehistory: Colonization, Culture, and Complexity*, edited by Terry L. Jones and Kathryn A. Klar, pp. 147-163, AltaMira Press, Lanham, MD.

⁴ Moratto, 1984 [2004]. *California Archaeology*, 2004 reprinted edition. Coyote Press, Salinas, CA.

iv. Upper Archaic Period (2,550 to 900 BP)

Evidence for Upper Archaic human occupation in the Central Valley is much more extensive than for earlier periods. The development of the Holocene landscape buried older deposits, resulting in exposure of only the Upper Archaic sites that post-date this burial. The first evidence of substantial native villages dates to this period. These villages were used as hubs from which the populace ventured out to collect resources, using a wide range of technologies—bone tools and ceremonial implements, new bead types, *Haliotis* ornaments, obsidian rough-outs for trade and well-made ceremonial blades, polished and ground-stone plummets, and continued use of the mortar and pestle and milling slab-handstone processing equipment. Village sites represented extended occupation, as evidenced by well-developed midden, which frequently contained hundreds of burials, storage pits, structural remains, ash dumps, and extensive floral and faunal remains.

v. Emergent Period (900 to 300 BP)

A major shift in material culture occurred around 900 BP, marking the beginning of the Emergent Period. Particularly notable was the introduction of the bow and arrow. The adoption of the bow occurred at slightly different times in various parts of the Sacramento Valley, but by 750 BP it was in use in the Delta region. The bow was accompanied by the Stockton-series serrated point, a seemingly local invention, distinctive from point types used in other parts of the state. In areas where stone was scarce, baked clay balls have been found, presumably for cooking in baskets. Along rivers, villages were frequently associated with fish weirs, with fishing taking on an increasing level of importance in the diet of the local populace.

c. Ethnography

Prior to the Euroamerican occupation of California, the Proposed Project Site was near the territorial boundary of the Patwin (Wintun) and the Plains Miwok. Using the Sacramento River as a territorial boundary, the Patwin occupied the land to the west, while the Plains Miwok occupied the land to the east.⁵ Please see Chapter IV.I, Tribal Cultural Resources, for further discussion of Ethnography and Tribal Cultural Resources.

d. History*i. Settlement of the Sacramento Valley*

The Sacramento Valley remained relatively isolated and sparsely populated until the Gold Rush. Given Sacramento's proximity to mining areas, and its accessibility to maritime traffic via the Delta and major river systems, the area quickly became a trading and economic center. Commerce along the Sacramento River encouraged continued population growth, with many of the miners and farmers settling along its natural levees. Settlers recognized that the active floodplain

⁵ McCarthy et al., 1985. *Ethnography and Prehistory of the North Coast Range, California*. University of California, Davis, CA.

deposited fertile soils in the lands nearest to the river, which supported bountiful crops and provided easy access to transportation corridors along the river itself. Ranchers and farmers found economic success in providing food and supplies for the miners, although frequent flooding troubled settlers' agricultural efforts and additional settlement.⁶

ii. Reclamation Districts

An RD is a legal structure which is organized to "reclaim" former wetland areas for agricultural use. The governing boards of these RDs are responsible for managing and maintaining the levees, canals, pumps, and other flood protection structures in the area. The California Legislature created the Board of Reclamation, today known as the Central Valley Flood Protection Board, in 1861, which facilitated the formation of local RDs.

The Delta contains approximately 70 islands, most of which were created by reclamation levees. Sherman Island (14,000 acres) and Twitchell Island (3,600 acres) were the earliest and largest of the reclamation farms in the Delta; they were soon followed by Bradford, Brannan, Bouldin, Andrus, Venice, Mandeville, Jersey, Staten, and Bethel islands, all completed by 1875. Between 1870 and 1880, 92,000 acres were reclaimed in the Delta. By 1930, a total of 441,000 acres had been reclaimed. Agriculture and horticulture activities on these islands included everything from growing wheat, barley, clover, potatoes, beans, sugar beets, orchards and various fruit types, and berries, to running sheep and cattle.⁷

The Proposed Project Site is located within RD 2098, which includes approximately 6,100 acres. Although the levees that currently border this district were originally constructed by local interest groups from 1918 to 1936, the RD itself was not formed until September 26, 1963. The Corps improved existing levees along the eastern, western, and southern boundaries of RD 2098 along Cache (in 1935), Hass (in 1936), and Shag (in 1961) Sloughs as part of the Sacramento River Flood Control Project (SRFCP).

iii. Corps Sacramento River Flood Control Project (1917-1961)

As early as the 1850s, the first levees were constructed by local landowners in the Central Valley. Some of these early levees eventually became part of a state-federal flood protection system that began when Congress authorized the SRFCP in the Flood Control Act of 1917. Construction of the SRFCP began in 1918 and continued for decades. By 1944, the project was about 90 percent complete. The State of California adopted and authorized the SRFCP in 1953 by adding Section 12648 to the California Water Code. The plan for completing the project was presented in the November 30, 1953, *Memorandum of Understanding (MOU) Respecting the Sacramento River Flood Control Project* between the Corps and the State Reclamation Board. This MOU included levee construction standards for river project and bypass levees, and outlined maintenance responsibilities.

⁶ Hoover et al., 2002. *Historic Spots in California, 4th Edition*. Revised by Douglas E. Kyle, Stanford University Press, Stanford, CA.

⁷ Thompson, 2006

Levee Unit 109

All three levee segments within the Proposed Project Site are part of Corps Levee Unit 109, a component of the SRFCP. The levees in the Proposed Project Site along Cache, Hass, and Shag Sloughs were originally constructed in the late 1910s, predominantly of organic clay and clay materials that were dredged from the adjacent sloughs and channels. In 1918, landowner Robert Malcolm, with the approval of the State Reclamation Board, constructed levees measuring 5 feet in height along Shag, Cache, and Hass Sloughs as part of his efforts to reclaim the land for agricultural activities. Levee Unit 109 was incorporated into the Army Corps of Engineers levee system between 1931 and 1961.

In 1959, Design Memorandum No. 13 was issued by the Corps Sacramento District for the improvement of 17.4 miles of SRFCP levees along the east bank of Cache Slough and Shag Slough. In 1961, field investigation of the levees revealed a 200-foot-long subsided area; this was followed by continued subsidence and sloughing of 2.4 miles of levee that bounded the southern tip of the Liberty Farms Property. Through 1973, remedial repair and upgrade construction were carried out annually. Additional construction repair work was done in 1977, 1978, 1979, and 1980 to bring the SPFC levees to grade. Numerous studies were conducted between 1981 and 1986 to determine alternative solutions to repair the levees in Unit 109.⁸ The studies determined that the best course of action was to create a new levee to connect Cache and Shag Sloughs, just north of the continually failing levees at the southern tip of the Liberty Farms Property. This construction took place in 1991, effectively cutting off and removing 166 acres from the Liberty Farms Property; the area is now known as Cache Slough Mitigation Area.

iv. Duck Hunting in the Delta

Sport hunting of waterfowl became a common activity in California in the 1840s and 1850s. The first duck club in California was established in 1879 in the Suisun Marsh. Due to the close proximity of San Francisco, market hunting was also common in the Delta, Sacramento Valley, and San Joaquin Valley in the late 1800s and early 1900s.⁹

Reclamation of lands in the Delta continued through the 1920s; land that could not be reclaimed for agricultural use due either to poor soil conditions or salinity levels were typically used for duck clubs. The economic depression of the 1930s slowed growth of hunting clubs in the Delta and surrounding marshes. Growth of clubs remained slow through World War II, as resources were diverted for the war.¹⁰

⁸ [Corps] U.S. Army Corps of Engineers, 1986 [2008]. *Sacramento River Flood Control Project, California Right Bank Yolo Bypass and Left Bank Cache Slough Near Junction Yolo Bypass and Cache Slough. Levee Construction General Design.*

⁹ [DWR] California Department of Water Resources, 1999. *Suisun Marsh Monitoring Program Reference Guide.*

¹⁰ Bureau of Land Management, 1991. *Waterfowl/Wetland Workshop – Anchorage, Alaska. August 14-16, 1991.*

The Liberty Farms Property contains an existing duck club, the Liberty Farm Duck Club. The Liberty Farms Duck club was converted from farm lands to duck production in 2005 with funding from the NRCS and CWA. The conversion was part of a wetland reserve program and the majority of the Liberty Farms Property was placed under a wetland conservation easement.

History of the Proposed Project Site

The Proposed Project Site is currently subdivided into three properties the Liberty Farms, Bowsbey, and Vogel Properties.

Liberty Farms Company

The history of Liberty Island and Liberty Farms begins in November 1917 with the organization of the Liberty Farms Company. Spearheaded by Robert K. Malcolm, the new company soon acquired lands in both Yolo and Solano counties. In April 1918, the State Reclamation Board granted approval for Liberty Farms to construct levees in the Yolo Basin. The reclaimed land established the Liberty Farms Company on an area spanning two islands – the western island (which includes the current Proposed Project Site, but not the Bowsbey Property) and the eastern island (Liberty Island, which now encompasses the Liberty Island Ecological Reserve). Twelve clam shell dredges and fifty traction engines were used to create 35 miles of levees, 150 miles of canals, and to grade the land. Although Liberty Farms Company was organized in 1917, there is little information not related to land acquisition, road construction, or levee work prior to 1936.

Liberty Farms Company leased land to tenants on a share basis, collecting rents, and establishing “camps.” These camps were spread across the lands held by Liberty Farms Company and were numbered somewhat sequentially. Over the years, at least 25 camps were established; however, they did not function concurrently as flooding often removed camps from operation. Very little information is available regarding the tenants of these camps. There is mention of Philippine labor at Camp 14 in May 1936; the list of tenants in 1941 includes the names Kallam, Romani, Shigaki, F. Gianoni, L. Gianoni, Del Prete, and Wakida but no additional information. Beginning in August 1944, likely due to the lack of available Japanese labor due to internment during World War II, Mexican nationals were employed to work the camps.¹¹

Since its inception, the Liberty Farms Property struggled with flooding. Between 1918 and 1973, the island flooded 27 times.¹² The levees of Cache and Hass Sloughs and the West Levee of the Yolo Bypass south of RD 2068 had received little maintenance over the years because there was no formal agreement between the property owners and DWR as required by the State Water Code. DWR recommended the formation of a reclamation district to solve this problem (to become RD 2098). Construction of a permanent West Levee of the Yolo Bypass was approved in April 1961. However, this levee continuously failed, as described above under “Levee Unit 109.” In addition to the funds spent to repair all the damage, this continual battle resulted in the loss of revenue due to areas not being available for farming, crops being planted late, and tenants

¹¹ University of California, Davis, 1918-1974. *Special Collections. Liberty Farms Box 52.*

¹² Dickman, A.I., 1981. “*The Story of Liberty Island: Robert K. Malcolm, Founder.*” Shields Library, Oral History Center, University of California, Davis, CA.

choosing not to renew leases. Esther Malcolm, wife of Robert Malcolm, who had been managing Liberty Farms Company since her husband died in 1951, dissolved the corporation, and sold the assets on March 8, 1973 to the Moresco Brothers Farming Company.¹³ The Moresco brothers continued to farm the area while battling failing levees. In 1991, construction of new levees at the southern tip of the Liberty Farms Property cut off and removed 166 acres from the property; the area is now known as Cache Slough Mitigation Area. In 1997 the 4,250-acre eastern portion became inundated when multiple levees failed; the portion was left inundated and is now known as Liberty Island Ecological Reserve.

Bowlsbey Property

The area known as the Bowlsbey Tract (Bowlsbey Property) was owned by the Bowlsbey family, likely since the early 1950s. Prior to that time, the area was known as the “Moore Tract” and was not developed. Glen A. Bowlsbey and his wife, Sally Lee, began converting the property from sugar beet production to a sheep ranch in the early 1970s. Glen Bowlsbey died in 1976 and Sally soon leased the ranch to the Schene family. The Schene family converted the ranch into a cattle operation and the family continues to run a cattle company on the land today.

Vogel Property

Little archival information is available about the Vogel Property. The Vogel Property was historically utilized for duck hunting. The interior was divided into two basins, with a central berm that separates the two basins and a flood gate that connects to Cache Slough, which can be opened and closed to flood or drain these areas. The property has not been used for duck hunting for at least 5 years.

e. Records Searches, Pedestrian Surveys, and Potential Cultural Resources

On March 23, 2018, Northwest Information Center (NWIC) staff at Sonoma State University conducted a cultural resources records search for the Proposed Project Site and a 0.25-mile buffer (NWIC No. 17-2139). The NWIC maintains the official California Historical Resources Information System records of previous cultural resources studies and recorded cultural resources for Solano County.

The purposes of the records searches were to: (1) determine whether known cultural resources have previously been recorded in or adjacent to the Proposed Project Site; (2) assess the likelihood for unrecorded cultural resources to be present based on historical references and the distribution of nearby resources; and (3) develop a context for the identification and preliminary evaluation of cultural resources. The records search consisted of an examination of the following documents:

- **NWIC base maps:** Liberty Island, CA

¹³ *Ibid.*

- **Resource Inventories:** *National Register of Historic Places-Listed Properties and Determined Eligible Properties (2012), California Register of Historical Resources (2012), California Points of Historical Interest (2012), California Inventory of Historical Resources (1976), California Historical Landmarks (2012), Historic Properties Directory (Solano County), Archaeological Determinations of Eligibility (Solano County).*

The records search revealed no previously recorded archaeological or historic resources were identified in the Proposed Project Site, nor within 0.25-mile radius of the Proposed Project Site. The NWIC has record of 23 previous cultural studies that have been conducted in or within 0.25 mile of the Proposed Project Site. Eleven of the studies on file at the NWIC were classified by the NWIC as *Other Reports* with little to no field work, or were missing maps. Of the remaining twelve studies, ten included portions of the Proposed Project Site.

In August 2018, Sean Jensen of the Genesis Society contacted the California Native American Heritage Commission (NAHC) to request a search of the Sacred Lands File and a list of Native American representatives who may have an interest in the Proposed Project. The Sacred Lands File Search indicated no sacred lands are known to exist within the Proposed Project Site. Contact information was provided for representatives of the Cortina Rancheria-Kletsel Dehe Band of Wintun Indians, the United Auburn Indian Community of the Auburn Rancheria, and Yocha Dehe Wintun Nation (YDWN). Each tribal representative was sent a letter providing information on the Proposed Project and requesting information on or concerns about cultural resources within the site. Letters were mailed in August 2018; no response has been received to this initial outreach to date. Separately, DWR consulted with YDWN pursuant to AB 52. Further information on this consultation may be found in Chapter IV.K, Tribal Cultural Resources.

In 2018, Sean Jensen of the Genesis Society conducted an initial pedestrian survey of the Proposed Project Site. Jensen surveyed the accessible portions of the Proposed Project Site (those not inundated with water) between September and October 2018, using 20-meter intervals. From July 16 to 18, 2019, ESA Archaeologists and Architectural Historians conducted a focused cultural resources pedestrian survey of the resources recorded by Jensen. ESA confirmed Jensen's findings that no archaeological sites were identified.

A search of NOAA's shipwreck database on October 14, 2019 revealed a wreck in Cache Slough, within the 0.25-mile radius, but west of the Proposed Project Site.

i. Newly Identified Built-Environment Elements

ESA identified seven historic-period cultural complexes consisting of 59 total individual elements. These elements consist of 1930s through 1970s buildings and structures associated with local agricultural activities. The Liberty Farms and Bowsbey Properties were collectively assessed as potential historic districts due to the close chronological, geographic, and contextual relationships between the individual features on these properties. Each element identified during field surveys is individually summarized in Table IV.E-1 and described below. Each element is considered against the criteria for eligibility as a state or national historic resource in the impact analysis below.

Table IV.E-1. Cultural Elements Identified in the Proposed Project Site

Designation	Type/Description	Age
Bowlsbey Property	Potential Historic District	Historic
Bowlsbey Main Complex	Buildings, structures	Ca 1957 to post-1974
Bowlsbey Pond 1	Earthen water retention pond on north end of property; triangular shape, measures approximately 320 by 260 feet	Ca 1974
Bowlsbey Pond 2	Earthen water retention pond on south end of property, measures approximately 270 by 175 feet	Ca 1974
Bowlsbey Canals and Roads	Infrastructure elements consisting of earthen canals, concrete lined canals, and dirt access roads	Ca 1974
Liberty Farms Property	Potential Historic District	Historic
Liberty Farms Labor Camp	Remnants of tenant labor camp, including post office, residences, building foundations, concrete demolition pile, barn, and ancillary elements	1952-1968
Liberty Farms Headquarters	Ranch Headquarters, including office and caretaker building	1932-1968
Liberty Farms Camp 2	Remnant of labor camp	Historic
Liberty Farms Camp 7	Residential buildings with ancillary structures	Ca 1937
Liberty Farms Camp 8	Residential buildings, barns, sheds, building foundation, loading dock, ancillary structures	Ca 1937; Ca 1957

Designation	Type/Description	Age
Liberty Farms Camp 9	Equipment sheds, grain dryer and silos, ancillary structures	Ca 1937; Ca 1957
Liberty Farms Canals and Roads	Earthen canal system with unimproved access roads.	Historic
Vogel Property	Building	Historic
Duck Slough (County Levee 64)	Earthen canal measuring 1.65-mile long and approximately 85 feet wide with an unknown depth.	Ca 1908
Lookout Slough (County Levees 17 and 32)	Earthen canal measuring 2.67-mile long, approximately 140 feet wide and 4-feet deep.	Ca 1925
Levee Unit 109 Levees	Structures	Historic
Cache Slough-Hass Slough Levee Unit 1 (Shag Slough Levee)	Earthen trapezoidal levee measuring approximately 5.31-mile-long, 20 feet wide at the crown, and 115 feet wide at the base.	1918-1961
Cache Slough-Hass Slough Levee Unit 2 (Cache Slough Levee)	Earthen trapezoidal levee measuring approximately 2.42-mile-long, 15 feet wide at the crown, and 90 feet wide at the base.	1918-1936
Cache Slough-Hass Slough Levee Unit 3 (Hass Slough Levee)	Earthen trapezoidal levee measuring approximately 1.1-mile-long, 20 feet wide at the crown, and 100 feet wide at the base.	1918-1935
Solano County Levee 18	Earthen levee measuring 1-mile long, 5-foot tall.	Ca 1957

Bowlsbey Property

The Bowlsbey Property consists of the Bowlsbey Main Complex (a collection of mid-century through modern agricultural buildings), related ancillary agricultural elements located along Malcolm Lane (including animal pens, troughs, and fencing), and a water conveyance system consisting of two earthen retention ponds that receive water from Duck Slough and Hass Slough and distribute it via gravity-fed earthen and concrete lined canals that extend throughout the property. The buildings of Bowlsbey Property include laborer housing (both historic, WWII repurposed buildings, and modern mobile homes), storage buildings (including warehouses, sheds, and hay barns), a modern metal animal corral, and other ancillary structures and buildings (water and gasoline tanks, animal pens, fences).

Liberty Farms Property

The Liberty Farms Property is bordered by levees that were constructed to protect the property from flooding. The Liberty Farms Property consists of a collection of discontinuous camps (including Labor Camp, Headquarters, Camp 2, Camp 7, Camp 8, and Camp 9) and a water conveyance system consisting of earthen irrigation channels and access roads that extend throughout the property. The camp sites consist of collections of mid-century through modern agricultural residential and ancillary buildings, building remnants, and related ancillary agricultural elements.

Vogel Building

The Vogel Building site consists of a single historic-age building located on the east side of the small island just south of the Vogel Property. During pedestrian surveys, direct site accessment was not possible due to dense vegetation surrounding the property as well as the presence of Cache Slough, but the building was documented from the Cache Slough East Bank Levee located approximately 175 feet to the east.

Solano County Levee 18 (Vogel Levee)

Solano County Levee 18 is a 1-mile long, 5-foot tall earthen levee surrounding the approximately 70.8-acre Vogel Property on the west side of the Proposed Project Site. Levee 18 surrounds the island on three sides and adjoins the Cache Slough Levee on the north side of the property.

Levee Unit 109 Levees: Hass Slough East Bank, Cache Slough East Bank, and Shag Slough West Bank

The levee surrounding the Proposed Project Site consists of three different levee segments (Hass Slough East Bank, Cache Slough East Bank, and Shag Slough West Bank); all of which are components of the Corps Levee Unit 109/RD 2098 systems. While the levee system within the Proposed Project Site consists of three separate segments of levees as identified by the Corps' National Levee Database, the levees were constructed concurrently as part of Malcolm's 1918 reclamation efforts, and present as one continuous resource.

The Shag Slough Levee, Unit-1, within the Proposed Project Site consists of an approximately 5.3-mile-long segment of earthen trapezoidal levee, located along the eastern edge of the Proposed Project Site. The levee is topped by a roughly 14-foot-wide gravel access road.

The Cache Slough Levee, Unit-2, consists of a roughly 2.4-mile-long segment of earthen trapezoidal levee, located along the western and southern edges of the Proposed Project Site. The levee is topped by a roughly 10-foot-wide gravel access road.

Within the Proposed Project Site, the Hass Slough Levee, Unit-3, consists of an approximately 1.1-mile-long segment of earthen trapezoidal levee, located along the western edge of the Proposed Project Site. The levee is topped by a roughly 12-foot-wide gravel access road.

Duck Slough and Solano County Levee 64

Duck Slough consists of an approximately 1.7 mile long earthen water conveyance channel along the northwest side of the Proposed Project Site, flanked by Solano County Levee 64 on the south side. Duck Slough measures approximately 140 feet wide with an unknown depth, and follows a straight diagonal southwest/northeast alignment connecting Cache Slough in the west with an irrigation network near the intersection of Malcolm Lane and Liberty Island Road.

Lookout Slough and Solano County Levees 17 and 32

Lookout Slough consists of a roughly 2.7 mile-long earthen water conveyance channel bisecting the Proposed Project Site. Lookout Slough measures approximately 85 feet wide with an unknown depth, and provides water to the Liberty Farms Property's' irrigation networks. The slough and levees follow the property boundary between Bowlsbey and Liberty Farms Properties, reflecting a L-shaped alignment extending west and then south from Shag Slough. Lookout Slough is flanked by County Levee 17 on the north side and County Levee 32 on the south side, both of which measure approximately 10 feet tall, 15 to 20 feet tall at the crown, and 75 feet wide at the base.

ii. Archaeological Discussion

ESA archaeological field crews expected domestic deposits, privies, and wells associated with working crews to be found at the work camps and farming complexes, and made a concerted effort to locate these archaeological features at each complex. The lack of such features is herein considered an anomaly for these types of resources.

3. REGULATORY FRAMEWORK

a. Federal Regulations

i. National Register of Historic Places

The National Historic Preservation Act of 1966, as amended, sets forth national policy and procedures for historic properties, defined as districts, sites, buildings, structures, and objects included in or eligible for listing in the National Register of Historic Places (National Register)

("historic properties"). The National Register criteria for evaluation are defined at 36 CFR 60.4 as follows: The quality of significance in American history, architecture, archaeology, and culture is present in districts, sites, buildings, structures, and objects of state and local importance that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and meet the following:

1. Are associated with events that have made a contribution to the broad pattern of our history;
2. Are associated with the lives of people significant in our past;
3. Embody the distinct characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or,
4. Have yielded, or are likely to yield, information important in prehistory or history.

b. State Regulations

ii. California Register of Historic Resources

The California Register of Historical Resources (California Register) established a list of those properties which are to be protected from substantial adverse change (Public Resources Code Section 5024.1). A historical resource may be listed in the California Register if it meets any of the following criteria:

1. It is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage.
2. It is associated with the lives of persons important in California's past.
3. It embodies the distinctive characteristics of a type, period, region or method of construction, or represents the work of an important creative individual, or possesses high artistic value.
4. It has yielded or is likely to yield information important in prehistory or history.

Similar to the National Register, a resource must meet one of the above criteria and retain integrity. The California Register uses the same seven aspects of integrity as the National Register.

The California Register includes properties that are listed or have been formally determined to be eligible for listing in the National Register, State Historical Landmarks, and eligible Points of

Historical Interest. Other resources require nomination for inclusion in the Register. These may include resources contributing to the significance of a local historic district, individual historical resources, historical resources identified in historic resource surveys conducted in accordance with State Historic Preservation Office procedures, historic resources or districts designated under a local ordinance consistent with Commission procedures, and local landmarks or historic properties designated under local ordinance.

iii. California Environmental Quality Act

CEQA requires public agencies to consider the effects of their actions on both historical resources and unique archaeological resources. Pursuant to Public Resources Code Section 21084.1, a “project that may cause a substantial adverse change in the significance of an historical resource is a project that may have a significant effect on the environment.” Pursuant to Public Resources Code Section 21084.2, a “project with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a significant effect on the environment.” Section 21083.2 requires agencies to determine whether projects would have effects on unique archaeological resources.

Historical Resources

“Historical resource” is a term with a defined statutory meaning (Public Resources Code Section 21084.1; determining significant impacts to historical and archaeological resources is described in the State CEQA Guidelines, Sections 15064.5[a] and [b]). Under State CEQA Guidelines Section 15064.5(a), historical resources include the following:

1. A resource listed in, or determined to be eligible by the State Historical Resources Commission, for listing in the California Register (Public Resources Code Section 5024.1).
2. A resource included in a local register of historical resources, as defined in Section 5020.1(k) of the Public Resources Code or identified as significant in a historical resource survey meeting the requirements of Section 5024.1(g) of the Public Resources Code, would be presumed to be historically or culturally significant. Public agencies must treat any such resource as significant unless the preponderance of evidence demonstrates that it is not historically or culturally significant.
3. Any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California may be considered to be a historical resource, provided the lead agency’s determination is supported by substantial evidence in light of the whole record. Generally, a resource would be considered by the lead agency to be historically significant if the resource meets the criteria for listing in the California Register of Historical Resources (Public Resources Code Section 5024.1).

4. The fact that a resource is not listed in or determined to be eligible for listing in the California Register of Historical Resources, not included in a local register of historical resources (pursuant to Section 5020.1[k] of the Public Resources Code), or identified in a historical resources survey (meeting the criteria in Section 5024.1[g] of the Public Resources Code) does not preclude a lead agency from determining that the resource may be an historical resource as defined in Public Resources Code Section 5020.1(j) or 5024.1.

Unique Archaeological Resources

CEQA also requires lead agencies to consider whether projects would affect unique archaeological resources. Public Resources Code Section 21083.2, subdivision (g), states that unique archaeological resource means an archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:

1. Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information.
2. Has a special and particular quality such as being the oldest of its type or the best available example of its type.
3. Is directly associated with a scientifically recognized important prehistoric or historic event or person.

iv. Discoveries of Human Remains under California Health and Safety Code Section 7050.5 and Public Resources Code Section 5097

In the event of discovering human remains, there shall be no further excavation or disturbance of the remains until they are examined by the Solano County Coroner. The Coroner has two working days to determine the nature of those remains. If the Coroner determines that the remains are Native American, he/she must contact the Native American Heritage Commission (NAHC) by telephone within 24 hours.

Once the NAHC has been notified of the discovery of Native American human remains, it shall immediately notify those persons believed to be the most likely descendants. The most likely descendants may inspect the site of the discovery and recommend to the owner methods of treating, with dignity, the human remains and any associated grave goods. The descendants shall complete their inspection and make recommendations or preferences for treatment within 48 hours of being granted access to the site.

v. California Native American Historical, Cultural, and Sacred Sites Act

The California Native American Historical, Cultural, and Sacred Sites Act applies to both State and private lands. The Act requires that upon discovery of human remains, that construction or

excavation activity cease and that the county coroner be notified. If the remains are of a Native American, the coroner must notify the NAHC. The NAHC then notifies those persons most likely to be descended from the Native American's remains. The Act stipulates the procedures the descendants may follow for treating or disposing of the remains and associated grave goods.

c. Local Regulations

i. Solano County General Plan

For discussion purposes, the following have been considered in the analysis of potential impacts and identification of mitigation, as needed.

The Solano County General Plan identifies two primary issues affecting the maintenance and preservation of cultural resources: 1) the need to improve consultation with Native American groups in the context of land use decisions, 2) the ability to leverage the county's historic capital for economic pursuits. Solano County subsequently outlines a series of policies pertinent to the maintenance and preservation of historic resources. Policies relevant to the Proposed Project are outlined below:

- RS.P-38: Identify and preserve important prehistoric and historic structures, features, and communities;
- RS.I-25: Require cultural resources inventories of all new development projects in areas identified with medium or high potential for archaeological or cultural resources. Where a preliminary site survey finds medium to high potential for substantial archeological remains, the County shall require a mitigation plan to protect the resource before issuance of permits.

4. ENVIRONMENTAL IMPACTS

a. Thresholds of Significance

Based on Appendix G of the CEQA Guidelines, a project would have a significant impact on cultural resources if the project would:

- (a) Cause a substantial adverse change in the significance of a historical resource as defined in Section 15064.5;
- (b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5;
- (c) Disturb any human remains, including those interred outside of formal cemeteries.

*i. Issues Not Evaluated Further*Historical Resources

As described below, no historic resources were identified on the Proposed Project Site. The seven historic-period cultural complexes consisting of 59 total individual elements, recorded during the pedestrian survey, were evaluated against National and California register criteria. None of the buildings or structures were found to be eligible for listing in the California Register or National Register and therefore are not considered historical resources under CEQA. As a result, Proposed Project construction and operation would have no impact on historical resources. This issue is not analyzed further.

b. Methods and Evaluation

This section contains the methods by which all identified resources were evaluated for their potential importance under CEQA and what, if any, impacts could be expected.

i. Application of National Register and California Register Criteria

National and California register criteria were used to evaluate the historic significance of the buildings and structures on the Proposed Project Site. The National Register criteria for eligibility are codified in 36 CFR Part 60 and explained in guidelines published by the Keeper of the National Register. The National and California register are discussed in more detail above under "Regulatory Framework." Eligibility for listing on the National and the California register rests on twin factors of significance and integrity. A resource must have both significance and integrity to be considered eligible. Loss of integrity, if sufficiently great, would become more important than the historical significance a resource may possess and render it ineligible. Likewise, a resource can have complete integrity, but if it lacks significance, it must also be considered ineligible.

The evaluations below use the letter/number criterion references from the National and California register, respectively. The evaluations are also based on the U.S. Department of the Interior, National Park Service Bulletin 15, How to Apply the National Register Criteria for Evaluation, which is the recognized national standard for evaluation of historic significance (U.S. Department of the Interior 2013).

Bowlsbey Property

Archival review did not determine that Bowlsbey Property possesses significant association with early-twentieth century reclamation or mid-twentieth century agricultural events. Review of County Assessor and Recorder records, historic newspapers, and discussions with the property owner, failed to identify any significant persons associated with the property. Therefore, neither Bowlsbey Property, nor its individual components, are eligible under Criteria A/1 (significant events) or B/2 (significant persons). The collection of building, structures, and ancillary components associated with Bowlsbey Property do not significantly embody the characteristics of a distinctive type, period, or method of construction, and therefore are not eligible for the National or California Registers under Criteria C/3 (architectural distinction). Additional study of

this typical agricultural property and its utilitarian buildings and structures is unlikely to yield any additional information (Criterion D/4).

As the Bowsbey Property does not meet the requirements of Criteria A/1–D/4, and has lost the majority of its integrity due to the demolition or modification of historic-era building and structures and construction of new buildings and structures, it would not be eligible for the National or California registers, either as a district nor in terms of any of its individual components. Therefore, the Bowsbey Property would not be considered a historical resource under CEQA.

Liberty Farms Company

Archival review did not determine that Liberty Farms Company possesses significant association with early-twentieth century reclamation or mid-twentieth century agricultural events. By the time the 6,000 acres of Liberty Farms Company was established in 1918, 417,000 total acres had already been reclaimed in the Sacramento-San Joaquin Delta. The earliest large-scale reclamation projects in the Delta occurred at Sherman Island (1868) and Twitchell Island (1869); about 14,000 acres were enclosed at Sherman Island. Additionally, while Robert Malcolm spearheaded the efforts to reclaim Liberty Island, he did not work in isolation nor appear to have achieved significant regional or state recognition for his efforts. Therefore, neither the Liberty Farms Property, its camps, nor its individual components, are eligible under Criteria A/1 (significant events) or B/2 (significant persons). As a large scale agricultural property typical for its age, use, and location, the collection of building, structures, and ancillary components associated with the Liberty Farms Property do not significantly embody the characteristics of a distinctive type, period, or method of construction, or represent the work of a master architect or builder (Criterion C/3). Both as a district or in terms of its individual components, the Liberty Farms Property does not have the potential to yield information important to an understanding of the prehistory or history of the local area, the state, or the nation (Criterion D/4).

The Liberty Farms Property retains its integrity of location within RD 2098; however, the Liberty Farms Property is the 1,750-acre westerly portion of a 6,000-acre area originally reclaimed by the Liberty Farms Company in 1918; the 4,250-acre eastern portion, now known as Liberty Island Ecological Reserve, became inundated in 1997 when multiple levees failed. This, combined with the ongoing demolition or modification of historic-era building and structures, as well as the construction of new buildings and structures, has resulted in impacts to the integrity of design, association, materials, workmanship, and feeling. The property does not possess the feeling or appearance of a mid-twentieth century farming operation, and lacks the physical integrity necessary to convey any such association with its historical use. As the Liberty Farms Property does not meet the requirements of Criteria A/1–D/4, and has lost the majority of its integrity, it would not be eligible for the National or California Registers. Therefore, the Liberty Farms Property, including its camps and individual components, would not be considered a historical resource under CEQA.

Vogel Building

The building appears to have originally been constructed in the 1930s as a private duck hunting cabin, used for personal local recreational activities within the Proposed Project vicinity. Review

of historic newspapers, archival materials at UC Davis Special Collections, and review of County Assessor and Recorder records failed to indicate any unique or significant associations between this property and twentieth century hunting activities. Therefore, the building does not appear eligible under Criteria A/1 (significant events) or B/2 (significant persons). As a recreational structure typical for its age, use, and location, the building does not significantly embody the characteristics of a distinctive type, period, or method of construction, or represent the work of a master architect or builder (Criterion C/3). Furthermore, the Vogel Building does not have the potential to yield information important to an understanding of the prehistory or history of the local area, the state, or the nation (Criterion D/4).

The ongoing modifications the building has undergone through its history, in addition to more recent collapse and damage from flooding and vegetation on the eastern façade, have resulted in the loss of physical integrity necessary to convey any historic significance the property may have had. As the building does not meet the requirements of Criteria A/1–D/4, and has lost the majority of its integrity, it is not eligible for the National or California registers. The Vogel Building is not eligible for listing in the California or National registers as an individual historic property and is not considered a historical resource under CEQA.

Solano County Levee 18

This levee represents typical agricultural improvements undertaken by property owners within the region during the twentieth century, and well post-dates most typical reclamation activities. Neither the property nor the levee appear significantly associated with reclamation, agricultural, or recreational activities within the region. Therefore, the levee does not appear eligible under Criteria A/1 (significant events) or B/2 (significant persons). The levee does not significantly embody the characteristics of a distinctive type, period, or method of construction, or represent the work of a master architect or builder (Criterion C/3). Finally, the levee was fully documented in the field and further study of the levee is unlikely to yield any new information regarding the agricultural history of the area or levee construction techniques. Therefore, Solano County Levee 18 does not appear eligible for listing under Criterion D/4.

The levee retains its physical integrity; however, as the levee does not meet the requirements of Criteria A/1–D/4, it is not eligible for listing in the California or National registers as an individual historic property as it does not meet the criteria for listing. As such, it would not be considered a historical resource under CEQA.

Levee Unit 109 Levees: Hass Slough East Bank, Cache Slough East Bank, and Shag Slough West Bank

The levee system within the Proposed Project Site does not appear significantly associated with reclamation or flood control activities within the region, but rather is part of a much larger system of flood control that spans the entire Delta and Sacramento River areas. Additionally, review of Corps records failed to identify any significant persons associated with the levees or their construction. Therefore, the levee segments associated with Levee Unit 109 do not reflect a significant or unique association with these activities and do not appear individually eligible under Criteria A/1 (significant events) or B/2 (significant persons). All three levee segments are typical

earthen structures, utilitarian with no distinct features and do not significantly embody the characteristics of a distinctive type, period, or method of construction, or represent the work of a master architect or builder (Criterion C/3). Finally, the levee segments associated with Unit 109 were fully documented in the field and further study is unlikely to yield any new information regarding the agricultural history of the area or levee construction techniques. Therefore, the levees do not appear eligible for listing under Criterion D/4.

The ongoing maintenance and the 1989 construction of the cross levee segment cutting off a portion of the original design have noticeably altered the Cache Slough Levee, which no longer follows the natural alignment of Cache Slough; therefore, the other criteria of integrity, including design, workmanship, materials, setting, feeling, and association, are no longer readily apparent. As the levees do not meet the requirements of Criteria A/1–D/4, and do not retain sufficient physical integrity to reflect their original 1918 design or SRFCP appearance, they are not eligible for the National or California Registers. As such, it would not be considered a historical resource under CEQA.

Duck Slough and Solano County Levee 64

While the Duck Slough channel appears to date to the early twentieth century, archival review identified no specific information regarding the channel, its construction, or its use. Additionally, review of County Assessor and Recorder records and historic newspapers failed to identify any significant persons associated with the channel or levee. Therefore, these resources do not appear eligible under Criteria A/1 (significant events) or B/2 (significant persons). As a privately owned and maintained irrigation channel and levee typical for their age and location, neither appear to significantly embody the characteristics of a distinctive type, period, or method of construction, or represent the work of a master architect or builder (Criterion C/3). Finally, the Duck Slough and Solano County Levee 64 were fully documented in the field and further study is unlikely to yield any new information regarding the agricultural history of the area or levee construction techniques (Criterion D/4).

While the channel appears to have been widened since its original turn of the century construction, the levee retains its physical integrity reflecting its mid-twentieth century construction and operation. However, as neither resource meets the requirements of Criteria A/1–D/4, they are not eligible for the National or California Registers. Therefore, Duck Slough and Solano County Levee 64 would not be considered historical resources under CEQA.

Lookout Slough and Solano County Levees 17 and 32

While the Lookout Slough channel appears to date to the early twentieth century, archival review identified no specific information regarding the channel, its construction, or its use beyond providing water to the Liberty Farms Property. Additionally, review of County Assessor and Recorder records and historic newspapers failed to identify any significant persons associated with the channel or levees. Therefore, the levee does not appear eligible under Criteria A/1 (significant events) or B/2 (significant persons). As a privately owned and maintained irrigation channel and levees typical for their age and location, neither resource significantly embody the characteristics of a distinctive type, period, or method of construction, or represent the work of a

master architect or builder (Criterion C/3). Furthermore, Lookout Slough and its associated Solano County Levees 17 and 32 were fully documented in the field and further study of the levee is unlikely to yield any new information regarding the agricultural history of the area or levee construction techniques (Criterion D/4).

While both have been machine maintained throughout the course of their operation, the channel and levees appear to have retained much of their physical integrity reflecting their early/mid-twentieth century construction and operation. However, as none of these resources meet the requirements of Criteria A/1–D/4, they are not eligible for the National or California Registers. As such, they would not be considered a historical resource under CEQA.

c. Proposed Project Impacts and Mitigation Measures

i. Substantial Adverse Change in the Significance of an Archaeological Resource as Defined in Section 15064.5

No known prehistoric or historic-period archaeological resources have been documented within the Proposed Project site. The pedestrian survey did not identify any archaeological sites. The shipwreck located within Cache Slough is west of the Proposed Project Site and would not be affected by Proposed Project actions.

The Proposed Project Site's Quaternary age surficial geology and soils, with exception to two small areas at the northwest boundary, are from the Holocene to Historic-era (11,800 to 150 years). Two small areas of Latest-Pleistocene basin deposits are located at the northwestern boundary of the Proposed Project Site. The potential for presence of buried archaeological deposits is typically high in locations in the Proposed Project Site with Holocene to Historic-era aged surficial geology and soils, while areas with Latest-Pleistocene aged surficial geology and soils has a low potential for buried deposits.

As described previously, this specific location does not appear to be sensitive for containing buried intact indigenous resources. Furthermore, tribes with knowledge of potential resources were contacted and did not indicate the likely presence of any buried archaeological resources in the Proposed Project Site.

Although unlikely, should accidental discoveries of potential archaeological resources be discovered during ground disturbance, the Contractor would be required to comply with Mitigation Measure CULT-1, which requires work stoppage in the vicinity of any potentially unique archaeological resource, as well as implementation of a mitigation plan should any unique archaeological resources be identified. Potential resources which may trigger a work stoppage may include but are not limited to: obsidian and chert flaked-stone tools or toolmaking debris; culturally darkened soil (midden) containing fire-affected rock, artifacts, or shellfish remains; and groundstone artifacts (e.g., mortars, pestles, handstones); battered stone tools, such as hammer stones and pitted stones. Historic-era materials might include stone, concrete, or adobe footings and walls; filled wells or privies; and deposits of metal, glass, and/or ceramic refuse.

Any mitigation plan written to avoid adverse impacts to a unique archaeological resource would be written to the satisfaction of a qualified archaeologist, minimizing the likelihood of adverse

changes to the significance of any archaeological resources. Accordingly, impacts to the significance of unique archaeological resources would be ***less than significant with mitigation incorporated***.

Mitigation Measure CULT-1: Stop Work for Accidental Archaeological Discoveries

If pre-contact or historic-era archaeological resources are encountered by construction personnel during project construction, all construction activities within 100 feet shall halt until a qualified archaeologist, defined as one meeting the Secretary of the Interiors Standards for Archeology, can assess the significance of the find. Pre-contact archaeological materials might include obsidian and chert flaked-stone tools (e.g., projectile points, knives, scrapers) or toolmaking debris; culturally darkened soil (midden) containing fire-affected rock, artifacts, or shellfish remains; and groundstone artifacts (e.g., mortars, pestles, handstones); battered stone tools, such as hammer stones and pitted stones. Historic-era materials might include stone, concrete, or adobe footings and walls; filled wells or privies; and deposits of metal, glass, and/or ceramic refuse.

If it is determined that the Proposed Project could damage a unique archaeological resource, construction shall cease in an area determined by a qualified archaeologist until a mitigation plan has been prepared and implemented to the satisfaction of the qualified archaeologist, DWR, the lead federal agency as applicable, and, if the resource is indigenous, relevant Native American representatives. The mitigation plan shall recommend preservation in place, or, if preservation in place is not feasible, data recovery through excavation.

If preservation in place is not feasible, a qualified archaeologist shall prepare and implement a detailed treatment plan to recover the scientifically consequential information from the resource prior to any excavation at the resource site. The treatment plan shall be prepared in consultation with DWR, the federal lead agency as applicable, and, if the resource is indigenous, relevant Native American representatives. Treatment for most resources would consist of (but would not necessarily be limited to) sample excavation, artifact collection, site documentation, and historical research, with the aim to target the recovery of important scientific data contained in the portion(s) of the significant resource to be impacted by the Proposed Project. The treatment plan shall include provisions for analysis of data in a regional context, reporting of results within a timely manner, curation of artifacts and data at an approved facility, and dissemination of reports to local and state repositories, libraries, and interested professionals.

ii. Disturbance of Human Remains, including Outside of Formal Cemeteries

Based on documentary research, no evidence suggests that any prehistoric or historic-era marked or un-marked human interments are present within or in the immediate vicinity of the Proposed Project site. However, the location of grave sites and Native American remains can occur outside of identified cemeteries or burial sites. Therefore, there is a possibility that

unmarked, previously unknown graves could be present within the Proposed Project Site and could be uncovered by construction activities related to the Proposed Project.

California law recognizes the need to protect Native American human burials, skeletal remains, and items associated with Native American burials from vandalism and inadvertent destruction. The procedures for the treatment of Native American human remains are contained in California Health and Safety Code sections 7050.5 and 7052 and Public Resources Code Section 5097.

These statutes require that if human remains are discovered, potentially damaging ground-disturbing activities in the area of the remains shall be halted immediately, and the Solano County coroner and the NAHC shall be notified immediately. If the remains are determined by NAHC to be Native American, the guidelines of the NAHC shall be adhered to in the treatment and disposition of the remains. Following the coroner's findings, the NAHC-designated Most Likely Descendant and the landowner shall determine the ultimate treatment and disposition of the remains and take appropriate steps to ensure that additional human interments, if present, are not disturbed. The responsibilities for acting upon notification of a discovery of Native American human remains are identified in Public Resources Code Section 5097.94.

Compliance with California Health and Safety Code Sections 7050.5 and 7052 and Public Resources Code Section 5097, requires avoidance or minimization of disturbance of human remains, and appropriate treatment of any remains that are discovered. Therefore, this impact would be ***less than significant***.

IV. ENVIRONMENTAL IMPACT ANALYSIS

F. HAZARDS AND HAZARDOUS MATERIALS

1. INTRODUCTION

This section of the Draft EIR evaluates potential hazards that may result from implementation of the Proposed Project. Hazardous materials that could be introduced as a result of project implementation and potential exacerbation of existing on-site hazards associated with the Proposed Project are assessed. The analysis in this section is based on the following technical reports prepared in support of the Proposed Project, which are included in the Appendix and available upon request from FRPA@water.ca.gov. Please include a subject line of "Lookout Slough Information Request".

- Appendix J – Phase I Environmental Site Assessment (Phase I ESA): Lookout Slough Restoration Project [Bowlsbey and Vogel Properties], WRA, February 2017.
- Appendix K – Phase II Environmental Site Assessment (Phase II ESA): Cache Slough Project Property [Bowlsbey and Vogel Properties], ENGEO, February 2017.
- Appendix L – Phase I ESA: Liberty Island Ranch [Liberty Farms Property], WRA, June 2017.
- Appendix M – Phase II ESA: Liberty Island Ranch [Liberty Farms Property], Blackburn Consulting, September 2017.
- Appendix N – Hazardous Materials Survey Report (ACM/Lead), Liberty Island Ranch (Liberty Farms Property), Blackburn Consulting, November 2-17.

2. ENVIRONMENTAL SETTING

a. Existing On-Site Hazards

i. Environmental Site Assessments

Two Phase I ESAs were performed for the Proposed Project Site, one for the Bowlsbey and Vogel Properties and one for the Liberty Farms Property. Each Phase I was intended to identify any on-site contamination that could require further due diligence or cleanup prior to site acquisition and ecosystem restoration. The Phase I ESAs identified potential areas of concern at the Bowlsbey, Vogel, and Liberty Farm properties. Each Phase I ESA used a combination of real estate documents, database searches, observed on-site conditions, and information provided by the previous occupant of each property. No potential hazardous material concerns were identified within the Vogel Property and no further analysis was conducted. Potential concerns identified in the Bowlsbey and Liberty Farms Properties include potential contamination with volatile organic compounds, metals, and petroleum products. These preliminary results indicated the need for further study to accurately assess whether hazardous materials concerns exist. A Phase II ESA was therefore conducted for each property. The results of these investigations are discussed for each property below.

Phase II ESA for the Bowsbey property

The environmental testing program at the Bowsbey Property focused on the areas of concern that were identified in the Phase I ESA. This investigation included using a magnetometer to determine if an unknown pipe might be connected to an underground storage tank, as well as collecting and analyzing 16 soil samples from eight borings surrounding a waste oil collection area and an aboveground gasoline storage tank. The results of the Phase II ESA for the Bowsbey Property are summarized below:

- The unknown pipe is not connected to an underground storage tank. The pipe is part of an abandoned gas well/pipe network and does not present an environmental risk.
- Review of the laboratory soil test results from around the waste collection area and the aboveground gasoline storage tank found detectable concentrations of metallic analytes, volatile organic compounds, and petroleum hydrocarbons in the soil samples; however, with the exception of one sample, reported concentrations of detectable analytes are below established screening levels.
- One soil sample in the vicinity of the waste collection area exhibited a petroleum hydrocarbon concentration that slightly exceeds the residential screening level but is below the environmental screening level. This slightly elevated hydrocarbon concentration is considered isolated and does not appear to be indicative of a greater environmental impact to on-site soils.
- Chromium samples were taken in the vicinity of a waste oil collection area, storage shed, and aboveground storage tank and was detected in several soil samples at levels low enough to be safe if the soils are left undisturbed but high enough to require additional testing if soils are excavated or off-hauled.

Phase II ESA for the Liberty Farms Property

The environmental testing program at the Liberty Farms Property was focused on the areas of concern that were identified in the Phase I ESA. This included a soil sampling and testing program to identify the potential for hazardous materials associated with previous agricultural activities. Soil samples were collected and analyzed based on the locations of barns, storage areas, visible soil stains, former locations of herbicide applicator tanks, and former locations of underground storage tanks. The results of the Phase II ESA for the Liberty Farms Property are summarized below:

- Moderate impacts were found to soil from previous agricultural activities and there were no additional areas of concerns.
- Concentrations above environmental screening levels were found at sample locations for insecticides, lead, arsenic, and petroleum hydrocarbons in the vicinity of existing infrastructure on the eastern portion of the property such as storage sheds and buildings.
- The insecticides that were found were primarily located within and around the existing storage building.

- The petroleum hydrocarbons were found in the general area of the former fuel aboveground storage tank.

ii. Asbestos-containing Materials and Lead in Existing Buildings

A Hazardous Material Survey Report for the Liberty Farms Property was performed in 2017. The report documented known and potential asbestos-containing materials and/or sources of lead located at the Liberty Farms Property. The results of the survey found or assumed the presence of asbestos-containing materials in nine un-useable residential structures and three barns. The results of the survey also found existing paints and glazed ceramic tiles known or assumed to contain lead in these same structures.

iii. Natural Gas Wells and Pipelines

The Proposed Project Site sits atop a formerly actively extracted natural gas field, the Maine Prairie Gas Field. For discussion of the field's history and available reserves, please see Chapter IV.H, Mineral Resources. According to available records from the California Department of Conservation's Division of Oil, Gas, and Geothermal Resources (DOGGR), all natural gas extraction and transportation infrastructure such as wells and pipelines within the Proposed Project Site have been plugged and abandoned in compliance with all applicable regulations. The location of natural gas infrastructure within the Proposed Project Site is depicted in Figure IV.F-1.

b. Removal of Hazardous Materials and Site Safety Risks

The current landowner is in the process of remediating or removing known hazardous materials and removing abandoned and unused structures that represent safety risks as part of its ongoing agricultural activities. The remediation of hazardous materials will be performed in accordance with State regulations and guidelines. These actions will be completed before the start of Proposed Project.

The following is a list of hazardous material that will be removed from the site prior to the start of the Proposed Project:

- Remediation of identified hazardous materials that were identified in the Phase II ESA report for the Bowsbey Property to be above established screening levels;
- Remediation of identified hazardous materials that were identified in the Phase II ESA report for the Liberty Farms Property to be above established screening levels;
- Removal and abatement of asbestos-containing materials, and paints and ceramic tiles containing lead from buildings.

c. Hazardous Sites (Cortese List)

The provisions of Government Code 65962.5 require the Department of Toxic Substance Control, the State Water Resources Control Board, the California Department of Health Services, and the California Integrated Waste Management Board to submit information pertaining to sites associated with solid waste disposal, hazardous waste disposal, and/or hazardous materials

releases to the Secretary of California EPA. Based on a review of regulatory databases,¹ including listed hazardous materials release sites compiled pursuant to Government Code 65962.5, the Proposed Project Site is not listed as a hazardous materials site. The nearest such site is located approximately 2.2 miles south of the Proposed Project's southern border, on Liberty Island Road 1,100 feet south east of the Hastings Island Bridge. The site is inactive and potentially contaminated with petroleum.

d. Emergency Response/Evacuation

Solano County's Office of Emergency Services works jointly with public agencies such as the sheriff's department and Solano Metropolitan Transportation to administer the Emergency Operation Plan.² Evacuation procedures are administered by Solano County General Services, the Solano County Sheriff, and the Office of Emergency Services. The Sheriff's Office is charged with identifying evacuation routes during any given evacuation event. While a unique evacuation route is selected during each disaster, major evacuation routes include major highways such as highways 85, 505, and 12³ as well as interstates 80 and 680.⁴ The closest of these to the Proposed Project Site are Interstate 80 and Highway 12. Interstate 5 is another major highway proximate to the Proposed Project and could be utilized during an evacuation event.

e. Wildfire Hazards

The California Department of Forestry and Fire Protection (CalFire) has mapped areas in Solano County with significant fire hazards based on fuels, terrain, weather, and other relevant factors. These zones, referred to as Very High Fire Hazard Severity Zones, are classified by the CalFire Director in accordance with Government Code Sections 51175-51189 to assist responsible local agencies in identifying measures to reduce the potential for losses of life, property, and resources from wildland fire. According to CalFire, the Proposed Project Site is not located within a Fire Hazard Severity Zone, but the site is located adjacent to a Moderately High Fire Hazard Severity Zone just west on the Zanetti Property.⁵

¹ State Water Resources Control Board, 2011. GeoTracker Environmental Database. <http://www.envirostor.dtsc.ca.gov/public/>. Accessed on 6/22/2018..

² Solano County, "Emergency Operation Plan (EOP)," 2017, 110.

³ Solano County Office of Emergency Services, "Solano County Emergency Operations Plan - Evacuation Annex," January 2017, <https://www.solanocounty.com/civicax/filebank/blobdload.aspx?BlobID=13275>.

⁴ Solano County, "Solano County General Plan - Chapter 5," n.d.

⁵ CAL FIRE. 2007. Available at: http://www.fire.ca.gov/fire_prevention/fhsz_maps_solano. Accessed August 1, 2018.



- Property Boundary (3,378 ac.)
- Plugged Gas Well
- PGE ESMT Location
- Gas Pipe

Figure IV.F-1. Natural Gas Wells and Pipelines in the Proposed Project Site

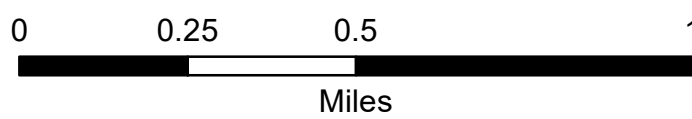


Map Prepared Date: 12/5/2019
 Map Prepared By: njander
 Base Source: Wood Rogers
 Base Date: 10/24/17
 Data Source(s): WRA

Prepared by:



Lookout Slough Tidal Habitat Restoration and Flood Improvement Project



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3. REGULATORY FRAMEWORK

a. Federal Regulations

i. National Emission Standards for Hazardous Air Pollutants

The USEPA, National Emission Standards for Hazardous Air Pollutants, (Code of Federal Regulations Title 40 Part 61), requires an owner or operator of a demolition or renovation project to thoroughly inspect at affected facilities or part of the facility where the demolition or renovation will occur for the presence of asbestos-containing materials prior to the commencement of that project.

ii. Resource Conservation and Recovery Act (RCRA)

RCRA (United States Code, Title 42, Section 6901 et seq.) provides USEPA with the authority to control hazardous waste from cradle-to-grave. This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. The 1984 federal Hazardous and Solid Waste Amendments to RCRA focus on waste minimization and phasing out land disposal of hazardous waste, as well as corrective actions for releases. Other mandates of this law include increased enforcement authority for USEPA, more stringent hazardous waste management standards, and a comprehensive underground storage tank program. The 1986 RCRA amendments enabled USEPA to address environmental problems from underground tanks storing petroleum and other hazardous substances. RCRA also sets forth a framework for the management of non-hazardous solid wastes.

RCRA Section 3006 allows USEPA to authorize state hazardous waste programs. Once authorized, the state program operates in lieu of the federal program, although USEPA retains enforcement authority even after a state program has been authorized. In 1992, the California Department of Toxic Substance Control received authorization from USEPA to implement RCRA requirements and regulations pertaining to the generation, transportation, treatment, storage, and disposal of hazardous waste in California. The Department of Toxic Substances Control is therefore the primary authority for enforcing RCRA's hazardous waste requirements in California.

iii. Toxic Chemical Release Inventory (Section 313) Toxic Substances Control Act (TSCA)

TSCA (Title 15, United States Code, Section 2601 et seq.) gives the USEPA authority to establish reporting, record keeping and testing requirements, and restrictions relating to chemical substances and/or mixtures. In 2016, the Frank R. Lautenberg Chemical Safety for the 21st Century Act updated TSCA, expanding the scope of chemical safety evaluations and providing measures for enhanced transparency of chemicals' hazards. TSCA addresses the production, import, use, and disposal of specific chemicals, including asbestos and lead-based paint.

iv. The Clean Water Act (CWA)

The CWA (Title 33, United States Code, Section 1251 et seq.) establishes the institutional structure for USEPA to regulate discharges of pollutants into the waters of the United States, establish water quality standards, conduct planning studies, and provide funding for specific grant projects. The USEPA has provided most states with the authority to administer many of the provisions of the CWA. In California, the State Water Board has been designated by USEPA to

develop and enforce water quality objectives and implementation plans. The State Water Board has delegated these responsibilities to nine RWQCBs throughout California, including the Central Valley RWQCB, which has jurisdiction over the Proposed Project Site. The Central Valley RWQCB regionally administers several programs under the CWA, including maintaining a list of impaired water bodies in the region and establishing Total Maximum Daily Loads (TMDLs) for these bodies, regulating waste discharges to surface water under the National Pollutant Discharge Elimination System (NPDES) program, and overseeing underground storage tank cleanup.

Section 301 of the Act requires the preparation of Spill Prevention Containment and Countermeasure (SPCC) plans. These Plans help facilities prevent oil spill, as well as control a spill should one occur. A Spill Prevention, Control, and Countermeasure Plan shall be developed and implemented) to minimize the potential for, and effects from, spills of hazardous, toxic, and petroleum substances during construction and operation activities, as well as minimize the effects of unearthing previously undocumented hazardous materials. The SPCC Plan shall be completed and provided to DWR before any construction activities begin. Implementation of this measure shall comply with State and federal water quality regulations. The Spill Prevention, Control, and Countermeasure Plan may be a dedicated plan or may be integrated into construction drawings.

The Spill Prevention, Control, and Countermeasure Plan shall include at minimum, the following:

- A description of spill sources and spill pathways in addition to the actions that shall be taken in the event of a spill (e.g., an oil spill from engine refueling shall be cleaned up immediately with oil absorbents) or the exposure of an undocumented hazard.
- Descriptions of containment facilities and practices, such as double-walled tanks, containment berms, emergency shut-offs, drip pans, fueling procedures, and spill response kits
- A description of how and when employees are trained in proper handling procedures, as well as spill prevention and response procedures.
- A discussion of hazardous materials management, including delineation of hazardous material and hazardous waste storage areas, ingress and egress routes, waterways, emergency assembly areas, temporary hazardous waste storage areas, and disposal processes/locations.
- Hazardous material handling, cleanup, and disposal methods recommended by the California Department of Transportation, the Central Valley Water Board, and the Solano County Department of Environmental Health.
- Materials Safety Data Sheets for all chemicals used and stored on-site.

If a spill is reportable, the construction contractor's superintendent shall take action to contact the appropriate safety and cleanup crews to ensure that the Spill Prevention, Control, and Countermeasure Plan is followed. A written description of reportable releases shall be submitted to the Central Valley Water Board and the California Department of Toxic Substances Control. This submittal shall contain a description of the release, including the type of material and an estimate of the amount spilled, the date of the release, an explanation of why the spill occurred,

and a description of the steps taken to prevent and control future releases. The releases shall be documented on a spill report form.

v. Safe Drinking Water Act

The Safe Drinking Water Act (United States Code Title 42, Section 300f et seq. 6939b; United States Code Title 15, Section 1261 et seq.) was originally passed by Congress in 1974 to protect public health by regulating the nation's public drinking water supply. Safe Drinking water Act authorizes USEPA to set national health-based maximum contaminant levels for drinking water to protect against both naturally occurring and human-made contaminants that may be found in drinking water. USEPA, state regulatory agencies, and water systems managers then work together to ensure these standards are met. The law was amended in 1986 and 1996 and requires many actions to protect drinking water and its sources, including rivers, lakes, reservoirs, springs, and groundwater wells. USEPA protects underground sources of drinking water, and many environmental regulations use the maximum contaminant levels for environmental clean-up standards. The maximum contaminant levels are divided into six broad classes of drinking water pollutants: microorganisms, disinfectants, disinfection byproducts, inorganic chemicals, organic chemicals, and radionuclides.

vi. Occupational Safety and Health Act

The Occupational Safety and Health Administration (OSHA) administers the Occupational Safety and Health Act, (United States Code Title 29, Chapter 15) which requires special training of handlers of hazardous materials, notification to employees who work in the vicinity of hazardous materials, and acquisition from the manufacturer of material safety data sheets. A materials safety data sheet describes the proper use of hazardous materials and is intended to provide workers and emergency personnel with procedures for handling or working with that material. The Act also requires the training of employees to remediate any hazardous materials accidental releases.

b. State Regulations

i. Hazardous Materials

According to California Code of Regulations, Title 22, Section 66261.20, the term "hazardous substance" refers to both hazardous materials and hazardous wastes, both of which are classified according to four properties: toxicity, ignitability, corrosiveness, and reactivity. A hazardous material is defined by California Code of Regulations, Title 22, Section 66261.10 as a substance or combination of substances that may cause or significantly contribute to an increase in serious, irreversible, or incapacitating illness or may pose a substantial presence or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed. Hazardous wastes are hazardous substances that no longer have practical use, such as materials that have been discarded, discharged, spilled, or contaminated or are being stored until they can be disposed of properly (California Code of Regulations, Title 22, Section 66261.10).

ii. Porter-Cologne Water Quality Control Act of 1969 (Porter-Cologne)

The Porter-Cologne Water Quality Control Act of 1969, promulgated within California Water Code, authorizes the state water quality agencies to implement pertinent federal CWA programs

(California Water Code, Division 7, Section 13160). Porter-Cologne also establishes separate, autonomous state water quality planning, permit, and enforcement programs that may affect the Project. As relates to hazardous materials, Article 4 outlines waste discharge requirements and Article 7 delineates requirements for hazardous substance removal, cleanup, and remediation.

iii. California Hazardous Waste Control Law

The California Hazardous Waste Control Law (California Health and Safety Code, Division 20, Chapter 6.5) is the basic hazardous waste statute in California and is administered by the Department of Toxic Substance Control. This law is similar to, but generally more stringent than, RCRA, and applies to a broader range of hazardous wastes, and requires recycling and waste reduction programs. Under this law, the Department of Toxic Substance Control is authorized to administer California's hazardous waste program and implement the federal program in California.

iv. California Department of Conservation, Division of Oil, Gas, and Geothermal Resources

The California Department of Conservation's DOGGR regulates drilling, operation, maintenance, and abandonment of oil, gas, and geothermal wells. Plugging and abandonment of oil and gas wells is to be done according to California Code of Regulations, Title 14, Division 2, Chapter 4, Subchapter 1, Article 3, Sections 1723–1723.8. As part of DOGGR's responsibilities for implementing Section 3208.1 of the Public Resources Code, each of the six DOGGR districts have developed the Construction-Site Plan Review Program to assist local agencies in identifying and reviewing the status of oil or gas wells near proposed development. The program is aimed at addressing potentially dangerous issues associated with development near oil or gas wells. DOGGR serves in an advisory role to make relevant information available to local agencies. Additionally, PRC Section 3208.1 authorizes the State Oil and Gas Supervisor of DOGGR to order the re-abandonment of a previously abandoned well if construction of any structure over or in the proximity to a well could result in a hazard.

v. California Occupational Safety and Health Act

The California Occupational Safety and Health Administration (Cal-OSHA) regulates worker safety similar to federal OSHA but also requires preparation of an Injury and Illness Prevention Program, an employee safety program of inspections, procedures to correct unsafe conditions, employee training, and occupational safety communication. In addition, Cal-OSHA regulations indirectly protect the general public by requiring construction managers to post warnings signs, limit public access to construction areas, and obtain permits for work considered to present significant risk of injury or to worker health, such as excavations greater than 5 feet. Typically, applicable requirements found in California Code of Regulations Titles 19 and 22 are included in construction contracts requiring contractors, among other things, to comply with the proper storage and disposal of substances such as fuel and lubricants. Compliance with applicable requirements for this portion of the law would be implemented once engineering designs are finalized.

vi. Fire Hazard Severity Zones

In accordance with Public Resources Code Sections 4201-4204 and Government Code Sections 51175-51189, CalFire has mapped areas of significant fire hazards based on fuels, terrain, weather, and other relevant factors. The zones are referred to as fire hazard severity zones and represent the risks associated with wildland fires.

c. Regional Regulations*i. Certified Unified Program Agencies (CUPA)*

CUPA consolidates, coordinates, and makes consistent the administrative requirements, permits, inspections, and enforcement activities of six environmental and emergency response programs on a county-wide basis. State agencies set the standards for their programs, and local CUPAs implement the standards. For each county, the agencies regulate and oversee the following documents and activities:

- Hazardous materials business plans
- California accidental release prevention plans or federal risk management plans
- Operation of Above Ground and Underground Storage Tanks
- Universal waste and hazardous waste generators and handlers
- Uniform Fire Code implementation
- Onsite hazardous waste treatment
- Inspections, permitting, and enforcement
- Proposition 65 reporting
- Emergency response

To conform with requirements of the Solano County CUPA, EIP shall be required to do the following:

- 1) Prohibit storage of hazardous materials, such as materials used as fuel and for equipment maintenance, where they could affect nearby properties, or where they might enter waters draining to the Cache Slough Complex.
- 2) Hazardous material containers shall be properly identified with a "Hazardous Waste" label, and any hazardous wastes shall be recycled and properly disposed of off-site. Equipment fuels and lubricants shall be stored with secondary containment.
- 3) EIP will be required to contact the local Certified Unified Program Agency (CUPA) or fire department for any site-specific requirements regarding hazardous materials or waste prior to the start of construction, including requirements for potential containment and handling.
- 4) Spill kits shall contain oil booms of sufficient length to surround excavation equipment when working in or near open water. Spill kits shall be present for any work adjacent to open waters. All spills of oil and other hazardous materials shall be immediately cleaned up and contained, and the National Response Center shall be notified. Any hazardous

materials cleaned up or used on-site shall be properly disposed of at an approved disposal facility.

ii. Yolo-Solano Air Quality Management District (YSAQMD)

The YSAQMD asbestos program sets rules for asbestos testing, surveying, and removal for projects within its jurisdiction, which includes portions of Yolo and Solano County, including the Proposed Project Site. Asbestos surveys are required of certain demolition projects and must be conducted by a certified asbestos consultant. Projects subject to the YSAQMD's asbestos program are required to notify the air district in writing 10 working days prior to demolition or abatement of asbestos-containing structures.

d. Local Regulations

No relevant local regulations related to hazards and hazardous materials were identified.

4. ENVIRONMENTAL IMPACTS

a. Methodology

Impacts to hazards and hazardous materials were assessed using technical reports documenting on-site hazards, observations of current on-site conditions, and regulatory hazardous materials databases. The information obtained from these sources was used to assess the significance of environmental impacts against applicable regulatory thresholds and the best professional judgement of the environmental professionals writing this Draft EIR.

b. Thresholds of Significance

Based on the CEQA Guidelines Appendix G, the project would have a significant impact on the environment related to hazards and hazardous materials if it would:

- a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.
- b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment.
- c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school.
- d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would create a significant hazard to the public or the environment.
- e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, result in a safety hazard or excessive noise for people residing or working in the project area.
- f) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.
- g) Expose people or structures, either directly or indirectly to a significant risk of loss, injury or death involving wildland fires.

c. Project Impacts and Mitigation Measures

i. Significant Hazards to the Public or the Environment through the Routine Transport, Use, or Disposal of Hazardous Materials

Dilapidated structures that contain asbestos and lead paint from the Liberty Farms and Bowsbey Properties are currently being removed and are not part of the Proposed Project.

During construction, there would be a temporary increase in the quantity of hazardous materials present within the Proposed Project Site. This includes materials which would be used to power and maintain construction equipment such as fuels, solvents, and lubricants. Materials used would be typical of construction activities and would not present any unusual hazards. Moreover, they would be used by an experienced contractor with knowledge of the equipment in question as well as protocols and regulations to prevent spills during construction. To this effect, the Contractor has proposed a construction methodology which would use the site interior as a settling basin, wherein drainage would occur through the Proposed Project Site (i.e. away from the perimeter water bodies) to settle out suspended sediments before being discharged via existing pumps into exterior tidal sloughs. In addition to using this methodology to minimize environmental risk associated with using construction equipment and associated chemicals, various protocols and BMPs are required during construction pursuant to CUPA regulations. . CUPA regulations require storage protocols to minimize the risk of hazardous material spills as well as response protocols to assure that in the unlikely event of a significant spill, the proper authorities are contacted and cleanup procedures are implemented. With implementation of these measures, construction risks associated with the routine transport, use, and disposal of hazardous materials would be less than significant.

Following construction, the presence of any materials that could be considered hazardous would be sporadic and minimal. Occasional operations and maintenance of the restored ecosystem, PG&E towers and peninsulas, the CDFW boat ramp, and levees would present the sources of potential hazardous materials use. Like construction activities, these would require the use of typical materials that would occur on an occasional, short-term basis. There would therefore be less equipment, fewer people, and a much smaller risk associated with any potential chemical use—including that of herbicides and fuels.

The environmental and health risks associated with the routine transport, disposal, and use of hazardous materials during Proposed Project construction, and operation and maintenance are minimal, with construction risks being greater than operational and maintenance risks. BMPs are required as part of Senate Bill 1082, which created the Unified Hazardous Waste and Hazardous Materials Management Regulatory Program (Unified Program). To further reduce this risk, an SPCC Plan is also required. Therefore, with the implementation of these state and federal requirements, impacts of the Proposed Project would not exceed the applicable threshold of significance related to significant hazards to the public or the environment through the routine transport, use, or disposal of hazardous materials and the Proposed Project's impact with regard to this threshold would be **less than significant**.

ii. *Significant Hazards to the Public or the Environment through Reasonably Foreseeable Upset and Accident Conditions Involving the Release of Hazardous Materials into the Environment*

Hazardous Material Cleanup

The Phase II ESAs conducted for the Liberty Farms and Bowsbey Properties revealed the potential presence of petroleum hydrocarbons, metals, and lead paint within these properties; primarily in the vicinity of existing buildings and farm infrastructure. No Phase II ESA was conducted for the Vogel Property, as the Phase I ESA did not identify any environmental hazards of concern on this property. Hazards identified in the Phase II ESA are presently being remediated and existing buildings contaminated with lead and asbestos are being removed. As these actions are not part of the Proposed Project, potential environmental impacts of these actions are not analyzed.

Abandoned Natural Gas Infrastructure

The Proposed Project Site is known to have a history of natural gas extraction and to contain abandoned natural gas wells and pipelines (Figure IV.F-1). Should this infrastructure leak or be disturbed, this could result in upset or accident conditions involving release of hazardous materials into the environment. Surveys were accordingly conducted during the design process to identify the exact location of natural gas wells and pipelines. Each well and pipeline was examined to determine whether it had been properly plugged and abandoned, improperly abandoned, or remained idle. All wells and pipelines were determined to be properly abandoned in compliance with applicable standards. These findings are consistent with well locations and status documented on the DOGGR online well finder tool.⁶

Although natural gas wells and pipelines are well-documented and all available data indicate that they have been properly plugged and abandoned in compliance with applicable standards, this does not preclude the slight possibility of future leaks or accidental disturbance during construction. Mitigation Measure MINERAL-1 therefore requires plans and procedures for natural gas well abandonment and avoidance to be incorporated into final construction plans to minimize the likelihood of such an occurrence. This would assure that natural gas wells and pipelines are properly accounted for in construction documents and are not allowed to leak in a manner which would release hazardous materials into the environment.

As well and pipeline considerations must be integrated into construction plans under Mitigation Measure HAZ-1, the risk of accident or upset conditions involving abandoned natural gas infrastructure would be minimal. Therefore, with the implementation of Mitigation Measures HAZ-1, impacts of the Proposed Project would not exceed the applicable threshold of significance related to significant hazards to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment and the Proposed Project's impact with regard to this threshold would be ***less than significant with mitigation incorporated.***

⁶ [DOGGR] California Department of Conservation: Department of Oil, Gas, and Geothermal Resources, "Department of Conservation Map Server," Well Finder: DOGGR GIS, 2018, <https://maps.conservation.ca.gov/oilgas/#webmaps>.

d. Mitigation Measure HAZ-1: Natural Gas Well and Pipeline Abandonment and Avoidance

Prior to the start of construction, EIP shall develop plans and procedures for natural gas well and pipeline abandonment and avoidance during construction, which may include but are not limited to re-abandonment, plugging, removal, or avoidance of on-site natural gas pipelines and wells. These procedures shall be incorporated into final construction plans provided to DWR and DOGGR prior to the start of ground disturbance and shall describe what work, if any, would be performed on each well and/or pipeline and which wells and/or pipelines would be avoided during site excavation.

Should mitigation of leaks, modification to well casing, or re-abandonment of wells or pipelines be necessary, EIP shall notify DOGGR in writing prior to commencing any such work. Should any natural gas wells or pipelines not previously documented be discovered during excavation, they shall immediately be reported to the Solano County recorder and DOGGR.

i. Hazardous Emissions or Handling of Acutely Hazardous Materials, Substances, or Waste within One-Quarter Mile of an Existing or Proposed School

There are no existing or proposed schools within one-quarter mile of the Proposed Project Site. The nearest existing schools are located 9-10 miles from the Proposed Project Site in Rio Vista. Since there are no schools present, there would be no hazardous emissions or handling of acutely hazardous materials, substances, or waste within one-quarter of an existing or proposed school. Therefore, impacts of the Proposed Project would not exceed the applicable threshold of significance related to hazardous emissions or handling of acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school and the Proposed Project would have **no impact** with regard to this threshold.

ii. Location on a Site which is Included on a List of Hazardous Materials Sites Compiled Pursuant to Government Code Section 65962.5 and, Resultant Significant Hazards to the Public or the Environment

The provisions of Government Code Section 65962.5 require the Department of Toxic Substance Control, the State Water Board, the California Department of Health Services, and the California Integrated Waste Management Board to submit information pertaining to sites associated with solid waste disposal, hazardous waste disposal, and/or hazardous materials releases to the Secretary of California EPA. Based on a review of regulatory databases^{7,8} including listed hazardous materials release sites compiled pursuant to Government Code Section 65962.5, the Proposed Project Site is not listed as a hazardous materials site. Therefore, impacts of the Proposed Project would not be located on a site which is included on a list of hazardous materials

⁷ State Water Resources Control Board, "GeoTracker," n.d., <https://geotracker.waterboards.ca.gov/datadownload>.

⁸ Department of Toxic Substances Control, "EnviroStor Database," n.d., <https://www.envirostor.dtsc.ca.gov/public/map/?myaddress=liberty+farms>.

sites compiled pursuant to Government Code Section 65962.5 and the Proposed Project would have **no impact** with regard to this threshold.

iii. Safety Hazards or Excessive Noise for People Residing or Working in the project area for a project located within an Airport Land Use Plan or where such a plan has not been adopted within two miles of a of a Public or Public Use Airport and impacts of the project on nearby airports.

Safety hazards or excessive noise for people residing or working in the project area are covered in Chapter IV.A, Noise, iii. This section focuses on the impact of the Proposed Project on nearby airports which could result in a safety hazard.

The nearest airports to the Proposed Project Site are Rio Vista Airport and Travis Air Force Base (TAFB). The Proposed Project Site is approximately 5.5 miles from Rio Vista Airport and is not within its area of influence. The Proposed Project Site is approximately 9.1 miles from TAFB and is within Zone C, Zone D, and the Assault Landing Zone - Training Overlay of the Plan. The Assault Landing Zone - Training Zone Overlay prohibits structures greater than 200 feet tall but otherwise does not impose additional relevant restrictions, and instead defers to the underlying compatibility zone (in this case, Zones C and D). Restrictions relevant to these designations include prohibition of uses which would constitute a hazard to flight and discouragement of residential development.

The Proposed Project would not create tall structures, residential or other noise-sensitive land uses, light sources, or other hazards to flight. The Land Use Compatibility Plan for TAFB cites birds as a potential hazard to flight in the Bird Hazard Strike Zone and Outer Perimeter. The Plan requires discretionary projects located in either of these zones to examine the project's potential to attract hazardous wildlife, wildlife movement, or bird hazards as part of the CEQA process. The Proposed Project Site presently contains suitable habitat for various waterfowl species, and species which favor agricultural habitat, including hawks, vultures, crows/ravens, and blackbirds.⁹ As a managed wetland complex and duck club, the Liberty Farms Property was designed to attract waterfowl such as ducks and geese; and irrigated pastureland within the Bowsbey Property attracts very large quantities of migrating birds such as geese and cranes.

On completion, the Proposed Project Site would contain habitat for estuarine/wetland favoring species such as blackbirds, geese/ducks, egrets, cormorants, and pelicans. The Proposed Project is not anticipated to substantially alter the quantity of birds present and would therefore not create an increased bird strike hazard.

The Proposed Project is consistent with the TAFB Land Use Compatibility Plan and would not introduce tall structures, noise-sensitive land uses, sources of light/glare, or increased bird strike hazards. Therefore, impacts of the Proposed Project would not exceed the applicable threshold of significance related to projects in the vicinity of a nearby airport resulting in a safety hazard and the Proposed Project's impact would be **less than significant**.

⁹ Solano County Department of Resources Management, "Travis Airforce Base Land Use Compatibility Plan," October 8, 2015, <https://admin.solanocounty.com:4433/civicax/filebank/blobdload.aspx?blobid=22050>.

iv. Impairment of Implementation or Physical Interference with an Adopted Emergency Response Plan or Emergency Evacuation Plan

Solano County tends to experience flooding every 5-10 years, sometimes necessitating an evacuation.¹⁰ The Proposed Project would include a new setback levee built to contemporary design standards and locally expand flood conveyance in the Yolo Bypass through floodplain expansion. These actions would increase flood resilience relative to baseline conditions, which would therefore have a moderately positive benefit on emergency evacuation or response by locally decreasing the likelihood of damaging flooding.

The portion of Liberty Island Road that borders the Proposed Project Site would be vacated partially along its east-west segment and the entirety of its north-south segment. One resident lives along this segment of Liberty Island Road, and access would be maintained or moved to assure continued emergency ingress and egress for occupants. There are no other properties served by this portion of Liberty Island Road apart from the Reserve, which does not contain any residences or businesses that would require evacuation or response in the event of an emergency.

As the Proposed Project would benefit local flood control efforts and would not impair emergency access to or from any neighboring properties, there would be no impairment or physical interference with an emergency response or evacuation plan. Therefore, impacts of the Proposed Project would not exceed the applicable threshold of significance with regard to adopted emergency response plans or emergency evacuation plans and the Proposed Project would have **no impact** with regard to this threshold.

v. Exposure of People or Structures, either directly or indirectly, to Significant Risk of Loss, Injury, or Death Involving Wildland Fires

The Proposed Project Site is not located within a Very High Fire Hazard Safety Zone (FHSZ) but is located adjacent to a Moderate FHSZ, as designated by CalFire.¹¹ The Proposed Project Site is in a highly rural area with few residents and is not located at the urban-wildland interface.¹²

During construction, the presence of gasoline powered equipment would lead to a temporary increase in on-site fire risk. This would be highly transient due to the fact that vegetation removal would occur early in the site preparation process, eliminating potential fuel sources.

Following construction, the Proposed Project would not create any structures or features that would draw significant quantities of people to the area or exacerbate wildfire risk. The Proposed Project would create tidal and subtidal marsh atop relatively saturated soils with a high groundwater table. The site would be regularly inundated by tidal waters and seasonally inundated by flood waters. Fire risk within the Proposed Project Site would be minimal due to the high degree of moisture and the types of vegetation present.

¹⁰ Solano County, "Emergency Operation Plan (EOP)," 2017, 110.

¹¹ Cal Fire. 2007. Available: http://www.fire.ca.gov/fire_prevention/fhsz_maps_solano. Accessed July 2018.

¹² Association of Bay Area Governments and California Department of Fire and Forestry, "Bay Area Hazards," 2003, <http://gis.abag.ca.gov/website/Hazards/?hlyr=concordGV&co=6013>.

As the Proposed Project Site is not at the urban-wildland interface, is not in a fire hazard severity zone, and would not exacerbate wildfire risk, it would not expose people or structures to significant risk of loss, injury, or death involving wildland fires. Therefore, impacts of the Proposed Project would not exceed the applicable threshold of significance with regard to exposing people or structures to a significant risk involving wildland fires and the Proposed Project would have ***no impact*** with regard to this threshold.

5. LEVEL OF SIGNIFICANCE AFTER MITIGATION

With implementation of Mitigation Measures HAZ-1, the Proposed Project would have ***less-than-significant impacts*** on hazards and hazardous materials.

IV. ENVIRONMENTAL IMPACT ANALYSIS

G. HYDROLOGY AND WATER QUALITY

1. INTRODUCTION

This section of the Draft EIR analyzes the Proposed Project's potential impacts on hydrology and water quality. Impacts are considered for the Proposed Project Site and the greater Cache Slough Complex. Analysis of impacts to hydrology and water quality are based on the following technical studies, which assess baseline conditions related to hydrology and water quality and model future conditions anticipated upon Proposed Project completion. These documents are in the Appendix and available upon request from FRPA@water.ca.gov with a subject line of "Lookout Slough Information Request", and include:

- Appendix C – Lookout Slough Tidal Habitat Restoration and Flood Improvement Project: 65% Geotechnical Basis of Design Report, Wood Rodgers 2019.
- Appendix D – Lookout Slough Tidal Habitat Restoration and Flood Improvement Project: 65% Basis of Design Report, Wood Rodgers 2019.
- Appendix M – Phase II ESA: Liberty Island Ranch [Liberty Farms Property], Blackburn Consulting, September 2017.
- Appendix O – Baseline Study Deliverable for Flood Conveyance Optimization, Environmental Science Associates, June 2019.
- Appendix P – Basis of Design Report – Tidal Hydrology and Hydraulic Analysis: Lookout Slough Restoration Project, Environmental Science Associates, January 2019.
- Appendix Q – Draft Hydrologic and Hydraulic System Analysis – Lookout Slough Tidal Habitat Restoration and Flood Improvement Project, Environmental Science Associates, September 2019.
- Appendix R – Hydrologic and Hydraulic Risk and Uncertainty Analysis: Lookout Slough Tidal Habitat Restoration and Flood Improvement Project, Environmental Science Associates, August 2019.
- Appendix S – Lookout Slough Tidal Habitat Restoration and Flood Improvement Project – Potential Salinity Impacts Assessment, Environmental Science Associates, April 2019.
- Appendix T – Lookout Slough Tidal Habitat Restoration and Flood Improvement Project – Potential Tidal Water Levels and Tidal Prism Impacts Assessment, Environmental Science Associates, June 2019.

2. ENVIRONMENTAL SETTING

a. Regional Setting

i. Surface Water Hydrology

The Proposed Project Site is located in the Cache Slough Complex in the Delta. Most precipitation in the Delta occurs between December and March with annual rainfall averages between 14 and 20 inches but can vary significantly from one year to the next. Average temperatures range from lows of around 40s degrees Fahrenheit to highs of around 90s degrees Fahrenheit and vary across the Delta from hotter in the east to cooler in the west. The Delta is a natural floodplain with numerous channels and islands located at the confluence of the Sacramento and San Joaquin rivers that covers roughly 1,315 square miles and drains approximately 40% of the state.¹ The Delta serves as an important receptor of runoff and source of water, providing water to roughly two-thirds of California's population.^{2,3} Delta channels have been modified to allow transport of this water and to reduce the effects of pumping on the direction of flows and salinity intrusion. Beneficial uses of the Delta include municipal water supply, agriculture, and wildlife habitat. Inflows to the Delta occur primarily from the Sacramento River system with some flows originating in Yolo Bypass, the San Joaquin River, and other eastside tributaries such as the Mokelumne, Calaveras, and Cosumnes rivers. In an above-normal year, nearly 85% of the total Delta inflow comes from the Sacramento River, more than 10% comes from the San Joaquin River, and the rest comes from the three eastside streams.⁴ The Delta is tidally influenced and surface water elevation rise and fall varying from less than one foot in the eastern Delta to more than five feet in the western Delta.⁵

Delta Flood Risk Management

California has a long history of flood management that started with the arrival of settlers in the Central Valley and the reclamation of lands in the Delta in the 1800s. The Central Valley and the Delta are prone to major flooding events because of abundant rainfall in the Sierra Nevada, major rivers carrying flood flows, and low elevations in the Delta. Flood management in California historically was based on physical modifications of stream channels and construction of flood control structures such as dams and reservoirs. More recently, flood management uses a more integrated approach, which includes a mix of structural and non-structural (e.g., land use practices) approaches. Currently, approximately 1,115 miles of levees protect 700,000 acres of land within the legal limits of the Delta. The Delta levee system carries water from the Sacramento, San Joaquin, Cosumnes, Mokelumne, and Calaveras rivers, and various creeks and streams,

¹ California Department of Water Resources. 2009. California Water Plan Update 2009. Bulletin 160-09.

² California Department of Water Resources, "The Delta," *The Delta*, accessed July 11, 2018, <https://water.ca.gov/Water-Basics/The-Delta>.

³ United States Geological Survey, "Sacramento-San Joaquin Delta: The Sinking Heart of the State," July 9, 2001.

⁴ California Department of Water Resources. *The State Water Project Final Delivery Capability Report 2015*. July 2015.

⁵ California Department of Water Resources. 2009. California Water Plan Update 2009. Bulletin 160-09.

and transports it past the many islands and tracts within the Delta before discharging to the San Francisco Bay or exported it via water supply projects.

Delta levees protect Delta lowlands for water for agricultural, industrial, and municipal use, and are responsible for protecting multiple interests and populations. Two major flood management projects exist upstream of the Delta: the Sacramento River Flood Control Project and the San Joaquin River Flood Control Project. The levees built as part of these projects are designated as SPFC levees and are maintained by federal and State agencies. Approximately 1,600 miles of levees are part of the Central Valley federal flood control projects, of which 385 miles are in the Delta. The remaining levees are non-SPFC levees and are maintained by local districts.

The Yolo Bypass is an operative feature of the Sacramento River Flood Control Project, which was originally authorized by the Flood Control Act of 1917 and modified by various Flood Control and River and Harbor Acts in 1928, 1937, and 1941. The Yolo Bypass is located immediately west of the metropolitan area of Sacramento and lies in a general north-to-south orientation extending from the Fremont Weir (upstream of the Delta) downstream to Liberty Island (located immediately east of the Proposed Project Site), a distance of about 43 miles. The Yolo Bypass is flooded about once every 3 years, on average, and flood flows generally occur during the winter months of December, January, and February. Local surface waters in the Yolo Bypass flow through the Tule Canal and Toe Drain, which are west of the Sacramento Deep Water Ship Channel. The Corps, CVFPB, and DWR are responsible for maintaining Fremont Weir, Sacramento Weir, and the flood-carrying capacity of the Yolo Bypass.

ii. Surface Water Quality

Water quality in the Delta is highly variable and heavily influenced by inflows from rivers and by seawater intrusion into the western and central portions of the Delta during periods of low outflow. Water quality parameters of particular concern include salt intrusion, turbidity, temperature, nutrients, and mercury. The concentrations of these materials in the Delta are affected by river inflows, tidal flows, agricultural diversions, drainage flows, wastewater discharges, water exports, cooling water intakes and discharges, and groundwater connectivity.

Delta waterways fall under the jurisdiction of the State Water Board, the Central Valley Regional Water Quality Control Board, and the San Francisco Bay Regional Water Quality Control Board. The State Water Board approved an update to the Water Quality Control Plan for the San Francisco Bay/Sacramento–San Joaquin Delta Estuary (Bay-Delta Basin Plan) and flow objectives for priority tributaries to the Delta to protect beneficial uses in the Bay-Delta watershed. Beneficial use designations for waterways across the Basin Plan include: Municipal and Domestic Supply (MUN); Industrial (IND); Industrial Process Supply (PRO); Agricultural (AGR); Groundwater (GWR); Water Contact Recreation (REC-1); Non-Contact Water Recreation (REC-2); Shellfish Harvesting (SHELL); Commercial and Sport Fishing (COMM); Warm Freshwater Habitat (WARM); Cold Freshwater Habitat (COLD); Migration of Aquatic Organisms (MIGR); Spawning, Reproduction, and/or Early Development (SPWN); Estuarine Habitat (EST); Wildlife Habitat (WILD); Rare, Threatened, or Endangered Species (RARE); and Navigation (NAV).

National Clean Water Act (CWA) Section 303(d) (see description under Regulatory Framework further in this section) listings under the authority of the Central Valley Regional Water Board, including approved changes, are provided in Table IV.F-1.⁶

Salinity

Salinity for municipal, agricultural and fish and wildlife uses is of particular concern in the tidally influenced Delta. Salinity in the Delta is subject to control through modifications caused by exports and floods, with climate as the primary long-term driver.⁷ Any failure of Delta levees and subsequent island flooding draws saline water into the Delta.

Turbidity

Turbidity is a measure of the amount of suspended solids within the water column. Turbidity levels in the Delta are generally high due to sediment transport from the Sacramento River and San Joaquin River watersheds, especially during high flow periods. Turbidity is correlated to the input of nutrients and other constituents that are adsorbed to particles within the water column. These adsorbed constituents on suspended sediment can be residual pesticides, herbicides, and other contaminants from upstream agricultural, industrial, and municipal land uses. Turbidity is an important measure of the load of sediment within the Delta and is often used in combination with other measurements to indicate water quality relative beneficial uses of water.

Nutrients, primarily nitrogen compounds (N) and phosphorus (P), may trigger excessive growth of algae or toxic blue-green cyanobacteria. Primary sources of nutrients are erosion, agricultural runoff, urban runoff, and treated effluent. The emergence of increased concentrations of harmful algae blooms is indicative of potential problems with water stagnation, nutrient loading, and temperature increase. The cyanobacterium *Microcystis aeruginosa* has been an increasing component of summer harmful algal blooms in the Delta.⁸

Pesticides

Over 100 types of pesticides are commonly used on the agricultural lands upstream of and in the Delta and in urban areas, and these are transported in runoff to Delta waters. Toxicity studies have frequently linked toxicity in the Delta to pesticides⁹, and the Delta is listed as impaired

⁶ California Department of Water Resources. 2010. *The State Water Project Delivery Reliability Report 2009*. August.

⁷ Enright, C., and S. D. Culberson. 2009. *Salinity trends, variability, and control in the northern reach of the San Francisco Estuary*. *San Francisco Estuary and Watershed Science*, 7(2). <http://escholarship.org/uc/item/0d52737f>. Accessed October 2019.

⁸ Lehman, P.W., Boyer, G., Satchwell, M. and Waller, S., 2008. *The influence of environmental conditions on the seasonal variation of Microcystis cell density and microcystins concentration in San Francisco Estuary*. *Hydrobiologia*, 600(1), pp.187-204.

⁹ Kuivila, K. M., and M. L. Hladik. 2008. *Understanding the occurrence and transport of current-use pesticides in the San Francisco estuary watershed*. *San Francisco Estuary and Watershed Science* 6(3). <http://escholarship.org/uc/item/06n8b36k>. Accessed September 12, 2017.

because of diazinon and chlorpyrifos. There are defined seasonalities to application and runoff: winter runoff includes dormant sprays and herbicides, spring includes insecticides, and summer includes runoff of rice pesticides¹⁰. Existing pesticide TMDLs that apply to North Delta waterbodies include diazinon and chlorpyrifos. The TMDL for the two pesticides applies to Miner Slough, the Deep Water Ship Channel, Prospect Slough, and Cache Slough. Not to be exceeded more than once in a 3-year period, diazinon water quality objectives are 0.16 micro-grams per liter (ug/L) (1-hour average) and 0.10 ug/L (4-day average). Chlorpyrifos objectives are 0.025 ug/L (1-hour average) and 0.015 ug/L (4-day average).

Bioaccumulants

A variety of bioaccumulative contaminants are found throughout the Delta, resulting in fish advisory limits such as those for the Port of Stockton stating that no fish or shellfish should be consumed because of contamination from mercury, dioxins, furans, and polychlorinated biphenyls.¹¹ A statewide study of fish that included the Delta concluded that mercury and polychlorinated biphenyls were the most common contaminants bioaccumulated into fish at levels of concern; the other detectable contaminants in tissue included selenium, dieldrin, DDT, chlordane but generally low in concentration.¹² Historic mining operations have resulted in large inputs of mercury to the Delta and subsequent uptake by fish, causing tissue concentrations in exceedance of national health guidelines for fish consumption¹³. A TMDL exists for mercury and methylmercury in the Delta. Fish mercury concentrations generally exceed the TMDL target goal (the water quality goal expressed as fish tissue concentrations) for trophic level 4 fish of 0.24 mg mercury per kilogram of muscle tissue g wet weight.¹⁴

iii. Groundwater Hydrology and Quality

Extensive hydraulic interaction occurs between the surface water and shallow groundwater systems. Spring runoff generated by melting snow in the Sierra Nevada increases flows in the Sacramento and San Joaquin rivers and tributaries and causes shallow groundwater levels near the rivers to rise. Because the Delta is a large floodplain and the shallow groundwater is hydraulically connected to the surface water, changes in river stages affect groundwater levels

¹⁰ Kuivila, K. M., and M. L. Hladik. 2008. *Understanding the occurrence and transport of current-use pesticides in the San Francisco estuary watershed*. *San Francisco Estuary and Watershed Science* 6(3). <http://escholarship.org/uc/item/06n8b36k>. Accessed September 12, 2017.

¹¹ Office of Environmental Health Hazard Assessment (OEHHA). 2007. *Health Advisory: Draft Safe Eating Guidelines for Fish and Shellfish from the San Joaquin River and South Delta (Contra Costa, San Joaquin, Stanislaus, Merced, Madera, and Fresno Counties)*. March.

¹² Davis, J. A., A. R. Melwani, S. N. Bezalel, J. A. Hunt, G. Ichikawa, A. Bonnema, W. A. Heim, D. Crane, S. Senson, C. Lamerdin, and M. Stephensen. 2010. *Contaminants in Fish from California Lakes and Reservoirs, 2007 – 2008: Summary Report on a Two-Year Screening Survey*. Prepared for the Surface Water Ambient Monitoring Program (SWAMP). May.

¹³ Central Valley Regional Water Quality Control Board. 2010. *Sacramento-San Joaquin Delta Estuary TMDL for Methylmercury*. Staff report. April.

¹⁴ DiPasquale, M. M., R. Stewart, N. S. Fisher, P. Pickhardy, R. P. Mason, A. Heyes, and L. Windham-Meyer. 2005. *Evaluation of Mercury Transformations and Trophic Transfer in the San Francisco Bay/Delta: Identifying Critical Processes for the Ecosystem Restoration Program*. Annual Report of Progress #ERP-02-P40 to the California Bay-Delta Authority (CBDA), Sacramento, CA. November.

and vice versa. This hydraulic connection is also evident when the tide is high and surface water flows from the ocean into the Delta, thereby increasing groundwater levels nearby. Shallow groundwater quality can be degraded by saltwater intrusion in the underlying aquifer from the ocean tidal flows.

Delta floodplain deposits contain a significant percentage of organic material (peat) ranging in thickness from 0 to 150 feet. Below the surficial deposits, unconsolidated non-marine sediments occur up to 3,000 feet thick. These sediments form the major deep water bearing groundwater formations in the Delta.

The Proposed Project Site is located in the Solano groundwater subbasin as defined by DWR. In the Solano subbasin, historical deep groundwater flow direction is from northwest to southeast. Deep water-bearing units underlying the Solano subbasin range in thickness from 1,500 to 2,500 feet and provide important well yield capacities of up to several thousand gallons per minute (gpm)¹⁵. Increasing agricultural and urban development in the 1940s in the Solano subbasin has caused groundwater level declines. Today, groundwater levels are mostly impacted by drought cycles but tend to recover quickly during wet years¹⁶. Deep groundwater quality in the Solano subbasin is generally good and is deemed appropriate for domestic and agricultural use¹⁷. However, Total Dissolved Solids concentrations at levels higher than 500 parts per million have been observed in the central and southern areas of the basin.

In 2010, the Central Valley Regional Water Quality Control Board (Central Valley Water Board) adopted a roadmap for protecting groundwater quality in the Central Valley. This roadmap is not a regulatory document but is intended to outline priorities and strategies for improved groundwater quality throughout the Central Valley. The Plan identifies salinity, pesticides, and pathogens as the primary groundwater constituents of concern throughout the Central Valley Water Board's jurisdiction, including in the Sacramento River Hydrologic Region.¹⁸

b. Local Setting

i. Surface Water Hydrology

The Cache Slough Complex totals approximately 53,000 acres, including 16,500 acres of diked land lying below the high tide line. The Cache Slough Complex is regarded as one of the largest remnant freshwater tidal slough habitat areas in the Delta due to the presence of a network of

¹⁵ California Department of Water Resources. 2004. *Sacramento Valley Groundwater Basin Solano Subbasin*. As revised for Bulletin 118-03. February.

¹⁶ California Department of Water Resources. 2004. *Sacramento Valley Groundwater Basin Solano Subbasin*. As revised for Bulletin 118-03. February.

¹⁷ California Department of Water Resources. 2004. *Sacramento Valley Groundwater Basin Solano Subbasin*. As revised for Bulletin 118-03. February.

¹⁸ Central Valley Regional Water Quality Control Board, "Groundwater Quality Protection Strategy: A 'Roadmap' for the Central Valley Region," August 2010, https://www.waterboards.ca.gov/centralvalley/water_issues/groundwater_quality/2010aug_gwq_protect_strat_approved.pdf.

tidal channels and flooded islands and diverse habitat types, which include variable channel sizes, tidal marsh, and dead end sloughs.¹⁹ The Proposed Project Site naturally drains into Hass Slough and Cache Slough which are all part of the Cache Slough Complex.

Proposed Project Site lands are currently separated from surrounding water bodies by levees. Levees on the periphery of the Bowsbey and Liberty Farms Properties are part of the SPFC levee system, which constitutes roughly half of the levees in the Cache Slough Complex. There are also several non-SPFC levees within the interior of the Proposed Project Site managed by RD 2098. These levees are located along Duck Slough and Lookout Slough and are intended to provide flood protection and support area water management. Levees within the Proposed Project Site generally lack sufficient freeboard for flood protection design criteria and are in need of maintenance and repair activities.²⁰ Levees within RD 2098 average 20 feet in height for SPFC levees and 11-18 feet for interior levees.

Leveed agricultural lands around the Cache Slough Complex are subject to flooding from stormwater, groundwater seepage, and irrigation returns. This is mitigated by draining and pumping water into the sloughs around the Cache Slough Complex. Flood protection is also provided by the Yolo Bypass, an important floodplain to the region, which receives water from rivers and tributaries that would otherwise flood agricultural operations and urban areas such as the Sacramento metropolitan area.

Flood control operations and river flow play an important role in determining the flow of water through the Cache Slough Complex. During winter months the design capacity of the Cache Slough Complex is 490,000 cubic feet per second (cfs) flow contributing to the system. In contrast, during the summer, tidal forces and diversions heavily influence the flow of the Cache Slough Complex, which tends to experience a net upstream flow. Diversions in the area further contribute, ultimately leading to a net flow of up to 3,000 cfs upstream. This may result in longer residence times and reduced mixing between regional and downstream waters.²¹ Other factors affecting flows in the Cache Slough Complex are municipal and agricultural stormwater runoff and wastewater discharge. The City of Vacaville's wastewater treatment plant discharges an average of seven million gallons of treated wastewater per day into the Cache Slough Complex via Ulatis Creek.²²

Diversions near the Proposed Project Site include the nearby RD 2068 agricultural diversion, the State Water Project's Barker Slough Pumping Plant, and private agricultural diversions. The

¹⁹ Jared Frantzych, Ted Sommer, and Brian Scheier, "Physical and Biological Responses to Flow in a Tidal Freshwater Slough Complex," *San Francisco Estuary and Watershed Science* 16, no. 1 (April 16, 2018), <https://doi.org/10.15447/sfew.s.2018v16iss1/art3>.

²⁰ Michael Brandman Associates, "FINAL Municipal Service Review: Solano County Water, Irrigation, Reclamation, and Flood Management Agencies" (Solano County LAFCO, April 13, 2009), <http://www.solanolafco.com/Studies/MSR/SpecialDistricts/WaterMSRfinalApril132009.pdf>.

²¹ Department of Water Resources and Department of Fish and Wildlife, "Fish Restoration Program Cache Slough Complex Conservation Assessment. Volume 1: Characterization Report," November 2015.

²² Department of Water Resources and Department of Fish and Wildlife.

largest nearby agricultural diversion is the RD 2068 diversion, which has a maximum capacity of 140 cfs. The Barker Slough Pumping Plant is the next largest diversion near the Proposed Project Site, over eight miles by navigable waterways to the west. It is a major source of drinking water for communities served by the North Bay Aqueduct north of the Delta, supplying water for the Travis Air Force Base, American Canyon, Benicia, Calistoga, Fairfield, Napa, Vacaville, Vallejo, and Yountville. Diversion rates from this station vary seasonally, starting as low as 10 cfs in the winter and peaking at 120 cfs in the summer with a maximum capacity of 140 cfs.²³

Tidal influences on Cache Slough Complex hydrology are particularly strong during the summer. The Delta experiences a mixed, twice-daily tidal cycle. This corresponds to two unequal high and two unequal low tides each day. Climate factors that may influence area hydrology include rainfall, wind, and temperature. Prevailing winds in the Cache Slough Complex are from the west and southwest. In the summer, southwest winds are stronger and wind speeds are higher and more consistent. Wind may influence flow by creating wave action.

Delta Flood Risk Management

The existing State-Federal levee system bounding the Proposed Project includes the West Levee of the Yolo Bypass (Reclamation District [RD] 2098 Unit 1) bordering Shag Slough, the cross levee and East Levee of Cache Slough (both of which compose RD 2098 Unit 2), and the East Levee of Hass Slough (RD 2098 Unit 3). With the exception of the cross levee, the existing system was designed and constructed in 1961 by the Corps as part of the Sacramento River Flood Control Project. The West Levee of the Yolo Bypass was originally designed and constructed with a crest six feet above the 1957 design water surface profile (1957 Profile), and the levees along Cache Slough and Hass Slough were constructed with a crest at least three feet above the 1957 Profile, although currently portions lie below this elevation due to settlement. The 1957 Profile was based on specified design discharges (not tied to a recurrence frequency) and adopted concurrent conditions at confluences of study streams. The 1957 Profile reflects revisions made up to and during design of the SPFC, as agreed upon by the Reclamation Board (now the Central Valley Flood Protection Board), the State of California, and the Corps, as published in "Levee and Channel Profiles, Sacramento River Flood Control Project," dated March 15, 1957. In this portion of the Yolo Bypass, the 1957 profile was scaled from the 1907 and 1909 floods, based upon the authorized design flow of 490,000 cfs.

The six-foot freeboard criterion along the West Levee of the Yolo Bypass provides a factor of safety for both flood stage and elevated water surface levels (also known as run-up) as a result of wind-generated waves in the Yolo Bypass. Historically, wind waves can grow to four feet or more during large storm events due to the combination of long fetch (the distance of open water from one bank to another) lengths in the Yolo Bypass and strong sustained winds.

The neighboring and downstream community of the city of Rio Vista is vulnerable to flooding from the Sacramento River and the Yolo Bypass. The City receives modest flood protection from an

²³ Department of Water Resources and Department of Fish and Wildlife.

existing floodwall that extends from the dock at the end of Montezuma Street to just north of Main Street. This floodwall was overtopped in 1986 and was subsequently raised. Since it was raised, the floodwall has not been overtopped by a flood event. However, downtown Rio Vista regularly experiences flooding from minor storm events and high tides.

Elevated water stages resulting from a flood event in the Sacramento River also overtop the west bank of the Sacramento River upstream of State Highway 12 and flow through the highway underpass, thereby effectively flanking the existing floodwall and flooding downtown Rio Vista. During these high-water events, businesses upstream of State Highway 12 are forced to close until floodwaters recede, since flooding along State Highway 84 makes the businesses inaccessible²⁴.

ii. Surface Water Quality

USGS monitors water quality in the Delta through a series of monitors dispersed throughout the region.²⁵ The nearest monitor to the Proposed Project Site is USGS 11455280. It is located in the waters of Cache Slough, just west of the Proposed Project Site. Where available, measurements discussed here are from the Cache Slough monitor. However, this monitor is missing measurements over relatively long periods of time in the recent past, so these data are supplemented with data from elsewhere in the Delta. Water quality metrics relevant to the Proposed Project include salinity, turbidity, and temperature. Pollutants of concern include nutrients, pesticides and bioaccumulants such as methylmercury. Each is discussed below.

Salinity

The Cache Slough Complex is currently characterized as fresh water with low levels of salinity even during dry periods. However, salinity may increase due to extensive evaporation, particularly during long periods of hot, dry weather. This occurs in parts of the Cache Slough Complex with little shade and shallow water.²⁶

Turbidity

While generally detrimental to industrial and municipal water uses, turbid waters may be beneficial for some area species, such as the Delta Smelt. The Cache Slough Complex generally has some of the most turbid waters in the Delta due to its connectivity to the Sacramento River and Yolo Bypass, which are among the primary sources of sediment in the Delta,²⁷ especially during storm

²⁴ Environmental Science Associates. 2019. *Lookout Slough Tidal Habitat Restoration and Flood Improvement Project – Draft Hydrologic and Hydraulic System Analysis*. September.

²⁵ United States Geological Survey, “Continuous Monitoring of Water Quality and Suspended-Sediment Transport in the San Francisco Bay and Delta,” 2018, <https://ca.water.usgs.gov/projects/baydelta/>.

²⁶ Environmental Science Associates, “Lookout Slough Tidal Habitat Restoration and Flood Improvement Project - Potential Salinity Impacts Assessment,” April 19, 2019.

²⁷ Tara L. Morgan-King and David H. Schoellhamer, “Suspended-Sediment Flux and Retention in a Backwater Tidal Slough Complex near the Landward Boundary of an Estuary,” *Estuaries and Coasts* 36, no. 2 (2013): 300–318.

flow. Cache Slough Complex turbidity fluctuates seasonally. A large downstream sediment flush typically occurs early on in the rainy season, resulting in elevated turbidity levels.²⁸ In the Proposed Project Site, apart from short-term, high-turbidity events, where turbidity has been observed as high as 1,400 Nephelometric Turbidity Units (NTU), turbidity mostly ranges from 0 NTU to 100 NTU, with generally lower turbidity levels in the summer than the winter.²⁹ Continuous turbidity monitoring performed by WRA at seven monitoring stations near the Proposed Project Site from May through August 2019 detected turbidity levels with outlier events reaching up to 1,400 (NTU), with turbidity mostly fluctuating between 0 and 80 NTU.

Pesticides

The Proposed Project Site is in an area listed in the TMDL due to the presence of toxic pesticides. An array of pesticides are present in area waterways due to agricultural and urban runoff. Pesticides responsible for the Cache Slough Complex's listing as an impaired waterbody include chlordane, chlorpyrifos, DDT, diazinon, and dieldrin, among other pesticides. In addition to their known health effects in humans, pesticides present in the Cache Slough Complex exhibit toxic effects on aquatic invertebrates.

Bioaccumulants

Metals such as mercury, methylmercury, lead, and other trace metals may be present in the Delta due to contamination from historical mining activity and runoff from industrial, urban, and agricultural land uses upstream. Such metals display a range of effects on humans and aquatic animals. Trace metals are present only in low concentrations, and exceedances are rarely recorded in the Delta. Methylmercury is the only trace metal detected at sufficiently high concentrations in the Cache Slough Complex to have triggered a 303(d) listing. Waters of the Proposed Project Site are therefore considered impaired due to the presence of methylmercury.

Methylmercury is the organic form of mercury most commonly found in the environment. In the Central Valley, inorganic mercury mostly comes from upstream tributaries that were contaminated by historic mining for gold and mercury. Naturally occurring bacteria add a methyl group to inorganic mercury under low oxygen conditions, making methylmercury. Methylmercury is environmentally persistent and readily bioaccumulative, meaning that it does not readily decompose, except under the right conditions of light and biological processes, in the environment and is more heavily concentrated at higher levels within the foodweb.³⁰

²⁸ Morgan-King and Schoellhamer.

²⁹ "USGS Current Conditions for USGS 11455280 CACHE SLOUGH NR HASTINGS TRACT NR RIO VISTA CA," accessed August 23, 2019, https://waterdata.usgs.gov/ca/nwis/uv/?site_no=11455280&PARAMeter_cd=00010,00095,00300,00400,63680,9133.

³⁰ National Research Council Committee on the Toxicological Effects of Methylmercury, *Toxicological Effects of Methylmercury* (Washington D.C.: National Academies Press (US), 2000), <https://www.ncbi.nlm.nih.gov/books/NBK225769/>.

iii. Groundwater Hydrology and Quality

The Proposed Project Site is located within the southeastern portion of the Solano Subbasin of the Sacramento Valley Groundwater Basin. Recharge to the shallow groundwater system in this area is primarily from inflow of rivers and streams into the Delta and from infiltration of precipitation and irrigation water. The most common ways groundwater leaves the system are through agricultural and municipal pumping, evaporation in areas with shallow depth to water, and discharge to streams.³¹ Groundwater levels in the vicinity of the Proposed Project Site have been reported to range from 3 to 12 feet below ground surface³². There is no information on the groundwater quality within the Proposed Project Site. However, past agricultural uses of the Proposed Project Site could indicate the potential presence of residual pesticides, herbicides, and petroleum products used for agricultural operations, in addition to salinity and pathogens measured in the subbasin.

3. REGULATORY FRAMEWORK

a. Federal Regulations

i. Rivers and Harbors Act of 1899

The Rivers and Harbors Act of 1899 regulates the quality and hydrology of navigable waters and their tributaries through permitting administered by the Corps. Pursuant to this Act, any discharge of refuse matter into navigable waters and/or their tributaries without a permit is prohibited. Additionally, the Rivers and Harbors Act requires a permit to excavate, fill, or alter the condition, or capacity of any navigable water or federal levee.

Section 10 of the federal Rivers and Harbors Act (RHA) allows the Corps to control, improve, and regulate constructed structures that might impede navigation along the Nation's waterways for the benefit of commerce, recreation, and public safety. Authorization from the Corps is required for construction in, dredging from, or deposition of into waters of the United States, including those around the Proposed Project Site.

ii. Clean Water Act (CWA)

The federal CWA is intended to help safeguard the quality of the Nation's waterbodies from point and non-point source pollution. Under this law the USEPA has primary administrative and scientific authority, while the Corps implements an important CWA permit program. The CWA contains several sections directly or indirectly applicable to surface water quality control at the Proposed Project Site, which are detailed below.

³¹ United States Geological Survey, "Groundwater Quality in the Southern Sacramento Valley, California," April 2011, https://www.waterboards.ca.gov/water_issues/programs/gama/docs/sosac_fs.pdf.

³² Blackburn Consulting. "Phase II Environmental Site Assessment: Liberty Island Ranch," September 2017.

CWA Section 303

Section 303 of the CWA requires states to adopt water quality standards for all surface waters of the United States. As defined by the CWA, water quality standards consist of two elements: (1) designated beneficial uses of the water body in question, and (2) criteria that protect the designated uses. Section 304(a) requires USEPA to publish advisory water quality criteria that accurately reflect the latest scientific knowledge on the kind and extent of all effects on health and welfare that may be expected from the presence of pollutants in water.

In California, USEPA has delegated responsibility to the State Water Board and its nine Regional Water Quality Control Boards for identifying beneficial uses and adopting applicable water quality objectives. Section 303(d) of the CWA requires the identification of water bodies that do not meet, or are not expected to meet, water quality standards (i.e., impaired water bodies). The affected water body, and associated pollutant or stressor, is then prioritized in the 303(d) List. The CWA further requires the development of a TMDL for each listing. In 2008, California began integrating the 303(d) List of Impaired Waters and the 305(b) Water Quality Assessment Report into a single report (Integrated Report).

CWA Section 401

CWA Section 401 establishes the Water Quality Certification program. Section 401 certification is the responsibility of the State Water Board and the appropriate Regional Water Board. Section 401 also requires federal agencies to obtain certification from the State. In general agencies are concerned with the potential discharge of toxic contaminants (in sediments) and the discharge of otherwise “clean” sediments themselves (e.g., resulting in increased turbidity).

CWA Section 402

Section 402 of the CWA established the National Pollutant Discharge Elimination System (NPDES) permit program to regulate point source and non-point source discharges of pollutants into waters of the United States. The NPDES permits are issued for long-term discharges, including discharges from wastewater treatment plants, and temporary discharges, such as discharges during construction activities. For example, construction activities, depending upon the extent of disturbance, would require a General Permit for Storm Water Discharges Associated with Construction Activities, Construction General Permit Order No. 2009-0009-DWQ (s amended by 2010-0014-DWQ and 2012-0006-DWQ) and the General Waste Discharge Requirements/NPDES Permit for Limited Threat Discharges to Surface Waters, Central Valley Regional Water Quality Control Board Order R5-2016-0076-01/NPDES Permit No. CAG995002 pdf, Adopted on 14 October 2016 (as modified on 28 October 2016, and amended by Order R5-2018-0002 on 1 February 2018) NPDES permits.

iii. Safe Drinking Water Act

The federal Safe Drinking Water Act establishes drinking water standards to safeguard public health. The law focuses on all above and belowground water sources actually or potentially used

for drinking water. The Act authorizes USEPA to establish minimum standards to protect tap water and requires all owners or operators of public water systems to comply with these primary (health-related) standards. The Safe Drinking Water Act targets treatment, distribution, and source water protection to assure drinking water quality.

b. State Regulations

i. Porter-Cologne Water Quality Control Act of 1969

Promulgated within California Water Code, the Porter-Cologne Act authorizes the State water quality agencies to implement pertinent federal CWA programs. Porter-Cologne also establishes separate, autonomous State water quality planning, permit, and enforcement programs. Under the authority granted to State water agencies by the Porter-Cologne Water Quality Control Act of 1969, the State Water Board and Central Valley Water Board have issued various plans, policies, and regulations on water quality. These include the Basin Plan, beneficial uses, outflow volume, and other requirements discussed below.

Sacramento and San Joaquin River Basin Water Quality Control Plans are developed by the California water quality agencies (State Water Board and Regional Water Boards) to outline steps to help ensure that State waters are suitable and safe for use. These plans may be statewide, regional, or waterbody-specific in scope, and they may address all or any number of pollutants. The primary water quality control plan covering the Cache Slough Complex is the Sacramento and San Joaquin River Basin Plan (Basin Plan). As outlined in the Basin Plan, water quality control consists primarily of protecting and maintaining water quality standards. Standards consist of: (a) designated beneficial uses of water, (b) water quality objectives, and (c) the State's anti-degradation policy. In addition to identification and establishment of water quality standards, the Basin Plan outlines implementation, regulatory (permit), and enforcement programs. Water quality objectives have been established by the Central Valley Water Board to protect the designated beneficial uses established in the Basin Plan. These protective limits are achieved primarily through the combined, collective issuance of individual water quality permits (and certifications) for significant human-caused sources of pollution. Permits may contain specific numeric limits (i.e., effluent limitations) on pollutant quantities to be discharged or regulate other (e.g., construction) activities to ensure that, collectively and with the benefit of dilution, water quality objectives would be achieved. Northern Delta surface waterbodies are currently listed as impaired in multiple pollutant categories. Section 303(d) of the CWA requires the development of TMDLs for impaired waterbodies

ii. Waste Discharge Requirements (WDRs)

As established by the Porter-Cologne Act, WDRs are water quality permits issued by the Regional Water Boards to dischargers of pollution into State waters, including disposal of soil or groundwater to land or waterbodies. The Regional Water Boards maintain the authority to issue WDRs to any suspected discharger. However, if Water Quality Certification is issued to an applicant seeking a federal license/permit, WDRs are not normally issued separately. WDRs may be required for some aspects of the Proposed Project.

iii. Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Bay-Delta Plan) and Water Rights Decision D-1641

The 1995 Bay-Delta Plan was developed as a result of the 1994 Bay-Delta Accord, which committed the Central Valley Project and State Water Project to new Delta habitat objectives. One of the main features of the 1995 Bay-Delta Plan was the estuarine habitat objectives (X2) for Suisun Bay and the western Delta. The X2 standard refers to the position at which 2 parts per thousand salinity occurs in the Delta estuary and is intended to improve shallow water fish habitat in the spring of each year. Other elements of the 1995 Bay-Delta Plan included export-to-inflow ratios intended to reduce entrainment of fish at the export pumps, Delta Cross Channel gate closures, minimum Delta outflow requirements, and San Joaquin River salinity and flow standards. The objectives were largely implemented through a water rights decision (D-1641) and primarily placed responsibility for attaining these requirements on the U.S. Bureau of Reclamation and DWR.

D-1641 also includes water circulation controls and potential methods to meet salinity objectives in the Southern Delta. D-1641 considered activities from various stakeholders and an array of factors affecting salinity in the Southern Delta in identifying flow objectives and allocating responsibility for meeting water quality requirements. Accordingly, D-1641 is considered in the below discussion of the Proposed Project's potential impacts on salinity.

The Bay-Delta Plan is currently being updated through two separate processes (Plan amendments). First, on December 12, 2018 the State Water Board adopted the Plan amendments establishing the Lower San Joaquin River flow objectives and revised southern Delta salinity objectives. On February 25, 2019, the Office of Administrative Law approved the Plan amendments, which are now in effect. Second, the State Water Board is also considering Plan amendments focused on the Sacramento River and its tributaries, Delta eastside tributaries (including the Calaveras, Cosumnes, and Mokelumne rivers), Delta outflows, and interior Delta flows.

iv. Sacramento-San Joaquin Delta Reform Act

In November 2009 the Sacramento-San Joaquin Delta Reform Act was passed. It established State policy of coequal goals for the Delta and created the Delta Stewardship Council as a new, independent State agency that will delineate how to meet these goals through development and implementation of the Delta Plan. The "coequal goals" are providing a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem. Under the act, the Delta Stewardship Council adopted a Delta Plan and implementing regulations in May 2013.

v. Central Valley Flood Protection Board (CVFPB)

The CVFPB is responsible for enforcing standards for construction, maintenance, and protection of adopted flood control plans within the Central Valley of California pursuant to the California Code of Regulations, Title 23. Proposed restoration and levee work within the Proposed Project Site would require an encroachment permit from the CVFPB.

An encroachment permit from the CVFPB is required for any project or plan of work that: (1) is within federal flood control project levees and within a CVFPB easement; (2) may have an effect on the flood control functions of project levees; (3) is within a CVFPB designated floodway; or (4) is within the regulated Central Valley Streams listed in the California Code of Regulations, Title 23.

Certain projects may be permitted in a designated floodway, provided they would not unduly impede the free flow of water in the floodway or jeopardize public safety. Some of these include: (a) open space uses not requiring a closed building, such as agricultural croplands, orchards, livestock feeding and grazing, or public and private recreation areas; (b) fences, fills, walls, or other appurtenances which do not create an obstruction or debris-catching obstacle to the passage of floodwaters; (f) improvements in stream channel alignment, cross-section, and capacity; and (i) other uses which are not appreciably damaged by floodwaters.

vi. Sacramento-San Joaquin Delta Mercury Control Program (DMCP) and Methylmercury Total Maximum Daily Load (TMDL)

The waterways in the Delta are subject to site-specific methylmercury fish tissue objectives, the DMCP, and monitoring provisions which apply to all Delta waterways, Yolo Bypass waterways within the Delta, and also those north of the Legal Delta boundary to which the commercial beneficial use applies.³³ The DMCP is designed to protect people eating one meal/week of trophic levels 3 and 4 Delta fish and some non-Delta commercial market fish. The DMCP identifies the waterways in the legal Delta and Yolo Bypass, up to the Fremont weir, subject to the regulation. The amendment uses a phased, adaptive management approach. Among other actions, the first phase focuses on conducting control or characterization studies to identify potential control mechanisms so dischargers can attain load and waste load allocations specified in the DMCP. The Delta Methylmercury TMDL was adopted by the Central Valley Water Board on April 22, 2010. Final approval by the USEPA was received on October 20, 2011.

Analysis for this DEIR is based on best available scientific information. As part of the first phase of the Delta Mercury Control Program, DWR is conducting both tidal wetland and open water characterization studies in the Yolo Bypass, the Delta and Suisun Marsh. The tidal wetland studies are examining whether tidal wetlands are a source or a sink of methylmercury. The open water characterization studies consist of the development of mercury models for the Delta and Yolo Bypass as well as a number of studies conducted to provide data to the Yolo Bypass Mercury model. Recent research, including preliminary results from the DWR studies referenced above, shows that tidal wetlands do not export mercury or methylmercury in large amounts, although seasonal differences occur, and imports and exports are heavily influenced by flow and whether a wetland is associated with a floodplain. DWR is currently analyzing data from these studies to

³³ Central Valley Regional Water Quality Control Board. 2016. *Central Valley Water Board approved changes to the Integrated Report (including changes to the 303(d) List and the 305(b) Report)*. https://www.waterboards.ca.gov/centralvalley/water_issues/tmdl/impaired_waters_list/#intrpt2014_2016.

inform understanding of tidal wetlands and floodplains with respect to mercury and methylmercury production³⁴³⁵³⁶.

c. Local Regulations

The following have been considered in the analysis of potential impacts and identification of mitigation, as appropriate.

i. Solano County General Plan

The Solano County General Plan's Public Facilities and Resources elements contain policies and goals relevant to hydrology and water quality. Policies and goals potentially applicable to the Proposed Project are listed below:

AG.P-8: Maintain water resource quality and quantity for the irrigation of productive farmland so as to prevent the loss of agriculture related to competition from urban water conduction internal or external to the county.

RS.G-9: Protect, monitor, restore, and enhance the quality of surface and groundwater resources to meet the needs of all beneficial uses.

RS.G-10: Foster sound management of the land and water resources in Solano County's watersheds to minimize erosion and protect water quality using best management practices and protect downstream waterways and wetlands.

RS.P-65: Require the protection of natural water courses.

RS.P-68: Protect existing open spaces, natural habitat, floodplains, and wetland areas that serve as groundwater recharge areas.

RS.P-71: Ensure that land use activities and development occur in a manner that minimizes the impact of earth disturbance, erosion, and surface runoff pollutants on water quality.

RS.P-72: Preserve riparian vegetation along county waterways to maintain water quality.

PF.P-32: Require development projects to minimize pollution of stormwater, water bodies receiving runoff, and groundwater, and to maximize groundwater recharge potential by:

- Implementing planning and engineering design standards that use low-impact development techniques and approaches to maintain and mimic the natural hydrologic regime;

³⁴ Turner, R.R., C.P.J. Mitchell, A.D. Kopec, and R.A. Bodaly. 2018. Tidal Fluxes of mercury and methylmercury for Mendall Marsh, Penobscot River estuary, Maine. *Science of the Total Environment*. 145-154.

³⁵ Lee, P. and J.L. Manning (in progress). Mercury Flux of Tidal Wetlands in Northern California for Delta Mercury Control Program Compliance. California Department of Water Resources.

³⁶ Mitchell, Carl & Gilmour, Cynthia. (2008). Methylmercury production in a Chesapeake Bay salt marsh. *J. Geophys. Res.* 113. 0-4. 10.1029/2008JG000765.

- Using “infiltration” style low-impact development technologies; and
- Following stormwater best management practices during and after construction, in accordance with relevant state-required stormwater permits.

PF.I-32: As a condition of Proposed Project approval, require new development to provide adequate on-site and offsite stormwater and drainage facilities to control both direct and indirect erosion and discharges of pollutants and/or sediments so that “no net increase in runoff” occurs as a result of the proposed project. To determine the needs for facilities and best management practices, the County will require, when necessary, that a licensed and County-approved civil engineer perform a hydrological/drainage analysis. The Proposed Project Applicant would be responsible for the cost of this analysis. In cases where a local or regional drainage facility may be the best solution to serve multiple properties or an entire drainage basin, the County will work with property owners and public agencies with jurisdiction in the affected area to devise an appropriate funding mechanism (e.g., impact fees, assessment district) for such facilities.

ii. Solano County Code of Ordinances

Chapter 12.2 of the Solano County Code outlines requirements to reduce flood losses in the unincorporated county. The ordinance restricts uses which are dangerous due to water hazards or which result in increases to flood height or velocity, places restrictions on development within floodways, establishes when construction is allowed, and outlines design principles. The ordinance also establishes when a State Water Project PP is required and delineates Applicant responsibilities for flood and erosion control.

4. ENVIRONMENTAL IMPACTS

a. Thresholds of Significance

In accordance with Appendix G of California Code of Regulations, Title 14, Ch. 3, the Proposed Project would have a significant environmental impact if it would:

- a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality;
- b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the Proposed Project may impede sustainable groundwater management of the basin;
- c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:
 - i. Result in substantial erosion or siltation on- or offsite;

- ii. Result in flooding on-or offsite;
 - iii. Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or
 - iv. Impede or redirect flood flows;
- d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation; or
- e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan.

b. Methods

Hydraulic models were utilized to assess the potential for increased stages in Cache and Hass Sloughs, as well as for other locations adjacent to, upstream of, and downstream of the Proposed Project Site. The model analysis indicates that there would be no change to water levels in Cache and Hass Sloughs, and that the Proposed Project would generally result in localized stage reductions in the Yolo Bypass and would not result in upstream or downstream stage increases. Stage decreases would have modest but positive impacts on flood-related public services by reducing demand on levees.

Hydraulic modeling was also used to evaluate changes to velocity and shear stress under the with-project condition to assess the likelihood of erosion and scour of flood control facilities. These models indicate that shear stress would slightly increase (+0.1 pounds/sq. ft.) upstream of the Proposed Project Site in Shag Slough, but that existing rock slope protection would be sufficient to assure that the channel and the levee do not scour or erode.

The Proposed Project would introduce tidal and flood waters into the Project Site. This would increase the potential for increased wave height and wave run-up from winds that originate from the northeast. This potential for increased wave height may impact the Duck Slough Setback Levee and the Cass/Hass Training Levee, and the Cross Levee and other off-site levee in the region.

Wave run-up analysis was modeled to analyze potential effects of wave run-up on the Proposed Project's levees and adjacent levees. This analysis indicated that the Proposed Project would not create significant changes to wind-wave generated erosion and that adjacent properties would not be subject to increased wind wave run-up.

c. Project Impacts and Mitigation Measures

- i. *Violation of Water Quality Standards or Waste Discharge Requirements or Substantial Degradation of Surface or Groundwater Quality due to Erosion and Sedimentation during Construction and Substantial alteration of an existing drainage pattern of the area in a manner that would result in substantial erosion or siltation or create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems.*

Construction of the Proposed Project would include removal of old infrastructure and debris, clearing for staging areas and access roads, excavation, grading, and levee construction to restore approximately 3,000 acres of tidal marsh. These construction activities could expose soils to temporary increased rates of erosion and increase sediment loading to receiving waters. In addition, some of the existing infrastructure may contain hazardous materials such as residual petroleum products, bioaccumulants, and pesticides. In-water work during levee breaching could agitate sediment and lead to downstream sedimentation and increased turbidity. In addition, construction equipment would be used within the Proposed Project Site and worker vehicles and construction equipment on staging areas could result in the contamination of soils resulting from spills of fuels, lubricants, and other pollutants during vehicle and equipment operation, refueling, parking. Improper handling, storage, or disposal of these materials in the vicinity of the Proposed Project Site could cause degradation of surface water and groundwater quality if they are eventually discharged into the surrounding sloughs and the Delta or if allowed to percolate into soils and underlying groundwater.

A NPDES Construction General Permit from the Central Valley Water Board is required prior to initiating earth disturbing activities to ensure construction activities would not degrade surface and groundwater quality. Requirements of the Construction General Permit include development of a stormwater pollution prevention plan (SWPPP) and implementing Best Management Practices (BMPs) that would (1) prevent increases in water turbidity, (2) control surface erosion; (3) control stormwater flows, (4) retain sediment within the construction site, and (5) restore vegetation. Conditions of the permit would include:

- Preparation of hazardous material spill control and countermeasure program;
- Stormwater quality sampling, monitoring, and compliance reporting;
- Development and adherence to a Rain Event Action Plan;
- Mandatory training under a specific curriculum; and
- Mandatory implementation of BMPs.

BMPs could include, but not be limited to (1) conducting major construction activities involving excavation and spoils haulage during the dry season, to the extent possible; (2) use of straw bales, sandbags, gravel traps and filters; (3) erosion control measures such as vegetation and physical stabilization; and (4) sediment control measure such as fences, dams, barriers, berms, traps, and basins. The specific BMPs to be implemented would be determined prior to issuance of the Construction General Permit, as determined by the Central Valley Water Board.

During construction, the site would be partially dewatered to suppress shallow groundwater (5 to 10 feet deep) to facilitate construction. The water from the dewatering, in addition to any rainwater, would be pumped into the existing open channel drainage system for removal. The existing drainage system ends at pumps which currently (and during construction will) discharge into the adjacent sloughs. Through implementation of the SWPP, water that is discharged from the work area into adjacent sloughs would meet thresholds for water quality that are established by the Regional Water Quality Control Board, and therefore would not contain any erosion or sediment which violates the thresholds. As part of this process, The Project would obtain and comply with a General Waste Discharge Requirements/NPDES Permit for Limited Threat Discharges to Surface Waters for the testing and disposal of groundwater or other water dewatered during construction.

Even with these precautions, it could still be possible for soil or contaminants to enter surface or groundwater during construction. Implementation of NPDES permit requirements, and turbidity monitoring plan included in Mitigation Measures HYDRO-1 and HYDRO-2, respectively, would ensure that impacts to surface and groundwater water quality would be minimized and reduced to less-than-significant levels. Please see Chapter IV.F, Hazards and Hazardous Materials for other regulations on the control, storage, and disposal of hazardous materials. Therefore, with the implementation of Mitigation Measures HYDO-1 and HYDRO-2, impacts of the Proposed Project would not exceed the applicable threshold of significance related to soil or construction-related contaminants entering surface or groundwater during construction. and the Proposed Project's impact with regard to this threshold would be ***less than significant with mitigation incorporated.***

Mitigation Measure HYDRO-1: The contractor in charge of the Proposed Project construction shall obtain the NPDES permits required for construction and discharge of dewatering prior to the start of construction activities.

Mitigation Measure HYDRO-2: Turbidity Monitoring Program

The Basin Plan for the Delta Estuary³⁷ contains turbidity objectives. Specifically, the plan states that where natural turbidity is less than 1 nephelometric turbidity unit (NTU), controllable factors shall not cause downstream turbidity to exceed 2 NTUs; where natural turbidity is between 1 and 5 NTUs, increases shall not exceed 1 NTU; where natural turbidity is between 5 and 50 NTUs, turbidity levels may not be elevated by 20% above ambient conditions; where ambient conditions are between 50 and 100 NTUs, conditions may not be increased by more than 10 NTUs; and where natural turbidity is greater than 100 NTUs, increases shall not exceed 10%.

³⁷ California Regional Water Quality Control Board Central Valley Region. Revised 2018. The Water Quality Control Plan (Basin Plan) for the California Regional Water Quality Control Board Central Valley Region.

When water is flowing through the Proposed Project Site, the Proposed Project shall monitor turbidity approximately 500 feet downstream of construction activities to determine whether turbidity is being affected by construction. Grab samples shall be collected at a downstream location that is representative of the flow near the construction site. If there is a visible sediment plume being created from construction, the sample shall represent this plume. A sampling plan shall be developed and implemented based on specific site conditions and in consultation with the Central Valley Water Board.

If turbidity limits exceed Basin Plan standards, construction-related earth-disturbing activities shall halt until sufficient turbidity limits can be met by application of BMPs specified in the NPDES Construction General Permit. DWR shall notify the Central Valley Water Board of the issue immediately and provide an explanation of the cause.

ii. Violation of Water Quality Standards or Substantial Degradation of Surface Water Quality or Substantially Altering the Existing Drainage Pattern of the site in a Manner that would lead to Turbidity caused by Erosion and Sedimentation during Post-Construction Operation

The Proposed Project would result in the restoration of tidal wetlands through grading, excavation of channels, and breaching levees within the Proposed Project Site and could affect the turbidity and water quality of waters outside the Proposed Project area. Particles contributing to turbidity may be organic or inorganic and may originate from such sources as sediment erosion and resuspension, sediment-disturbing activities like dredging, algae, and other microorganisms, and may contain residual amounts of herbicides or pesticides from past farming activities. Cache Slough Complex turbidity fluctuates seasonally. The nearest continuous monitoring locations near the Proposed Project Site are administered by USGS and include Shag Slough at Liberty Island Road (#11455276) and Cache Slough at South Liberty Island (#11455315). Based on available monitoring data, there was a high turbidity event in the vicinity of the Proposed Project Site from late 2014 to early 2015, where turbidity reached as high as 250 NTUs. As stated in the previous impact analysis with regard to construction impacts with regard to erosion and sedimentation, the Central Valley Water Board imposes maximum turbidity increases based on the Basin Plan. The Proposed Project Site's baseline turbidity levels are generally above 100 NTUs apart from occasional high turbidity events from increased flood flows.

The Proposed Project could contribute to increased turbidity levels and herbicides or pesticides in the adjacent water bodies from erosion and sedimentation from the Proposed Project Site through the constructed channels and breaches. However, geotechnical and hydrologic and hydraulic investigation, modeling, and analyses for the Proposed Project indicate that the underlying soil provides stable soil conditions that would not be susceptible to erosion from the hydraulic shear stresses on the designed channels and levee breaches.^{38,39} Post-construction

³⁸ Environmental Science Associates. 2019. Lookout Slough Tidal Habitat Restoration and Flood Improvement Project – Draft Hydrologic and Hydraulic System Analysis. September.

³⁹ Draft 65% geotechnical basis of design Report. Blackburn Consulting. November 2019.

natural recruitment of emergent marsh vegetation would provide additional stability to soils and dampening of shear stresses.

In addition, current farming practices result in the discharge of excess water collected from onsite irrigation and runoff that contain residual levels of herbicides and pesticides. Farming practices of application of herbicides and pesticides and discharge of excess collected waters into the Delta would end prior to construction of the Proposed Project. Furthermore, as explained previously, the Proposed Project Site soils would be stable and not discharge sediment or soil containing residual herbicides or pesticides above existing levels discharged from current farming practices. Therefore, impacts of the Proposed Project would not exceed the applicable threshold of significance related to turbidity, herbicides and pesticides as a result of post-construction operation and the Proposed Project's impact with regard to this threshold would be ***less than significant***.

iii. Violation of Salinity Quality Standards or Conflict with a Water Quality Control Plan during Post-Construction Operation – Drinking Water

Tidal wetland habitat restoration would result in greater tidal exchange and flows in the neighboring Delta channels would change. These changes could alter the salinity regime in the Delta. Increased Delta salinity could negatively impact drinking water quality by impacting water treatment plant operations. RMA analyzed the potential salinity impacts of the Proposed Project using a modeling scenario based on calendar year 2009, representative of a dry year (i.e., low Delta outflow of freshwater). By comparing EC for the existing conditions scenario with the Project conditions, the modeling provided a quantitative evaluation of the salinity changes.

D-1641 established multiple compliance monitoring stations to protect drinking water beneficial uses, which include: Contra Costa Canal at Pumping Plant 1 (C5), Clifton Court Forebay (C9), the Delta Mendota Canal entrance (DMC1), the North Bay Aqueduct at Barker Slough (SLBAR3), the City of Vallejo intake at Cache Slough (C19). Additionally, RMA analyzed changes in salinity at the Contra Costa Water District's intakes at Mallard Slough, Old River, and Victoria Canal.

Given the dynamic nature of a tidal system, the effects of restoration on salinity at Delta drinking water intakes were expected to be small compared to other factors such as precipitation, Delta inflow, and tides. The RMA modeling predicts reduced EC at the Barker Slough North Bay Aqueduct intake (reductions up to five percent) and Contra Costa Water District intake at Mallard Slough (reductions up to 1.2 percent). All the other stations are predicted to have increased EC of up to 1.6 percent for at least one month per year, with the largest increases typically occurring in the fall. The RMA modeling indicates that even for sites that would experience a slight increase in salinity as a result of the Proposed Project, the level of salinity would still be in compliance with D-1641 standards.

Based on the RMA modeling results, Proposed Project salinity changes would not result in substantial adverse effects on the beneficial use of Delta waters as a drinking water source. Therefore, impacts of the Proposed Project would not exceed the applicable threshold of

significance related to drinking water quality from increased salinity levels post-construction operation and the Proposed Project's impact with regard to this threshold would be **less-than-significant impact**.

iv. Violation Salinity Quality Standards or Conflict with a Water Quality Control Plan during Post-Construction Operation – Agriculture

Water in the Delta is used by many agricultural operations for irrigation of crops. Increases in salinity levels in Delta waters can affect agricultural water users by limiting the amount of water used during a tidal cycle. Irrigation water that is more saline can negatively impact crop yields. The Proposed Project has the potential to affect water quality for in-Delta agricultural irrigation users by increasing salinity concentrations at their agricultural diversion intakes.

RMA analyzed the potential salinity impacts of the Proposed Project, using a modeling scenario based on calendar year 2009, representative of a dry year. By comparing EC for the existing conditions scenario with the Proposed Project conditions, the modeling provides a quantitative evaluation of the salinity changes. The D-1641 stations for agricultural beneficial uses include Sacramento at Emmaton (D22) and San Joaquin at Jersey Point (D15).

The RMA modeling results for stations D22 and D15 indicate that under the 2009 modeling scenario, EC levels would be slightly reduced for most of the year compared to existing conditions. These slight EC reductions are largest during the months of August through October, when the reductions are still less than 5 percent. The only predicted increases in EC with the Project at D-1641 stations designated for agricultural beneficial uses occur in March for the D22 station and in May for station D15, although the net increases were very slight (<0.5 percent). Furthermore, these net short-term increases would not exceed any D-1641 compliance requirements that protect agricultural beneficial uses. Therefore, impacts of the Proposed Project would not exceed the applicable threshold of significance related to agriculture from increased salinity levels post-construction operation and the Proposed Project's impact with regard to this threshold would be **less than significant**.

v. Violation Salinity Quality Standards or Conflict with a Water Quality Control Plan during Post-Construction Operation – Fish and Wildlife

Increases in salinity levels in the Delta have been correlated with effects on fish and wildlife populations and changes to their habitats. D-1641 includes salinity standards specifically intended to protect a more natural distribution of species composition and wildlife habitats across the Delta. These standards are intended to maintain water quality conditions to prevent the following: a) loss of biodiversity, b) conversion of brackish marsh to salt marsh habitat; c) decreased population abundance of wildlife species and/or loss of habitat from increased salinity, and d) significant reductions in plant stature or percent cover from soil salinity or other water quality issues.

RMA analyzed the potential salinity impacts of the Proposed Project using a modeling scenario based on calendar year 2009, representative of a dry year. By comparing EC for the existing

conditions scenario with the Proposed Project conditions, the modeling provides a quantitative evaluation of the salinity changes.

The D-1641 stations for fish and wildlife beneficial uses are: D15 (San Joaquin at Jersey Point), D29 (San Joaquin at Prisoners Point), and C2 (Sacramento at Collinsville). Based on the RMA modeling results, salinity at these three stations would change with the Proposed Project by at most 3 percent as compared to existing conditions. The largest changes are predicted to be decreased EC at D15 of about 3 percent during July and August. The largest EC increases, of about 2-3 percent, are predicted for D29 during September through November. The salinity changes projected for Station C2 include both increases and decreases, depending on the month, but remain less than 1 percent. When these changes are considered relative to D-1641 standards, the Proposed Project would not result in any exceedance of the EC standards that are protective of fish and wildlife beneficial uses.

X2 represents the distance, measured in kilometers upstream from the Golden Gate Bridge, to where salinity measured one meter off the estuary's bed is 2 parts per thousand (ppt). In the past, X2 has averaged around 74 kilometers inland from the Golden Gate, although when tides are stronger and/or downstream flows weaker, X2 may extend as far inland as Rio Vista at 100 km from the Golden Gate Bridge. X2 demarcates the low salinity zone where freshwater transitions into brackish water. This zone is historically associated with higher primary productivity, zooplankton populations, and abundances of native estuarine species. D-1641 requires the location of X2 to be west of certain specific locations for a specified number of days each month (specifically, Collinsville, Chipps Island, and Port Chicago at 81 km, 75 km, and 64 km, respectively, from the Golden Gate Bridge).

Based on the salinity modeling RMA conducted, the Proposed Project would very slightly shift the position of X2 seaward for all months of 2009, as compared to existing conditions. The largest shift, less than 0.2 km (650 ft) seaward, is predicted for an October 2009 scenario with the Proposed Project in place. The shifts in X2 from the Proposed Project are seaward, the direction of X2 shift that is correlated with improved habitat conditions for many native Delta species. Overall, therefore, impacts of the Proposed Project would not exceed the applicable threshold of significance related to fish and wildlife from increased salinity levels post-construction operation and the Proposed Project's impact with regard to this threshold would be ***less-than-significant***.

vi. Post-Construction Changes to Tidal Range that Could Affect in-Delta Agricultural Water Supplies and Drainage

Tidal cycles in the Delta influence the costs and availability of water use of agricultural water users and influence drainage of soils on cropland. The Proposed Project restoration of tidal wetland habitat would alter the existing drainage system in and adjacent to the Proposed Project Site, including tidal exchanges that could affect agricultural water supply and drainage. Large changes to the tidal range have the potential to affect agricultural water management. Since soil drainage for agriculture is managed by pumping and gravity drainage in the Delta, any impacts to pumping and gravity drainage will directly impact soil drainage. For pumps, an increase in the height of the

low tide elevation would reduce the amount of head needed to be overcome by the pump and thus has the possibility to reduce energy consumption cost, while a reduction in the elevation of high tides would increase those energy consumption costs. For intakes operated using gravity, an increase in the elevation of low tides has the possibility to increase the duration and flow of water onto agricultural fields while a decrease in high tide elevation has the possibility to conversely decrease the duration and flow of irrigation water onto agricultural fields. During the NOP scoping process, some stakeholders expressed a concern that intakes operated solely using gravity may become ineffective due to the lowering of water surface elevations, and costs to upgrade these intakes with powered pumps could be prohibitively high because many of these intakes are not in close proximity to existing electric utility lines.

Modeling by RMA predicted a reduction in the tidal range with an increase of heights of low tides and a reduction in the heights of high tides. The modeling predicts there would be a reduction in the average elevation of high tides of up to 0.2 feet in the immediate vicinity of the Proposed Project Site (i.e., along Shag Slough) and an increase in the average elevation of low tides of up to 0.1 feet. These predicted changes in tidal height diminish in channels located farther away from the Proposed Project Site. The slight reduction in average high tides is not expected to appreciably affect the operations of agricultural intakes in the Delta. Since there would also be a slight increase of up to a 0.1 feet in average low tides in the immediate vicinity of the Proposed Project Site (i.e., along Shag Slough), there would be a minor but offsetting balance to the changes in average tidal range impacts on the timing of local agricultural water pumping (either for use of water for irrigation or for discharge of excess water on irrigated lands) over the course of a full tidal cycle. Furthermore, there would be no effect of changes in tidal range on agricultural drainage operations since they are typically not influenced by changes in tidal height. The changes in tidal ranges described above would not affect drainage pump operations. Therefore, impacts of the Proposed Project would not exceed the applicable threshold of significance related to post-construction changes to tidal range that could affect in-Delta agricultural supplies and drainage and the Proposed Project's impact with regard to this threshold would be ***less-than-significant***.

vii. Post-Construction Changes to Tidal Range that Could Affect in-Delta Wetland and Wetland Riparian Habitats

Tidal ranges influence the spatial presence of habitats along the watercourses throughout the Delta. The Proposed Project would permanently convert existing non-tidal wetland and terrestrial habitat to tidal freshwater wetlands and open tidal water habitat through reintroduction of daily tidal inundation to the Proposed Project Site. Reintroduction of daily tidal inundation to the Proposed Project Site would slightly alter the tidal range in surrounding Delta channels, as described previously. The effect of this tidal change has the potential to affect nearby off-site habitat such as tidal wetland habitat. Specifically, within areas in close proximity to the Proposed Project Site, the narrow band of elevations between the current average high tide and the up to 0.2 feet lower average high tide conditions are expected to experience slightly less frequent daily tidal inundation. In addition, the Proposed Project would result in a 0.1-foot increase in the average low tide range resulting and a slight offset to the change in average high tides. The overall increase in tidal wetland habitats created by the Proposed Project, including a net gain of more

than 2,000 acres of wetlands within the Proposed Project site, are expected to more than offset the minor effects on off-site habitat due to the minor changes in tides.

The extent of riparian forests in the vicinity of the Proposed Project Site is limited because it is adjacent to the Yolo Bypass, in which most woody vegetation is removed to ensure adequate flood conveyance capacity. There is limited riparian vegetation (mostly scrubby vegetation) along channels throughout the area in and around the Proposed Project Site, including areas along the Sacramento River downstream of the Yolo Bypass. Most of this vegetation is on ground surface elevations above average high tide elevation and gets its water from groundwater. Although the Proposed Project would result in a small localized reduction in the elevation of the mean high tide, it is expected that waterside vegetation would not lose access to groundwater. Further, the results of RMA's modeling show tidal changes diminish with distance to insignificant levels further from the Proposed Project Site.

In summary, the increase in the extent of total wetland habitat and improvements in functional values of existing on-site wetland features are expected to significantly offset the loss of existing freshwater non-tidal wetland functions present within the Proposed Project Site, and the Proposed Project is expected to have little to no impacts on on-site or neighboring riparian habitat. Therefore, impacts of the Proposed Project would not exceed the applicable threshold of significance related to post-construction changes to tidal range that could affect in-Delta wetland and wetland riparian habitats and the Proposed Project's impact with regard to this threshold would be ***less-than-significant***.

viii. Post-Construction Changes to Wind-Wave Generated Erosion

Wind across open bodies of water in the Delta influence the water surface elevations against levees and can create higher waves against levees that result in impacts to levee integrity. The Proposed Project would expose the interior side of the levees on the Proposed Project Site to wind-generated waves. This could lead to erosion and affect the integrity of the levees over time, which may lead to subsequent erosion impacts on neighboring levees. While wind-wave erosion depends on several factors (e.g., levee bank conditions, levee geometry), the dissipation of wave energy over time is considered a primary contributor. Wind-wave energy often varies seasonally with wind speed and direction. In the Proposed Project vicinity, average wind speeds during the spring and summer months are generally greater and more constant, directed strongly from the west-southwest. In fall and winter, wind direction is more variable and average wind speeds are significantly lower. As the length of open water across which wind can blow uninterrupted (i.e., fetch) increases, so does wind-wave energy. Depending on prevailing wind direction, maximum fetch for the Proposed Project would range approximately from 3.6 to 13.5 miles.

Wave run-up analysis was modeled to analyze potential effects of wave run-up on the Proposed Project's levees and adjacent levees. Modeling results for the Yolo Bypass East Levee show that at the lowest elevation of the levee wave run-up could overtop the levee under modeled wave run-up conditions. However, the analyses discovered that the Yolo Bypass East Levee does not meet freeboard requirements and has the potential to be overtopped from wave run-up under

current conditions. The Proposed Project Duck Slough Setback Levee would be constructed with a minimum freeboard of six feet above the design flood water surface elevation. Modeling of wave run-up for the Duck Slough Setback Levee showed no overtopping from wave run-up.

The Proposed Project would also introduce water to the current landside levee slopes for the Cache/Hass Slough East Levees. The Proposed Project would effectively change the purpose of the Cache/Hass Slough East Levees from the current purpose of protecting neighboring lands within the Proposed Project Site from elevated water stages in Cache and Hass Sloughs to preventing water stages inside the Yolo Bypass within the Proposed Project Site from raising water surfaces in Cache/Hass Slough. To assure no increase in water stages in Cache or Hass Slough, the Cache/Hass Slough Levee would undergo a series of improvements and remain in place. These improvements were designed to enhance stability, reduce settlement, and protect against erosion due to wind-wave forces. As such, the Cache/Hass Slough East Levee would become a training levee, and would be referred to as the Cache/Hass Slough Training Levee. The Cache/Hass Slough Training Levee would be degraded to one foot above the 1957 Authorized Design Flow water surface elevation, or the 100-year water surface elevation, whichever is higher. Notably, in some locations, short segments of the Cache/Hass levee have settled over the years resulting in crown elevation approximately one foot above the 1957 elevation.

As part of the Proposed Project, the Cache/Hass Slough Training Levee would be reconstructed to have a 16-foot wide levee crown and uniform 4H:1V side slopes. These measures would make the Cache/Hass Slough Training Levee more resilient given the potential for larger wind-generated waves. The modeled wave run-up with the Proposed Project ranges from 2.3 to 3.4 feet and, therefore, the Cache/Hass Slough Training Levee would continue to not have sufficient freeboard to completely contain total wave run-up. However, the Cache/Hass Slough Training Levee would be protected at the crest using rock slope protection, articulated concrete block, a turf reinforcing mat, or other similar erosion control measures, as needed. This crest protection would effectively break all waves emanating from the Proposed Project Site such that waves would not continue to propagate towards the Cache Slough and Hass Slough west levees.

The Cross Levee was designed and built with a varying amount freeboard, ranging from 3 to 6.5 feet across the levee. While the maximum recorded wind speed from the north is high and results in a higher amount of total wave run-up, it should be noted that this direction is not the dominant wind direction. While the total wave run-up exceeds the freeboard on the Cross Levee for the selected fetch site, erosion protection beyond existing native grasses is not considered necessary due to the limited overtopping duration and planned operation and maintenance. The Cross Levee would effectively break all waves emanating from the Proposed Project Site such that waves would not continue to propagate past the levee.

In addition to these improvements, the Cache/Hass Slough Training Levee and Cross Levee would undergo long term O&M activities. DWR will take over O&M of the Cache/Hass Slough Training Levee and Cross Levee from RD 2098 and would implement maintenance activities such as regular inspections, repairs following flood conditions, and rodent abatement, among others.

Based on the Proposed Project design and results of wind-wave modeling, adjacent properties would not be subject to increased wave run-up from the Proposed Project beyond the Cache/Hass Slough Training Levee and Duck Slough Setback Levee. Therefore, impacts of the Proposed Project would not exceed the applicable threshold of significance related to post-construction changes wind-wave generated erosion and the Proposed Project's impact with regard to this threshold would be **less than significant**.

ix. Impacts on Water Temperature in the Delta

The Basin Plan for the Delta requires that that natural receiving water temperatures shall not be altered unless beneficial uses would not be adversely affected, with a maximum increase of no more than five degrees Fahrenheit. Following restoration, the Proposed Project Site would be converted to subtidal channels and emergent marsh. Bringing water onto shallow flats and exposing it to solar radiation has the potential to raise temperatures. However, the hydrodynamic modeling completed by Environmental Science Associates⁴⁰ indicate that residence time of water within the majority of the Proposed Project Site would range between one and 14 days. Further, the Proposed Project would have minimal effects on tidal exchanges within the adjacent waterways (see previous discussion in impact viii on effects on tidal levels) indicating water exchanges from the site into adjacent waterways would maintain current flow and water surface elevations mixing on a regular basis with adjacent waterbodies. While emergent marsh absorbs more solar radiation than open waters, the presence of vegetation reduces water temperatures partly due to shading. Recent research on long-term slough and tidal marshes has documented the cooling function of natural tidally influenced sloughs and marshes as an important ecosystem service.⁴¹ Temperature decreases associated with marsh vegetation shading are therefore anticipated to roughly offset or decrease temperature increases associated with solar radiation due to shallow depth. Accordingly, changes to water temperature would be minimal and would not impact in-Delta water temperature criteria. Therefore, impacts would be **less than significant impact**.

x. Risk of Release of Pollutants due to Inundation from Flood, Tsunami, or Seiche

The risks of tsunami and seiche are relatively low because of the Proposed Project Site's inland location and lack of large, closed water bodies. The risk of flooding, however, is relatively high, particularly in the post-project condition. During construction, the Proposed Project Site would remain isolated from the Yolo Bypass Floodplain due to flood protection offered by the Shag Slough Levee. Should the levee overtop and flood conditions occur, the site interior would function as a settling basin, capturing any water and sediment potentially contaminated by pollutant release. The risk of pollutant release due to inundation from flood, tsunami, or seiche during construction is therefore relatively low. In the long-term, the Proposed Project Site would be connected to the Yolo

⁴⁰ Environmental Science Associates. 2019. *Lookout Slough Tidal Habitat Restoration and Flood Improvement Project – Draft Hydrologic and Hydraulic System Analysis*. September.

⁴¹ Christopher Enright, Steven D. Culberson, and Jon R. Burau, "Broad Timescale Forcing and Geomorphic Mediation of Tidal Marsh Flow and Temperature Dynamics," *Estuaries and Coasts* 36, no. 6 (November 1, 2013): 1319–39, <https://doi.org/10.1007/s12237-013-9639-7>.

Bypass floodplain and would regularly be flooded during bypass events. No potentially polluting land uses that would risk pollutant release would be present within the restoration area. As the Proposed Project would be isolated from the local floodplain during construction and would not have pollutants present for release post-implementation, impacts related to the risk of release of pollutants due to inundation from flood, tsunami, and seiche would be **less than significant**.

xi. Impedance of Sustainable Groundwater Management through Decreased Groundwater Supplies or Interference with Groundwater

Groundwater in the Proposed Project vicinity has been reported to be three to 12 feet below ground surface. Precipitation, irrigation, and water surface elevations in and around the Proposed Project Site influence local groundwater level. The Proposed Project would result in temporary dewatering in areas where groundwater is perched or where surface water has collected. This dewatering would be temporary and would not affect neighboring landowners. The Proposed Project would create approximately 3,000 new acres of tidally influenced wetlands that would be inundated frequently compared to existing conditions and add to the groundwater table, compensating for any water lost to groundwater as result of dewatering. The Proposed Project would not result in the use of groundwater or long-term dewatering.

To assure long-term levee stability and minimize risk to adjacent properties, geotechnical investigations at the 65% design phase examined both underseepage, through-seepage of groundwater and floodwaters. These investigations found the design is projected to be stable for steady-state slope stability, rapid drawdown slope stability, and end-of-construction slope stability and have no through seepage.

A soil-bentonite cutoff wall is included in the proposed Duck Slough Setback Levee design to provide a seepage barrier within the levee foundation and to tie together the underlying clay blanket. The proposed cutoff walls range in depth from approximately 25 to 50 feet below the existing ground surface. The Duck Slough Setback Levee would therefore not be at risk for underseepage. Similarly, based on historic geotechnical explorations, a thick clay blanket underlies properties across Cache and Hass Sloughs and there is no true aquifer present which could elevate exit gradient and result in seepage. Off-site levees across Cache and Hass Sloughs would therefore not be at risk for underseepage.

As a result of all these factors, impacts of the Proposed Project would not exceed the applicable threshold of significance related to impedance of sustainable groundwater management through decreased groundwater supplies or interference with groundwater and the Proposed Project's impact with regard to this threshold would be **less than significant**.

xii. Changes to Flood Flow and Conveyance that could Result in a Potential Increase to Flood Risk

The conveyance of flood flows through the Cache Slough Complex and Yolo Bypass are significant to the flood risk management in the Delta. Changes to the conveyance of flood flows near the confluence of these two floodways could affect water surface elevations resulting in exacerbation of flood risk management. Upon levee breach and degrade, the Proposed Project Site would be

connected with the Yolo Bypass floodplain, leading to hydraulic changes during flooding events. Should such changes result in increased flood surface elevations that would substantially increase flood risk on nearby properties, this would create a potentially significant impact.

Currently, flood protection for the Proposed Project Site and its surroundings is provided by a series of State Plan of Flood Control (SPFC) levees along the perimeter of the site. These include the Cache Slough Levee, the Hass Slough Levee, and the Yolo Bypass West (Shag Slough) Levee. The existing Cache Slough and Hass Slough Levees are deficient due to lack of freeboard and deferred maintenance over time, making them vulnerable to water level increases, erosion, and wind-wave run-up potential.

Proposed modifications to the Shag Slough Levee include nine breaches and degradation of two 1,500-foot segments of the remnant levee to allow overtopping during high flow conditions. By providing connectivity between the Yolo Bypass and the Proposed Project Site, the Proposed Project aims to increase overall corridor width and make up to 40,000 acre-feet of additional overbank storage available during large flood events, increasing flood conveyance in this portion of the Yolo Bypass. Flood protection previously offered by the Shag Slough Levee would now be provided by a newly constructed Duck Slough Setback Levee, which would become a part of the SPFC levee system upon Proposed Project completion.

During high-flow flood events, breach and degrade of the Shag Slough Levee would facilitate connection between the Proposed Project Site and the Yolo Bypass. This would create a condition where water levels on the Proposed Project Site would be slightly higher than those inside of Cache Slough. During design of levee modifications, the Proposed Project was constrained to prevent increases of flood stages in Cache and Hass Slough to no more than 0.01 foot. The Cache Slough Levee would also remain in place as a training levee and provide a wind-wave buffer for an additional layer of safety for levees on the opposite side of Hass Slough and Cache Slough.

In designing the Duck Slough Setback Levee, a series of flooding and habitat considerations were accounted for. Chief among these was the need to maintain the existing level of flood protection for lands north and west of the Proposed Project Site. Additionally, the Proposed Project was designed to increase local flood conveyance in the Yolo Bypass past the capacity needed to safely pass a 100-year flood event. This would be achieved by building the levee to the 100-year event (or the 1957 authorized design profile, whichever is higher) with six feet of freeboard and one extra foot for climate resiliency, consistent with DWR's flood planning objectives for the Central Valley. Regulations and guidance documents consulted during the design process include:

- California Code of Regulations, Title 23, Section 120 – Levees
- Corps Engineering Manual No. 1110-2-1913 – Engineering and Design – Design and Construction of Levees
- Corps, Design Guidance for Levee Under-Seepage, Engineering Technical Letter 1110-2-569, May 1, 2005

- Code of Federal Regulations, Title 44, Section 65.10 – Mapping of Areas Protected by Levee Systems

Although proposed levee modifications would create local flood control benefits in the Cache Slough Complex, alteration of State-Federal levees requires careful consideration to ensure that risk is not transferred from one part of the system to another. The downstream City of Rio Vista was considered in analyzing the Proposed Project's potential impacts on downstream flooding, and the Proposed Project was designed to not increase water levels at Rio Vista.

Wood Rodgers and Environmental Science Associates performed hydraulic analyses using historic flow record data and design storm hydrology for 10-, 100-year, and 200-year events. Models were calibrated with data from the January 1997 flood event and validated with data from the January 2006 flood event. In addition to hydrologic flow data, the models integrated topographic, bathymetric, and land cover considerations. The hydraulic analysis determined that the Proposed Project would have modest, mostly beneficial effects on regional flood hydrology. Eleven index locations were evaluated in the vicinity of the Cache Slough Complex, with nine experiencing a decrease in water surface elevation during one or more of the storm events analyzed, and two experiencing no change. Decreases range from -0.01 to -0.55 foot, with maximum water level reductions along the northern edge of the Proposed Project Site. The Proposed Project would locally reduce flood risk by providing enhanced conveyance in the Yolo Bypass and creating a new setback levee. Compared to baseline conditions, water elevations during the 100-year event would decrease in most upstream and downstream locations. These results indicate that the Proposed Project would improve local flood control and conveyance, and that the Proposed Project would not substantially alter the drainage pattern of the area in a way that would result in flooding. Therefore, impacts of the Proposed Project would not exceed the applicable threshold of significance related to changes to flood flow and conveyance that could result in a potential increase to flood risk and the Proposed Project's impact with regard to this threshold would be ***less than significant***.

5. LEVEL OF SIGNIFICANCE AFTER MITIGATION

With implementation of Mitigation Measures HYDRO-1 through HYDRO-2, the Proposed Project would have ***less-than-significant impacts*** on hydrology and water quality.

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IV. ENVIRONMENTAL IMPACT ANALYSIS

H. MINERAL RESOURCES

1. INTRODUCTION

This section describes mineral and natural gas resources at the Proposed Project Site and considers whether the Proposed Project would lead to a lack of availability of a locally important mineral resource. This discussion assesses the potential impacts of the Proposed Project on mineral and natural gas rights over, under, and across the Proposed Project Site held by third-party entities, as well as the possibility of accidental discovery of improperly abandoned natural gas wells during construction. The analysis in this chapter is based on field investigations, public databases and published reports on mineral resources in California, and real estate documents for Proposed Project Site properties, which were incorporated into the following technical reports, which are available upon request from Fpra@water.ca.gov. Please include a subject line of “Lookout Slough Information Request”.

- Appendix U – Mineral Report and Remoteness Opinions [Bowlesby and Vogel Properties], Cantrell & Associates, Inc. and GeoResource Management, Inc., February 2017.
- Appendix V – Mineral Report and Remoteness Opinion: Liberty Farms Property, Cantrell & Associates, Inc., August, 2017.

2. ENVIRONMENTAL SETTING

a. Non-fuel Mineral Resources

Non-fuel mineral resources mined or produced within Solano County include mercury, sand, gravel, clay, stone products, calcium, and sulfur. Mineral resource zones, as designated in the County General Plan, include areas northeast of Vallejo, south and southeast of Green Valley, south and east of Travis Air Force Base, and around Vacaville and Fairfield. Stone, gravel, sand, and clay mines are spread throughout the county, while mercury mines are mostly east of Vallejo.¹ No mine or non-fuel mineral resource extraction areas exist on the Proposed Project Site. The nearest mine or mineral resource zone nearest to the Proposed Project Site is a sand and gravel mine in the City of Rio Vista.

b. Oil and Natural Gas

Portions of the Proposed Project Site are known to contain decommissioned natural gas wells and associated pipelines. Impacts as a result of hazardous conditions resulting from gas production activity is discussed in Chapter IV.F. Mineral Resources within the Proposed Project Site are partially severed, meaning some mineral resource rights underneath the Proposed Project Site are under separate ownership from the land at the surface of the site. Due to the

¹ Solano County, “Solano County - General Plan,” November 4, 2008, https://www.solanocounty.com/depts/rm/planning/general_plan.asp.

history of previous natural gas extraction and the potential to affect resource extraction rights, Cantrell and Associates and GeoResource Management conducted a study to assess the likelihood of future mineral resource extraction. This evaluation documented and considered several factors, including mineral resource right ownership, existing mineral resource extraction infrastructure, and the history of extraction within and near the Proposed Project Site. The below discussion summarizes the information used to assess the likelihood of future extraction, which investigators concluded is negligible.

Review of production and development records from nearby wells, well logs from oil and gas tests and previously producing wells, and other available records revealed that western portions of the Bowsbey and Liberty Farms Properties and the entirety of the Vogel Property sit atop the southern portion of Maine Prairie Gas Field, and that up to 37 decommissioned wells and associated pipelines are located within the Bowsbey and Liberty Farms Properties (as depicted in Figure IV.F-1 of Chapter IV.F, and displayed on the following page again for ease of reference).

Maine Prairie Gas Field was discovered in 1945. Production records suggest that approximately 122,910,000 Mcf (1 Mcf = 1,000 cubic feet at 14.73 pounds per square inch of pressure and 60 degrees Fahrenheit) of natural gas were extracted from the field from approximately the mid-1940s through the early-2010s. Documented extraction over the course of the field's history totals approximately 98% of estimated recoverable reserve capacity of 126,000,000 Mcf, as determined by a 1968 California Division of Oil and Gas report. This number is not inclusive of ten years of missing extraction data in the 1960s. Since nearly all of its reserves are accounted for in production records despite the fact that ten years of data are unavailable, the field is assumed to be depleted.²

According to California Department of Conservation data, five unplugged gas wells remain throughout the Maine Prairie Gas Field. None of these wells have experienced extraction in the last decade, nor are any of these wells located within the Proposed Project Site. Records examined and site visits conducted in support of the Proposed Project design process indicate the presence of decommissioned gas wells and associated pipelines within the Bowsbey and Liberty Farms Properties. During the development of construction plans, the exact location of each natural gas well and pipeline within the Proposed Project Site was surveyed and/or documented, and abandonment condition was assessed for compliance with applicable law and regulations.

² Cantrell & Associates, Inc. and GeoResource Management, Inc., "Mineral Report and Remoteness Opinions: Request for Proposal Secondary Number 10127576," February 22, 2017.







-  Property Boundary (3,378 ac.)
-  Plugged Gas Well
-  PGE ESMT Location
-  Gas Pipe

Figure IV.F-1. Natural Gas Wells and Pipelines in the Proposed Project Site

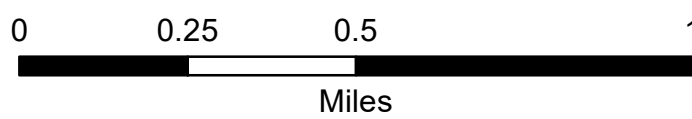


Map Prepared Date: 12/5/2019
 Map Prepared By: njander
 Base Source: Wood Rogers
 Base Date: 10/24/17
 Data Source(s): WRA

Prepared by:



Lookout Slough Tidal Habitat Restoration and Flood Improvement Project



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3. REGULATORY FRAMEWORK

a. Federal Regulations

No relevant federal regulations were identified.

b. State Regulations

i. California Department of Conservation, Division of Oil, Gas, and Geothermal Resources (DOGGR) Construction Site Plan Review Program

DOGGR regulates drilling, operation, maintenance, and abandonment of oil, gas, and geothermal wells. As part of DOGGR's responsibilities for implementing PRC Section 3208.1, districts have developed the Construction-site Plan Review Program to assist local agencies in identifying and reviewing the status of oil or gas wells near proposed development. The program is aimed at addressing potentially dangerous issues associated with development near oil or gas wells. DOGGR serves in an advisory role to make relevant information available to local agencies.

Section 3208.1 of the PRC states that if any property owner, developer, or local permitting agency either fails to obtain an opinion from DOGGR, or fails to follow the advice of DOGGR when development occurs near an oil or gas well, then the owner of the property on which the well is located may be responsible for re-abandonment costs should a future problem arise with the well. To use the DOGGR Well Review Program, the developer or property owner submits a completed Well Review Program Application to DOGGR. Before issuing building or grading permits, local permitting agencies review and implement DOGGR's preconstruction well requirements. Interaction between local permitting agencies and DOGGR helps resolve land-use issues and allows for responsible development in oil and gas fields.

ii. Surface Mining and Reclamation Act of 1975

The California law that regulates mining activities is the Surface Mining and Reclamation Act of 1975 (SMARA, PRC Section 2710 et seq.). This law's purpose is to create and maintain an effective and comprehensive surface mining and reclamation policy with regulation of surface mining operations to ensure that adverse environmental effects are prevented or minimized and that mined lands are reclaimed to a usable condition that is readily adaptable for alternative land uses. Production and conservation of minerals are encouraged, and consideration is given to values relating to recreation, wildlife, range and forage, and aesthetic enjoyment while eliminating residual hazards to public health and safety. These goals are achieved through land-use planning by allowing jurisdictions to balance the economic benefits of resource extraction with the need to provide other land uses.

c. Local Regulations

The following have been considered in the analysis of potential impacts and identification of mitigation, as appropriate

i. Solano County General Plan

The Solano County General Plan's Resource Element contains the following policies on mineral resources relevant to the Proposed Project:

RS.I-43 – Seal abandoned gas wells in accordance with Division of Oil and Gas regulations. Remove the drilling or production facilities and revegetate the surface area with native vegetation within one growing season after abandonment.

4. ENVIRONMENTAL IMPACTS

a. Thresholds of Significance

In accordance with CEQA Guidelines Appendix G, the Proposed Project would have a significant environmental impact if it would:

- i. *Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state.*
- ii. *Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan.*

b. Methodology

To assess the potential for loss of availability of mineral resources of value to the region or residents of the state, this EIR first considers whether mineral resources are present. The potential for such mineral resources to generate economic value for the region and the state is subsequently considered. Should mineral resources with the potential to generate economic value on a regional or state-wide scale be present, a direct, significant impact could occur if the Proposed Project would deplete these resources, substantially reduce their value, or make future extraction excessively difficult.

To assess the potential for loss of availability of a locally important resource recovery site, land use plans such as the Solano County General Plan were reviewed to determine whether the Proposed Project Site contains any officially designated mineral resource recovery sites. Should any such sites be present, a direct, significant impact could occur if the Proposed Project would deplete these resources, substantially reduce their value, or make future extraction excessively difficult.

c. Project Impacts and Mitigation Measures

- i. *Loss of availability of a known mineral resource that would be of value to the region and the residents of the state*

The Proposed Project Site is located at the southern end of a depleted natural gas production field, the Maine Prairie Gas Field. The Maine Prairie Gas Field has a maximum productive area of approximately 690 acres and underlies the southwestern portion of the Proposed Project Site. According to data from DOGGR, all wells and pipelines on the Proposed Project Site have been plugged and decommissioned.³

A California licensed, qualified geologist considered production history in the Maine Prairie Gas field, depth of known reserves, and other factors to determine whether there is any potential for future oil and gas production within the Proposed Project Site. Data considered in this process indicate that the Maine Prairie Gas Field as a whole is depleted, with nearly all of its available

³ *Cantrell & Associates, Inc. and GeoResource Management, Inc.*

reserves having already been extracted. No production has been documented since 2010, and all wells and pipelines within the Proposed Project Site have been plugged and decommissioned. Moreover, any remnant natural gas reserves are over 5,000 feet below ground surface, making further extraction too expensive to be economically viable. This investigation therefore concluded that the likelihood of future oil and natural gas extraction within the Proposed Project Site is negligible. Given the low availability of mineral resources within the Proposed Project Site and the excessive expense of potential future extraction, there are no mineral resources of value to the region and the residents of the State known to exist within the site. The Proposed Project would therefore not result in the loss of availability of any such resource. Therefore, impacts of the Proposed Project would not exceed the applicable threshold of significance related to a loss of availability of a known mineral resources that would be of value to the region and the residents of the state and the Proposed Project's impact with regard to this threshold would be **less than significant**.

- ii. *Loss of availability of a locally important mineral resources recovery site delineated on a local general plan, specific plan, or other land use plan.*

According to the Resources Chapter of the Solano County General Plan, mineral resources mined or produced in Solano County include mercury, sand and gravel, clay, stone products, calcium, and sulfur. The General Plan depicts known resource zones and active mines, none of which are located in the Proposed Project Site or the immediate vicinity.⁴ As such, there would be no loss of availability of a designated locally important mineral resource recovery site.

Therefore, impacts of the Proposed Project would not exceed the applicable threshold of significance related to a loss of availability of a known mineral resources that would be of value to the region and the residents of the state and the Proposed Project's impact with regard to this threshold. Therefore, impacts of the Proposed Project would not exceed the applicable threshold of significance related to loss of availability of a locally important mineral resources recovery plan and the Proposed Project's impact with regard to this threshold would be **less than significant**.

5. LEVEL OF SIGNIFICANCE AFTER MITIGATION

Impacts to mineral resources would be **less than significant**. No mitigation is required.

⁴ Solano County, "Solano County General Plan - Chapter 4," November 4, 2008.

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IV. ENVIRONMENTAL IMPACT ANALYSIS

I. PUBLIC SERVICES

1. INTRODUCTION

This section of the Draft EIR evaluates potential impacts to public services that may result from implementation of the Proposed Project. This chapter summarizes public services including emergency services such as fire and police protection, schools, parks, but primarily focuses on the Proposed Project's potential effects on public services related to modifying flood control infrastructure, altering habitat for potential disease vectors (i.e., mosquitoes), and the effects of vacating portions of Liberty Island Road. Descriptions and analyses in this section are based on information provided by Federal regulations (such as Corps guidance on levee construction), State regulations (such as California Code of Regulations Title 23), regulatory plans (such as the Delta Plan and the Central Valley Flood Protection Plan), Proposed Project plans, and various reports and literature. This includes the following technical reports, which were prepared for the Proposed Project and are available upon request from FRPA@water.ca.gov with a subject line of "Lookout Slough Information Request":

- Appendix C – Lookout Slough Tidal Habitat Restoration and Flood Improvement Project 65% Geotechnical Basis of Design Report, Blackburn Consulting, December 2019
- Appendix D – Lookout Slough Tidal Habitat Restoration and Flood Improvement Project 65% Basis of Design Report, Wood Rogers, December 2019

2. ENVIRONMENTAL SETTING

a. Emergency Services – Fire Protection

Fire protection services for the Proposed Project Site and its surroundings are provided by the Dixon Fire Department (Fire Department). The Fire Department serves the 6.7-square-mile City of Dixon and 320 square miles of nearby unincorporated county, with a total service population of approximately 25,000 people. In 2017, the Fire Department responded to roughly 2,500 calls for service, the majority of which (~1,500) were rescue or emergency medical services-related.^{1,2} The Fire Department has a goal of arriving on the scene of a call within 7 minutes 90% of the

¹ City of Dixon, "About the Dixon Fire Department | Dixon, CA - Official Website," accessed October 29, 2019, <https://www.cityofdixon.us/300/About-the-Department>.

² Dixon Fire Department, "Dixon Fire Department 2017 Annual Report," 2017, <https://www.cityofdixon.us/DocumentCenter/View/9729/2017-Annual-Report?bidId=>.

time. At the time its Strategic Plan was written, the Fire Department had a 90% performance of approximately 18 minutes.³

b. Emergency Services – Police Protection

Police services for unincorporated Solano County, including the Proposed Project Site, are offered by the Solano County Sheriff's Department (Sheriff). The Sheriff's Marine Patrol Unit provides police services for approximately 150 miles of Solano County waterways. In 2016, the Marine Patrol Unit responded to 14 search and rescue cases, six boating accidents, 47 vessel assists, and 537 boat inspections, and issued 625 warnings/citations.⁴ On dry land, the Sheriff's Patrol bureau serves 900 square miles of unincorporated county.⁵

In addition to the Solano County Sheriff's Marine Patrol Unit, the United States Coast Guard (Coast Guard) provides law enforcement and emergency services for waterways near the Proposed Project Site. The Coast Guard has enforcement authority in federally navigable waters, as well as responsibility for search and rescue, environmental protection, and navigation aid.

c. Schools

School services for the portion of unincorporated Solano County that includes the Proposed Project Site are DH White Elementary School, Riverview Middle School, and Rio Vista High School of the River Delta Unified School District in the City of Rio Vista.⁶

d. Parks

Detailed setting information on parks is provided in Chapter IV.J, Recreation. Throughout the Delta, there are a variety of city and County parks that accommodate many recreational uses, including fishing, birding, hunting, boating, and other regionally popular activities. There are no city or County parks near the Proposed Project Site. The Reserve however, is a CDFW managed conservation area that is open to public recreation and located to the east of the Proposed Project Site across Shag Slough. The Reserve is accessed primarily by boat with pedestrian access via Liberty Island Road and the Shag Slough Bridge.

e. "Other Public Services" – Flood Control

As the Proposed Project would involve modifications to levees, this analysis of "Other Public Services" considers the Proposed Project's potential impacts on public flood control services. Flood control infrastructure such as pumps, weirs, flood walls, and an extensive levee network protect life and property in the Delta, contributing to the social, cultural, and economic health of the surrounding communities. In the Cache Slough Complex, DWR and local maintaining

³ Dixon Fire Department and Citygate Associates, "Development of a Long-Range Strategic Plan for the City of Dixon Fire Department: Final Report, Volume 1 of 2," February 22, 2007, <https://www.cityofdixon.us/DocumentCenter/View/277/Volume-1---Dixon-Final-Report?bidId=>.

⁴ Alameda County Sheriff's Office, "Airport and Marine Patrol Police Services," Alameda County Sheriff's Office, accessed July 16, 2018, https://www.alamedacountysheriff.org/les_airport.php.

⁵ Solano County Sheriff's Office, "Solano County Sheriff's Office 2016 Annual Report," 2016, <http://www.solanocounty.com/civicax/filebank/blobdload.aspx?blobid=26719>.

⁶ Solano County, "Solano County - General Plan," November 4, 2008, https://www.solanocounty.com/depts/rm/planning/general_plan.asp.

agencies, including RDs, are responsible for flood control services, including levee maintenance. The Corps and the Central Valley Flood Protection Board oversee levee maintenance and modification as the primary regulatory authorities with jurisdiction over the region's flood control levees.

Lands within and adjacent to the Proposed Project Site are presently protected by levees maintained by RDs 2098, 2068, 2060, and 2104. Other nearby lands are protected by levees maintained by RDs 146, 501, 536, 1667, 2084, and 2093.

Levees bounding the Proposed Project Site include the Shag Slough Levee (RD 2098 Unit 1, Yolo Bypass West Levee), the Cross Levee and the southern portion of the Cache/Hass Slough Levee (collectively RD 2098 Unit 2, Cross Levee and Cache Slough East Levee), and the northern portion of Cache/Hass Slough Levee (RD 2098 Unit 3, Hass Slough East Levee). The Corps improved existing levees along the eastern, western, and southern boundaries of RD 2098 along Cache (in 1935), Hass (in 1936), and Shag (in 1961) Sloughs as part of the Sacramento River Flood Control Project (SRFCP). Currently these levees are maintained by RD 2098 utilizing maintenance fees collected from private landowners with some supplemental funding coming from County property taxes.⁷ RD 2098 presently oversees approximately 10.97 miles of levee, spending approximately \$38,000 annually on maintenance.

The Shag Slough Levee was designed and constructed with a crest of approximately six feet above the 1957 design water surface profile while the Cache/Hass Slough Levee was constructed with a crest approximately three feet above the 1957 design water surface profile. Over time the Cache/Hass Slough Levee has consolidated due to poor soil foundation conditions, with portions of the crest of the levee at approximately one foot above the 1957 design water surface profile. The 1957 design profile is based on specified design discharges and adopted concurrent conditions at confluences of streams within the Sacramento River Flood Control Project. In this portion of the Yolo Bypass, the 1957 design profile was scaled from the 1907 and 1909 floods, based on the authorized design flow of 490,000 cubic feet per second. The six-foot freeboard criterion for the Shag Slough Levee was intended to provide a factor of safety for both flood stages and wind-wave run-up in the Yolo Bypass.⁸

The Shag Slough Levee is part of a larger flood control system along the Yolo Bypass. The Yolo Bypass is a 59,000-acre floodway that, as part of the Sacramento River Flood Control Project, provides flood relief for the greater Sacramento Region during heavy rainfall and snowmelt events.⁹ The Yolo Bypass' design capacity ranges from 343,000 cubic feet per second to 500,000

⁷ Michael Brandman Associates, "FINAL Municipal Service Review: Solano County Water, Irrigation, Reclamation, and Flood Management Agencies" (Solano County LAFCO, April 13, 2009), <http://www.solanolafco.com/Studies/MSR/SpecialDistricts/WaterMSRfinalApril132009.pdf>.

⁸ Environmental Science Associates, "Baseline Study Deliverable for Flood Conveyance Optimization: Lookout Slough Tidal Habitat Restoration and Flood Improvement Project" (Sacramento, CA, June 2019).

⁹ UC Davis Center for Watershed Sciences, "Yolo Bypass: The Inland Sea of Sacramento," California WaterBlog (blog), February 21, 2017, <https://californiawaterblog.com/2017/02/20/yolo-bypass-the-inland-sea-of-sacramento/>.

cubic feet per second.¹⁰ Most of the Proposed Project Site, along with land under the jurisdiction of RD 2068 and 2060 to the north and west are located within the Yolo Bypass' historic 100-year floodplain, but have been isolated from the floodplain by levees.

f. "Other Public Services" – Vector Control

The Solano County Mosquito Abatement District (Abatement District), is an independent special district responsible for mosquito abatement throughout incorporated and unincorporated Solano County, serving a total area of approximately 829 square miles. The Abatement District was originally organized in 1930 under the Mosquito Abatement District Act of 1915 (Health and Safety Code Section 2000-2093). This Act was amended in 2002 and is now referred to as the Mosquito Abatement and Vector Control District Law.

The Mosquito Abatement District aims to control mosquitoes which may bring disease or harassment to humans and/or domestic animals through a variety of natural, physical, and chemical control measures. There are 21 mosquito species known to occur in Solano County, 12 of which are managed by the Abatement District.¹¹

Of the 12 mosquito species managed, some are aggressive nuisance biters or can transmit viruses that are harmful to human, wildlife, and domestic animals. The Mosquito Abatement District website highlights six species as aggressive biters that may be detrimental to livestock operations (California salt marsh mosquito [*Ochlerotatus squamiger*], foul water mosquito [*Culex stigmatosoma*], house mosquito [*Culex pipiens* spp.], duck club *Ochlerotatus malanimon*, pale marsh mosquito [*Ochlerotatus dorsalis*], and pasture mosquito [*Aedes nigromaculis*]). All but California salt marsh mosquito are considered vectors of diseases such as West Nile virus and encephalitis.¹²

Despite varying habitat requirements among different mosquito species, all mosquitoes require standing water to reproduce.¹³ In general, habitat that has shallow standing water for five or more consecutive days, poor-draining substrates, flat to gently-sloping surfaces, low turbulence, gradually-fluctuating water levels, dense vegetation, and high decomposition rates has favorable breeding conditions for mosquitoes.¹⁴ Conversely, wetland habitat with strong daily tidal fluctuations, open waters, surface turbulence, and habitat for predators inhibit mosquito productivity.

The Proposed Project Site presently contains standing water in Lookout Slough, Sycamore Slough, irrigation and drainage ditches, and managed wetland cells. Lookout and Sycamore

¹⁰ Yolo County, "Yolo Bypass Drainage and Water Infrastructure Improvement Study," April 2014, <https://www.yolocounty.org/home/showdocument?id=23985>.

¹¹ Solano County Mosquito Abatement District and Cardno, "Integrated Mosquito Management Program Draft Programmatic EIR," April 2014, https://bfae60b9-24e5-4ef9-a27d-bc1adf3140ab.filesusr.com/ugd/251dec_6ee12370c96e4c6690bec83ae854874e.pdf.

¹² "Solano County Mosquito Abatement District," Solano Co Mosquito, accessed June 10, 2019, <https://www.solanomosquito.com/mosquitoes>.

¹³ "Solano County Mosquito Abatement District."

¹⁴ BF Eldridge, "Biology and Control of Mosquitoes. Prepared in Colaboration with Vector-Borne Disease Section, Center for Infectious Diseases, and California Department of Public Health.," 2008.

Sloughs, and parts of managed wetland cells in the southern portion of the site contain relatively deep waters, limiting their utility as mosquito breeding habitat. Shallow irrigation and drainage ditches and most managed wetland cells within Liberty Farms, on the other hand, provide shallow standing water habitat that may currently provide quality mosquito breeding habitat.

3. REGULATORY FRAMEWORK

The discussion of the regulatory framework below focuses primarily for flood control protection, for which there are numerous regulations. Further regulatory details are contained in Chapter IV.G, Hydrology and Water Quality, Other public services including emergency services are only regulated at the County or city level.

a. Federal Laws and Regulations

i. Title 33, United States Code (USC), Section 408

Title 33 USC Section 408 provides the Secretary of the Army authority to grant permission to alter a Corps civil works project if the proposed alteration does not impair usefulness of the project and is not injurious to the public interest. In its oversight capacity for levee modifications process, the Corps provides guidelines for levee engineering. Among these are Corps' Engineer Manual titled *Engineering and Design – Design and Construction of Levees* and the Corps' Engineering Technical Letter titled *Engineering and Design – Design Guidance for Levee Underseepage*.^{15,16}

Section 408 provides a uniform process for modifications to all types of Corps civil work projects and applies to any action that would build upon, alter, improve, move, occupy, or otherwise affect the project, excepting certain minor actions such as routine operations and maintenance. The Section 408 process typically requires a non-federal project sponsor, an Applicant (if different than the non-federal sponsor), the Corps District 408 coordinator, and a Corps regional integration team. The non-federal sponsor must issue a concurrence and written acknowledgement and acceptance of any new O&M requirements. Where a 404 decision is also required, the 408 and 404 processes should be closely coordinated (see Chapter IV.G, Hydrology and Water Quality, for more on the 404 process).

ii. Title 44, Code of Federal Regulations (CFR), Section 65.10

Title 44 CFR Section 65.10 establishes minimum standards for certified levee design, operation, and maintenance. Procedural guidance issued in 2010 describes the Federal Emergency Management Agency's (FEMA) levee accreditation review process. This "completeness check" is intended to ensure that all requisite data demonstrating compliance with Section 65.10 have been submitted. Factors examined during levee certification include available freeboard, regulatory compliance, operations and maintenance plans, interior drainage, structural design,

¹⁵ Department of the Army: U.S. Army Corps of Engineers, "Engineering and Design: Design and Construction of Levees" (Washington D.C., April 30, 2000), https://www.publications.usace.army.mil/Portals/76/Publications/EngineerManuals/EM_1110-2-1913.pdf.

¹⁶ Department of the Army: U.S. Army Corps of Engineers, "Engineering and Design: Design Guidance for Levee Underseepage" (Washington D.C., May 1, 2005), https://www.mvn.usace.army.mil/Portals/56/docs/engineering/HurrGuide/ETL_1110-2-569_%20DESIGN_GUIDANCE_FOR_LEVEE_UNDERSEEPAGE_May_2005.pdf.

inspection reports, and a with and without levee analysis. These checks are performed in three steps that are intended to be carried out sequentially. To be certified, a levee must have a minimum of three feet of freeboard, with an additional one-half foot above the minimum at the upstream end of the levee – tapering to no less than the minimum at the downstream end, and an additional one foot above the minimum within 100 feet of either side of the levee.

b. State Laws and Regulations

i. 2007 California Flood Legislation

In 2007, the California Legislature passed six bills adding to and amending state flood management and land use laws, including Senate Bill (SB) 5 and 17 and Assembly Bill (AB) 5, 70, 156, and 162. These bills added to or amended sections in the California Government Code, Health and Safety Code, Public Resource Code (PRC), and Water Code, which have since been updated as recently as 2012. These bills collectively outline a comprehensive approach to flood management as part of the land use planning process. As part of this legislation, SB 5 added language to the Government Code Section 65007(h) requiring cities and counties within the Sacramento-San Joaquin Valley outside of urban settings to make a finding on compliance with the FEMA standard of flood protection before approving, among other things, a discretionary permit or entitlement of any property development or use that is located in a flood hazard zone.

ii. California Code of Regulations, Title 23

Title 23 California Code of Regulations, Section 120 provides levee construction requirements within the jurisdiction of the CVFPB. Section 120 is incorporated by reference and builds upon the Corps' Design and Construction of Levees Manual (EM 1110-2-1913), supplementing Corps requirements with additional standards. Among these requirements are additional analyses for settlement and seepage, freeboard requirements to account for excessive wave action, and granting the CVFPB a permanent easement across the property occupied by the proposed flood control works.

c. Regional Regulations and Plans

i. Delta Plan – Delta Stewardship Council (Council)

Chapter Seven of the Delta Plan contains policies relevant to public services such as flood facilities. Risk Reduction Policy 1 requires prioritization of State investments in Delta levees and risk reduction, including investments in flood risk management such as levee operation, maintenance, and improvements. Risk Reduction Policy 4 states that no encroachment may be allowed or constructed in the Yolo Bypass Floodplain unless it can be demonstrated that the encroachment would not have a significant adverse impact on floodplain values and functions.

ii. Central Valley Flood Protection Plan (Flood Protection Plan)

The Central Valley Flood Protection Plan provides guidance on flood risk management in the Central Valley. The CVFPB adopted the Flood Protection Plan in 2012 and updated it in 2017. The plan outlines strategies to prioritize investments in flood management, promote multi-benefit projects, and integrate and improve ecosystem functions associated with flood risk reduction projects.

iii. Lower Sacramento River/Delta North Regional Flood Management Plan (Regional Flood Management Plan)

The Regional Flood Management Plan was developed in response to the 2012 Central Valley Flood Protection Plan by a working group of North Delta counties, flood agencies, citizens groups, local maintaining agencies, and other interested stakeholders. The Regional Flood Management Plan develops a long-term vision for integrated flood management in the North Delta Region and identifies priority flood control projects.

d. Local Regulations

The following have been considered in the analysis of potential impacts and identification of mitigation, as appropriate.

i. Solano County General Plan

Public Health and Safety Element of the Solano County General Plan contains the following policies related to public services such as flood protection:

HS.P-6: Work with federal, state, and local agencies to improve flood control and drainage throughout the county.

HS.P-8: Work with responsible parties to ensure dams, levees, and canals throughout the county are properly maintained and/or improved.

ii. Solano County Code

Section 7 of the Solano County Code addresses emergency services by establishing an Office of Emergency Services and assigning it powers and responsibilities. The Office of Emergency Services is a division of the Solano County Sheriff's Office. In the event of an emergency, the director of the Office of Emergency Services has the authority to issue rules and regulations related to the protection of life and property affected by the emergency and to require emergency services of any County officer or employee. The incident commander is responsible for developing and maintaining the County's emergency plan.

4. ENVIRONMENTAL IMPACTS

a. Thresholds of Significance

In accordance with CEQA Guidelines Appendix G, the Proposed Project would have a significant environmental impact if it would:

a). Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, to maintain acceptable service ratios, response times or other performance objectives for any of the following public services:

- i. Fire Protection;
- ii. Police Protection;
- iii. Schools;

- iv. Parks; or
- v. Other public facilities.

Fire and police protection are discussed concurrently below due to the similar range of Proposed Project elements with potential to affect either type of public services. Due to the nature of the Proposed Project and based on comments received during the EIR scoping process, “other public services” are analyzed in the context of flood control and vector control.

b. Methodology

To be considered a significant environment impact on public services, a project’s effects on service ratios, response times, and other performance objectives must necessitate the construction or expansion of new governmental facilities, the construction or expansion of which may result in a significant environmental impact. Reduction in response time, increase in service ratio, and other adverse effects on performance objectives do not themselves constitute significant environmental impacts. Accordingly, this analysis first considers applicable performance metrics for public services and whether the Proposed Project may directly or indirectly cause an adverse effect on these metrics. This analysis next considers whether any potential effects on service metrics would be sufficiently adverse to necessitate new or physically altered governmental facilities, the construction of which could cause significant environmental impacts.

c. Project Impacts and Mitigation Measures

i.-ii. Adverse physical impacts associated with provision of new or physically altered fire or police protection facilities, the construction of which could cause significant environmental impacts

Towards the beginning of the construction period, vegetation would be removed throughout the Proposed Project Site. Some riparian trees would remain in place, but non-native grassland and other vegetation with potential to serve as fuel for a fire would generally be removed. The Proposed Project Site would remain unvegetated throughout construction. After construction is completed and levees are breached, tidal marsh vegetation is anticipated to naturally colonize the site. Because the Proposed Project Site would be stripped of vegetation in the short-term and colonized by less flammable vegetation than what is currently present in the long-term, fire risk would decline.

Construction activity would temporarily increase demand for emergency medical response by introducing workers using heavy equipment to the site. Construction would increase activity on the site on a daily basis for approximately two years. As further described in the Impacts Found to be Less Than Significant Chapter (IV.A) of this DEIR, ecosystem and levee maintenance activities would generate relatively few vehicle trips at a relatively low frequency (approximately once per month, and once per 90 days, respectively).

Construction work crews of approximately 26 persons, as stated in the Impacts Found to be Less Than Significant Chapter (IV.A), are relatively small in comparison to the overall service population of the Dixon Fire Department (25,000-person service population). Furthermore, the most recently available data indicate the Fire Department’s 90% response rate is approximately 157% above its goal response rate, likely due to the rural, sprawling nature of the area served.

Due to the small number of workers which would potentially require emergency services and the fact that response times are already above target, no new Dixon Fire Department facilities would be needed to serve worker emergency medical needs while maintaining acceptable service ratios.

Beyond construction and maintenance workers, the Proposed Project would not directly or indirectly expand human presence in a manner which would create demand for fire or police services. The Proposed Project Site would be placed under a conservation easement and future facilities which may induce population growth would not be permitted. No new utilities or roads would be constructed which could indirectly induce population growth—although, some modifications to existing infrastructure would occur, including vacation of a portion of Liberty Island Road.

A portion of the terminus of Liberty Island Road would be removed from public use. This includes the north-south section along Shag Slough and the east-west section that is just north of the Project Site. The only effect of removing this road is that the pedestrian access to the Reserve will be eliminated and maintenance access to the bridge will be limited to waterborne vehicles. Pedestrian access to the Reserve is via the structurally deficient Shag Slough Bridge, which cannot support emergency vehicles. However, fire and police protection for the Reserve is also currently provided by boat access from entities with emergency marine services such as the Solano County Sheriff Marine Patrol Division or the Coast Guard.

Demand for fire and police within the Proposed Project Site would be reduced due to discontinuation of farm activities and duck hunting at the Proposed Project Site. The Reserve would continue to provide recreational opportunity, which would be accessible via boat. For recreationalists who continue to use the Reserve, emergency services would need to be provided by entities with marine capabilities, such as those discussed above. As those entities already provide marine emergency services and use of the Reserve is not anticipated to increase, no increased demand would result.

The Proposed Project would not substantially increase need for police or fire service and no new or physically altered facilities would be needed. Therefore, impacts of the Proposed Project would not exceed the applicable threshold of significance related to adverse physical impacts associated with provision of new or physically altered fire or police protection facilities and the Proposed Project would have **no impact** with regard to this threshold.

iii. Adverse physical impacts associated with provision of new or physically altered schools, the construction of which could cause significant environmental impacts

In unincorporated Solano County, most children attend the public school that is geographically nearest to them. For the Proposed Project Site, all such schools are located in Rio Vista and are part of the River Delta Unified School District. None of these schools would experience an increase in demand due to the Proposed Project, as the Proposed Project would not be growth-inducing. No new infrastructure, housing, or places of employment which may induce population growth would be constructed. Modifications to existing electrical, flood control, and transportation infrastructure would occur; none of which would expand service to new areas. As such, there would be no need for new or physically altered schools. Therefore, impacts of the Proposed Project would not exceed the applicable threshold of significance related to adverse physical

impacts associated with provision of new or physically altered schools and the Proposed Project would have **no impact** with regard to this threshold.

iv. Adverse physical impacts associated with provision of new or physically altered parks, the construction of which could cause significant environmental impacts

There are no public city or County parks in the immediate vicinity of the Proposed Project Site. The nearest public park is Sandy Beach Park in Rio Vista, about 10 miles south. Considering that the Proposed Project Site would not increase the population of Solano County, there would be no need for the construction of new park facilities. Although there are no parks present near the site, the Reserve provides recreational opportunity on conservation lands adjacent to the Proposed Project Site. Potential impacts to recreation, including effects on shoreline fishing on the western side of the Reserve, are discussed in further detail in Chapter IV.J, Recreation. Therefore, impacts of the Proposed Project would not exceed the applicable threshold of significance related to adverse physical impacts associated with provision of new or physically altered parks and the Proposed Project would have **no impact** with regard to this threshold.

v. Adverse physical impacts associated with provision of other new or physically altered public service facilities related to flood control, the construction of which could cause significant environmental impacts

These results are discussed in further detail in Chapter IV.G, Hydrology and Water Quality.

vi. Adverse physical impacts associated with provision of other new or physically altered public service facilities related to vector control, the construction of which could cause significant environmental impacts

Some mosquito species known to occur in Solano County can transmit diseases such as West Nile Virus, Western equine encephalitis, Saint Louis encephalitis, dog heartworm, and malaria that are harmful to humans, wildlife, and domestic animals. Additionally, some mosquito species in Solano County are aggressive biters of humans and livestock that may pose a nuisance, especially in large numbers. In total, there are 21 species of mosquito known to exist in Solano County, 12 of which are managed by the Mosquito Abatement District, of which six are known to be aggressive biters and are considered disease vectors.¹⁷ Mosquito species managed by Solano County, their potential to transmit diseases or create a nuisance, and their preferred habitat types are summarized in Table IV-I-1 below. Changes in mosquito productivity resulting from alterations to breeding habitat availability have the potential to increase demand for mosquito control programs from the Abatement District, which could have physical, adverse effects on the environment through expanded use of chemical, biological, or other mosquito control methods.

¹⁷ "Solano County Mosquito Abatement District."

Table IV-I-1. Managed Mosquito Species of Solano County

Common Name	Disease Vector	Nuisance Biter	Preferred Breeding Habitat
California salt marsh (<i>Ochlerotatus squamiger</i>)		X	Salt and brackish marshes following high tides, rains.
Cool weather (<i>Culiseta incidens</i>)			Variety of standing water sources, including creeks, brackish water.
Encephalitis (<i>Culex tarsalis</i>)	X		Clear standing water, including marshes. Occasionally found in vegetation on stream margin.
Foul water (<i>Culex stigmatosoma</i>)	X	X	Standing, polluted water, such as sewage, drainage.
House (<i>Culex pipiens pipiens</i> & <i>Culex pipiens quinquefasciatus</i>)	X		Standing, somewhat polluted water, such as sewage, drainage.
Duck club <i>Ochlerotatus melanimon</i>	X	X	Irrigated pasture, duck clubs, alfalfa fields.
Pale marsh (<i>Ochlerotatus dorsalis</i>)	X	X	Salt marshes, brackish waters.
Pasture (<i>Aedes nigromaculis</i>)		X	Irrigated pasture, drainage ditches, alfalfa fields.
Western tree hole (<i>Ochlerotatus sierrensis</i>)		X	Tree rot holes
Winter (<i>Culiseta inornata</i>)			Wide range of standing water, prefers sunlit areas. Examples include duck clubs, irrigation ditches, brackish marshes.

Source: Solano County Mosquito Abatement District. "Mosquitoes." Solano Co Mosquito, 2017.
<https://www.solanomosquito.com/mosquitoes>.

*The genus names *Ochlerotatus* and *Aedes* are used interchangeably for certain species on the referenced webpage. *Ochlerotatus* is used preferentially throughout this document.

Currently, pastureland subject to periodic flood irrigation covers 38% of the Proposed Project Site, primarily on the Bowsbey Property. Due to prolonged periods of flooding, the presence of emergent vegetation, and absence of predaceous fish, irrigated pastures pose challenges to mosquito control agencies due to high levels of mosquito productivity.¹⁸ Similarly, an additional

¹⁸ BF Eldridge, "Biology and Control of Mosquitoes. Prepared in Collaboration with Vector-Borne Disease Section, Center for Infectious Diseases, and California Department of Public Health."

31% of the Proposed Project Site, at the Liberty Farms Tract is actively flooded and drained on an annual basis, creating breeding grounds for mosquitoes.

Overall, the Proposed Project would result in a decrease in suitable mosquito breeding habitat relative to current conditions through the creation of open water channels subject to tidal circulation, increase in water surface turbidity, and creation of more favorable habitat for predators (such as fish). Studies have demonstrated that restoring tidal connectivity through the removal of barriers and creation of channels that increase open water circulation can significantly reduce mosquito populations.¹⁹ By removing irrigated pastures and periodically flooded but stagnant duck habitat, the Proposed Project is expected to reduce local mosquito populations. The Proposed Project's negative effect on breeding mosquitoes would be further pronounced due to the Proposed Project Site's elevation profile.

As there would be less suitable mosquito breeding habitat present under the post-project conditions, there would be no need for new, expanded, or relocated governmental facilities for the purpose of maintaining mosquito control performance standards. Therefore, impacts of the Proposed Project would not exceed the applicable threshold of significance related to adverse physical impacts associated with provision of new or physical altered facilities related to vector control and the Proposed Project would have **no impact** with regard to this threshold.

5. LEVEL OF SIGNIFICANCE AFTER MITIGATION

The Proposed Project would have ***less-than-significant impacts*** on Public Services. No mitigation is required.

¹⁹ BF Eldridge, "Biology and Control of Mosquitoes. Prepared in Collaboration with Vector-Borne Disease Section, Center for Infectious Diseases, and California Department of Public Health."

IV. ENVIRONMENTAL IMPACT ANALYSIS

J. RECREATION

1. INTRODUCTION

This section discusses the existing recreational resources near the Proposed Project Site and throughout the Delta and evaluates the potential direct and indirect impacts of the Proposed Project on recreational resources. To determine whether the Proposed Project would result in a significant environmental impact related to recreation, this Draft EIR evaluates impacts related to physical deterioration of recreational facilities and impacts from the need for construction or expansion of recreational facilities. Potential impacts to recreation are assessed in light of existing formal and informal recreation practices and areas in the Delta, plans and policies related to Delta recreation, and easements present in the Proposed Project Site that are pertinent to recreation. This section also includes an evaluation of the Proposed Project on regional fishing opportunities.

2. ENVIRONMENTAL SETTING

a. Local Recreation

There are no officially sanctioned, public recreational facilities within the Proposed Project Site; though there are private facilities and access points to public areas with recreational opportunities. Recreational opportunities within the Proposed Project Site are presently limited to waterfowl hunting at the private Liberty Farms Duck Club. Adjacent to the Proposed Project Site, the Shag Slough Bridge provides pedestrian access to the Liberty Island Ecological Reserve (the Reserve), which provides recreational opportunities further detailed below.

The Liberty Farms Duck Club is a privately owned and operated venue for waterfowl hunting. Because the Liberty Farms Duck Club is not open to the public, use data are not available. The Liberty Farms Duck Club was created in 2005 through a 1,634-acre restoration project, which created managed wetland cells throughout the Liberty Farms Property. The project restored approximately 975 acres of seasonal and semi-permanent wetlands, 575 acres of upland grasslands, and 84 acres of riparian habitat, consistent with an easement purchased by the United States Department of Agriculture's Natural Resources Conservation Service (NRCS) and the California Waterfowl Association. The project was designed to create nesting habitat and winter cover for avian species popular for hunting such as mallard (*Anas platyrhynchos*), pheasant (*Phasianus colchicus*), gadwall (*Mareca strepera*), cinnamon teal (*Anas cyanoptera*), and dove (*Columbidae* spp.).

Additionally, fishing occurs on the Shag Slough Levee and from the Shag Slough Bridge. Technically, fishing is not allowed as the Shag Slough Levee is private land and the Shag Slough Bridge has signage posted indicating "no fishing from bridge"; however, anglers park along Liberty Island Road and fish off the side of the road and the bridge into Shag Slough. The Shag Slough

Levee and Bridge are intended for flood control and transportation purposes, respectively (although the bridge is structurally deficient and presently closed to vehicular traffic). As such, they are not maintained for recreational purposes and use data are not available. However, the bridge provides pedestrian access to a small portion of the western shoreline of Shag Slough in the Reserve where bank fishing is allowed.

The Reserve is located on the eastern side of Shag Slough. The Reserve is maintained by CDFW and is open to the public for recreational activities. The Reserve is primarily accessed by boats but can be accessed by pedestrians from the Proposed Project Site via the Liberty Island Bridge.

The interior of the Reserve is open to tidal inundation and is shallow enough to only be accessible by kayak or shallow-water boats. Recreational activities within the interior of the Reserve include fishing, bird watching, and hunting. Activities which may be carried out on foot within the Reserve are limited to a small portion of the shoreline along higher ground and include shoreline fishing and bird watching. These activities occur along the western bank of Shag Slough near the Shag Slough Bridge, which provides the only pedestrian access point.¹

Fishing occurs year-round at the Reserve. Fishing for Striped Bass is most popular in the fall, winter, and spring, coinciding with the fish migration, but also occurs year-round. Fishing for White Sturgeon also occurs on the Reserve, primarily in the winter and early summer. Most sturgeon anglers fish from the west bank of the Reserve into Shag Slough. Anglers for Striped Bass also fish along Shag Slough from the western side of the Reserve, and from boats in the Reserve's interior. Due to the limited access to recreation land at the Reserve, public use data for Shag Slough are not readily available.

b. Regional Recreation

Recreation is important to the economy and identity of the Delta. Popular recreational activities throughout the region often center on the Delta's waterways, wildlife, and agriculture. The Delta Stewardship Council estimates that approximately 12 million activity days of recreation occur in the Delta annually, capitalizing on recreational opportunities throughout the region such as fishing, boating, birding, and hunting.² While other recreational activities are present throughout the Delta, these activities are the primary focus of this analysis due to their presence within and near the Proposed Project Site and their potential to be affected by the Proposed Project.

According to the California Department of Parks and Recreation's 2012 statewide recreation survey, a plurality of adult recreationists in California travel between 21 to 60 minutes to the places they visit most often for recreation.³ Table IV.J-1 provides a sample of opportunities to fish from a bank or pier within a 60 minute drive of the proposed project site. Information for these recreational inventories was obtained from official documents such as the Delta Protection

¹ [CDFW] California Department of Fish and Wildlife, "Reserve Land Management Plan," July 2015, <https://www.wildlife.ca.gov/Lands/Planning/Liberty-Island-ER>.

² Delta Stewardship Council, "The Delta Plan: Ensuring a Reliable Water Supply for California, a Healthy Delta Ecosystem, and a Place of Enduring Value" (Sacramento, April 26, 2018), <http://deltacouncil.ca.gov/delta-plan-0>.

³ California State Parks, "Survey on Public Opinions and Attitudes on Outdoor Recreation in California," January 2014.

Commission's Inventory of recreational facilities in the Delta⁴, the Delta Stewardship Council's Delta Plan⁵, and City and County Parks Department webpages, as well as unofficial sources such as online angler's forums and crowd-sourced lists of fishing spots.⁶ The latter was included due to the popular use of waterways, levees, and bridges throughout the Delta as informal recreational facilities and includes 28 informal fishing areas and 30 fishing piers, which are included in Table IV.J-1 as appropriate based on distance from the Proposed Project Site and availability of bank fishing opportunities.

Table IV.J-1 represents a limited sample of the total amount of area for shoreline and pier fishing available in the Delta based on the sources described above. The length of bank available within these areas was assessed based on the absence of vegetation, which was determined by reviewing current Google Earth imagery. Most areas in this table offer about 500 linear feet for shoreline fishing. Several areas offer substantial amounts of shoreline available for fishing, in particular Brannan Island State Recreation Area (approximately 3,000 linear feet), and an informal area near Rio Vista known as "The Patio" offers about 2,000 linear feet. Informal recreational opportunities are noted here due to the popularity of bank fishing from levee roads and other informal fishing areas throughout the Delta. However, because this practice often takes place on private property, this analysis is based on the availability of formal bank fishing opportunity at publicly managed recreational areas.

⁴ Delta Protection Commission, "2015 Inventory of Recreation Facilities in the Sacramento-San Joaquin Delta," 2015.

⁵ Delta Stewardship Council, "The Delta Plan."

⁶ California Delta Chambers & Visitor's Bureau, "Delta Fishing Holes," accessed October 17, 2019, <https://californiadelta.org/fishing/delta-fishing-holes/>.

Table IV.J-1. Selected Shoreline and Pier Fishing Sites within a One Hour Drive of the Proposed Project Site¹

Facility	Managing Entity	Location
"The Dairy"	NA - Informal	Near Rio Vista
"Tennessee's Spot"	NA – Informal	Near Isleton B
"The Power Lines"	NA – Informal	Near Decker Island
"The Windmill"	NA – Informal	Near Isleton
Big Break	East Bay Regional Parks	Oakley
Cliffhouse Fishing Area	Sacramento County Parks	Near Isleton
Hogback Island Recreation Facility	Sacramento County Parks	Near Isleton
Sandy Beach County Park	Solano County	Rio Vista
Westgate Landing Regional Park	San Joaquin County	Lodi
Garcia Bend Park	City of Sacramento	Sacramento
Discovery Park	City of Sacramento	Sacramento
Sherman Island Public Access Facility	Sacramento County Parks	Near Antioch
Rio Vista Fishing Pier	City of Rio Vista	Rio Vista
Georgiana Slough Fishing Access	Sacramento County Parks	Near Isleton
Brannan Island State Recreation Area	California State Parks	Near Rio Vista
Antioch Fishing Pier – Antioch/ Oakley Regional Shoreline	East Bay Regional Parks	Antioch
Antioch Pier Downtown Fishing Pier – "Compy's"	City of Antioch	Antioch
"The Dump Gate"	NA-Informal	Isleton
"The Patio"	NA – Informal	Near Rio Vista

¹ Shoreline fishing sites outlined in this table represent a limited sample of all shoreline fishing sites within a 60-minute drive of the Proposed Project Site. Data presented above do not represent a comprehensive inventory of shoreline fishing areas.

3. REGULATORY SETTING

a. State Regulations

i. Delta Plan – Delta Stewardship Council (Council)

The 2013 Delta Plan prepared by the Delta Stewardship Council includes a recreation element, and within that element there is specific language (p. 196) to encourage recreation and tourism. No policies with regulatory effect are included in furtherance of this goal, but the element includes the following recommendations:

- DP R11. Provide New and Protect Existing Recreation Opportunities
- DP R12. Encourage Partnerships to Support Recreation and Tourism
- DP R13. Expand State Recreation Areas
- DP R14. Enhance Nature-based Recreation
- DP R15. Promote Boating Safety

- DP R16. Encourage Recreation on Public Lands
- DP R17. Enhance Opportunities for Visitor-serving Businesses

b. Local Regulations

Each of the counties (Alameda, Contra Costa, Solano, Sacramento, San Joaquin, and Yolo counties) that have unincorporated areas that coincide with the Delta Plan area have General Plans for those areas. These General Plans all have, as a state requirement, an open space element, which includes a discussion of outdoor recreation resources. However, whatever recreation resource goals, policies, and standards are included in each of those General Plans must be consistent with the Delta Plan.

4. ENVIRONMENTAL IMPACTS

a. Thresholds of Significance

Based on CEQA Guidelines Appendix G, a project could have a significant impact on recreational resources if it would cause any of the following conditions to occur:

- a) increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated; or
- b) include recreational facilities or require the construction or expansion of recreational facilities, which might have an adverse physical effect on the environment.

Additionally, DWR, as the Lead Agency for the Proposed Project has included the following significance threshold:

- c) substantially decrease opportunities to fish from the shoreline within the Delta region.

b. Project Impacts and Mitigation Measures

- i. Increase the Use of Existing Neighborhood and Regional Parks or other Recreational Facilities such that Substantial Physical Deterioration of the Facility Would Occur or be Accelerated from Displacement Impacts to other Shoreline Fishing Opportunities in the Delta*

The Shag Slough Bridge currently provides pedestrian access from the terminus of Liberty Island Road to the eastern shoreline of Shag Slough for bank fishing. However, this section of Liberty Island Road would be closed to the public as a result of the Proposed Project (Figure III-8). This would eliminate pedestrian access to bank fishing along the shoreline of the Reserve. As a result, it is possible that some angling use currently occurring on the Reserve would be shifted to other bank/shoreline fishing areas within the Delta.

Although no public use data are readily available for the Reserve, based on the fact that most Delta residents live on the outer fringes of the Delta in the “secondary zone” and most Californians travel a maximum of an hour to their preferred recreation spots, it is assumed that a relatively

small number of people use the Reserve. It is estimated based on fishing rates of Delta residents⁷ and the population of the Proposed Project Site's Census Tract that approximately 200 people across the Tract partake in fishing. Of these, approximately 40% fish from the bank⁸, and a smaller subset use the Reserve for bank fishing purposes. Conservatively assuming that all 80 bank fishers visit the Reserve on a semi-regular basis and assuming that they would evenly disburse to the limited sample of public recreational facilities (Table IV.1-1) upon loss of bank fishing access, any given public recreation facility within an hour of the Proposed Project Site would only absorb approximately six to seven semi-regular users. These users would most likely fish from shoreline areas that had previously experienced bank fishing. Due to the relatively small potential for increased use at other facilities, substantial deterioration or accelerated deterioration would not occur. Therefore, impacts of the Proposed Project would not exceed the applicable threshold of significance related to an increase in the use of recreational facilities such that substantial physical deterioration would occur or be accelerated and the Proposed Project's impact with regard to this threshold would be **less than significant**.

ii. Impacts from Recreational Facilities That are Part of the Project or Resulting from any construction or expansion of parks and recreational facilities

Although some outdoor recreation opportunities, such as fishing from a boat, may increase on-site due to establishing new tidal channels, the goals of the Proposed Project do not include other improvements related to public access and recreation. Because the Proposed Project does not include the construction of recreational amenities and would not displace recreational facilities that would need to be re-constructed elsewhere, new park and recreation facilities would not be constructed. Therefore, impacts of the Proposed Project would not exceed the applicable threshold of significance related to construction or expansion of recreational facilities and the Proposed Project's impact with regard to this threshold would be **less than significant**.

iii. Impacts resulting from a decrease in opportunities to fish from the shoreline within the Delta region.

The Proposed Project Site is currently used by pedestrians to access the Reserve for shoreline fishing along the eastern shoreline of Shag Slough. Pedestrian access to the Reserve would be eliminated by the Proposed Project.

As noted above, the Delta region (Table IV.J-1) offers multiple locations where anglers can fish from the shoreline or a pier. The loss of shoreline fishing for pedestrians at the Reserve is small in comparison to other opportunities in the Delta for fishing from a bank or pier. Therefore, impacts of the Proposed Project would not exceed the applicable threshold of significance related to a decrease in opportunities to fish from the shoreline within the Delta region and the Proposed Project's impact with regard to this threshold would be **less than significant**.

⁷ Amy Mickel, Stanley Taylor, and Gregory Shaw, "Recreation & Tourism in the Delta," n.d., 81.

⁸ Cynthia Thomson and Rosemary Kosaka, "Results of the 2015 economic survey of Central Valley Anglers, p. 20

5. LEVEL OF SIGNIFICANCE AFTER MITIGATION

Proposed Project impacts related to recreation would be ***less-than-significant***. No mitigation is required.

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IV. ENVIRONMENTAL IMPACT ANALYSIS

K. TRIBAL CULTURAL RESOURCES

1. INTRODUCTION

This section analyzes and evaluates the potential impacts of the Proposed Project on known and unknown “tribal cultural resources” (as defined by AB 52, Statutes of 2014, in Public Resources Code Section 21074). Tribal cultural resources were added as a resource subject to review under CEQA, effective January 1, 2015 under AB 52 and include site features, places, cultural landscapes, sacred places or objects, which are of cultural value to a tribe. Archaeological resources and human remains are discussed in Chapter IV.E, Cultural Resources.

The information and analysis in this section are based on consultation between DWR and representatives of the Yocha Dehe Wintun Nation (YDWN) pursuant to AB 52. Additionally, this analysis incorporates information from technical reports and background documents prepared for the Proposed Project, primarily the “Lookout Slough Tidal Habitat Restoration and Flood Improvement Project – Cultural Resources Inventory and Evaluation Report,” ESA 2019 (Appendix I). This document is available upon request from FRPA@water.ca.gov with a subject line of “Lookout Slough Information Request.” Confidential information has been redacted from this report.

2. ENVIRONMENTAL SETTING

The environmental setting for tribal cultural resources is encompassed in the cultural resources in Chapter IV.E of this EIR. Therefore, only select, focused portions of the environmental setting are repeated in this section. This section is taken from the “Lookout Slough Tidal Habitat Restoration and Flood Improvement Project – Cultural Resources Inventory and Evaluation Report” report (Appendix I), prepared for the Proposed Project.

a. Ethnography

At the time of Euroamerican contact, the Proposed Project Site was near the border of three linguistic groups—the Bay Miwok, the Plains Miwok, and the Patwin. Linguistic evidence suggests that the two Miwok groups descended from a Penutian-language speaking population that arrived in California 4,000 to 4,500 BP. The ancestral Miwok languages began to form no later than ca. 1,500 BP, when proto-Patwin (also a Penutian language) speaking people migrated southward out of Oregon and the northern Sacramento Valley.¹ The archaeological evidence for Patwin, Bay, and Plains Miwok populations suggest that all had a subsistence focused on delta

¹ Golla, 2011. *California Indian languages*. University of California Press, Berkeley, CA.

and riparian environments and may have been in regular contact with each other.^{2,3} Despite having differing languages, the Bay and Plains Miwok have been documented within the ethnographic literature as having similar cultures, and as such are discussed together below.

Beginning in the early 16th century, but primarily during the late 19th and early 20th centuries, Native American lifeways and languages were documented throughout California. Whether by professional ethnographers or anthropologists, field personnel from government agencies such as the Bureau of Indian Affairs, soldiers, merchants, settlers, or travelers, ethnographic accounts partly illuminate the traditions, beliefs, and cultures of Native American groups during specific points in time. Synthesized narratives such as the *Handbook of North American Indians*⁴ categorize Native traditions and practices; however, the complexity of regional diversity should not be overlooked.

Depopulation and relocation of Central Valley Native Americans in the 19th century resulted in conflicting and incomplete information about tribal locations. Though cultural descriptions of these groups in the English language are known from as early as 1849, most of our current cultural knowledge comes from various early 20th century anthropologists. The uncertainty regarding the territorial boundaries of the Native American groups that occupied the Proposed Project Site and vicinity derives from the fact that ethnographies historically demarcated contact-period tribal boundaries in various and conflicting ways.⁵ Prior to the Euroamerican occupation of California, the Proposed Project Site was near the territorial boundary of the Patwin (Wintun) and the Plains and Bay Miwok.⁶ Using the Sacramento River as a territorial boundary, the Patwin occupied the land to the west, while the Plains Miwok occupied the land to the east, south, and southeast, and Bay Miwok to the southwest.⁷

i. Patwin (Wintun)

Prior to the Euroamerican occupation of California, the Proposed Project Site was in an area traditionally occupied by the Patwin. The Patwin territory was an extensive region within north-central California and included the lower portion of the west side of the Sacramento Valley west of the Sacramento River from about the location of the town of Princeton in the north to Benicia in the south. The Patwin territory was bounded to the north, northeast, and east by other Penutian-speaking peoples (Nomlaki, Wintu, and Maidu, respectively), and to the west by the Pomo and other coastal groups. Within this large territory, the Patwin have traditionally been divided into

² Moratto et al, 1984 [2004]. *California Archaeology, 2004 Reprinted Edition*. Coyote Press, Salinas, CA.

³ Rosenthal et al., 2007. "The Central Valley: A View from the Catbird's Seat" in *California Prehistory: Colonization, Culture, and Complexity*, edited by Terry L. Jones and Kathryn A. Klar, pp. 147-164, AltaMira Press, Lanham, MD.

⁴ Heizer, 1978. *California, handbook of North American Indians, Vol. 8*. Smithsonian Institution, Washington, D.C.

⁵ Waechter, 1993. *Addendum to the Report on the Archaeological Survey for the Proposed SMUD Gas Pipeline between Winters and Sacramento, Yolo and Sacramento Counties, California*.

⁶ Johnson, 1978. "Patwin" in *California*. Pp. 350-360, *Handbook of North American Indians, Vol. 8*. Smithsonian Institution, Washington, D.C.

⁷ Levy, 1978. "Eastern Miwok" in *California*. Pp. 398-413, *Handbook of North American Indians, Vol. 8*. Smithsonian Institution, Washington, D.C.

River, Hill, and Southern groups, although in actuality a more complex set of linguistic and cultural differences existed than is indicated by these three geographic divisions.⁸

As with most of the hunting-gathering groups of California, the “tribelet” represented the basic social and political unit. Typically, a tribelet chief would reside in a major village where ceremonial events were also typically held. The status of such individuals was patrilineally inherited among the Patwin, although village elders had considerable power in determining who actually succeeded to particular positions. While the clear definition of and reasoning behind the boundaries of each tribelet was not recorded by early ethnographers, it was noted that at least some of these tribelets were defined by small drainages.

Many of the Patwin residential buildings were permanent, constructed from wood timber and built largely below ground. Four types of permanent buildings have been recorded: ceremonial dance house, residential dwelling, sudatory or sweat house, and menstrual hut. These buildings had prescribed locations within a village in relation to each other.

The Patwin subsistence strategy focused largely on riparian habitat—fishing for salmon, perch, trout, pike, and other fish, through the use of nets and weirs. Hunting was focused on elk, deer, antelope, bear, and a variety of waterfowl and game birds through the use of bow and stone-tipped arrows, spears, and nets; waterfowl could be caught through the use of decoys. Ancestral Patwin collected freshwater mussel and turtle. Sunflower, clover, wild oats, and a host of other edible seeds were collected, with valley oak acorns as a food staple.⁹ These were processed using hopper mortars—bottomless conical baskets placed on stone slabs. Meats could also be pulverized using stone grinding tools. Basketry, clothing, cordage, and nets were woven with the help of bone and antler needles and awls.

The Plains Miwok practiced the Kuksu religion, a belief system focused around secret societies whose membership was conducted through initiation. The Patwin uniquely held three different such societies, each focused on initiation, shamanic and healing functions, and dancing, respectively. Ceremonies were conducted for girls’ maturity, and the group also held beliefs that explained their natural world.

The onslaught of Euroamerican culture negatively impacted Patwin culture and peoples. By 1871-72, when Stephen Powers surveyed the state gathering ethnographic information, the Patwin culture appeared to him to be virtually extinct. Euroamerican influences within Patwin territory increased dramatically as ranching and farming became popular in the area. Euroamerican settlers, especially within the Sacramento Valley, quickly made inroads into lands occupied by Native Americans. Conflicts grew in number, and Patwin populations continued to decline from disease, military skirmishes, vigilante raids, and other causes. In 1972, the Bureau of Indian Affairs listed only 11 remaining Patwin descendants. Despite the massive decline in

⁸ McCarthy and Swenson, 1985. *Ethnography and Prehistory of the North Coast Range, California*. University of California, Davis, CA.

⁹ Johnson, 1978. “Patwin” in California. Pp. 350-360, *Handbook of North American Indians*, Vol. 8. Smithsonian Institution, Washington, D.C.

population, the Patwin still reside in Solano County and are represented locally within the county by YDWN.¹⁰

ii. Plains and Bay Miwok

The Plains Miwok lived in the Central Valley along the Sacramento, Cosumnes, and Mokelumne rivers. Their neighbors, the Bay Miwok, lived south and east from Rio Vista, crossing to the south side of the Sacramento Delta and extending west to roughly what is now Walnut Creek and south to, and including, Mount Diablo. These two groups had several different language speakers on all sides—Northern Valley Yokuts to the south and east, Ohlone to the west and southwest, Patwin to the north and northwest, and Nisenan to the north and northeast. Evidence suggests that the two Miwok groups were central to a large trade network extending west to the coast and east into the Sierras and beyond.

Bay and Plains Miwok villages were built on high ground, above the surrounding flood plains, with principal villages concentrated along major drainages. These Miwok groups had two forms of house construction: conical-shaped houses constructed with poles with roof and walls using thatching of brush, grass, or tule; and semi-subterranean houses that were earth-covered. Larger villages had a 12 to 15-meter-diameter semi-subterranean assembly house and a sweathouse, a smaller version of the assembly house.

Like most tribes in California, the basic unit of sovereignty was a tribelet—a connection of families and villages totaling some 300-500 people, with a defined territory and proprietary access to the resources in that territory. Each tribelet was overseen by a chief or head figure whose authority was passed to him through patrilineal heritage to male heirs; if a son was not available, a daughter would be appointed the leader. The chief position was represented locally at each village by the local patrilineage, which oversaw around 20 people.

Seasonality defined Plains Miwok subsistence strategies, and their economy was based principally on the use of natural resources from the grasslands and riparian corridors adjacent to the area's many drainages. As with many California Native American groups, the Plains Miwok relied heavily on acorn, processed with stone grinding tools, for food. Other non-animal foods consisted of nuts, seeds, roots, greens, berries, and mushrooms. The Plains Miwok hunted tule elk, pronghorn antelope, jackrabbit, squirrel, beaver, quail, and waterfowl. Like the Patwin, the Plains Miwok subsistence strategy was largely focused on riparian environments. Salmon was the principal animal food for the Plains Miwok, ranking above other river resources such as sturgeon. Salt, nuts, basketry, and obsidian were obtained through trade with the Sierra Miwok.

Wooden digging sticks, poles, and baskets were used for gathering vegetal resources, while stone mortars, pestles, and cooking stones were used for processing foods. Items used for obtaining animal resources included nets, snares, seines, bows, and arrows. Arrow points were primarily made of basalt and obsidian.

¹⁰ Johnson, 1978. "Patwin" in California. Pp. 350-360, *Handbook of North American Indians*, Vol. 8. Smithsonian Institution, Washington, D.C.

Like the Patwin, shamans, healing doctors, ceremonies, and dances played largely in the Plains and Bay Miwok religious systems. However, these groups did not entirely adopt the secret society Kuksu religion seen elsewhere in Northern California, instead practicing their own dances and ceremonies, with attributes borrowed from neighboring cultures.¹¹

Bay and Plains Miwok peoples were first contacted by the Spanish in the second half of the 18th century. When the coastal tribal populations were depleted, the Spanish aggressively captured first Bay and then Plains Miwok for conversion and labor at the Missions; many, if not most of those that avoided capture succumbed to the subsequent disease epidemics that swept through California. Over time, Miwok people resisted enculturation and capture by the Spanish, at times uniting different tribelets to defend themselves. New diseases, violence, and increased pressure to enculturate by miners and settlers arrived with the Gold Rush; with the establishment of California as state in 1850, formal federal efforts to take tribal lands for distribution to Euro-American settlers continued to push tribes to the brink of extinction. Nevertheless, Plains and Bay Miwok surviving families continued to be resilient, and are numbered among other nearby tribal groups, including the Muwekma Ohlone to the west and the Lone Band of Miwok Indians to the east.

b. Records Searches, Pedestrian Surveys, and Consultation

A records search was performed by the Northwest Information Center (NWIC) staff at Sonoma State University in March 2018 (NWIC No. 17-2139) as described in Chapter IV.E, Cultural Resources. The records search revealed no previously recorded archaeological resources within the Proposed Project Site, or within a 0.25-mile radius of the Proposed Project Site. Archaeological resources are described and discussed in Chapter IV.E, Cultural Resources. In July 2019, ESA Archaeologists and Architectural Historians conducted a cultural resources pedestrian survey of the Proposed Project Site. All accessible areas of the Proposed Project Site were covered during the pedestrian survey. No archaeological sites were identified.

i. Documented Ethnographic Villages Near the Proposed Project Vicinity

A review of ethnographic literature for the current investigation revealed that no documented Native American villages are mapped in or in the immediate vicinity of the Proposed Project Site. The nearest ethnographic villages are the Plains Miwok villages of *Siusumne* and *Chucumne*. Both villages were west of the Sacramento River; *Siusumne* was approximately 4.8 miles east-northeast of the Proposed Project Site, and *Chucumne* was approximately 5.2 miles east of the Proposed Project Site.

ii. Native American Outreach

On August 22, 2018, an information request letter was delivered to the NAHC requesting a review of their Sacred Lands Files, and a list of Native American Contacts for the Proposed Project Site. The NAHC responded on August 30, 2018, indicating that a search of the Sacred Lands Files produced negative results. The consultation list from the NAHC included the following:

¹¹ Kroeber, 1925 [1976]. *Handbook of the Indians of California*, Bureau of American Ethnology Bulletin 78, Smithsonian Institution, Washington, D.C.

- Charlie Wright, Cortina Indian Rancheria of Wintun Indians
- Anthony Roberts, YDWN
- Gene Whitehouse, United Auburn Indian Community of the Auburn Rancheria

Letters were delivered on August 31, 2018 to all representatives on the NAHC contact list, and all those contacted were requested to supply any information they might have concerning prehistoric sites or traditional use areas within, adjacent or near the Proposed Project Site. No responses were received from the contacted parties.

iii. AB 52 Consultation

To participate in AB 52 tribal consultation, a tribe must request, in writing, to be notified by lead agencies through formal notification of proposed projects in the geographic area with which the tribe is traditionally and culturally affiliated (Public Resources Code Section 21080.3.1(b)). DWR received requests from three California Native American Tribes for project notifications pursuant to AB 52 for the project region: 1) YDWN, 2) United Auburn Indian Community of the Auburn Rancheria; and 3) the Lone Band of Miwok Indians. Formal invitations to consult were sent by certified mail to the contact persons listed for each of these three tribes on March 13, 2019. No response was received from the United Auburn Indian Community of the Auburn Rancheria or Lone Band of Miwok Indians.

James Kinter, Tribal Historic Preservation Officer for YDWN, responded on behalf of the Tribe on April 8, 2019, accepting DWR's invitation to consult under AB 52, requesting additional project information and to schedule a consultation meeting. DWR responded to YDWN in a letter dated April 24, 2019 and arranged a conference call to further discuss the project. The specific details of the consultations are confidential pursuant to California law, however, as summary of events related to communication between the tribes and DWR is provided below:

- On April 24, 2019, DWR provided background information and cultural resources studies for the Proposed Project as well as contact information to schedule a meeting.
- On July 10, 2019, Laverne Bille and Robert Gary of YDWN spoke with DWR via phone. The conference call discussed the Proposed Project's design and purpose, cultural resource investigation methods and results to date, and the potential for the Proposed Project to impact tribal cultural resources. Tribal representatives noted that the Tribe would send DWR specific concerns, if any, in the future and that YDWN may send DWR a draft tribal monitoring agreement and mitigation measures in the future if specific concerns are identified.
- On July 19, 2019, DWR sent an email to YDWN staff with supporting attachments, including notes from the conference call and a summary of materials received by DWR from YDWN to date.

At the time of publication (November 2019), DWR has not received further correspondence detailing specific concerns regarding potential impacts to tribal cultural resources or proposed mitigation measures to alleviate any such impacts. Tribal consultation to date is documented in

Appendix I of the Lookout Slough Tidal Habitat Restoration and Flood Improvement Project – Cultural Resources Inventory and Evaluation Report (ESA 2019).

3. REGULATORY SETTING

a. Federal

There are no federal regulations applicable to Tribal Cultural Resources.

b. State

i. California Register of Historic Resources

The California Register of Historical Resources (California Register) established a list of those properties that are to be protected from substantial adverse change (Public Resources Code Section 5024.1). A historical resource may be listed in the California Register if it meets any of the following criteria:

1. It is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage.
2. It is associated with the lives of persons important in California's past.
3. It embodies the distinctive characteristics of a type, period, region or method of construction, or represents the work of an important creative individual, or possesses high artistic value.
4. It has yielded or is likely to yield information important in prehistory or history.

ii. Public Resources Code Section 21080

In September of 2014, the California Legislature passed AB 52, which requires lead agencies to analyze a Proposed Project's impacts on tribal cultural resources separately from archaeological resources and establishes tribal consultation requirements during the planning process. AB 52, as provided in Public Resources Code Sections 21080.3.2, 21080.3.4, and 21082.3, requires:

1. Within 14 days of determining that an application for a project is complete or of a decision by a public agency to undertake a project, a lead agency must provide formal notification to representatives of California Native American tribes that have requested notice. The notification must contain, in writing, a brief description of the project, lead agency contact information, and notification that the tribe has 30 days to request consultation. A lead agency must begin the consultation process within 30 days of receiving a request for tribal consultation.
2. If requested by the tribe, the lead agency is required to consult on alternatives to the project, recommended mitigation measures, and significant effects. Type of

environmental review necessary, significance of tribal cultural resources, significance of the project's impact on tribal cultural resources, and tribe-recommended project alternatives or appropriate measures for preservation or mitigation are considered discretionary consultation topics.

3. If a lead agency's project may have a significant effect on tribal cultural resources, the lead agency must discuss in its environmental documentation whether the project would have a significant effect on a tribal cultural resource and whether alternatives or mitigation measures were adopted to avoid or reduce the identified impact. Mitigation measures agreed upon during consultation must be included in the environmental document and MMRP.
4. Tribal consultation should be considered concluded when both parties agree to measures to mitigate or avoid a significant effect or if one of the parties, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached.

iii. California Environmental Quality Act

CEQA requires public agencies to consider the effects of their actions on "tribal cultural resources." Pursuant to Public Resources Code Section 21084.2, a "project with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a significant effect on the environment."

Tribal Cultural Resources

Defined in Public Resources Code Section 21074(a), tribal cultural resources are:

1. Sites, features, places, cultural landscapes, sacred places and objects with cultural value to a California Native American tribe that are either of the following:
 - a. Included or determined to be eligible for inclusion in the California Register of Historical Resources; or
 - b. Included in a local register of historical resources as defined in subdivision (k) of Section 5020.1.
2. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Section 5024.1. In applying the criteria set forth in subdivision (c) of Section 5024.1 for the purposes of this paragraph, the lead agency shall consider the significance of the resource to a California Native American tribe.

Tribal cultural resources are further defined under Section 21074 as follows:

- a. A cultural landscape that meets the criteria of subdivision (a) is a tribal cultural resource to the extent that the landscape is geographically defined in terms of the size and scope of the landscape; and
- b. A historical resource described in Section 21084.1, a unique archaeological resource as defined in subdivision (g) of Section 21083.2, or a “non-unique archaeological resource” as defined in subdivision (h) of Section 21083.2 may also be a tribal cultural resource if it conforms with the criteria of subdivision (a).

Mitigation measures for tribal cultural resources must be developed in consultation with the affected California Native American tribe pursuant to newly chaptered Section 21080.3.2, or according to Section 21084.3. Section 21084.3 identifies mitigation measures that include avoidance and preservation of tribal cultural resources and treating tribal cultural resource with culturally appropriate dignity, taking into account the tribal cultural values and meaning of the resource.

c. Local

For discussion purposes, the following have been considered in the analysis of potential impacts and identification of mitigation, as needed.

i. Solano County General Plan

Chapter Four of the Solano County General Plan (Resources Element) contains policies and programs intended to preserve Cultural Resources and include Native American groups in the planning process. The following such policies are applicable to the Proposed Project:

- RS.P-38: Identify and preserve important prehistoric and historic structures, features, and communities.
- RS.P-40: Consult with Native American governments to identify and consider Native American cultural places in land use planning.
- RS.I-25: Require cultural resources inventories of all new development projects in areas identified with medium or high potential for archeological or cultural resources. Where a preliminary site survey finds medium to high potential for substantial archaeological remains, the County shall require a mitigation plan to protect the resource before issuance of permits. Mitigation may include:
 - Having a qualified archaeologist present during initial grading or trenching (monitoring);
 - Redesign of the project to avoid archaeological resources (this is considered the strongest tool for preserving archaeological resources);

- Capping the site with a layer of fill; and/or
- Excavation and removal of the archaeological resources and curation in an appropriate facility under the direction of a qualified archaeologist.
- Alert applicants for permits within early settlement areas to the potential sensitivity. If significant archaeological resources are discovered during construction or grading activities, such activities shall cease in the immediate area of the find until a qualified archaeologist can determine the significance of the resource and recommend alternative mitigation.

4. ENVIRONMENTAL IMPACTS

a. Methodology and Evaluation

The impact analysis for tribal cultural resources is based on the findings of the Lookout Slough Tidal Habitat Restoration and Flood Improvement Project – Cultural Resources Inventory and Evaluation Report (ESA 2019) and consultation with the YDWN. The analysis is also informed by the provisions and requirements of federal, state, and local laws and regulations that apply to tribal cultural resources.

Public Resources Code Section 21074 defines Tribal Cultural Resources as “sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American Tribe” that are listed or determined eligible for California Register listing, listed in a local register of historical resources, or otherwise determined by the lead agency to be a tribal cultural resource.

Criteria for listing on the California Register is discussed in detail in Section IV.E (Cultural Resources). In summary, per Public Resources Code Section 5024.1(c), to be considered eligible, a resource must be associated with significant historical events or people; be associated with important people to our past, embody the work of a historic period, region, or person; or have the potential to yield information important to understanding history or prehistory of the area, state, or nation. To assess whether any tribal cultural resources listed or eligible for listing or determined through DWR’s discretion to be significant, DWR engaged interested Native American parties in Proposed Project planning pursuant to AB 52 as described under subheading b.iii. of the Environmental Setting above. Through the tribal consultation process, it was determined that there are no known tribal cultural resources within or adjacent to the Proposed Project Site.

b. Thresholds of Significance

Based on Appendix G of the CEQA Guidelines, a project would have a significant impact on cultural resources if the project would:

- (a) Cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural

landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:

- i. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or
- ii. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the new resource to a California Native American tribe.

c. Project Impacts and Mitigation Measures

- i. *Significant adverse change in a tribal cultural resource that is listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in PRC section 5020.1(k) or on a resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of PRC Section 5024.1.*

Pursuant to AB 52, DWR sent notification letters to YDWN, United Auburn Indian Community of the Auburn Rancheria, and the Lone Band of Miwok Indians, in March 2019. YDWN was the only tribe to request consultation. No tribal cultural resources, as defined in Public Resources Code Section 21074, have been identified in the Proposed Project Site through archival research, a field survey, or consultation with YDWN. Therefore, the Proposed Project is not expected to affect any tribal cultural resources.

Although the Proposed Project is not expected to affect any tribal cultural resources, the Proposed Project would involve ground-disturbing activities that may extend into undisturbed soil. It is possible that such activities could unearth, expose, or disturb subsurface archaeological resources that were not identified on the surface. Because previously unrecorded archaeological deposits could be present in the Proposed Project Site, and they could be found to qualify as tribal cultural resources pursuant to Public Resources Code Section 21074, impacts of the Proposed Project on tribal cultural resources would be ***potentially significant***.

Mitigation Measure TCR-1A: Stop Work for Accidental Discoveries

If indigenous archaeological resources are encountered during project development or operation, all activity within 100 feet of the find shall cease and the find shall be flagged for avoidance. DWR and a qualified archaeologist, defined as one meeting the U.S. Secretary of the Interior's Professional Qualifications Standards for Archaeology and with expertise in California archaeology, shall be immediately informed of the discovery. The qualified archaeologist shall inspect the discovery and shall notify DWR of their initial assessment.

Indigenous archaeological materials might include obsidian and chert flaked-stone tools (e.g., projectile points, knives, scrapers) or toolmaking debris; culturally darkened soil (middens) containing heat-affected rocks, artifacts, or shellfish remains; stone milling equipment (e.g., mortars, pestles, handstones, or milling slabs); and battered stone tools, such as hammerstones and pitted stones.

Mitigation Measure TCR-1B: Tribal Cultural Resources Management Plan

If the qualified archaeologist determines that the resource is or is potentially indigenous in origin, YDWN shall be contacted to assess the find and determine whether it is potentially a tribal cultural resource. If DWR determines, based on recommendations from YDWN, that the resource may qualify as a tribal cultural resource (as defined in Public Resources Code Section 21074), DWR shall consult with YDWN to develop and implement a tribal cultural resources management plan that outlines the background on and treatment measures for the resource. Treatment may include, as feasible, processing materials for reburial, minimizing handling of cultural objects, leaving objects in place within the landscape, returning objects to a location within the Proposed Project Site where they would not be subject to future impacts, avoidance, and treating with culturally appropriate dignity. Avoidance means that no activities associated with the Proposed Project Site may affect the tribal cultural resource. "Treating with culturally appropriate dignity" means taking into account the tribal cultural values and meaning of the resource through implementation of, but not limited to, the following measures:

- Protecting the cultural character and integrity of the resource
- Protecting the traditional use of the resource
- Protecting the confidentiality of the resource
- Protecting the resource

DWR shall determine whether avoidance and such treatment are feasible, considering factors such as the nature of the find, project design, costs, and other considerations. If avoidance and the suggested treatment outlined above are not feasible, DWR shall consult with YDWN to determine treatment measures to minimize or mitigate any potential impacts on the resource pursuant to Public Resources Code Section 21083.2 and State CEQA Guidelines Section 15126.4.

Construction work at the location of the find may commence only upon DWR authorization. Work may proceed in other parts of the Proposed Project Site while the mitigation is being implemented.

5. LEVEL OF SIGNIFICANCE AFTER MITIGATION

With implementation of Mitigation Measures TCR-1A and TCR-1B, the potential for ground-disturbing activities to unearth, expose, or disturb previously unidentified subsurface archaeological resources, including any cultural resources on or in the tide and submerged lands

of California, that could be found to qualify as tribal cultural resources would be reduced to less than significant. Accordingly, impacts to tribal cultural resources would be ***less than significant***.

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V. CUMULATIVE IMPACTS

1. INTRODUCTION

As defined in CEQA Guidelines Section 15355, a cumulative impact is an environmental impact that is created as a result of the combination of the project evaluated together with other projects causing related impacts. CEQA Guidelines Section 15130 requires the consideration of cumulative impacts within an EIR when a project's incremental effects are cumulatively considerable. Cumulatively considerable means that "...the incremental effects of an individual project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects." In identifying projects that may contribute to cumulative impacts, the CEQA Guidelines allow the use of the list approach or the projection approach. The list approach involves use of a list of past, present, and probable future projects, producing related or cumulative impacts, including those which are outside of the control of the lead agency. The projection approach uses a summary of projections in adopted planning documents that describe or evaluate regional conditions contributing to cumulative impacts such as general plans and general plan EIRs.

The Proposed Project's cumulative impacts were considered in conjunction with the list of related projects in Table V-2 below. The list includes planned, approved, reasonably foreseeable, and recently constructed projects of various purposes, including (but not limited to) habitat restorations, resource management, infrastructure repair / enhancement, flood control, and water supply. Listed projects were compiled at the release of the Notice of Preparation (NOP), March 21, 2019. Additionally, where appropriate, the Proposed Project's cumulative impacts were considered alongside buildout of the Solano County General Plan and relevant environmental impacts identified in the Solano County General Plan EIR.

2. RELATED PROJECTS

Sections 15126 and 15130 of the CEQA Guidelines (PRC Title 14, Division 6, Chapter 3) provide that EIRs consider the significant environmental effects of a proposed project and "cumulative impacts." Cumulative impacts refer to two or more individual effects that, when taken together, are considerable or that compound or increase other environmental impacts (CEQA Guidelines Section 15355).

CEQA Guidelines Section 15130(b)(1) identifies two basic methods for establishing the cumulative environment in which the proposed project is to be considered: the use of a list of past, present, and probable future projects or the use of projections contained in adopted relevant planning documents (projections) that describes or evaluates conditions contributing to the cumulative effect. For this Draft EIR, both the Projects and the Projections approach have been combined to generate the most reliable future Projections possible.

a. Cumulative Significance Criteria

For purposes of this Draft EIR, the Proposed Project would have a significant cumulative effect if:

- the cumulative effects of related projects (past, present, and probable future Projects) are not significant and the incremental impact of implementing the Proposed Project is substantial enough, when added to the cumulative effects of related Projects, to result in a new cumulatively significant impact; or
- the cumulative effects of related projects (past, current, and probable future projects) are already significant and implementation of the Proposed Project makes a considerable contribution to the effect. The standards used herein to determine whether a contribution is considerable are that either the impact must be substantial or must exceed an established threshold of significance.

b. Geographic Context

The geographic area that could be affected by implementation of the Proposed Project in combination with other projects varies depending on the type of environmental resource being considered. Impact analysis in this Draft EIR considers different geographic areas as appropriate to each impact. Many cumulative impacts (such as cultural resources and mineral resources), occur within the immediate vicinity of a project (adjacent to or within 1/2 mile); some impacts (such as impact on Hydrology / Water Quality) affect the local watershed; and some impacts are regional (such as air quality criteria pollutants). The general geographic area associated with different types of environmental effects of the Proposed Project are listed in Table V-1). Also listed is the method of evaluation used to analyze cumulative impacts for each environmental resource (described further above).

Table V-1. Geographic Scope of Cumulative Impacts and Methods of Evaluation

Resource Issue	Geographic Area	Method of Evaluation
Agriculture and Forestry Resources	Delta and Project Site	Projects and Projections
Air Quality	Local (toxic air contaminants and odors) Air Basin (construction-related and mobile sources)	Projects and Projections
Biological Resources	Delta and Project Site	Projects
Cultural Resources	Delta and Project Site	Projects
Hazards	Delta and Project Site	Projects
Hydrology / Water Quality	Immediate Project vicinity and Sacramento and San Joaquin River watersheds within the legal boundaries of the Delta, and Suisun Marsh	Projects
Mineral Resources	Project Site	Projects
Public Services	Delta and Project Site	Projects
Recreation	Delta and Project Site	Projects
Tribal Cultural Resources	Delta and Project Site	Projects

Notes: Projects = the use of a list of past, present, and probable future Projects; Projections = the use of Projections contained in relevant planning documents.

For those environmental resources that were evaluated based on the Projections approach, the Projections take into consideration future Projects that are not included in the below list of related plans and Projects.

c. List of Cumulative Plans and Projects

Table V-2 lists the related (or cumulative) projects identified for the Proposed Project. These related projects comprise a list of approved, proposed, or in-progress projects in the Delta at the time the Notice of Preparation for this Draft EIR was released March 21, 2019. The list includes projects of various purposes, including (but not limited to) habitat restorations, diversions, and dredging.

Table V-2. Related Projects

Name	Type	Location	Lead Agency / Proponent	Status
American River Common Features WRDA 2016 SREL Levees Improvement Project	Flood Control	Sacramento County	Army Corps of Engineers/Central Valley Flood Protection Board/Sacramento Area Flood Control Agency	Planning
American River Common Features WRDA 2016 Sacramento Weir Expansion Project	Flood Control	Sacramento County	Army Corps of Engineers/Central Valley Flood Protection Board/Sacramento Area Flood Control Agency	Planning
Capital Conservation Bank	Habitat Restoration	Yolo County	Yolo County	Planning
Davis-Woodland Water Supply Project	Water Supply	Yolo County	City of Davis; UC Davis; City of Woodland	Construction completed 2016
Decker Island Levee Repair Demonstration Project	Infrastructure Repair / Enhancement	Solano County	DWR	Planning
Decker Island Tidal Habitat Restoration Project	Habitat Restoration	Solano County	DWR	Construction completed 2018
Rio Vista Estuarine Research Station	Natural Resource Management	Solano and San Joaquin Counties	DWR	Planning
Dutch Slough Tidal Marsh Restoration Project	Habitat Restoration	Contra Costa County	DWR	Construction began May 2018. Next Phase to begin 2021.
Fremont Weir Adult Fish Passage Modification Project	Fish Passage Improvement	Yolo County	DWR; US Bureau of Reclamation	Construction completed in 2018
Lambert Road Flood Flight	Flood Control	Sacramento County	Sacramento County	Planning
Lindsey Slough Freshwater Tidal Marsh Enhancement Project	Habitat Restoration	Solano County	CDFW	Construction complete
Lisbon Weir Fish Passage Enhancement	Agriculture; Infrastructure Repair / Enhancement; Resource Management	Yolo County	US Bureau of Reclamation; DWR	Planning
Lower Elkhorn Basin Levee Setback	Flood Control	Yolo County	DWR	Planning

Name	Type	Location	Lead Agency / Proponent	Status
Lower Putah Creek Realignment Project	Habitat Restoration; Flood Control	Yolo County	CDFW	Planning
Lower Yolo Ranch Restoration Project	Habitat Restoration	Yolo County	Westlands Water District	Construction planned for 2020
Montezuma Wetlands Restoration Project, Phase I	Habitat Restoration	Suisun Marsh	Solano County	Planning
North American Wetlands Conservation Act 3 – Lower Putah Creek Floodplain Restoration	Habitat Restoration; Flood Control	Solano, Yolo Counties	Solano County Water Agency	Planning
North Delta Fish Conservation Bank	Habitat Restoration	Yolo County	RD 2093	Completed 2013
North Delta Flood Control and Ecosystem Restoration Project	Habitat Restoration; Flood Control; Recreation	Sacramento County	DWR	Planning
Prospect Island Tidal Habitat Restoration Project	Habitat Restoration	Solano County	DWR	NOD Filed August 2019
Sacramento River Flood Control Project General Reevaluation	Flood Control	Central Valley-wide	Central Valley Flood Protection Board	Planning
South Canal Diversion Fish Screen Project	Resource Management	Yuba County	Yuba County Water Agency	Planning
Southport Sacramento River Early Implementation Project	Flood Control	Yolo County	Southport Sacramento River Early Implementation Project	Planning
Tule Red Tidal Restoration Project	Habitat Restoration	Suisun Marsh	State and Federal Water Contractors Water Agency	Construction completed Fall 2019
Wildlife Corridors for Flood Escape on the Yolo Bypass Wildlife Area	Habitat Restoration	Yolo County	Yolo County Resource Conservation District	Planning
Winter Island Tidal Habitat Restoration Project	Habitat Restoration	Contra Costa County	DWR	Completed Fall 2019
Winters Putah Creek Nature Park / Floodplain Restoration and Recreational Access Project	Flood Control; Recreation	Solano, Yolo Counties	Central Flood Protection Board	Completed 2018

Name	Type	Location	Lead Agency / Proponent	Status
Wings Landing	Habitat Restoration	Solano	DWR	Planning
Yolo Bypass Salmonid Habitat Restoration and Fish Passage Project	Habitat Restoration; Resource Management	Yolo County	DWR	Planning Construction planned for 2021
Yolo Flyway Farms Restoration Project	Habitat Restoration	Yolo County	DWR	Construction completed in 2018

3. CUMULATIVE IMPACT ANALYSIS

The cumulative impact analysis below is guided by the requirements of CEQA Guidelines Section 15130. Key principles established by this section include:

- A cumulative impact only occurs from impacts caused by the Proposed Project and other projects. An EIR should not discuss impacts that do not result from the Proposed Project.
- When the combined cumulative impact from the increment associated with the Proposed Project and other projects is not significant, an EIR need only briefly explain why the impact is not significant; detailed explanation is not required.
- An EIR may determine that a project's contribution to a cumulative effect impact would be rendered less than cumulatively considerable if a project is required to implement or fund its fair share of mitigation intended to alleviate the cumulative impact.

a. Agriculture and Forestry

The Proposed Project was evaluated for its potential to convert substantial quantities of important farmland to non-agricultural use and to conflict with a Williamson Act Contract. As Williamson Act Contracts are enacted on a property-by-property basis and the Proposed Project would not conflict with any of its adjacent properties' Williamson Act contracts, there is no potential for cumulative impacts related to conflict with a Williamson Act contract. Accordingly, this discussion focuses on whether the Proposed Project would result in a cumulatively considerable contribution to the loss of important farmland or whether the Proposed Project and related projects would cause changes that would convert substantial quantities of farmland to non-agricultural use. For the purposes of this discussion, buildout of the Solano County General Plan is considered. Additionally, related ecosystem restoration projects, which were not accounted for in the General Plan's assessment of agricultural land conversion, are discussed.

The General Plan EIR concluded that buildout of Solano County's 2008 General Plan would result in a significant and unavoidable loss of important farmland. The General Plan identified approximately 21,971 acres of existing agricultural land, including 4,131 acres of important farmland, which would be converted to non-agricultural use. Per the Solano County General Plan,

no feasible mitigation was identified for this impact. Much of this impact would occur in other portions of the County and would be the result of urban development.

More locally, planned and completed ecosystem restoration projects in the Cache Slough Complex that would convert farmland to non-agricultural use include the Proposed Project, Lower Yolo Ranch, Prospect Island, Yolo Flyway Farms, and Lindsey Slough. These projects have a total spatial footprint of approximately 9,000 acres. Not all of this land is currently agricultural land, but these projects are located in an agricultural region and would together convert agricultural land to non-agricultural use, including over 2,000 acres of important farmland. By comparison, there are approximately 38,000 acres of farmland in the Cache Slough Complex, including roughly 20,000 acres of important farmland.

The combined impact of related projects on the conversion of farmland, including important farmland, to non-agricultural use would be cumulatively significant due to the large acreage that would be converted relative to the acreages presently available. However, the Proposed Project's incremental contribution would be less than cumulatively considerable. The Proposed Project would convert approximately 1,460 acres of agricultural land to open space use. Most of this is prime farmland. This impact was mitigated to less-than-significant levels (MM AG-1) through investment in off-site agricultural improvements that would convert other grazing land to prime farmland and emplacement of an agricultural easement on other Solano County prime farmland. Preservation and enhancement included in this mitigation would be roughly proportional in size, value, and quality to the agricultural land lost through Proposed Project implementation, reducing contribution to cumulative impacts to less-than-significant levels and assuring the long-term preservation of agricultural land in Solano County, including prime farmland. Thus, although related projects would have a cumulatively significant impact on the loss of agricultural land, the Proposed Project's contribution would be ***less than cumulatively considerable***.

b. Air Quality

Primary considerations of the Proposed Project's potential impacts on air quality include whether the Proposed Project would conflict with an applicable air quality plan or result in a cumulatively considerable net increase of a criteria pollutant for which the region is non-attainment. Given the scope of applicable air quality plans and the nature of ambient air pollution dispersal, the appropriate geographic scope for cumulative analysis of the Proposed Project's air quality impacts is the Sacramento Valley Air Basin (SVAB), especially projects within the Yolo-Solano Air Quality Management District's (YSAQMD) jurisdiction.

As discussed in Chapter IV.C, Air Quality, with implementation of Mitigation Measures AIR-1 and AIR-2, the Proposed Project would have less-than-significant impacts related to emissions of ozone precursors and PM₁₀. These mitigation measures provide controls for equipment operations, engine requirements, and dust particles. Operation of the Proposed Project would include post-construction site maintenance, monitoring, and adaptive management activities which would only generate a small number of trips in light-duty vehicles: criteria pollutant emissions from these activities are minor and would be negligible. Thus, the Proposed Project would therefore not have a cumulatively considerable contribution to non-attainment of the

NAAQS or CAAQS for which the SVAB is designated non-attainment and would consequently not have a cumulatively considerable contribution to conflict with an applicable air quality control plan. As such, the Proposed Project's impacts on air quality would be ***less than cumulatively considerable***.

c. Biological Resources

The Proposed Project was evaluated for potential impacts to sensitive biological communities, jurisdictional aquatic resources and special-status plant and wildlife species, and was determined to have less-than-significant impacts with mitigation (MM's BIO-1A, 1B, 2, 3A,3B, 3C, 3D, 3F, 4A, 5A, and 6). The area of cumulative impact analysis includes lands and waters within the legal boundaries for the Delta. In the long-term, the Proposed Project would have generally beneficial impacts on biological resources through restoration of native ecosystem, which would re-introduce tidal marsh habitat within a portion of its historic range in the Delta and create habitat for special-status and listed plant, fish, and wildlife species. When considered cumulatively with other habitat restoration projects in the region, the Proposed Project would have a cumulatively beneficial long-term impact on special-status species, sensitive biological communities, and protected wetlands through the restoration of thousands of acres of tidal marsh habitat.

The Proposed Project would generally have a positive impact on sensitive natural communities and wetlands. Though on-site riparian vegetation would be temporarily removed, there would be a slight net increase in riparian acreage on the Proposed Project Site; and the Proposed Project and related projects would ensure permanent protection of riparian habitat. Long-term impacts would therefore be cumulatively beneficial. Short-term loss of riparian habitat's ecosystem functions could be cumulatively considerable in light of the need for similar ecosystem restoration projects to remove riparian vegetation around a similar time period. It would take several years for riparian plantings to reach maturity, so there would be impacts related to the short-term loss of riparian vegetation. However, other restoration projects in the vicinity of the Proposed Project would be required to mitigate for loss of riparian vegetation. Additionally, the Proposed Project includes on-site riparian preservation areas that would be maintained in place throughout all stages of construction. Given the Proposed Project's relatively small role in creating cumulative impacts related to the temporary loss of mature riparian vegetation (approximately 25 acres) and the fact that it would, alongside related projects, lead to permanent protection of riparian habitat, impacts to riparian vegetation would be ***less than cumulatively considerable***.

The Proposed Project and related projects throughout the Delta would lead to conversion of wetland types (i.e. managed wetlands) and non-wetland areas to tidal marsh. Existing wetland types within the Proposed Project Site are presently comprised of coastal and valley freshwater marsh, managed wetlands, and irrigated pasture. These projects would shift wetland composition and would accordingly shift the profile of some species present in the area. For example, conversion of managed wetlands could make the area more favorable for diving ducks than dabbling ducks. Anticipated shifts in species compositions and wetland types would not result in any adverse cumulative impacts to biological resources, as the proposed restorations would lead

to a net gain in wetland habitat suitable for native fish and wildlife species. As such, impacts on wetlands and sensitive biological communities would be ***cumulatively beneficial***.

During construction, the Proposed Project would have the potential to temporarily adversely affect biological resources through localized physical disturbance, noise, and impacts to water quality. These individual impacts were mitigated to less-than-significant levels through implementation of Mitigation Measure BIO-1A and BIO-1B, which require general best management practices and habitat avoidance measures to protect biological resources. Given the localized nature of these impacts, projects within the Cache Slough Complex were considered to have the potential to create cumulative impacts with the Proposed Project. Based on available information on project status, two projects (Phase two of Dutch Slough and Lower Yolo Ranch) within the Cache Slough Complex listed in Table V-2 were identified as having sufficient construction schedule overlap with the Proposed Project to result in cumulative impacts to noise, water quality, physical disturbance, or other factors that may impact biological resources. However, both the Dutch Slough EIR and the Lower Yolo Ranch include mitigation measures to reduce potentially significant impacts to special status species to less than significant levels. General construction impacts to biological resources would therefore be ***less than cumulatively considerable***.

Project impacts on special-status plants species requiring mitigation include impacts to woolly rose-mallow, Suisun Marsh aster, and Parry's rough tarplant. These and other special-status plant species with potential to occur in the Proposed Project Site have been documented to occur in other areas throughout the Yolo Bypass and the Cache Slough Complex that are targeted for floodplain expansion and/or ecosystem restoration. The Proposed Project would only lead to temporary habitat loss (ranging from one to three years), but could overlap with construction associated with these other projects. In the long-term, on-site habitat restoration and levee improvements would create suitable upland and aquatic habitat for special-status plant species, including woolly rose-mallow, Suisun Marsh aster, and Parry's rough tarplant. Implementation of MM BIO-2 would ensure impacts to these special status plant species would be less than significant. As such, this impact would be ***less than cumulatively considerable***.

Similarly, the Proposed Project has the potential for temporary adverse impacts to listed and special-status fish species through construction-related injury or mortality, noise, turbidity, and stranding. Various fish species with the potential to be adversely affected by construction have documented ranges throughout the Bay-Delta and have critical habitat throughout the Cache Slough Complex. Accordingly, other tidal restoration projects throughout the Delta are considered to have the potential for cumulative impacts. Projects that would have an overlapping construction period with the Proposed Project include phase two of the Dutch Slough Tidal Habitat Restoration Project and the lower Yolo Ranch Project. Both projects would have minimal temporal overlap with the Proposed Project. In addition, Mitigation Measures BIO-1A and BIO-4A through BIO-4B require a Worker Environmental Awareness Program, fish exclusion and/or relocation measures, and erosion minimization measures to protect special-status fish species. Thus, the Proposed Project's short-term construction impacts on special-status fish species will be less than cumulatively considerable. In the long-term, the Proposed Project and related projects would create habitat for species such as Delta Smelt, Chinook Salmon, Steelhead, Longfin Smelt, and

Sacramento Splittail, creating a net beneficial effect on special-status and listed fish species. This impact would therefore be ***cumulatively beneficial***.

The Proposed Project would have the potential for temporary impacts on special-status bird species, non-special status bird species protected by the MBTA, and roosting bats through construction-related nest and roost disturbance. This potential impact was mitigated to less-than-significant levels through avoidance and minimization measures requiring pre-construction surveys and buffers around active nests and maternity roosts (MMs BIO-3A and BIO-3E). Other construction projects that occur in the immediate vicinity of the Proposed Project, would also need to mitigate for potential noise and physical disturbance that would contribute to the likelihood of nest abandonment and/or physical harm of nesting birds and roosting bats. Therefore, impacts to nesting birds and roosting bats would be ***less than cumulatively considerable***.

The Proposed Project would result potentially significant impacts from the loss of Swainson's hawk foraging and nesting habitat. Removal of irrigated pastureland and nonnative grassland (DEIR Chapter IV.D Biology) would impact foraging habitat. Impacts from the loss of Swainson's hawk nesting habitat would be mitigated for by replacing observed nest trees that are removed outside of the active nesting season, and any active nests would not be disturbed (MM BIO-3A). Impacts to the loss of Swainson's hawk foraging habitat would be mitigated for by purchasing off-site conservation easements on a minimum of 1,000 acres of lands with high quality foraging habitat for Swainson's hawk (MM BIO-3B). Direct impacts to this species from the Proposed Project would be less than significant with mitigation. Thus, direct impacts would be ***less than cumulatively considerable***.

No related projects with a shared construction period were identified within one quarter mile of the Proposed Project Site, maintaining this impact at a level that would not be cumulatively considerable. Other nearby ecosystem restoration projects, specifically Lower Yolo Ranch, would also result in permanent and temporary loss of Swainson's hawk foraging and nesting habitat and would also need to provide appropriate compensatory mitigation. The Lower Yolo Ranch project included a mitigation measure requiring the Project to preserve Swainson's Hawk habitat at a ratio of 0.5 to 1. Impacts to Swainson's hawk would therefore be ***less than cumulatively considerable***.

The Proposed Project would remove five elderberry shrubs, which are a source plant for the valley elderberry longhorn beetle. On-site surveys found the five elderberry shrubs proposed for removal to be of poor quality for valley elderberry longhorn beetle. The Proposed Project would mitigate for the removal of these five elderberry shrubs by replanting elderberry plants at a ratio that would assure the continued existence of potential valley elderberry longhorn beetle within the Proposed Project Site (MM BIO-3H).

Given the valley elderberry longhorn beetle's range and life history, related projects throughout the Delta that would remove riparian vegetation and non-riparian elderberry shrubs have the potential for cumulative impacts. Related projects with the potential for the removal of riparian vegetation and non-riparian elderberry shrubs are mostly nearby ecosystem restorations. In general, these projects would leave portions of existing riparian vegetation in-place or avoid the

removal of non-riparian elderberry shrubs and would plant new riparian vegetation and/or elderberry shrubs to replace vegetation that has been removed. This would enable valley elderberry longhorn beetle's continued use of these sites and result in long-term habitat enhancement. As such, impacts to valley elderberry longhorn beetle would be **less than cumulatively considerable**.

The Proposed Project has the potential for adverse, temporary construction-related impacts to giant garter snake and western pond turtle. Both species would benefit from the Proposed Project in the long-term through on-site habitat enhancement. The Proposed Project would mitigate for temporary construction-related impacts to giant garter snake by providing biological monitors during construction, observing speed limits at critical times and locations throughout construction, and implementing other BMP's to protect giant garter snakes during construction (MM BIO-3E). The Proposed Project would mitigate for temporary construction-related impacts to western pond turtle by relocating western pond turtle away from active construction areas and protect this species during construction (MM BIO-3F).

Related projects throughout the Delta that may directly disturb or harm giant garter snake and western pond turtle individuals or habitat during the Proposed Project's construction period have the potential for adverse cumulative impacts. This includes several ecosystem restoration and resource management projects identified in Table V-2. While these projects would all have the potential to adversely affect giant garter snake and western pond turtle through physical injury or short-term habitat degradation these projects would generally enhance habitat for these species, leading to a greater abundance in aquatic habitat, reducing human disturbance, and increasing habitat complexity relative to the existing habitat, which has been greatly modified from its natural state. As such, the Proposed Project and other related projects would have a **cumulatively beneficial** effect on giant garter snake and western pond turtle.

d. Cultural Resources

The area of cumulative impact analysis for cultural resources is the Proposed Project Site and other lands within the legal boundaries of the Delta. According to a Cultural Resources Inventory prepared for the Proposed Project Site by Environmental Science Associates¹, there are no cultural resources eligible for listing in the National or State Registers within the Proposed Project Site. The Cultural Resources Inventory reviewed various maps and documents and performed an intensive pedestrian survey of potential historical resources within the site. All identified potential resources were assessed for eligibility as individual resources or as part of a historic district. No potentially eligible resources were identified through this process, and no Proposed Project-specific significant impacts to cultural resources would occur.

Historic themes associated with the Proposed Project include mid-twentieth century Delta agriculture and early twentieth century land reclamation and flood control. Projects on properties also related to these historic themes could collectively result in cumulative impacts on historic

¹ Environmental Science Associates, "Lookout Slough Tidal Habitat Restoration and Flood Improvement Project - Cultural Resources Inventory and Evaluation Report," August 2019.

resources. These include projects listed in Table V-2 above as flood control, habitat restoration, or infrastructure repair / enhancement projects. These projects types would have varying effects on the integrity of mid- twentieth century agricultural infrastructure and early twentieth century land reclamation and flood control features. For example, habitat restoration would have negative impacts if breach and/or degrade is required to facilitate project inundation, while infrastructure repair / enhancement would have positive impacts by facilitating preservation of these resources through improved resilience.

Levees within the Proposed Project Site were determined by Environmental Science Associates to not have sufficient integrity to be strong examples of these historic periods, so the Proposed Project's incremental contribution to any cumulative impacts on historic resources would be negligible.

The Proposed Project is located on sensitive soils for buried archaeological resources and would require the performance of professionally accepted and legally compliant procedures for the discovery and protection of previously undocumented significant archaeological resources during construction. This would entail stopping work only in the area of buried resource, establishing a 100-foot buffer around that resource, and not resuming work until a treatment plan is developed (MM CULT-1). Accordingly, for this reason, these projects would not result in a significant adverse impact on any archaeological resources; and this impact would not be cumulatively considerable.

In summary, the Proposed Project is not a strong representation of relevant historic themes, and many other example would remain throughout the Delta upon implementation of all related projects. The Proposed Project and related projects have the potential to unearth archaeological remains – but all other projects in the Delta are legally required to stop work until any finds can be assessed by a qualified archaeologist (MM CULT-1). Thus, impacts to cultural resources would be ***less than cumulatively considerable***.

e. Hazards

The area of cumulative impact analysis includes the area within the legal boundaries of the Delta. The Proposed Project would involve removing Infrastructure associated with farming and duck hunting from the Proposed Project Site. The Proposed Project would also abandon penetrations through the Cache/Hass Slough Levee associated with the drainage and inlet pipes that were used at the Bowsbey Property. This would include plugging pipes with concrete or grout in accordance with established guidelines. Mitigation Measure HAZ-1 would ensure impacts would be less than significant by requiring EIP to develop plans and procedures for natural gas well and pipeline abandonment and avoidance during construction, which may include but are not limited to re-abandonment, plugging, removal, or avoidance of on-site natural gas pipelines and wells. These procedures shall be incorporated into final construction plans provided to DWR and DOGGR. Other tidal restoration projects in the Delta may also require removal of buried natural gas infrastructure but these projects would also be required to develop abandonment plans and procedures per DOGGR regulations. Thus, impacts to hazards would be ***less than cumulatively considerable***.

f. Hydrology and Water Quality

i. Hydrology

The area of cumulative impact analysis includes those portions of the Sacramento and San Joaquin River watersheds within the legal boundaries of the Delta. Hydrologic conditions throughout the Cache Slough Complex were modeled for a theoretical future condition where the Proposed Project and several related projects have been implemented. Related projects accounted for in these models include weir expansions, levee setbacks, levee removals, and other planned projects with the potential to alter area hydrology. For greater detail on modeling assumptions and projects considered in the cumulative hydraulic analysis, please see Appendix D-1, Basis of Design Report.

In general, model results suggest localized stage reductions in the Yolo Bypass with no increase in other parts of the system. All modeled locations displayed no change or decreased peak flood stages for events ranging from the 10% ACE to the 0.5% ACE under the with-project cumulative condition. These decreases ranged from 0.01 to 0.55 feet. Modeled decreases tended to be greatest in the vicinity of the Proposed Project Site but occurred throughout the Cache Slough Complex. No locations displayed increased flood stages under with-project cumulative conditions.

Velocity models intended to assess potential cumulative effects on erosion and siltation found that under the cumulative future condition, water velocities would slightly increase in several locations. The greatest increases were modeled within and immediately adjacent to the Proposed Project Site within the Yolo Bypass. Upstream and downstream of the site, changes in velocity were relatively minor, and generally ranged from a 0.5 foot per second decrease to a 0.5 foot per second increase under all three occurrence frequencies modeled. These increases were accounted for in Proposed Project design and erosion countermeasures were included to assure that erosion and scour would not occur due to cumulative velocity increases.

Separately, related tidal restoration projects' cumulative effects on tidal prism were assessed (see Chapter IV.G, Hydrology and Water Quality for modeling details and assumptions). For the purposes of this analysis, tidal restoration projects throughout the Delta and Suisun Marsh were considered. These projects include: Winter Island, Wings Land, Tule Red, McCormack Williamson Tract, Lower Yolo Ranch, Dutch Slough, and Prospect Island. These projects would lead to regional tidal damping, reducing high tide heights, and raising low tide heights. However, hydraulic models found that each project's effects would be mostly localized and would not lead to a cumulatively considerable change in tidal range. Consequently, impacts on scour, deposition, and outflows resulting from changes to tidal range would not be cumulatively considerable.

ii. Water Quality

Hydraulic changes from restoration, levee modification, and other related projects detailed in Table V-2 have the potential to alter regional water quality metrics, particularly salinity and methylmercury. Outflow conditions were modeled to account for the Proposed Project and related tidal restoration projects located throughout the Delta and Suisun Marsh to assess compliance

with D-1641, which is used to assess compliance with applicable salinity standards (see Chapter IV.F, Hydrology and Water Quality for modeling details and assumptions). These projects include: Winter Island, Wings Land, Tule Red, McCormack Williamson Tract, Lower Yolo Ranch, Dutch Slough, and Prospect Island. Under the cumulative with-project condition, no D-1641 violations were modeled at any monitoring locations. The only predicted increases in EC with the Proposed Project at D-1641 stations designated for agricultural beneficial uses occur in March for the D22 station and in May for station D15, although the net increases were very slight (<0.5 percent). Furthermore, these net short-term increases would not exceed any D-1641 compliance requirements that protect agricultural beneficial uses. As such, the Proposed Project's impacts on salinity were determined to not be cumulatively significant.

In summary, the Proposed Project alongside related projects would not significantly degrade water quality with regard to pertinent contaminants such as methylmercury and salinity. The Proposed Project and related flood control projects would not lead to significant adverse hydrologic impacts such as increases to erosion, scour, or flood stages. Cumulatively, there would be a small decrease in flood elevations across all modeled event frequencies. Accordingly, impacts to hydrology and water quality would be **less than cumulatively considerable**.

g. Mineral Resources

The Proposed Project was identified as having less than significant impacts on the loss of mineral resources important to local residents or the State. Although natural gas has been extracted from the Proposed Project Site in the past, wells and pipelines have since been decommissioned and a licensed geologist has verified that the likelihood of future extraction is negligible. Past natural gas extraction activity on the Proposed Project Site was associated with the larger Maine Prairie Gas Field. Accordingly, projects within and near the Maine Prairie Gas Field are the primary subject of analysis on the Proposed Project's cumulative effect on mineral resources.

Maine Prairie Gas Field was discovered in the mid-1940s and was used for extraction from that time until the early 2010s. The last recorded production across the Maine Prairie Gas Field occurred in 2010. Documented extraction over the course of the field's history totals approximately 98% of the field's estimated recoverable reserve capacity, as determined by a 1968 California Division of Oil and Gas Report. The conclusion that 98% of the field's capacity has been depleted does not account for missing data from 1965-1976, so it is reasonable to assume the field to be depleted.

The Maine Prairie Gas Field extends over an area of approximately 3,500 acres, spanning portions of the Proposed Project Site (roughly 640 acres) and nearby parcels to the north, east, and south. No related projects within the Maine Prairie Gas Field were identified, so there are no projects that would cumulatively contribute to the loss of mineral resources within the Maine Prairie Gas Field. Furthermore, the field is almost completely depleted and the likelihood of future extraction is negligible. Since the Proposed Project would have less-than-significant impacts on the loss of mineral resources and no related projects with the potential for cumulative impacts were identified, the Proposed Project's impact on mineral resources would be **less than cumulatively considerable**.

h. Public Services

The Proposed Project's impacts on public services were primarily considered in the context of "other" public services—namely flood protection and vector control. The area of cumulative impact analysis is the lands and waters within the legally defined boundaries of the Delta. These are discussed individually below. Impacts to Fire Protection, Police Protection, and Schools were found to be less than significant or have no impact. As discussed in Section IV-H, Public Service, these impacts would result in no construction of new facilities and thus not represent potential for a cumulative impact.

i. Other Public Services – Flood Control

The Proposed Project's localized effects on nearby levee systems are discussed in detail in Chapter IV.H, Public Services, and were determined to be less than significant with mitigation. Regionally, projects with the potential for cumulative impacts on flood protection services include most projects in Table V-2 as many of these projects would have the potential to alter flood control infrastructure such as levees as well as hydraulic forces that may affect flood control infrastructure such as erosive forces and flood elevations. Many related projects in Table V-2 are flood control and/or infrastructure improvement projects, including floodplain expansions and levee maintenance/repairs. Like the Proposed Project, such projects would improve flood conveyance and enhance the Delta's levee system. Several of these projects are also located within the Yolo Bypass, which is an important floodway for protecting the Central Valley, including the Sacramento Metropolitan Area.

Habitat restoration projects listed in Table V-2, particularly tidal restoration projects, would have the potential to alter flood stages, water velocity, and other hydraulic factors that may affect flood control systems. During hydraulic modeling at the Proposed Project's 30% design phase, a future cumulative condition that accounted for reasonably foreseeable projects nearby was modeled. Projects included in DWR's 2016 Basin-Wide Feasibility Study were the basis for this analysis. The Future Cumulative Condition analysis reflects the Yolo Bypass Option 3 (preferred) plan from the Basin-Wide Feasibility Studies – Sacramento River Basin, which was prepared as part of the 2017 CVPP Update.

This model found that the future cumulative condition would have a modest reduction in the 1% ACE surface elevation with the Proposed Project included. In addition, Mitigation Measure HYDRO-3 ensures that the proposed project will not have a significant impact on existing nearby flood control structures. As the Proposed Project and related projects would positively contribute to the reduction of flood stages and the enhancement of Delta flood control infrastructure under the cumulative condition, impacts on other public services related to flood control would be ***cumulatively beneficial***.

ii. Other Public Services – Vector Control

Wetland restoration projects throughout the Delta have the potential to create suitable mosquito habitat, which may pose a nuisance to local livestock operations or vector infectious diseases

harmful to public health. Immature mosquitoes are entirely aquatic, so mosquitoes require standing water to reproduce. The primary factor considered in this analysis of whether projects would create a cumulatively considerable impact related to vector populations is therefore whether they would create a considerable increase in standing water, enabling increased mosquito breeding. Such an impact would be considered cumulatively significant were it to necessitate new or expanded mosquito control infrastructure, the construction of which may cause a significant environmental impact.

Projects listed as “habitat restoration” in Table V-2 are considered to have the potential to create a cumulatively considerable impact on vector populations. There are 19 such projects listed in Table V-2, the majority of which are tidal restorations. These projects would have the potential to create standing water in portions of their project sites that experience limited tidal influence but would otherwise facilitate inundation patterns that move water in and out with the semi-diurnal tide. Such habitat would be of limited utility for mosquito breeding due to the regular water movement. This is true within the Proposed Project Site, where the Proposed Project would result in a net decrease in suitable mosquito habitat. As the Proposed Project would have beneficial impacts on vector control, resulting in less mosquito breeding habitat within the Proposed Project Site, its contribution to mosquito habitat in the area would not be cumulatively significant. Thus, the Proposed Project’s impact on vector control would be ***less than cumulatively considerable***.

i. Recreation

There are no officially sanctioned, public recreational facilities within the Proposed Project Site; though there are private facilities and access points to public areas with recreational opportunities. Recreational opportunities within the Proposed Project Site are presently limited to waterfowl hunting at the private Liberty Farms Duck Club. Adjacent to the Proposed Project Site, the Shag Slough Bridge provides pedestrian access to the Reserve. Temporary construction impacts on recreation would be limited to project activities and not overlap any other projects’ impacts on recreation. Following project implementation, the bridge would no longer be available to pedestrian access, thus eliminating shoreline fishing from the western side of the Reserve. Since there are many other areas in the Delta that provide shoreline fishing opportunities the loss of bridge access and shoreline fishing would be a less than significant impact. No contribution to cumulative impacts to regional recreation is anticipated to be caused by project construction, or by post-project conditions. The loss of bridge access could cause displacement of shoreline angling use to other areas in the Delta. However, given the estimated number of anglers that would be displacement from the west side of the Reserve, (80 anglers per day), and the number of other shoreline fishing areas in the Delta, impacts to biological and physical resources in these areas would be less than significant. Therefore, for displaced angler impacts on biological and physical resources in other shoreline fishing areas and impacts to the total regional shoreline fishing opportunities would both be ***less than cumulatively considerable***.

j. Tribal Cultural Resources

Although the Proposed Project is not expected to affect any tribal cultural resources, the Proposed Project would involve ground-disturbing activities that may extend into undisturbed soil. It is possible that such activities could unearth, expose, or disturb subsurface archaeological resources that were not identified on the surface. Pursuant to AB 52, DWR sent notification letters to Yocha Dehe Wintun Nation (YDWN), United Auburn Indian Community of the Auburn Rancheria, and the Lone Band of Miwok Indians, in March 2019.

One Native American Tribe requested formal consultation on the Proposed Project—YDWN. In response to this request, DWR provided YDWN with details on the Proposed Project and met with tribal leaders via teleconference on July 10, 2019. YDWN subsequently provided DWR a construction monitoring agreement. DWR has included a routine and widely accepted mitigation measure for inadvertent discovery of tribal cultural resources. This mitigation measure (MM CULT-1) states that if a qualified archaeologist determines that a resource found is or is potentially indigenous in origin, work shall be stopped at the location of the discovered resource, and YDWN shall be contacted to assess the find and determine whether it is potentially a tribal cultural resource. If DWR determines, based on recommendations from YDWN, that the resource may qualify as a tribal cultural resource (as defined in Public Resources Code Section 21074), DWR shall consult with YDWN to develop and implement a tribal cultural resources management plan that outlines the background on and treatment measures for the resource. For further detail on tribal consultation and proposed mitigation, please see Chapter IV.I, Tribal Cultural Resources. With implementation of MM CULT-1, the Proposed Project would have a less-than-significant impact on tribal cultural resources.

Projects in Table V-2 with the potential to cause an adverse effect on the significance of tribal cultural resources have the potential to create cumulative impacts with the Proposed Project. These projects are all subject to the same legal requirements governing the protection of tribal cultural resources as the Proposed Project, including requirements to consult with tribes during the planning process and to stop work in the event of accidental discovery of archaeological resources or human remains. Furthermore, the Proposed Project would implement all mitigation measures agreed upon during its tribal consultation project, so it would not make an incremental contribution to any regional cumulative impacts on tribal cultural resources. Thus, the Proposed Project's impact on tribal cultural resources would be ***less than cumulatively considerable***.

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VI. GENERAL IMPACT CATEGORIES

1. SUMMARY OF SIGNIFICANT, UNAVOIDABLE IMPACTS

Section 15126.2(c) of the CEQA Guidelines requires that an EIR describe any significant impacts which cannot be avoided without imposing an alternative project design and the implications of these impacts. Based on the analysis contained in the Draft EIR and the Initial Study, implementation of the Proposed Project would not result in any significant, unavoidable environmental impacts.

2. GROWTH-INDUCING IMPACTS OF THE PROPOSED PROJECT

Section 15126.2(e) of the CEQA Guidelines requires a discussion of the ways in which a proposed project could directly or indirectly foster economic or population growth, or the construction of additional housing, in the surrounding environment.

The Proposed Project Site is presently used for livestock grazing and waterfowl hunting. Both uses would end upon Proposed Project implementation. Proposed ecosystem restoration activities would convert the Proposed Project Site into undeveloped open space. No new residential or commercial lands are included in the Proposed Project.

DWR and CDFW staff would monitor and patrol the site but maintenance and monitoring would not occur on a daily basis and ecosystem monitoring would be limited to a ten-year duration, so any employment opportunities created to fill these needs would be insufficient to trigger substantial population growth. Similarly, DWR and RD 2098 staff or contractors would be needed to perform levee maintenance activities. Maintenance needs would not be sufficient to trigger the need for many full-time employees and would likely decrease due to the fact that the levees currently present would be improved or replaced with levees using modern engineering and construction convention and therefore will need less maintenance.

Although the Proposed Project includes modifications to infrastructure such as construction of elevated peninsulas to provide maintenance access to transmission towers, levee top roadways, and a new boat ramp, these elements would not be open to the general public. Nor would the Proposed Project expand electrical, natural gas, wastewater or transportation capacity to new areas. As such, the Proposed Project would not be growth inducing and no impacts would occur.

3. SIGNIFICANT, IRREVERSIBLE CHANGES TO THE ENVIRONMENT

Section 15126.2(d) of the CEQA Guidelines states that an EIR must discuss significant irreversible environmental changes associated with a proposed project, including large commitments of non-renewable resources, impacts which commit future generations to similar

uses (such as construction of roadways to previously uninhabited areas), and irreversible damage that could result from environmental accidents associated with the project.

Proposed Project construction, maintenance, and monitoring would use equipment and vehicles which use non-renewable fuels such as gasoline and diesel. Most non-renewable resource consumption would occur during the construction period through the daily use of fossil fuels to power heavy equipment such as excavators, pile drivers, and other pieces of construction equipment. Following construction, which is scheduled to last approximately two years, use of non-renewable resources would decline. Ecosystem maintenance and monitoring, patrol by DWR and CDFW staff, and levee maintenance activity would require fossil fuel use, but these activities would generally use lighter duty vehicles than construction (apart from some maintenance activities) and would be less frequent than construction activities. Since the scope of this use of non-renewable resources relative to the global magnitude of fossil fuel use is minor, the Proposed Project would not make significant, irretrievable commitments of non-renewable resources.

The Proposed Project Site sits on top of an abandoned natural gas field, the Maine Prairie Gas Field. Through partial removal of existing decommissioned gas pipelines and restoration of tidal inundation to the site, the Proposed Project would have the potential to make future extraction of any remnant natural gas, a non-renewable resource, more difficult. However, as discussed in further detail in Chapter IV.G, Mineral Resources, virtually all of the field's estimated capacity has already been extracted, and no extraction has occurred in the last decade. The field is therefore assumed to be depleted, and the likelihood of the Proposed Project making this non-renewable resource less accessible is negligible.

While the Proposed Project involves construction of minor transportation facilities such as levee roads and a boat launch, these are relatively small project components, would not be open to the public, and would not serve any new areas. They would therefore not expand access to any previously uninhabited areas and would not irretrievably commit future generations to developing any such areas. Similarly, levee improvements would enhance the area's flood control infrastructure and replace existing flood control systems within the Proposed Project Site; they would not result in reclamation of any new areas which would subsequently become irreversibly committed to future development.

Breach of the Shag Slough Levee and emplacement of a conservation easement upon the Proposed Project Site would irreversibly convert the site from its present uses, agriculture and private recreation, to habitat, conservation, and flood management uses. While this would lead to permanent loss of agricultural land within the Proposed Project Site, one off-site property would be improved to create prime farmland and additional agricultural land would be placed under an agricultural easement. Mitigation for the permanent loss of agricultural production within the Proposed Project Site is discussed in further detail in Chapter IV.C, Agriculture and Forestry Resources.

VII. PROJECT ALTERNATIVES

1. INTRODUCTION

Section 15126.6(f) of the CEQA Guidelines requires that an EIR describe a range of reasonable alternatives to the Project or to the location of the Proposed Project Site and to evaluate the comparative merits of the alternatives. The “rule of reason” governing the range of alternatives specifies that an EIR should only discuss those alternatives necessary to permit a reasoned choice. The EIR need not analyze alternatives to the Project to the same degree of detail as the preferred alternative but should provide enough detail to allow for meaningful comparison and evaluation.

In this section of the EIR, three alternatives to the Proposed Project are discussed: the No Project Alternative, the No Channel Alternative, and the Yolo Bypass Option 3 Alternative. The basis for the selection of these alternatives is discussed below and alternatives that were eliminated from further consideration are disclosed along with the reason for their elimination. A description is provided of each proposed alternative and each alternative’s environmental impacts are analyzed according to the CEQA Appendix G checklist. Mitigation measures are provided for potentially significant environmental impacts where feasible.

2. DEVELOPMENT OF ALTERNATIVES CONSIDERED IN THIS EIR

Section 15126.6(c) of the CEQA Guidelines describes criteria for selection of alternatives. The EIR should briefly describe the rationale for selecting the alternatives discussed and identify alternatives that were considered but eliminated from further consideration. Alternatives to the Proposed Project should feasibly accomplish most of the basic objectives of the Proposed Project and avoid or substantially decrease one or more significant effect. Alternatives may be eliminated from detailed consideration in an EIR for failure to meet most project objectives, infeasibility, or inability to avoid significant environmental impacts.

a. Project Objectives

The objectives of the Lookout Slough Tidal Habitat Restoration and Flood Improvement Project are organized under three broader goals and are listed below. As stated above, potential alternatives should feasibly accomplish most of the basic project objectives.

i. Goal 1:

Create and maintain a diverse landscape of intertidal and associated subtidal habitat that supports habitat elements for native species and improved food productivity within the Project area.

Objectives:

- a. Improve primary and secondary productivity and food availability for Delta Smelt and other native fishes within the Proposed Project Site and the immediate tidal sloughs surrounding the Proposed Project Site.
- b. Improve rearing habitat for Delta Smelt, salmonids, and other native fish.
- c. Promote suitable spawning habitat with appropriate water velocities and depths accessible for Delta Smelt within the Proposed Project Site and the immediate tidal sloughs surrounding the Proposed Project Site.
- d. Increase on-site diversity of foraging, breeding, and refuge habitat conditions for aquatic and terrestrial wetland-dependent species.
- e. To the greatest extent practical, preserve existing topographic variability to allow for habitat succession and resilience against future climate change.
- f. To the greatest extent practical, avoid promoting conditions adverse to Proposed Project biological objectives, such as those that would favor establishment or spread of invasive exotic species.

ii. Goal 2:

Design and implement a Project that also supports viable populations of special-status aquatic and terrestrial species.

Objectives:

- a. Minimize temporary effects to special-status aquatic and terrestrial species when implementing Proposed Project activities (e.g., earth disturbance and vegetation management activities).
- b. Include habitat elements for special-status aquatic and terrestrial species.

iii. Goal 3:

Provide additional flood storage and conveyance within the Yolo Bypass to reduce the chance of catastrophic flooding and protect existing nearby infrastructure (e.g., agriculture, power, and human habitation).

Objectives:

- a. Protect existing nearby infrastructure surrounding the Proposed Project Site and avoid any adverse flood-related impacts in the region.
- b. Provide flood management benefits by reducing flood stages in the lower part of the Yolo Bypass.

b. Alternatives Considered but Eliminated from Further Consideration

Factors that may be taken into account when addressing the feasibility of alternatives are site suitability, economic viability, availability of infrastructure, general plan consistency, other plans or regulatory limitations, jurisdictional boundaries and whether the proponent can reasonably

acquire, control, or otherwise have access to the alternative site (CEQA Guidelines Section 15126.6(f)).

To feasibly support the Proposed Project's habitat-related objectives, any potential site must be capable of restoration to tidal marsh habitat suitable for target fish species. Factors which may affect a site's suitability for restoration include water quality, elevation, tidal action, continuity with existing habitat, and other ecological factors. Delta Smelt, the primary target species of proposed restoration activities, is typically found in water of low or no salinity, relies on tidal action for movement, and favors relatively cool waters rich in zooplankton. As habitat conditions have deteriorated, Delta Smelt's distribution has become restricted relative to its historic range. The species is seldom found in the South or Central Delta, likely due to high temperatures and low turbidity, among other factors.¹ Alternative sites outside of the North Delta were therefore considered incapable of achieving habitat restoration objectives.

Due to the relatively narrow portion of the Delta suitable for restoring tidal marsh habitat for Delta Smelt, the scope of potential alternative Proposed Project Sites is limited. Potential alternative locations are further limited by the fact that other sites with suitable characteristics for restoration to tidal marsh habitat have already been constructed, proposed, or considered for other ecosystem restoration projects. Because DWR must restore 8,000 acres of tidal marsh habitat and the portions of the Delta in which it may do so are limited, off-site alternatives to the proposed 3,400-acre Proposed Project Site in the North Delta were not considered reasonably feasible and were removed from further consideration.

An alternative that considered breaching the Cache/Hass Slough Levee at a single location at the intersection of Lookout Slough with Cache Slough and degrading the entire Shag Slough Levee to the 10% ACE (Cache Slough Breach Alternative) was rejected because it failed to reduce any of the Proposed Project's significant environmental effects. This alternative was considered for the purposes of enhancing nutrient export to Cache and Hass Sloughs and enhancing connectivity with the Yolo Bypass. However, modeling results described in the Proposed Project's Basis of Design Report indicate that nutrient export would be satisfactory without a breach along Cache Slough and that two 1,500-foot degrade segments would adequately provide flood conveyance from the Yolo Bypass.

Moreover, several of the Cache Slough Breach Alternative's environmental impacts would be more adverse than those of the Proposed Project. These include greater impacts to air quality, biological resources, flood control-related public services, and hydrology and water quality. The additional levee breach and degrade would increase earthwork quantities, leading to potentially higher ozone precursor and particulate matter emissions due to the need for more equipment use and earth disturbance. Furthermore, increased site disturbance with motorized equipment would potentially increase impacts to biological resources at risk of direct injury or harm during construction. Additionally, impacts to flood control-related public services and hydrology and water quality would be more adverse due to the potential for a slight increase in flood elevations

¹ Peter Moyle et al., "Delta Smelt: Life History and Decline of a Once-Abundant Species in the San Francisco Estuary," *San Francisco Estuary and Watershed Science* 14, no. 2 (July 18, 2016), <https://doi.org/10.15447/sfews.2016v14iss2art6>.

in Cache and Hass Sloughs. Impacts to cultural resources, tribal cultural resources, recreation, hazards, non-flood related public services, mineral resources, and agriculture would remain the same, as project components with the potential to impact these resources would be unchanged. As all impacts would be equal to or greater than those of the Project, this alternative was eliminated from further consideration.

3. METHODOLOGY

The below alternatives analysis is presented as a comparative analysis to the Lookout Slough Tidal Habitat Restoration and Flood Improvement Project as currently proposed. Accordingly, for the purposes of analyzing the environmental impacts of project alternatives, the same thresholds of significance and environmental and regulatory settings applied to analysis of the Proposed Project are used. Thresholds of significance, technical background documents used as information sources, and environmental and regulatory settings are discussed in Chapters IV.B through IV.K of this Draft EIR. Additionally, where relevant, mitigation measures required of the Proposed Project are assumed to apply to alternatives. Project alternatives are not described to the same degree of detail as the Proposed Project. Rather, enough detail is provided to enable meaningful comparison of the merits of each alternative.

4. NO PROJECT ALTERNATIVE

a. Description of Alternative

Under the No Project Alternative, no project would take place. The Shag Slough and Vogel Levees would not be breached or partially degraded, the Cache/Hass Slough Levee would not be improved, and the Duck Slough Setback Levee would not be constructed. Flood conveyance would remain unchanged in the Yolo Bypass and existing flood control infrastructure would continue to protect current land uses in RD 2098 and 2068.

As levees around the Proposed Project Site would remain unchanged, tidal influence would not be restored and the site would not be inundated. Current land uses would continue, including the operations of the Liberty Farms Duck Club and of approximately 1,463 acres of prime farmland used for irrigated grazing at the Bowsbey Property. Both properties contain water control infrastructure such as drainage ditches, pumps, and culverts that would remain in place. Additionally, other infrastructure across the site such as PG&E local transmission lines and plugged gas wells and pipelines would remain in place. The Shag Slough Levee and Cache/Hass Slough Levee would continue to provide flood control for the site. Due to the high maintenance needs of these levees², it is possible that increased maintenance activity or levee repair efforts would eventually be required to assure that the Proposed Project Site has adequate flood protection. While it is unclear at this time what these maintenance needs would be and whether they would occur, this analysis assumes that SPFC levees within the Proposed Project Site would continue their current maintenance regimen.

² Yolo County, "Lower Sacramento River/Delta North Regional Flood Management Plan," 2014, p.68

No invasive plant control, levee breach, or tidal channel excavation would occur. Because the Proposed Project Site would remain isolated from adjacent waterways and tidal influence, native tidal ecosystems would not be re-established under the No Project Alternative.

b. Relationship to Project Objectives

The No Project Alternative would partially meet one of the project's ten objectives. A brief explanation of the No Project Alternative's relationship to each objective is described in Table VII-1 below.

c. Agriculture and Forestry Resources

The Proposed Project Site is presently all in open space or agricultural use—Bowlsbey as grazing land, Vogel as unmanaged open space, and Liberty Farms as a private duck club. All three sections of the Proposed Project Site are under Williamson Act Contracts. Under the No Project Alternative, the three properties would remain under their current uses and would not undergo any modification. There would therefore be no conversion of agricultural land, including prime farmland, to non-agricultural use or any conflict with Williamson Act Contracts. The No Project Alternative would therefore have no impact on agriculture and forestry resources. This constitutes a lesser impact than the Proposed Project, which would have less-than-significant impacts with implementation of required mitigation measures.

d. Air Quality

Under the No Project Alternative, the Proposed Project Site would remain in its existing uses—agriculture, open space, and a private duck club. While these uses have associated emissions, there would be no change in emissions relative to baseline conditions. The continued use of the Proposed Project Site in its present uses would not introduce any new people, businesses, land uses, or other sources of emissions. As there would be no change from the baseline, the No Project Alternative would not conflict with any air quality plan, result in a cumulatively considerable increase in a criteria pollutant, or otherwise adversely affect air quality. Thus, no new impacts would occur. By comparison, under the Proposed Project, construction equipment used during the approximately two-year construction period would temporarily increase particulate matter and ozone precursor emissions. This impact would be less than significant with mitigation. Although the Proposed Project would not appreciably increase air pollutant concentrations, this is a greater effect than the No Project Alternative, which would result in no increase in emissions from the baseline conditions.

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Table VII-1. No Project Alternative's Relationship to Project Objectives

Objective	Meets Objective	Rationale
Improve primary and secondary productivity and food availability for Delta Smelt and other native fishes within the Proposed Project Site and the immediate tidal sloughs surrounding the Proposed Project Site.	No	No connection would be constructed between the Proposed Project Site and tidal sloughs and no modifications that would improve primary or secondary productivity would occur.
Improve rearing habitat for Delta Smelt, salmonids, and other native fish.	No	No alterations to habitat for Delta Smelt, salmonids, or other native fish within the Proposed Project Site or adjacent tidal sloughs would occur.
Promote suitable spawning habitat with appropriate water velocities and depths accessible for Delta Smelt within the Proposed Project Site and the immediate tidal sloughs surrounding the Proposed Project Site.	No	No alterations to habitat for Delta Smelt, salmonids, or other native fish within the Proposed Project Site or adjacent tidal sloughs would occur.
Increase on-site diversity of foraging, breeding, and refuge habitat conditions for aquatic and terrestrial wetland-dependent species.	No	Foraging, breeding, and refuge habitat for aquatic and terrestrial wetland-dependent species would be unaltered, resulting in no net change in diversity.
To the greatest extent practical, preserve existing topographic variability to allow for habitat succession and resilience against future climate change.	No	Ongoing geomorphic and climatic processes would continue, and topography would not be altered to accommodate these processes.
To the greatest extent practical, avoid promoting conditions adverse to Project biological objectives, such as those that would favor establishment or spread of invasive exotic species.	No	No change in conditions for invasive species establishment would occur. Existing populations of invasive species would remain in place and no new processes which would favor invasive species introduction would begin.
Minimize temporary effects to special-status aquatic and terrestrial species when implementing Project activities (e.g., earth disturbance and vegetation management activities).	Yes	The No Project Alternative would not include actions that would result in temporary impacts to special-status aquatic or terrestrial species.

Objective	Meets Objective	Rationale
Include habitat elements for special-status aquatic and terrestrial species.	Partial	No new habitat elements for special-status fish species would be introduced. Aquatic special-status fish species would continue to be absent from the Proposed Project Site due to continued isolation from tidal waters, but habitat for terrestrial species such as giant garter snake and Swainson's hawk would remain in place.
Protect existing nearby infrastructure surrounding the Proposed Project Site and avoid any adverse flood-related impacts in the region.	Partial	Existing flood control infrastructure would remain in place and continue to protect nearby infrastructure and prevent flood-related impacts. However, this infrastructure could require expanded maintenance and/or repair efforts to continue to prevent adverse flood-related impacts in the long-term.
Provide flood management benefits by reducing flood stages in the lower part of the Yolo Bypass.	No	Flood stages in the lower part of the Yolo Bypass would remain unchanged.

e. Biological Resources

Under the No Project Alternative, the Proposed Project Site would continue to be used for agricultural, duck hunting, and open space purposes. Direct and indirect adverse impacts on special-status species could occur under these uses. Indirect effects include agricultural runoff that could harm plant species or make habitat less suitable for wildlife species. Direct effects include physical harm that could result from the continued presence of humans, dogs, and farm and duck club operations on the site. This is a lesser impact than that of the Proposed Project, which would have less-than-significant impacts with mitigation and has the potential to affect such special-status wildlife species such as giant garter snake, Swainson's hawk, pallid bat, and others, as well as special-status plant species such as Suisun Marsh aster, Mason's lilaepsis, Woolly rose mallow, and Parry's rough tarplant. Although not considered an environmental impact, it is worth noting that this alternative would entirely fail to create any tidal marsh habitat to help fulfill habitat needs for Delta Smelt and salmonids pursuant to the NMFS and USFWS BiOps.

Under the No Project Alternative, there would be no impact to sensitive biological communities such as great valley mixed riparian. This is a lesser impact than that of the Proposed Project, which would have less-than-significant impacts on riparian habitat with mitigation, as there would be an approximate 10% increase in riparian acreage—which would assure no net loss of riparian habitat and offset temporary impacts associated with the loss of riparian habitat function as plantings mature.

Continued agricultural and duck hunting activities throughout the Proposed Project Site may have an adverse effect on coastal and valley freshwater marsh or open water aquatic resources through agricultural run-off and/or disruption associated with humans, dogs, and livestock on the site. However, the risk of disturbance and adverse effects would remain comparable to baseline levels, and no new impacts would occur.

In summary, the No Project Alternative would maintain agricultural and duck club operations on the site. The risk of adverse effects to special-status species and their habitat would be unchanged from baseline levels. As such, no new impacts would occur. The No Project Alternative would result in a lesser impact than the Project, which would have less than significant impacts on biological resources with mitigation incorporated. The Proposed Project would mostly result in short-term impacts to biological resources—and would be beneficial in the long-term due to the restoration of approximately 3,164 acres of habitat for special-status species in an area with favorable conditions for restoration. While the No Project Alternative would not incur any short- or long-term impacts, it would not result in long-term benefits as the Proposed Project would.

f. Cultural Resources

According to archival research, no cultural or archaeological resources have been previously mapped within the Proposed Project Site. Upon application of criteria for significance, all potential cultural and archaeological resources identified within the Proposed Project Site were recommended as ineligible for listing in the California and National Registers. Due to soil types and geologic features within the site as well as the site's history and pre-history, there is low

potential for buried resources throughout the Proposed Project Site. The highest potential occurs in the vicinity of the Duck Slough Setback Levee alignment due to the depth of excavation, but this potential remains low due to the site's history of disturbance and the low likelihood of indigenous occupation of the site.

Under the No Project Alternative, no structures would be removed from the Proposed Project Site and no ground disturbance would occur. Accordingly, no archaeological or historical resource would be adversely affected and no impact would occur. Although the likelihood of disturbing any cultural resources during Proposed Project construction is low, the No Project alternative would not require any ground disturbance, and its potential for impacts to cultural resources is lower than that of the Proposed Project.

g. Hazards and Hazardous Materials

The No Project Alternative would not alter baseline risks related to hazards or hazardous materials within the Proposed Project Site. Contaminated infrastructure that poses a health risk is presently being remediated and removed. Because this is occurring prior to Proposed Project implementation, the No Project Alternative would also incur this benefit to hazardous material conditions within the Proposed Project Site. Natural gas wells and pipelines would continue to underlie the site, and the potential risk of future leaks would remain unchanged. Future leaks would require cleanup after notifying DOGGR. Hazardous material conditions would remain unchanged, and the potential for future leaks could still require implementation of BMPs required by Solano County CUPA and a SPCC Plan. Therefore, this impact is considered equal to that of the Proposed Project.

h. Hydrology and Water Quality

The No Project Alternative would result in no change in salinity, turbidity, or other water quality metrics. No project would occur and agricultural and duck hunting operations would continue on the site. These uses may require the application of substances such as fertilizers and herbicides, which could contribute to water quality violations. However, use of any such chemicals would not increase above baseline use.

This alternative would not alter any levees or expand the Yolo Bypass Floodplain. Accordingly, there would be no changes to local or regional hydrology from baseline conditions. Flood elevations would remain unchanged, as would tidal prism, water velocity, wind-wave fetch, and other hydrologic parameters with potential to change under the Proposed Project. As these parameters would not be altered, there would be no change to erosion, scour, or the local groundwater table. This is a lesser impact than the Proposed Project, which would benefit flood hydrology but could result in minor, localized changes to other hydrologic parameters.

Although the No Project Alternative would incur lesser hydrologic impacts than the Proposed Project, it would not yield the same enhanced flooding conveyance as the Proposed Project. A new levee would not be constructed and connectivity to the Yolo Bypass would not be increased. Thus, the No Project Alternative would result in no impact to hydrology and water quality—but

would not incur the same benefits to hydrology and water quality as the Proposed Project, which would enhance levee protection and reduce flood stages in the Yolo Bypass.

i. Mineral Resources

The No Project Alternative would leave plugged gas wells and pipelines in place and future extraction from the natural gas field underlying the Proposed Project Site would remain theoretically possible. A remoteness opinion issued by a licensed geologist prepared for the project concluded that future extraction from the site has a negligible likelihood. As such, no impact would occur; this would be marginally lesser than but comparable to the Project, which would have a less-than-significant impact on mineral resources.

j. Public Services

There would be no changes to infrastructure within or operations of the Proposed Project Site that would necessitate new or expanded public service facilities. The level of service for fire and police and departments would remain the same under the No Project Alternative. The Proposed Project would require provision of a new setback levee to replace flood protection currently offered by levees that are proposed for breach or degrade. Under the No Project Alternative, no such breach or degrade would be required. As such, existing infrastructure would continue to serve its purpose and there would be no environmental impacts associated with replacement or relocation. Thus, the No Project Alternative would have no impact on public services related to flood control, a lesser but comparable impact to the Proposed Project's less-than-significant impact.

Irrigated pasture, managed wetland cells, and open water present within the Proposed Project Site currently provide suitable breeding habitat for several mosquito species known to occur in Solano County, including winter, pasture, and *Aedes melanimon* mosquitoes. Although habitat needs vary for different mosquito species, wetland habitat that has shallow standing waters for five or more consecutive days, poor-draining substrates, flat to gently sloping surfaces, low turbulence, gradually-fluctuating water levels, dense vegetation, and high decomposition rates generally create favorable breeding habitat for mosquitoes. The No Project Alternative would leave existing standing water in place, neither enhancing nor reducing the quality of mosquito habitat. In contrast, the Proposed Project would increase surface water turbidity, improve surface water circulation, and enhance habitat for mosquito predators such as fish. Thus, although the No Project Alternative would have no impact on vector control, it would not create the same benefits as the Project.

k. Recreation

The No Project Alternative would not directly or indirectly alter use of recreation facilities within or near the Proposed Project Site, which presently include private waterfowl hunting in the Liberty Farms Duck Club and public kayaking, bird watching, hunting, and bank fishing in the Reserve. Pedestrian access to the Reserve would be unaltered, with Liberty Island Road and the Shag Slough Bridge remaining accessible to the public. There would therefore be no impact on

recreation. This is a lesser impact than that of the Project, which would result in a less-than-significant impact due to loss of pedestrian access to the Reserve for bank fishing.

I. Tribal Cultural Resources

Archival research conducted during a cultural resources survey of the Proposed Project Site indicated that there are no known cultural resources present within the site, but that there is some sensitivity for buried archaeological resources in areas where deep excavation would occur. As part of this study, notification was sent to all potentially interested Native American parties provided by the NAHC. Throughout the Spring and Summer of 2019, DWR consulted with the Yocha Dehe Wintun Nation, the only tribe to request formal consultation on the Project pursuant to AB 52. During this process, the Yocha Dehe Wintun Nation did not identify any specific concerns related to tribal cultural resources but expressed that they may request that tribal monitors be present during construction and may send mitigation measures to DWR should specific concerns arise during the planning process.

As the Proposed Project Site would remain unchanged in its current state and no ground disturbance would occur, the No Project Alternative would not result in any changes to the significance of tribal cultural resources eligible for state or local listing and no accidental discovery of tribal cultural resources would occur. Thus, no impact would occur. This would be a lesser impact than the Project, which would have a less-than-significant impact on tribal cultural resources.

m. Conclusion

The No Project Alternative would generally have less impact on environmental topic areas than the Proposed Project. However, it would not have any benefit on Biological Resources while the Project would restore approximately 3,164 acres of native tidal marsh ecosystem and would not create any additional flood storage in the Yolo Bypass while the Project would create approximately 40,000 acre-feet of additional storage. The No Project Alternative would be partially consistent with one of the ten Project objectives and would otherwise fail to achieve any of the project objectives.

5. NO CHANNEL ALTERNATIVE

a. Description of Alternative

The Proposed Project includes a network of over 20 miles of tidal channels throughout the Proposed Project Site interior. Under the No Channel Alternative, these channels would not be constructed. All other elements would remain the same as the Project. Accordingly, the Duck Slough Setback Levee would be constructed, the Shag Slough Levee would be breached at nine locations and have two segments degraded, and the Vogel Levee would be breached at two locations. Specifications of levee elevations and breach size would remain unchanged. On-site infrastructure such as water control features and farm buildings would be removed while PG&E transmission towers would be protected in place through the construction of elevated peninsulas.

Liberty Island Road would be partially decommissioned, moving the terminus of the road from the current Shag Slough Bridge to a point part way along the east-west leg of the road. All approvals, permits, and consultations required of the Project are anticipated to be required of the No Channel Alternative. For a complete list, please see Table III-4 of Chapter III, Project Description.

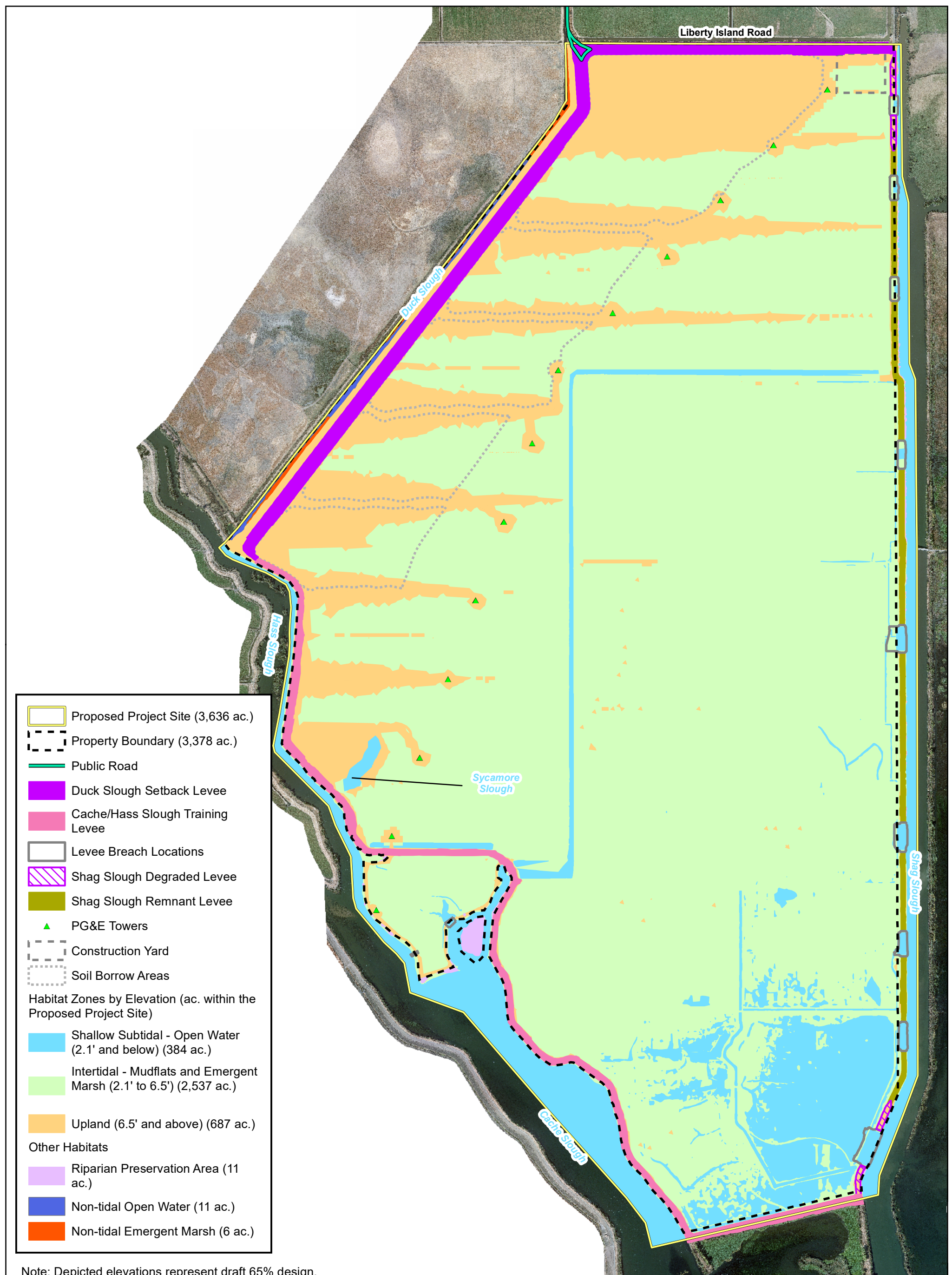
Under the Proposed Project, approximately 20 miles of tidal channels would necessitate roughly 1,800,000 cubic yards of excavation within the site interior. Eliminating tidal channels from the Project's design would therefore reduce the Project's overall excavation needs by approximately 1,780,000 cubic yards, from roughly 5,254,894 cubic yards to 3,474,894 cubic yards. This would reduce requirements for grading and excavation within the Proposed Project Site and decrease the use of heavy equipment, including that of excavators, bulldozers, and scrapers.

Similarly to the Proposed Project, the No Channel Alternative would create elevations suitable for shallow subtidal open water habitat, intertidal mudflat and emergent marsh habitat, a riparian planting program, and upland habitat. The acreages and distributions of these habitats would shift. Namely, the No Channel Alternative would shift towards more creation of intertidal and upland habitat and less shallow subtidal habitat. Unlike the Project, the No Channel Alternative would not create any giant garter snake foraging pond habitat. As Delta Smelt spawning habitat creation is anticipated to occur along tidal channels under the Project, no Delta Smelt spawning habitat would be created under the No Channel Alternative. Eliminating the tidal channel network would decrease the creditable acreage of Delta Smelt habitat creation—requiring DWR to account for differences in creditable acreage elsewhere. The specifics of any replacement restoration projects are not known and are therefore not considered a reasonably foreseeable impact under CEQA and are not considered in this analysis. Anticipated habitat type elevations under the No Channel Alternative are depicted in Figure VII-1.

b. Relationship to Project Objectives

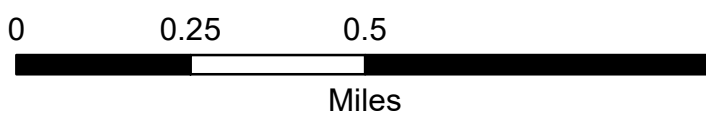
The No Channel Alternative would meet all but one of the ten Project objectives, as summarized in Table VII-2 below.

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Note: Depicted elevations represent draft 65% design.

Figure VII-1. No Channel Alternative



Prepared by:

Map Prepared Date: 12/9/2019
 Map Prepared By: njander
 Base Source: Wood Rogers
 Base Date: 10/24/17
 Data Source(s): WRA



Lookout Slough Tidal Habitat Restoration and Flood Improvement Project

Table VII-2. No Channel Alternative's Relationship to Project Objectives

Objective	Meets Objective	Rationale
Improve primary and secondary productivity and food availability for Delta Smelt and other native fishes within the Proposed Project Site and the immediate tidal sloughs surrounding the Proposed Project Site.	Partial	Even without tidal channels, re-established emergent marsh vegetation is still anticipated to facilitate enhanced nutrient production within the Proposed Project Site. Although, tidal channels would significantly improve conveyance throughout the site and into the Cache Slough Complex. The absence of tidal channels would also restrict tidal inundation to be significantly muted throughout the Proposed Project Site.
Improve rearing habitat for Delta Smelt, salmonids, and other native fish.	Partial	The elimination of tidal channels would reduce the amount of created shallow subtidal habitat, which is essential for creating fish rearing habitat. This alternative would have some shallow subtidal habitat in the southeastern areas of the Proposed Project Site.
Promote suitable spawning habitat with appropriate water velocities and depths accessible for Delta Smelt within the Proposed Project Site and the immediate tidal sloughs surrounding the Proposed Project Site.	No	Although the requisite conditions for Delta Smelt spawning are poorly documented in the wild, laboratory data and data from similar species indicate that Delta Smelt likely spawn in shallow subtidal water with low velocity and small substrates such as pebbles or sand available. The No Channel Alternative would not create any such habitat.
Increase on-site diversity of foraging, breeding, and refuge habitat conditions for aquatic and terrestrial wetland-dependent species.	Partial	The No Channel Alternative would provide benefits for terrestrial wetland dependent species in a manner similar to the Project. This alternative would create less shallow subtidal habitat that would create foraging, breeding, and refuge habitat for fish species. This alternative would also create less habitat for migratory waterfowl.
To the greatest extent practical, preserve existing topographic variability to allow for habitat succession and resilience against future climate change.	Yes	The existing topography contains a significant amount of land at elevations that would convert to tidal marsh habitat with rising sea levels. The Duck Slough Setback Levee would be designed to be resilient to rising sea levels. This alternative and the Project address this goal to the greatest extent practical.
To the greatest extent practical, avoid promoting conditions adverse to Project biological objectives, such as those that would favor establishment or spread of invasive exotic species.	Yes	This alternative would avoid promoting conditions that would favor the establishment or spread of invasive exotic species and would include the control of existing invasive plant species within the limit of disturbance. This could require slightly more extensive efforts than under the Proposed Project due to tidal damping which may create more favorable invasive species conditions and could occur absent tidal channels.
Minimize temporary effects to special-status aquatic and terrestrial species when implementing Project activities (e.g., earth disturbance and vegetation management activities).	Yes	Parry's rough tarplant, Suisun Marsh aster, giant garter snake, Swainson's hawk, and other special-status plant and wildlife species would face potential impacts mostly resulting from direct disturbance or harm or temporary habitat loss. With mitigation these impacts would be less than significant
Include habitat elements for special-status aquatic and terrestrial species.	Partial	This alternative would not create any giant garter snake foraging pond habitat or Delta Smelt spawning habitat. As Delta Smelt spawning habitat creation is anticipated to occur along tidal channels, no Delta Smelt spawning habitat would be created under this alternative. This alternative would create giant garter snake basking and winter refugia similar to the Proposed Project.
Protect existing nearby infrastructure surrounding the Proposed Project Site and avoid any adverse flood-related impacts in the region.	Yes	The proposed Duck Slough Setback Levee and the Cache/Hass Slough Training Levee are project elements in this alternative and the Project. These features will provide protection of existing nearby infrastructure surrounding the Proposed Project Site. This alternative would reduce flood-related impacts in the regions.
Provide flood management benefits by reducing flood stages in the lower part of the Yolo Bypass.	Yes	The partial degrade and breaching of the Shag Slough Levee would provide flood management benefits by reducing flood stages in the lower part of the Yolo Bypass.

c. Agricultural Resources

The No Channel Alternative would have the same spatial footprint as the Proposed Project in the same location. Similar to the Proposed Project, approximately 3,164 acres of habitat would be inundated due to restored tidal influence and floodplain connectivity. This would convert approximately 1,460 acres of prime farmland to non-agricultural use. Mitigation Measure AG-1 would apply to the No Channel Alternative and would mitigate impacts related to the conversion of prime farmland to non-agricultural use to less-than-significant levels. Similar to the Project, the No Channel Alternative would maintain the Vogel and Liberty Farms Properties in open space use and convert the Bowsbey Property to open space use. Open space uses are considered acceptable uses under all three properties' Williamson Act Contracts, so no violation with a Williamson Act Contract would occur.

The No Channel Alternative would therefore have a less-than-significant impact on Williamson Act Contracts and impacts related to the conversion of prime farmland to non-agricultural use that would be less than significant with mitigation incorporated. This would be similar in magnitude to the Project, which would convert equivalent quantities of farmland to non-agricultural use.

d. Air Quality

Air quality modeling prepared for the Project accounted for roughly 1,780,000 cubic yards of excavation more than the Project's excavation needs under the No Channel Alternative (~34% more). There would therefore be a substantially decreased need for excavation, grading, and sidecast, all of which would generate PM₁₀ emissions. Furthermore, there would be less need for the use of motorized equipment such as excavators and scrapers, creating less diesel particulate and ozone precursor emissions.

Earthwork reduction would also shorten the construction schedule, which presently contains 105 total days for grading activity. This would result in less worker trips to the site and less associated emissions. This would be a relatively small reduction, as worker trips constitute a very small portion of overall construction emissions. Long-term emissions would remain comparable to the Project, with potentially small changes due to altered maintenance needs associated with removal of tidal marsh channels from the Project design. Any such change would similarly be relatively small due to the already minimal emissions associated with long-term maintenance and monitoring.

The No Channel Alternative would result in less emissions than the Project, creating a lesser impact on air quality. For the purposes of this analysis, it is assumed that the No Channel Alternative's impacts on air quality would remain significant absent mitigation, and that all air quality mitigation measures identified in Chapter IV.C, Air Quality, would apply to this alternative. Accordingly, the No Channel Alternative's impacts on air quality would be less than significant with mitigation incorporated. Although this is the same determination as that of the Proposed Project, there would be less overall emissions associated with the No Channel Alternative due to

decreased earthwork needs. This impact would therefore be less than that of the Proposed Project.

e. Biological Resources

The No Channel Alternative would have the same spatial footprint as the Proposed Project and would be constructed via similar methods, resulting in comparable impacts to special-status species. This includes impacts to Parry's rough tarplant, Suisun Marsh aster, giant garter snake, Swainson's hawk, and other special-status plant and animal species described in Chapter IV.D, Biological Resources. These potential impacts mostly result from direct disturbance or harm or temporary habitat loss. All previously identified mitigation measures would apply to the No Channel Alternative and would reduce these impacts to less-than-significant levels. The No Channel Alternative would therefore have less than significant construction impacts with mitigation and a net benefit for most biological resources.

The No Channel Alternative would provide a net benefit to biological resources through conversion of most of the Proposed Project Site to native tidal marsh habitat that may serve as habitat for several special-status plant, fish, and wildlife species. However, lack of tidal channels on the Proposed Project Site interior would reduce this benefit. Hydrologic modeling results indicate that removing tidal channels from the Project design would create tidal damping that would reduce the extent of the mean higher high water (MHHW) tidal action, reducing the quantity of habitat created for Delta Smelt and other special-status fish species. Additionally, tidal channel removal would diminish nutrient export capabilities into Cache Slough. Benefits to biological resources would still be attained, but to a lesser extent than the Proposed Project.

In summary, the No Channel Alternative would have less-than-significant impacts to biological resources with mitigation. These impacts would be comparable to those of the Proposed Project and would mostly be limited to the construction period and would be associated with potential disturbance/harm and temporary habitat loss. In the long-term, the No Channel Alternative would benefit biological resources through restoration of a large tidal marsh area. Benefits would be lesser than those of the Proposed Project, however, due to reduced ecosystem function associated with the absence of tidal channels.

f. Cultural Resources

According to archival research, no cultural or archaeological resources have been previously mapped within the Proposed Project Site. Upon application of criteria for significance, all potential cultural and archaeological resources identified within the Proposed Project Site were recommended as ineligible for listing in the California and National Registers. Due to soil types and geologic features within the site as well as the site's history and pre-history, there is low potential for buried resources throughout the Proposed Project Site. The highest potential occurs in the vicinity of the Duck Slough Setback Levee alignment due to the depth of excavation, but this potential remains low due to the site's history of disturbance the low likelihood of indigenous occupation of the site.

Under the No Channel Alternative, less excavation would occur than under the Proposed Project, reducing the possibility of accidental discovery of archaeological resources. Deep excavation would still occur in the vicinity of the Duck Slough Setback Levee—and excavation removed from the Project design would be shallow excavation with minimal risk of encountering buried resources. The No Channel Alternative would require removal of the same buildings and structures as the Proposed Project, none of which are eligible for listing as historical resources. The No Channel Alternative would therefore not adversely affect the significance of cultural resources and would have a less-than-significant impact on cultural resources. Potential impacts to cultural resources would be marginally lesser than those of the Proposed Project.

g. Hazards and Hazardous Materials

The No Channel Alternative would have a comparable but slightly lesser impact on hazards and hazardous materials than the Proposed Project. The same pre-Proposed Project Site cleanup benefits would be incurred, as on-site cleanup of contaminated buildings and soils is being conducted prior to and separately from the Project. Similarly to the Proposed Project, the site interior would function as a settling basin, minimizing the risk of hazardous materials spills or leaks into adjacent waterways during construction. Preparing an SPCC Plan (Section 301 of the Clean Water Act) and adhering to BMPs required by Solano County CUPA, would apply to this alternative, imposing requirements on staging area locations, fuel storage, and other construction elements to further reduce the risks associated with use of hazardous materials. These impacts would therefore be comparable to those of the Proposed Project.

The No Channel Alternative, however, would have a lesser impact associated with the risk of accident and upset conditions involving the existing abandoned natural gas wells and pipelines underlying the site. Tidal channel excavation throughout the site has the potential to encounter natural gas infrastructure, creating the need for potential avoidance or re-abandonment and the possibility of accidental disturbance. Although DOGGR requires integrating avoidance and abandonment measures into Proposed Project construction plans and reduces this impact to less-than-significant levels, there would be a decreased need for these actions under the No Channel Alternative, and the risk of disturbing sub-surface natural gas infrastructure would be confined to excavations along the Duck Slough Setback Levee alignment. As such, impacts to hazards and hazardous materials are still considered less-than-significant with mitigation incorporated, but are considered slightly lesser than those of the Proposed Project.

h. Hydrology and Water Quality

Project alternatives were subject to the same hydrological modeling process as the Proposed Project to assess their possible impacts on such hydrology and water quality parameters as tidal prism, salinity, and flood elevations, among others. Tidal channels primarily influence such water quality considerations as tidal damping and exposure time. The No Channel Alternative model displays significantly more tidal damping and lower exposure time than the Proposed Project. The implications of lower exposure time are most relevant to biological resources and are accordingly discussed above.

Model results indicate that the No Channel Alternative would provide comparable flood benefits to the Proposed Project. Both alternatives would increase floodplain width and provide a hydraulic buffer between the Yolo Bypass and Cache Slough, preventing water surfaces from increasing in Hass Slough and Cache Slough. The No Channel Alternative displayed either no increase in flood stages or modest decreases at all modeled locations. These changes were identical in magnitude to those of the Proposed Project.

The No Channel Alternative would share similar water quality impacts to the Proposed Project. Increased tidal damping would primarily affect local hydrologic conditions and would have little influence on regional hydrology which would create the potential for salinity impacts. Due to the similar footprint and regional hydrologic impacts to the Project, the No Channel Alternative would similarly have minimal impacts on salinity. Similar construction methods would be used to the Proposed Project, with less need for excavation and potentially less associated turbidity impacts. However, like the Proposed Project, this alternative would use the site interior as a settling basin and would use a cofferdam during levee breach, making impacts on turbidity and other construction-related water quality objectives less-than-significant and similar in magnitude to the Proposed Project. This alternative would potentially increase on-site erosion and scour, as the site interior would naturally develop channels through these forces over time—in contrast to the Proposed Project, which would have relatively stable channels by design.

In summary, the No Channel Alternative would have beneficial impacts on hydrology and less-than-significant impacts on water quality. This is comparable to but slightly greater than the Proposed Project, as tidal channels on the Proposed Project Site interior would have few regional implications for hydrology but channels would naturally scour and could lead to mild levels of on-site erosion.

i. Mineral Resources

Impacts on the availability of natural gas would be unchanged from the Proposed Project. The same area would be inundated via similar methods and placed under a permanent conservation easement. The Maine Prairie Gas Field would no longer be available for natural gas extraction, but this gas field has been demonstrated to have negligible remaining extractable natural gas resources. Accordingly, this alternative's impacts on the availability of important mineral resources would be less than significant and would be the same as those of the Proposed Project.

j. Public Services

According to the hydrologic modeling performed for the Proposed Project and Project alternatives, tidal channels have little influence on the Proposed Project's flood protection impacts. The No Channel Alternative would yield similar flood protection benefits to the Proposed Project, resulting in similarly positive impacts on public services related to flood control.

Hydrologic modeling indicates that the No Channel Alternative would result in significant tidal damping. This would result in lower high tide elevations and consequently, shallower water in intertidal areas. Although habitat needs vary by species, this would generally make intertidal areas more suitable mosquito breeding habitat relative to site conditions under the Proposed

Project. This would still be either comparable to or a slightly positive change from baseline conditions due to the removal of shallow managed wetlands and irrigation canals from the Proposed Project Site. It therefore remains unlikely that increased on-site mosquito breeding habitat would be sufficient to create the need for new or expanded vector control facilities; but it could lead to increased need for pesticide use or other vector control methods relative to the Proposed Project. Impacts to public services related to vector control would therefore remain less than significant but would be greater than those of the Proposed Project, which would reduce available on-site mosquito breeding habitat.

The No Channel Alternative would have positive impacts on public services related to flood control and less-than-significant impacts on public services related to vector control. The former would be comparable to the Proposed Project while the latter would be more significant, making the No Channel Alternative's impacts slightly greater than the Proposed Project's. Impacts on all other public services would be the same as the Proposed Project's impacts because no project features with the potential to affect other public services would be altered.

k. Recreation

The No Channel Alternative would require vacation of a portion of Liberty Island's east-west alignment along the northern border of the Proposed Project Site. This would preclude future use of the Shag Slough Bridge and would consequently remove the sole terrestrial access point to the Reserve. The Reserve would therefore only be accessible by boat, which could result in the displacement of bank fishing recreationists. This impact is identical to that of the Proposed Project, which was determined to have less-than-significant impacts due to the abundance of alternative bank fishing opportunity relative to the quantity of people who would likely no longer use the Reserve. The source of this impact is the vacation of a portion of Liberty Island Road, and road vacation would not differ between alternatives. This impact would therefore be less-than-significant and the same as the Proposed Project.

I. Tribal Cultural Resources

Archival research conducted during a cultural resources survey of the Proposed Project Site indicated that there are no known cultural resources present within the site, but that there is some possibility for buried archaeological resources in areas where deep excavation would occur. This possibility is minimal due to conditions of the site's history and present-day characteristics detailed in the Cultural Resources Inventory.

As part of this study, notification was sent to all potentially interested Native American parties provided by the NAHC. Throughout the Spring and Summer of 2019, DWR consulted with the Yocha Dehe Wintun Nation, the only tribe to request formal consultation pursuant to AB 52. During this process, Yocha Dehe Wintun Nation did not identify any specific concerns related to tribal cultural resources, but expressed that they may request that tribal monitors be present during construction and may send mitigation measures to DWR should specific concerns arise during the planning process. At this time, no such concerns have been identified or measures have been provided, and impacts are accordingly considered less than significant. Should Yocha Dehe Wintun Nation identify any concerns, DWR will continue the consultation process.

Under the No Channel Alternative, less excavation would occur than under the Proposed Project, reducing the possibility of impacting buried Tribal Cultural Resources. Deep excavation would still occur in the vicinity of the Duck Slough Setback Levee, the area most at risk for buried resources. Excavation removed from the Project design would be shallow excavation with minimal risk of encountering buried resources. The No Channel Alternative would therefore not adversely affect Tribal Cultural Resources and would have a less-than-significant impact. Potential impacts to Tribal Cultural Resources would be slightly less than those of the Proposed Project.

6. YOLO BYPASS OPTION 3 ALTERNATIVE

a. Description of Alternative

The Yolo Bypass Option 3 Alternative is based on Option 3 of the Draft Central Valley Flood Protection Plan Basin-Wide Feasibility Study for the Sacramento River (Feasibility Study). The purpose of the Feasibility Study is to evaluate the feasibility and benefits of actions for improving the capacity, flexibility, and resiliency of the SPFC system within the Sacramento River Basin. Various actions are developed in the Feasibility Study using considerations such as hydraulic performance, ecosystem improvements, geotechnical suitability, cost efficiency, and implementation feasibility. Option 3, which is the basis of the Yolo Bypass Option 3 Alternative, is among the options formulated under this set of considerations for the Proposed Project Site.

Similar to the Proposed Project, the Yolo Bypass Option 3 Alternative would rely on levee degrade and breaching to enhance connectivity between the Proposed Project Site and adjacent waterways. This alternative would involve construction of a setback levee and would include one levee breach and degradation of two levees. This alternative would provide connectivity between the Proposed Project Site and the Yolo Bypass during high-flow events.

Under the Yolo Bypass Option 3 Alternative, the Shag Slough Levee would be partially degraded, beginning just south of the Yolo / Solano County line at Shag Slough and ending where the Yolo Bypass West Levee ties in with the Cross Levee in the southeastern corner of the Proposed Project Site. The Cross Levee, which runs approximately west-east along the southern end of the Liberty Farms Property would be partially degraded along its entire length. Both levees would be degraded to the 10-year event water surface elevation, allowing both levees to overtop and direct water onto the Proposed Project Site during high-flow events. Levee degradation would facilitate hydraulic connectivity between the Proposed Project Site and the western side of the Yolo Bypass.

As the Cross Levee and the southern portion of the Yolo Bypass West Levee would no longer provide flood protection, a setback levee would be constructed. The setback levee would replace flood protection to adjacent westerly properties previously offered by the Cross Levee and Yolo Bypass West Levee, which in their degraded states would function as weirs. The setback levee would be built using roughly the same methods as the Proposed Project but would be constructed on less stable soils than the proposed setback levee, potentially necessitating additional site preparation and earthwork. Under this alternative, the setback levee would run roughly north-

south from the southern terminus of Cache Slough to approximately half-way up the Liberty Farms Property before turning to the northeast and running until roughly the northeastern terminus of Lookout Slough. The setback levee would be built to approximately 22-24 feet high and 14,800 feet long, compared to 20-24 feet high and 15,250 feet long under the Proposed Project. This would result in a footprint of roughly 83 acres and 1,600,000 cubic yards of earthwork, compared to 74 acres and 1,513,261 cubic yards under the Proposed Project.

Like the Proposed Project, the Yolo Bypass Option 3 Alternative would include removing existing flood control and irrigation infrastructure, constructing elevated peninsulas, planting riparian vegetation along levee toes as needed, revegetating marsh areas through natural recruitment, and grading a series of tidal channel networks throughout the Proposed Project Site interior. These elements would occur using the same methodologies and specifications outlined in the Project's Project Description. Anticipated habitat type elevations are depicted in Figure VII-2. The Yolo Bypass Option 3 Alternative would create approximately 890 acres of tidal marsh habitat, approximately 2,290 acres less than the Proposed Project.

b. Relationship to Project Objectives

The Yolo Bypass Option 3 Alternative would meet nine of the Project's ten objectives, as discussed in Table VII-3 below.

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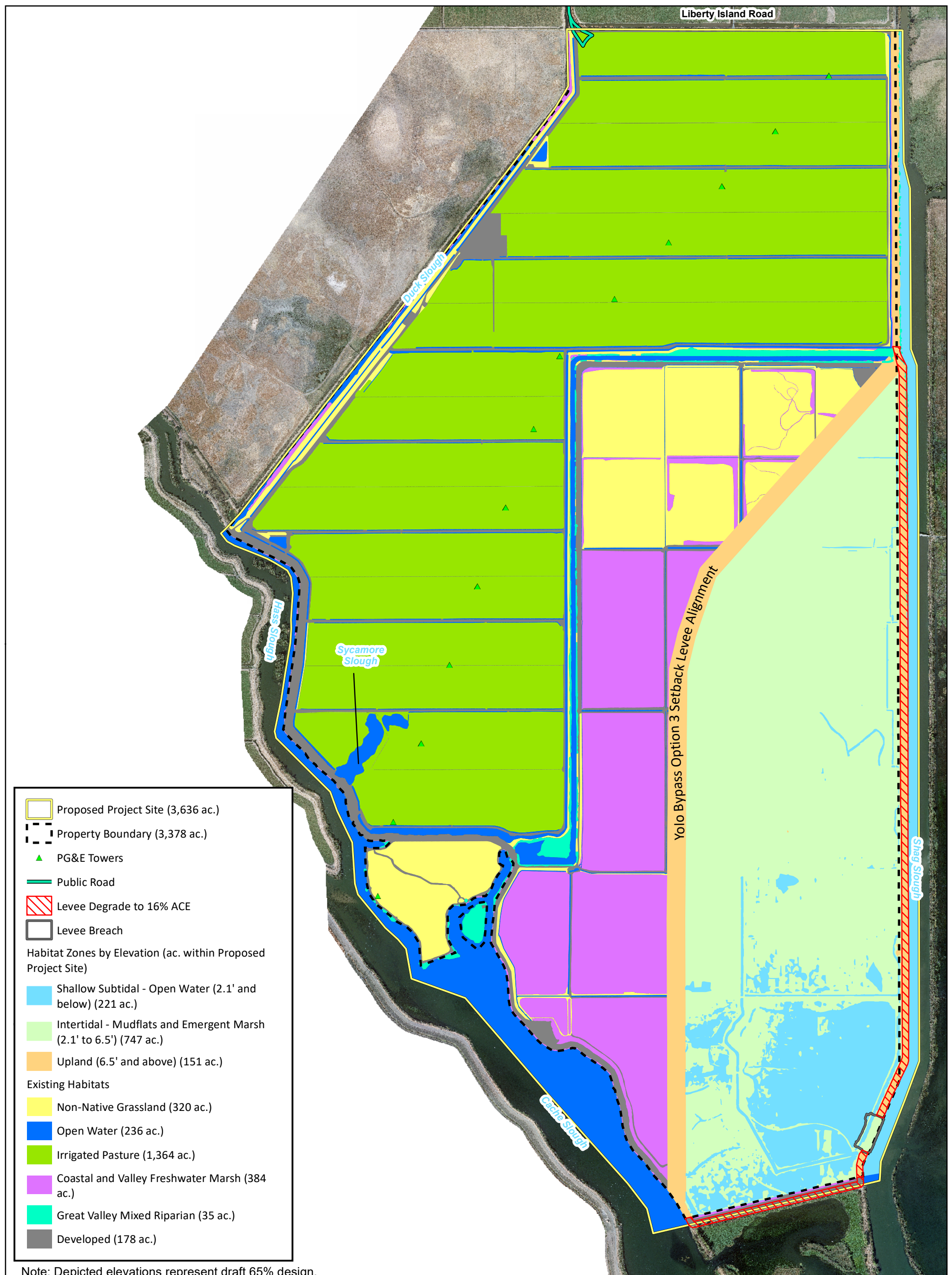
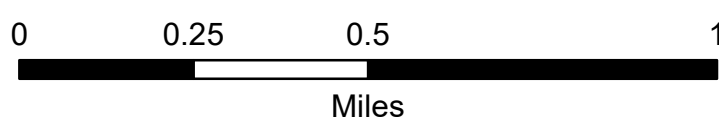


Figure VII-2. Yolo Bypass Option 3



Prepared by:



Lookout Slough Tidal Habitat Restoration and Flood Improvement Project

Table VII-3. Yolo Bypass Option 3 Alternative's Relationship to Project Objectives

Objective	Meets Objective	Rationale
Improve primary and secondary productivity and food availability for Delta Smelt and other native fishes within the Proposed Project Site and the immediate tidal sloughs surrounding the Proposed Project Site.	Partial	Even without tidal channels, re-established emergent marsh vegetation is still anticipated to facilitate enhanced nutrient production within the Proposed Project Site. Although, tidal channels would significantly improve conveyance throughout the site and into the Cache Slough Complex. The absence of tidal channels would also restrict tidal inundation to be significantly muted throughout the Proposed Project Site.
Improve rearing habitat for Delta Smelt, salmonids, and other native fish.	Partial	The elimination of tidal channels would reduce the amount of created shallow subtidal habitat, which is essential for creating fish rearing habitat. This alternative would have some shallow subtidal habitat in the southeastern areas of the Proposed Project Site.
Promote suitable spawning habitat with appropriate water velocities and depths accessible for Delta Smelt within the Proposed Project Site and the immediate tidal sloughs surrounding the Proposed Project Site.	No	Although the requisite conditions for Delta Smelt spawning are poorly documented in the wild, laboratory data and data from similar species indicate that Delta Smelt likely spawn in shallow subtidal water with low velocity and small substrates such as pebbles or sand available. The Yolo Bypass Option 3 Alternative would not create any such habitat.
Increase on-site diversity of foraging, breeding, and refuge habitat conditions for aquatic and terrestrial wetland-dependent species.	Partial	The Yolo Bypass Option 3 Alternative would create approximately 890 acres of tidal marsh habitat for Delta Smelt, which is 2,290 acres less than the habitat created by the Proposed Project. This alternative would provide benefit for terrestrial wetland dependent species in a manner similar to the Project. This alternative would create less shallow subtidal habitat that would create foraging, breeding, refuge habitat for fish species. This alternative would also create less habitat for migratory waterfowl.
To the greatest extent practical, preserve existing topographic variability to allow for habitat succession and resilience against future climate change.	Yes	The existing topography does contain a significant amount of land at elevations that would convert to tidal marsh habitat with rising sea levels. The Duck Slough Setback Levee would be designed to be resilient to rising sea levels. This alternative and the Project address this goal to the greatest extent practical.
To the greatest extent practical, avoid promoting conditions adverse to Project biological objectives, such as those that would favor establishment or spread of invasive exotic species.	Yes	This alternative would avoid promoting conditions that would favor the establishment or spread of invasive exotic species. This would include the control of existing invasive plant species within the limit of disturbance.
Minimize temporary effects to special-status aquatic and terrestrial species when implementing Project activities (e.g., earth disturbance and vegetation management activities).	Yes	Impacts to biological resources associated with localized disturbance and temporary habitat loss during construction would be generally limited to the eastern portion of the Proposed Project Site. Construction would not occur in the Western portion of the Proposed Project Site.
Include habitat elements for special-status aquatic and terrestrial species.	Partial	This alternative would not include foraging ponds or new peninsulas suitable for winter brumation and/or basking for giant garter snake however the setback levee constructed to bisect the Liberty Farms Property would widen the Yolo Bypass floodplain and create additional flood storage and tidal marsh habitat for Delta Smelt.
Protect existing nearby infrastructure surrounding the Proposed Project Site and avoid any adverse flood-related impacts in the region.	Yes	The proposed setback levee and existing portions of the Cache/Hass Slough Levee would provide protection of existing nearby infrastructure surrounding the Proposed Project Site. This alternative would reduce flood-related impacts in the regions.
Provide flood management benefits by reducing flood stages in the lower part of the Yolo Bypass.	Yes	The partial degrade of both the Shag Slough Levee and Cross Levee would facilitate hydraulic connectivity between the Proposed Project Site and the western side of the Yolo Bypass and provide flood management benefits by reducing flood stages in the lower part of the Yolo Bypass.

c. Agricultural Resources

Upon completion of the Yolo Bypass Option 3 Alternative, all agricultural land associated with the Bowsbey Property would remain in place, as marsh restoration would occur entirely within the Liberty Farms Property. Thus, no conversion of farmland, including prime farmland, to non-agricultural use would occur.

There would be no conflict with any of the three properties' Williamson Act contracts. All three contracts state that the subject property must be maintained in open space or agricultural use. The Bowsbey Property is currently under agricultural use and the Vogel and Liberty Farms Properties are under open space use; and there would be no change in these uses upon completion of this alternative. Much of the Liberty Farms Duck Club would be converted to open water and intertidal marsh. This would still be considered an open space use, and several managed wetland cells comprising 378 acres of Coastal and Valley freshwater marsh and 320 acres of non-native grassland would remain unchanged.

The Yolo Bypass Option 3 Alternative would therefore have less-than-significant impacts on agricultural resources. This is less than the Proposed Project, which would have less-than-significant impacts on agricultural resources after implementation of mitigation requiring investment in off-site agricultural improvements and purchase of an agricultural conservation easement.

d. Air Quality

Air quality modeling prepared for the Proposed Project accounted for roughly 5,500,000 cubic yards of cut and fill. Removal of approximately 2,400 of 3,400 acres from the Project design (~29.5% reduced spatial footprint) would substantially decrease earthwork cut and fill needs. There would therefore be a decreased need for excavation, grading, and side cast, all of which would generate PM₁₀ and PM_{2.5} emissions. Furthermore, there would be less need for the use of motorized equipment such as excavators and scrapers, creating less diesel particulate and ozone precursor emissions.

Earthwork reduction would also shorten the construction schedule. This would result in less worker trips to the site and less associated emissions. This would be a relatively small reduction, as worker trips constitute a very small portion of overall construction emissions. Long-term emissions would remain comparable to the Proposed Project, with potentially small changes due to altered maintenance needs associated with reduction of the Project's spatial footprint and the area of marsh requiring management. Any such change would similarly be relatively small due to the already minimal emissions associated with long-term maintenance and monitoring.

The Yolo Bypass Option 3 Alternative would result in less emissions than the Proposed Project, creating a lesser impact on air quality. For the purposes of this analysis and to facilitate comparison with the Project, it is assumed that the Yolo Bypass Option 3 Alternative's impacts on air quality would remain significant absent mitigation, and that all air quality mitigation measures identified in Chapter IV.C, Air Quality, would apply to this alternative. Accordingly, the Yolo

Bypass Option 3 Alternative's impacts on air quality would be less than significant with mitigation incorporated and be lesser than Proposed Project impacts.

e. Biological Resources

The Yolo Bypass Option 3 Alternative would have less impacts on biological resources than the Proposed Project or the No Channel Alternative but more impacts than the No Project Alternative. It would also have less long-term benefit than the proposed No Channel Alternative or the Proposed Project. Impacts to biological resources would generally be limited to the eastern portion of the Proposed Project Site, as most potential adverse impacts to biological resources are associated with localized disturbance and temporary habitat loss during construction; and construction would not occur in the western portion of the Proposed Project Site.

Ongoing impacts to biological resources from agricultural operations in the Bowlsbey Property may continue, but these would not present a change from baseline conditions. Biological resources in the Vogel Property and the western portion of the Liberty Farms Property would be similarly unaffected. This includes all populations of Parry's rough tarplant and woolly rose mallow with potential to be affected by the Proposed Project, as well as populations of Suisun Marsh aster along the Vogel Levee (although populations along the Shag Slough Levee would be impacted by levee degrade). Riparian vegetation along levee toes and Lookout Slough that would be removed and replanted elsewhere under the Proposed Project and No Channel Alternative would remain in place under the Yolo Bypass Option 3 Alternative. Although, riparian vegetation along Shag Slough would be removed—potentially creating impacts to Swainson's hawk nesting habitat would be reduced to less-than-significant levels through pre-construction surveys, avoidance measures, and replanting nest trees at a 3:1 ratio, should any be removed.

The Yolo Bypass Option 3 Alternative would have reduced construction-related impacts on giant garter snake due to the minimal work that would occur along levees. However, this alternative would not include foraging ponds or new peninsulas suitable for winter brumation and/or basking. Giant garter snake would therefore not be adversely impacted in the long-term but would not benefit from the same degree of increased habitat complexity.

Similarly, this alternative would require less in-water work due to the fact that only one breach would occur. Construction-related impacts to fish through direct disturbance and temporary habitat degradation would therefore be localized and minimal and would be further reduced through implementation of mitigation measures requiring BMPs such as cofferdam use and fish salvage. Although it would incur the least severe construction-related impacts, this alternative would yield less benefit to special-status fish than the No Channel Alternative and the Proposed Project, as it would restore the least tidal marsh habitat.

The Yolo Bypass Option 3 Alternative would result in less-than-significant impacts to biological resources with implementation of applicable mitigation measures. These impacts would be reduced in magnitude from the Proposed Project, and some impacts would altogether not occur. Although this alternative would have lower impacts to special status plant and terrestrial wildlife species in the long-term, it would create the least new tidal marsh habitat of all alternatives, apart from the No Project Alternative, creating the smallest net long-term benefit to biological resources.

f. Cultural Resources

According to archival research, no cultural or archaeological resources have been previously mapped within the Proposed Project Site. Upon application of criteria for significance, all potential cultural and archaeological resources identified within the Proposed Project Site were recommended as ineligible for listing in the California and National Registers. Due to soil types and geologic features within the site as well as the site's history and pre-history, there is low potential for buried resources throughout the Proposed Project Site. The highest potential occurs in the vicinity of the Duck Slough Setback Levee alignment due to the depth of excavation, but this potential remains low due to the site's history of disturbance the low likelihood of indigenous occupation of the site.

Under the Yolo Bypass Option 3 Alternative, less excavation would occur than under the Proposed Project due to this alternative's reduced spatial footprint, diminishing the possibility of accidental discovery of archaeological resources. Deep excavation would still occur during levee construction but would now occur within the Liberty Farms Property. This area has similarly sensitive soil characteristics to the Duck Slough Setback Levee area, so the risk of unearthing buried resources would remain comparable to the Proposed Project.

Given the minimal likelihood of accidental disturbance of cultural resources, the Yolo Bypass Option 3 Alternative would not adversely affect the significance of cultural resources and would have a less-than-significant impact on cultural resources. Potential impacts to cultural resources would be slightly less than potential impacts under the Proposed Project due to reduced excavation needs.

g. Hazards and Hazardous Materials

The Yolo Bypass Option 3 would incur the same benefits to pre-Project hazardous soil and building materials abatement as the Proposed Project, the No Project Alternative, and the No Channel Alternative. Cleanup activities are presently ongoing for safety reasons and would be complete prior to construction of this alternative. The risks associated with regular use, transport, and disposal of hazardous materials would be similar to but slightly lesser than those of other alternatives due to the lesser extent of construction activities and because adhering to BMPs per Solano County CUPA requirements would still apply.

Impacts associated with potential accident conditions due to disruption of sub-surface natural gas infrastructure would be lesser than those of the Proposed Project due to this alternative's decreased ground disturbance needs. Preparing an SPCC Plan and adhering to DOGGR requirements would apply where well and pipeline avoidance and removal are necessary, but the need for this would generally be lower due to this alternative's reduced spatial footprint. Accordingly, this alternative's impacts are considered less than significant with mitigation and are lesser than those of the Proposed Project.

h. Hydrology and Water Quality

The Yolo Bypass Option 3 Alternative was subject to the same hydrological modeling as the Proposed Project, the details of which are discussed in the 65% Basis of Design Report. This

alternative is the most hydrologically distinct of the four options, as it would modify flood control infrastructure and expand the Yolo Bypass, but would do so with substantially different methods than the Proposed Project and the No Channel Alternative. The Shag Slough levee would cease to function for flood control purpose, similar to other alternatives. A single breach would be constructed in the southern reach of the levee and a setback levee would be constructed bisecting the Liberty Farms Property from south to northeast. This would widen the Yolo Bypass floodplain and create additional flood storage.

Widening the Yolo Bypass would alter hydrology in the Proposed Project Site as well as at upstream and downstream locations. Changes to flood stages were modeled by the same methods as changes under the Project. Model results indicate that the Yolo Bypass Option 3 Alternative would create changes in flood stages at modeled locations ranging from a 0.27 foot decrease to a 0.13 foot increase. Five of ten locations displayed no change in flood stages while two showed decreases and three showed increases. Increases generally occurred in the waters in close proximity to the Proposed Project Site, including within Hass Slough, Cache Slough, and the nexus of Cache Slough and the Yolo Bypass. The Proposed Project and the No Channel Alternative, by comparison, would result in no change or modest decreases in flood stages at all modeled locations. Although potential increases would be small, any increased water surface elevations were considered significant impacts during analysis carried out throughout this EIR, so this impact is considered potentially significant absent mitigation and more severe than other alternatives' impacts.

The Yolo Bypass Option 3 Alternative would have less-than-significant impacts on water quality. This conclusion is primarily based on impacts identified for the Proposed Project and this alternative's smaller spatial footprint and quantity of earthwork needed. Like the Proposed Project, hydrologic alterations would have the potential to change salinity concentrations in nearby waterbodies. This alternative would be significantly smaller in size and scope than the Proposed Project, limiting its influence on regional hydrology relative to the Project, which was determined to have a less-than-significant impact on salinity.

This alternative would substantially decrease the Project's spatial footprint relative to the Proposed Project and the No Channel Alternative and would require the fewest breaches and would consequently have the least potential for turbidity and other adverse construction-related water quality impacts. This alternative would be required to implement the same mitigation measures as the other alternatives, which would require BMPs and other measures to reduce the potential for construction-related impacts. Accordingly, construction-related water quality impacts for this alternative would be less than significant with mitigation incorporated and would be lesser than those of other alternatives.

The Yolo Bypass Option 3 Alternative is the only alternative with a different setback levee location than the Proposed Project. Potential setback levee tie-in locations were examined through geotechnical borings, as documented in the Geotechnical Basis of Design Report. Geotechnical exploration results indicate that potential setback levee tie-in locations for this alternative are highly susceptible to underseepage. This would primarily affect western portions of the Liberty

Farms Property and could necessitate ongoing levee maintenance which may result in water quality impacts. This impact is considered potentially significant absent mitigation.

In summary, the Yolo Bypass 3 Option Levee would provide some hydrologic benefit through levee setback and floodplain expansion. This option would, however, result in greater hydrology impacts than the No Channel Alternative and the Proposed Project due to slightly increased flood stages (0.13 foot) in Cache and Hass Slough. Throughout the Project design process, even minor flood stage increases within Cache and Hass Slough have been considered unacceptable. Thus, this alternative's impacts to hydrology and water quality are considered potentially significant and greater than those of the Proposed Project.

i. Mineral Resources

Impacts to the availability of natural gas would be slightly reduced relative to the Proposed Project. Portions of the Liberty Farms Property would undergo ecosystem restoration and be placed under a conservation easement, precluding future natural gas extraction. Extraction would remain theoretically possible within the Bowsbey Property and western portions of the Liberty Farms Property, as infrastructure could remain in place and no conservation easement would be placed on these portions of the site. Although, the Maine Prairie Gas Field is almost entirely depleted, so while theoretically possible, the likelihood of future mineral resource extraction would be very low. Accordingly, this impact is considered less than significant and is marginally lesser than that of the Proposed Project.

j. Public Services

According to Hydrologic Modeling performed for the Proposed Project and Project alternatives, the Yolo Bypass Option 3 Alternative would provide flood protection benefit by expanding the Yolo Bypass Floodplain but would result in slightly greater hydrologic impacts by locally increasing flood stages (up to 0.13 foot) in Cache and Hass Slough. Existing levee systems nearby are maintained by RDs which are often under resource constraints, and this alternative would potentially increase their maintenance needs. This may result in a potentially significant environmental impact through levee deterioration or failure, or through direct impacts associated with increased maintenance. Thus, impacts to public services would be considered potentially significant and would be greater than those of other alternatives.

This alternative would convert portions of the Liberty Farms Property from relatively stagnant managed wetlands to tidal marsh. Re-introducing tidal influence to the property would diminish on-site habitat quality for breeding mosquitoes by increasing water depth and circulating water throughout the site. As such, this alternative would create a net benefit to vector control-related public services. As irrigation ditches which provide potentially suitable mosquito breeding habitat would remain in place, this benefit would be slightly lesser than that of the Proposed Project.

The Yolo Bypass Option 3 Alternative would have mixed impacts on public services. Impacts related to flood protection would be potentially significant and greater than those of the Proposed Project; while impacts to vector control would be beneficial but slightly less so than those of the Proposed Project.

k. Recreation

The No Channel Alternative would require vacation of a portion of Liberty Island's east-west alignment along the northern border of the Proposed Project Site. This would preclude future use of the Shag Slough Bridge and would consequently remove the sole terrestrial access point to the Reserve. The Reserve would therefore only be accessible by boat, which could result in the displacement of bank fishing recreationists. This impact is identical to that of the Proposed Project, which was determined to have less-than-significant impacts due to the abundance of alternative bank fishing opportunity relative to the quantity of people who would likely no longer use the Reserve. The source of this impact is the vacation of a portion of Liberty Island Road, and road vacation would not differ between alternatives. This impact would therefore be less-than-significant and the same as the Proposed Project.

l. Tribal Cultural Resources

Archival research conducted during a cultural resources survey of the Proposed Project Site indicated that there are no known cultural resources present within the site, but that there is some possibility for buried archaeological resources in areas where deep excavation would occur. This possibility is minimal due to conditions of the site's history and present-day characteristics detailed in the Cultural Resources Inventory.

As part of this study, notification was sent to all potentially interested Native American parties provided by the NAHC. Throughout the Spring and Summer of 2019, DWR consulted with the Yocha Dehe Wintun Nation, the only tribe to request formal consultation pursuant to AB 52. During this process, Yocha Dehe Wintun Nation did not identify any specific concerns related to tribal cultural resources but expressed that they may request that tribal monitors be present during construction and may send mitigation measures to DWR should specific concerns arise during the planning process. At this time, no such concerns have been identified or measures have been provided, and impacts are accordingly considered less than significant. Should Yocha Dehe Wintun Nation identify any concerns, DWR will continue the consultation process.

Under the Yolo Bypass Option 3 Alternative, less excavation would occur than under the Proposed Project, reducing the possibility of impacting Tribal Cultural Resources. Excavation that would occur under the Proposed Project but not the Yolo Bypass Option 3 Alternative (i.e. portions of the tidal channel network) would be shallow excavation with minimal risk of encountering buried resources. Given this information and the fact that legal work stoppage requirements for accidental discoveries would apply both to the Proposed Project and the Yolo Bypass Option 3 Alternative, any potential reduction in risk associated with construction would be relatively small. The Yolo Bypass Option 3 Alternative would therefore not adversely affect Tribal Cultural Resources and would have a less-than-significant impact with mitigation. Potential impacts to Tribal Cultural Resources would be slightly less than for the Proposed Project.

7. ENVIRONMENTALLY SUPERIOR ALTERNATIVE

In addition to the discussion and comparison of impacts of the Proposed Project and the alternatives, Section 15126.6 of the CEQA Guidelines requires that an "environmentally superior"

alternative be selected and the reasons for such a selection be disclosed. In general, the environmentally superior alternative is the alternative that would be expected to generate the least amount of significant impacts. Identification of the environmentally superior alternative is an informational procedure and the alternative selected may not be the alternative that best meets the Project objectives or needs of the Lead Agency.

In this case, the No Project Alternative would result in the least amount of potentially significant environmental impacts (see Table VII-4). However, Section 15126.6 of the CEQA Guidelines requires that another environmentally superior alternative be selected in addition to the No Project Alternative. Based on the analysis provided above, apart from the No Project Alternative, the No Channel Alternative would result in the lowest quantity of significant environmental impacts. The No Channel Alternative is therefore considered the environmentally superior alternative.

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Table VII-4. Comparison of Alternatives' Impacts

Resource Area	Proposed Project	No Project	No Channel	Yolo Bypass Option 3
Agricultural Resources	LTS w/ Mitigation	No Impact	Similar Impact	Less Impact
Air Quality	LTS w/ Mitigation	No Impact	Less Impact	Less Impact
Biological Resources	LTS w/ Mitigation	No Impact	Less Impact	Less Impact
Cultural Resources	LTS	No Impact	Less Impact	Less Impact
Hazards and Hazardous Materials	LTS w/ Mitigation	No Impact	Less Impact	Less Impact
Hydrology and Water Quality	LTS w/ Mitigation	No Impact	Similar Impact	Greater Impact
Mineral Resources	LTS	No Impact	Less Impact	Less Impact
Public Services	LTS	No Impact	Similar Impact	Greater Impact
Recreation	LTS	No Impact	Similar Impact	Similar Impact
Tribal Cultural Resources	LTS	No Impact	Similar Impact	Similar Impact
<i>Determinations of greater, similar, or less are relative to the Proposed Project</i>				

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VIII. PREPARERS OF THE EIR AND PERSONS CONSULTED

1. LIST OF PREPARERS

The following is a list of the individuals who directed, managed, prepared, and/or reviewed sections of the EIR; conducted related fieldwork or modeling; and/or provided significant background materials.

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Jesse Patchett, PE, CFM	Project Manager

v. Public Services, Flood Control – Blackburn Consulting

Nicole Hart, PE	Senior Engineer
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2. LIST OF PERSONS AND ORGANIZATIONS CONSULTED

a. Public Agencies

i. Local Agencies

City of Vallejo
Reclamation District 2060

Reclamation District 2068

Solano County Airport Land Use Commission

Solano County Department of Resource Management

Solano County Mosquito Abatement District

ii. State Agencies

California Department of Conservation – Division of Oil, Gas, and Geothermal Resources

Central Delta Water Agency

Central Valley Regional Water Quality Control Board

Delta Protection Commission

Delta Stewardship Council

Native American Heritage Protection Commission

North Delta Water Agency

State Lands Commission

b. Private Organizations

California Waterfowl

D&R Livestock

Hastings Island Land Company

Petersen Estate

Willow Ranch Properties

c. Private Individuals

John Cronin

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