South Bay Salt Pond Restoration Project

Restoring the Wild Heart of the South Bay

Draft Environmental Impact Statement/Report, Phase 2, Eden Landing Ecological Reserve

Volume 1 | April 2018

Photo Credit: Cris Benton

California Department of Fish and Wildlife / U.S. Fish and Wildlife Service partnering with California State Coastal Conservancy

CALIFORNIA DEPARTMENT OF FISH & WILDLIFE

U.S. FISH & WILDLIFE SERVICE

Coastal Conservancy

AECOM

Draft Environmental Impact Statement/Report,
Phase 2, Eden Landing Ecological Reserve

Type of Action: Administrative

Lead Agencies: U.S. Department of the Interior, Fish and Wildlife Service
State of California, Department of Fish and Wildlife

Abstract: The proposed action analyzed in the Draft Environmental Impact Statement/Environmental Impact Report (EIS/EIR) is the restoration of salt ponds at the Eden Landing Ecological Reserve in Alameda County, California. The Draft EIS/EIR is tiered from the 2007 Programmatic EIS/EIR for the South Bay Salt Pond Restoration Project (SBSP) which provided a program level evaluation of 15,100 acres of salt ponds owned by the Fish and Wildlife Service and the California Department of Fish and Wildlife (CDFW). The Phase 2 actions described in the Draft EIS/EIR tier from the 2007 Final EIS/EIR for the SBSP Restoration Project and consist of project-level implementation of the SBSP Restoration Project in the southern half of the Eden Landing Ecological Reserve. The Eden Landing Ecological Reserve is owned and managed by the CDFW. The Phase 2, Eden Landing project involves the proposed restoration and/or enhancement of 2,270 acres of tidal wetlands and managed pond habitats in the South San Francisco Bay while simultaneously providing flood risk management and wildlife-oriented public access and recreation.

Contacts:

Anne Morkill
Project Leader, San Francisco Bay National Wildlife Refuge Complex
1 Marshlands Road
Fremont, CA 94555
(510) 792-0222

Brenda Buxton
Deputy Program Manager, Bay Conservancy Program
State Coastal Conservancy
1515 Clay St., 10th Floor
Oakland, CA 94612-1401
(510) 286-0753

TABLE OF CONTENTS

Volume 1

Appendices

List of Tables

List of Figures

List of Acronyms

°F	degrees Fahrenheit
μg/kg	microgram(s) per kilogram
μg/L	microgram(s) per liter
μg/m^3	microgram(s) per cubic meter
2007 Final EIS/R	2007 South Bay Salt Pond Restoration Project Final EIS/R
AB	California Assembly Bill
ABAG	Association of Bay Area Governments
AC Transit	Alameda-Contra Costa Transit District
ACFCC	Alameda Creek Flood Control Channel
ACFCWCD	Alameda County Flood Control and Water Conservation District
ACMAD	Alameda County Mosquito Abatement District
ACTC	Alameda County Transportation Commission
ACWD	Alameda County Water District
ADA	Americans with Disabilities Act
ADT	average daily traffic
AMP	Adaptive Management Plan
APC	Alviso Planned Community
APE	Area of Potential Effect
ARP	Aquifer Reclamation Program
BA	Biological Assessment
BAAQMD	Bay Area Air Quality Management District
BART	San Francisco Bay Area Rapid Transit District
Basin Plan	Water Quality Control Plan
Bay Plan	San Francisco Bay Plan
Bay Trail	San Francisco Bay Trail
Bay	San Francisco Bay
BCDC	Bay Conservation and Development Commission
BMP	Best Management Practice
BO	Biological Opinion
CAA	Clean Air Act (federal)
CAAQS	California Ambient Air Quality Standards
CAISO	California Independent System Operator
Caltrans	California Department of Transportation
CAP	clean air plan
CAP	Climate Action Plan
CARB	California Air Resources Board
Cargill	Cargill Inc.
CBC	California Building Code
CCAA	California Clean Air Act
CCP	Comprehensive Conservation Plan
CCR	California Code of Regulations
CDFG	California Department of Fish and Game

CDFW	California Department of Fish and Wildlife
CDPH	California Department of Public Health
CEC	California Energy Commission
CESA	California Endangered Species Act
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CH_4	methane
CMP	corrugated metal pipe
CNDDB	California Natural Diversity Database
CNEL	Community Noise Equivalent Level
CNPS	California Native Plant Society
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CP3C	Cargill Pond 3C
CRHR	California Register of Historical Resources
CRPR	California Rare Plant Rank
CSLC	California State Lands Commission
CTR	California Toxics Rule
CWA	Clean Water Act
CY	cubic yard(s)
dBA	A-weighted decibels
DDT	dichloro-diphenyl-trichloroethane
Delta	San Francisco Bay Delta
DTSC	Department of Toxic Substances Control
DWR	California Department of Water Resources
EBDA	East Bay Discharge Authority
EBRPD	East Bay Regional Park District
EFH	Essential Fish Habitat
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EIS/R	Environmental Impact Statement/Report
ELER	Eden Landing Ecological Reserve
EO	Executive Order
ER-L	Effects Range–Low
ER-M	Effects Range–Median
ESA	Federal Endangered Species Act of 1973
FDEP	Florida Department of Environmental Protection
FEMA	Federal Emergency Management Agency
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FIP	Federal Implementation Plan
FR	Federal Register

GHG	greenhouse gas
gpm	gallon per minute
GPS	global positioning system
GWP	Global Warming Potential
H_2S	hydrogen sulfide
HALS	Historic American Landscape Survey
HAP	Hazardous Air Pollutant
HCP	Habitat Conservation Plan
HDPE	high-density polyethylene
IPCC	Intergovernmental Panel on Climate Change
ka	thousand years ago
km	kilometer(s)
kV	kilovolt(s)
L_{dn}	day-night noise level
L_{eq}	equivalent noise level
LGP	low ground pressure
L_{max}	maximum noise level
L_{min}	minimum noise level
LOS	level of service
LTMS	San Francisco Bay Long-Term Management Strategy
L_x	statistical descriptor
Ma	million years ago
MEI	Maximally Exposed Individual
mg/kg	milligram(s) per kilogram
mg/L	milligram(s) per liter
mg/m^3	milligram(s) per cubic meter
MHHW	mean higher high water
MHW	mean high water
MLD	Most Likely Descendant
MMRP	Mitigation Monitoring and Reporting Program
MOA	Memorandum of Agreement
msl	mean sea level
MTC	Metropolitan Transportation Commission
N_2O	nitrous oxide
NAAQS	national ambient air quality standards
NASA	National Aeronautics and Space Administration
NAVD88	North American Vertical Datum of 1988
NCCP	Natural Community Conservation Plan
NEPA	National Environmental Policy Act
NESHAP	National Emissions Standards for HAPs
ng/L	nanogram(s) per liter
NGO	non-governmental organization
NGS	National Geodetic Survey
NHPA	National Historic Preservation Act

NMFS	National Marine Fisheries Service
NO_2	nitrogen dioxide
NOA	naturally occurring asbestos
NOAA	National Oceanic and Atmospheric Administration
NOD	Notice of Determination
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRHP	National Register of Historic Places
NWIC	Northwest Information Center
NWR	National Wildlife Refuge
O&M	operation and maintenance
O_3	ozone
OAC	Old Alameda Creek
Operations Plan	Eden Landing Ecological Reserve System E2 and E2C Operation Plan
OPR	Office of Planning and Research
OSHA	Occupational Safety and Health Administration
PAH	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyl
PG&E	Pacific Gas and Electric Company
Point Blue	Point Blue Conservation Science
PM	particulate matter
PM_{10}	particulate matter with a diameter of 2.5 micrometers; respirable particulate matter
$PM_{2.5}$	particulate matter with a diameter of 10 micrometers; fine particulate matter
PMT	Project Management Team
Porter-Cologne	California Porter-Cologne Water Quality Control Act
ppb	part(s) per billion
ppm	part(s) per million
ppt	part(s) per thousand
PPV	peak particle velocity
QAPP	Quality Assurance Project Plan
Refuge	Don Edwards San Francisco Bay National Wildlife Refuge
Reserve	Eden Landing Ecological Reserve
RHA	Rivers and Harbors Act
RMP	Regional Monitoring Program
RMS	root mean square
ROD	Record of Decision
ROG	reactive organic gas
RWQCB	Regional Water Quality Control Board (San Francisco Bay)
SAFER Bay	Strategy to Advance Flood Protection, Ecosystems and Recreation along the Bay
SB	California Senate Bill
SBSP	South Bay Salt Pond
SCC	California State Coastal Conservancy
SCVWD	Santa Clara Valley Water District

SENL	Single Event [Impulsive] Noise Level
SFBAAB	San Francisco Bay Area Air Basin
SFBBO	San Francisco Bay Bird Observatory
SFBJV	San Francisco Bay Joint Venture
SFEI	San Francisco Estuary Institute
SHPO	California State Historic Preservation Officer
SIP	State Implementation Plan
SO_2	sulfur dioxide
South Bay	South San Francisco Bay
SR	State Route
SSC	suspended sediment concentration
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TAC	toxic air contaminant
TBD	to be determined
TDS	total dissolved solids
Tg	teragram(s) (million metric tons)
TMDL	Total Maximum Daily Load
TSS	total suspended solids
UBC	Uniform Building Code
UPRR	Union Pacific Railroad
USACE	United States Army Corps of Engineers
USD	Union Sanitary District
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
V	volts
VdB	vibration decibel(s)
VMT	vehicle miles traveled
Water Trail	San Francisco Bay Area Water Trail

This page intentionally left blank

EXECUTIVE SUMMARY

S.1 Introduction

This Draft Environmental Impact Statement/Environmental Impact Report (EIS/R) was prepared by the United States Fish and Wildlife Service (USFWS) and the California Department of Fish and Wildlife (CDFW; formerly the California Department of Fish and Game, CDFG), partnering with the California State Coastal Conservancy (SCC), with technical assistance from the Alameda County Flood Control and Water Conservation District (ACFCWCD) and others to evaluate the potential environmental impacts of the proposed South Bay Salt Pond (SBSP) Restoration Project, Phase 2 at Eden Landing.

S.1.1 SBSP Restoration Phase 2 Project

The SBSP Restoration Project is a multi-agency effort to restore tidal marsh habitat, reconfigure managed pond habitat, maintain or improve flood risk management, and provide recreation opportunities and public access in 15,100 acres of former salt-evaporation ponds purchased from and donated by Cargill, Inc. (Cargill) in 2003. Immediately after the March 2003 acquisition, the landowners, CDFW and USWFS, implemented the Initial Stewardship Plan (USFWS and CDFG 2003) which was designed to maintain open and unvegetated pond habitats with enough water circulation to prevent salt production and provide some habitat values. The longer-term planning effort, a 50-year programmatic level plan for restoration, flood risk management, and public access that included a first phase of projects, is described in the 2007 SBSP Restoration Project Final EIR/S (2007 Final EIS/R), which addressed the SBSP Restoration Project at both the program level and at the Phase 1 level. This longer-term planning was facilitated by the SCC and was completed in January of 2009. It was through this planning process that the SBSP Restoration Project created the project goals and objectives. These goals and objectives continue to guide the project to the present day.

SBSP Restoration Project Objectives

1. Create, restore, or enhance habitats of sufficient size, function, and appropriate structure to:
   - Promote restoration of native special-status plants and animals that depend on South San Francisco Bay habitat for all or part of their life cycles.
   - Maintain current migratory bird species that utilize existing salt ponds and associated structures such as levees.
   - Support increased abundance and diversity of native species in various South San Francisco Bay aquatic and terrestrial ecosystem components, including plants, invertebrates, fish, mammals, birds, reptiles and amphibians.
2. Maintain or improve existing levels of flood risk management in the South Bay Area.
3. Provide public access and recreational opportunities compatible with wildlife and habitat goals.
4. Protect or improve existing levels of water and sediment quality in the South Bay, and take into account ecological risks caused by restoration.
5. Implement design and management measures to maintain or improve current levels of vector management, control predation on special status species, and manage the spread of nonnative invasive species.
6. Protect the services provided by existing infrastructure (e.g., power lines, railroads).

The SBSP Restoration Project's planning phase was completed in January 2009 with the publication of the 2007 Final EIS/R and subsequent regulatory permit issuance. Phase 1 implementation began immediately after completion of final designs. Restoration was completed in 2014, and final public access and recreation features were completed and opened to the public in May 2016. Phase 1 included the construction of 3,040 acres of tidal or muted tidal wetlands, 710 acres of enhanced managed pond, construction of habitat islands and improved levees, 7 miles of new public access and recreation trails, and other public access features. The planning and design for the Phase 2 projects started in 2010, continued for the Alviso and Ravenswood complexes (owned and managed by USFWS at the Don Edwards San Francisco Bay National Wildlife Refuge, or Refuge) with the 2015 Phase 2 Draft EIS/R and 2016 Phase 2 Final EIS/R for the Alviso and Ravenswood complexes, and continues for Eden Landing with this Draft EIS/R. The ponds that were not part of Phase 1, nor planned to be part of Phase 2, will continue to be actively managed according to the goals set forth in the Initial Stewardship Plan, the Adaptive Management Plan (AMP), the 2007 Final EIS/R, and current operations plans, until further implementation planning is completed and any necessary adaptive management studies are completed.

The Phase 2 actions described in this Draft EIS/R tier from the 2007 Final EIS/R for the SBSP Restoration Project and consist of project-level implementation of the SBSP Restoration Project for some areas of the Eden Landing Ecological Reserve (ELER, or Reserve). The 2007 Final EIS/R assessed the environmental consequences associated with two long-term restoration alternatives. In consideration of the environmental consequences discussed in the 2007 Final EIS/R, the USFWS Record of Decision and the CDFW Notice of Determination state that the USFWS and CDFW will implement Programmatic Alternative C, which would eventually convert up to 90 percent of the former salt ponds to tidal marsh, while at least 10 percent would remain as enhanced managed ponds. Phase 2 is the second project component of this long term restoration project, which would incrementally advance the project toward this end goal. Each of the Eden Landing Phase 2 Alternatives considered in this Draft EIS/R consist of various components that, if instituted, further advance the project toward achieving the 90/10 goal.

Construction, operations, and maintenance of Phase 2 activities at Eden Landing would be independent from activities at other Phase 2 ponds (i.e., those owned and managed by the USFWS as part of the Don Edwards San Francisco Bay National Wildlife Refuge). When considering and developing project alternatives for Phase 2, Eden Landing has been independently considered in meeting the targeted habitat designated in Program Alternative C (the 90/10 alternative), and separate sets of action alternatives were developed for the Eden Landing pond complex.

The Eden Landing Phase 2 project activities would occur in the southern half of the ELER within the Eden Landing pond complex. This pond complex is located in Alameda County, California (see Figure ES-1 and Figure ES-2). Four restoration alternatives are proposed for the Eden Landing pond complex, one of which is a No Action Alternative. This Draft EIS/R evaluates the following alternatives for each of the pond clusters.

Eden Landing Phase 2 Project Area

The Eden Landing Phase 2 project area is comprised of 11 ponds which are located within the southern portion of the ELER. Three sub-groups have been created to describe the southern half of the Eden Landing pond complex in more general terms, and are organized by their similarities and location within the Phase 2 project area. These sub-groups are organized as follows:

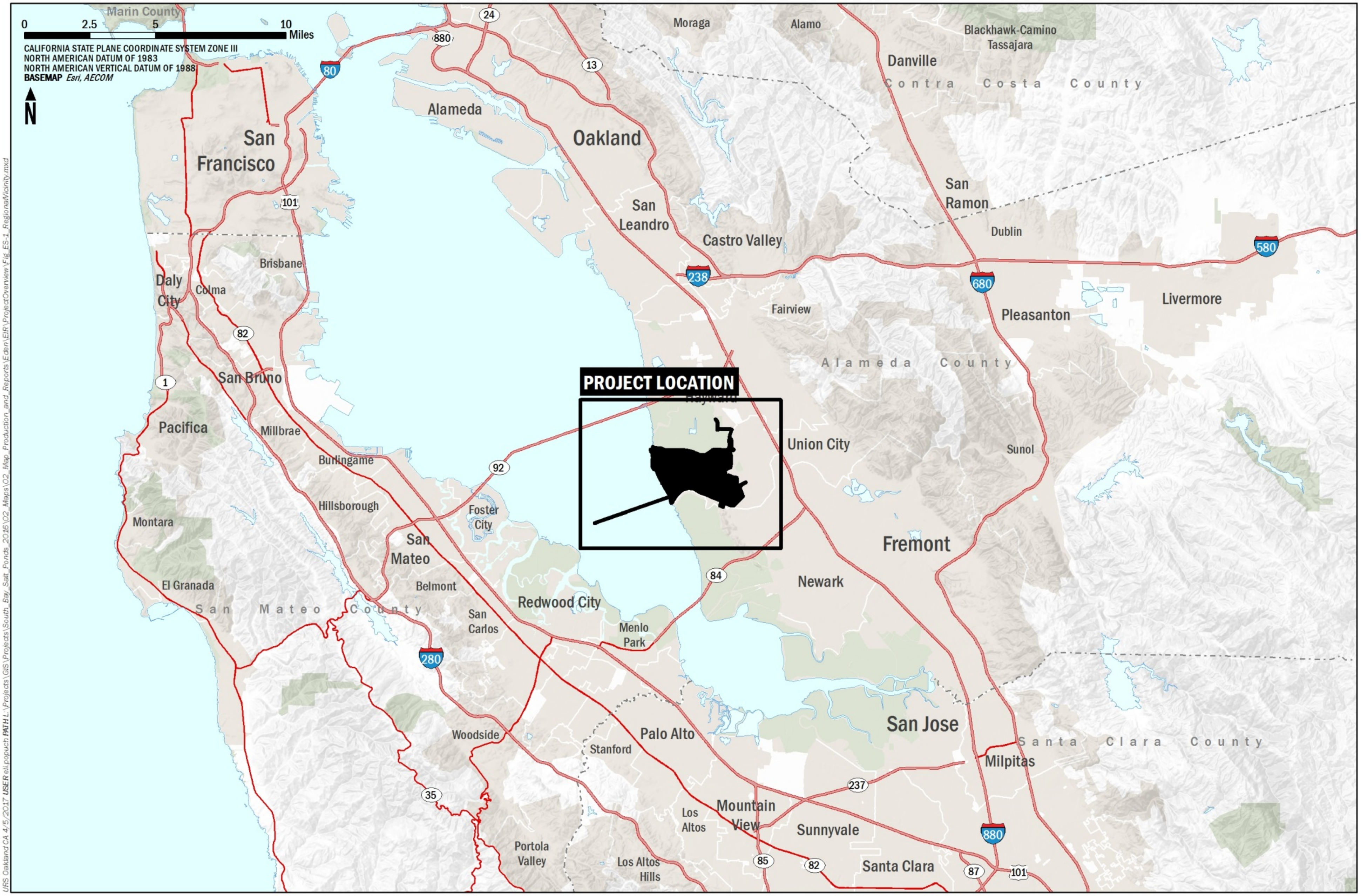
- The Bay Ponds: Ponds E1, E2, E4, and E7 are the four large ponds closest to San Francisco Bay. Phase 2 actions proposed at these ponds are intended to restore them to tidal marsh.
- The Inland Ponds: Ponds E5, E6, and E6C are somewhat smaller ponds in the northeast portion of the Phase 2 project area. These ponds could be restored to tidal marsh or to enhanced managed ponds, depending on which of the Phase 2 action alternatives is selected.

- The Southern Ponds: Also sometimes called the "C-Ponds" -- Ponds E1C, E2C, E4C, and E5C are in the southeastern portion of the complex. They are separated from the Inland Ponds and the Bay Ponds by an Alameda County-owned freshwater outflow channel and diked marsh areas known collectively as "the J-Ponds". The Southern Ponds surround a natural hill known as Turk Island and abut another small hill commonly called "Cal Hill" that are private inholdings, and are excluded from the Phase 2 project area. The Southern Ponds could be restored to tidal marsh or to enhanced managed ponds, depending on which of the Phase 2 Action Alternatives is selected.

The Eden Landing Phase 2 project area is generally bounded by San Francisco Bay on the west, Old Alameda Creek (OAC) on the north, the federal Alameda Creek Flood Control Channel (ACFCC) on the south, and – to the east – a mix of suburban/urban communities, the Union Sanitary District (USD) Treatment Plant, a county-owned landfill, a Cargill-owned salt pond no longer in production (CP3C) and their upland hill lands, an Alameda County property known as the "J-Ponds" which are diked areas with detention basins and drainage channels, and a strip of existing tidal marsh between the Bay Ponds and the ACFCC.

As stated above, this Draft EIS/R evaluates the potential environmental impacts related to four alternatives, the No Action Alternative (Alternative Eden A), and three Action Alternatives (Alternative Eden B, C, and D respectively). Under the No Action Alternative (Alternative Eden A), the CDFW would continue to maintain and operate the Eden Landing pond complex as part of ELER, but no new activities would occur in the project area. The Action Alternatives all aim to restore the existing ponds to either entirely tidal marsh or a mixture of tidal marsh and enhanced managed ponds. These Action Alternatives will restore and enhance a mix of wetland habitats, maintain or enhance flood risk management, and provide wildlife-oriented public access and recreational opportunities.

Under all of the Action Alternatives, common proposed actions include: levee breaches, levee lowering, levee raising, installation of water control structures for managed ponds and fish habitat connectivity, excavation of pilot channels, connectivity for anadromous fish habitat, construction of habitat islands, habitat transition zones, beneficial reuse of dredged material and/or upland fill material, and adding recreation components such as extension of the Bay Trail and viewing platforms. These components are included in various combinations and locations in each Action Alternative and are intended to improve habitat complexity and allow appropriate Reserve management. Each Eden Landing Phase 2 alternative is described in detail below and illustrated in Figures ES-3 through ES-6. Table ES-1 summarizes these various features for each of the Action Alternatives.

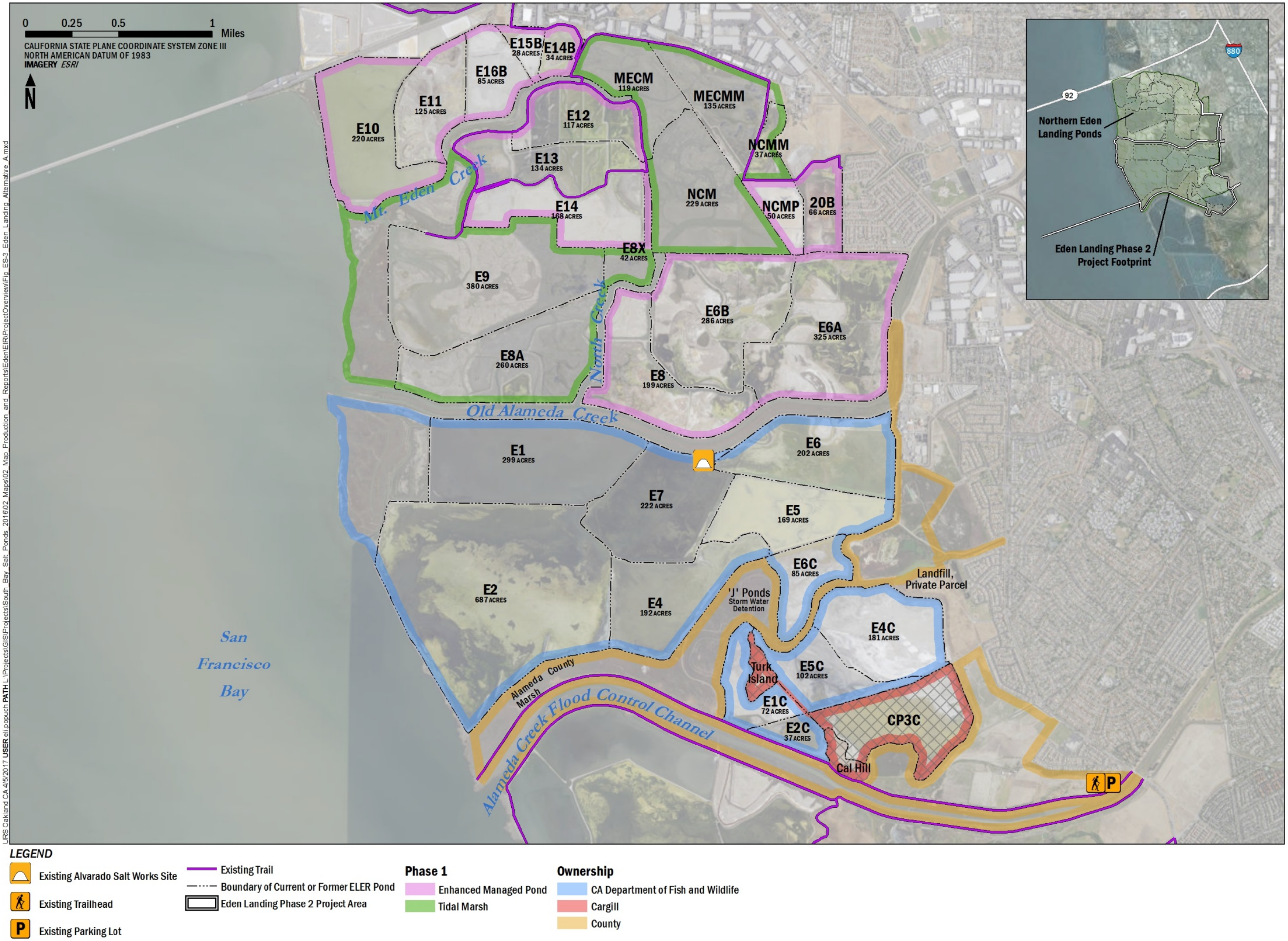


AECOM
South Bay Salt Pond Restoration Project

Figure ES-1
Eden Landing Phase 2 Regional Location

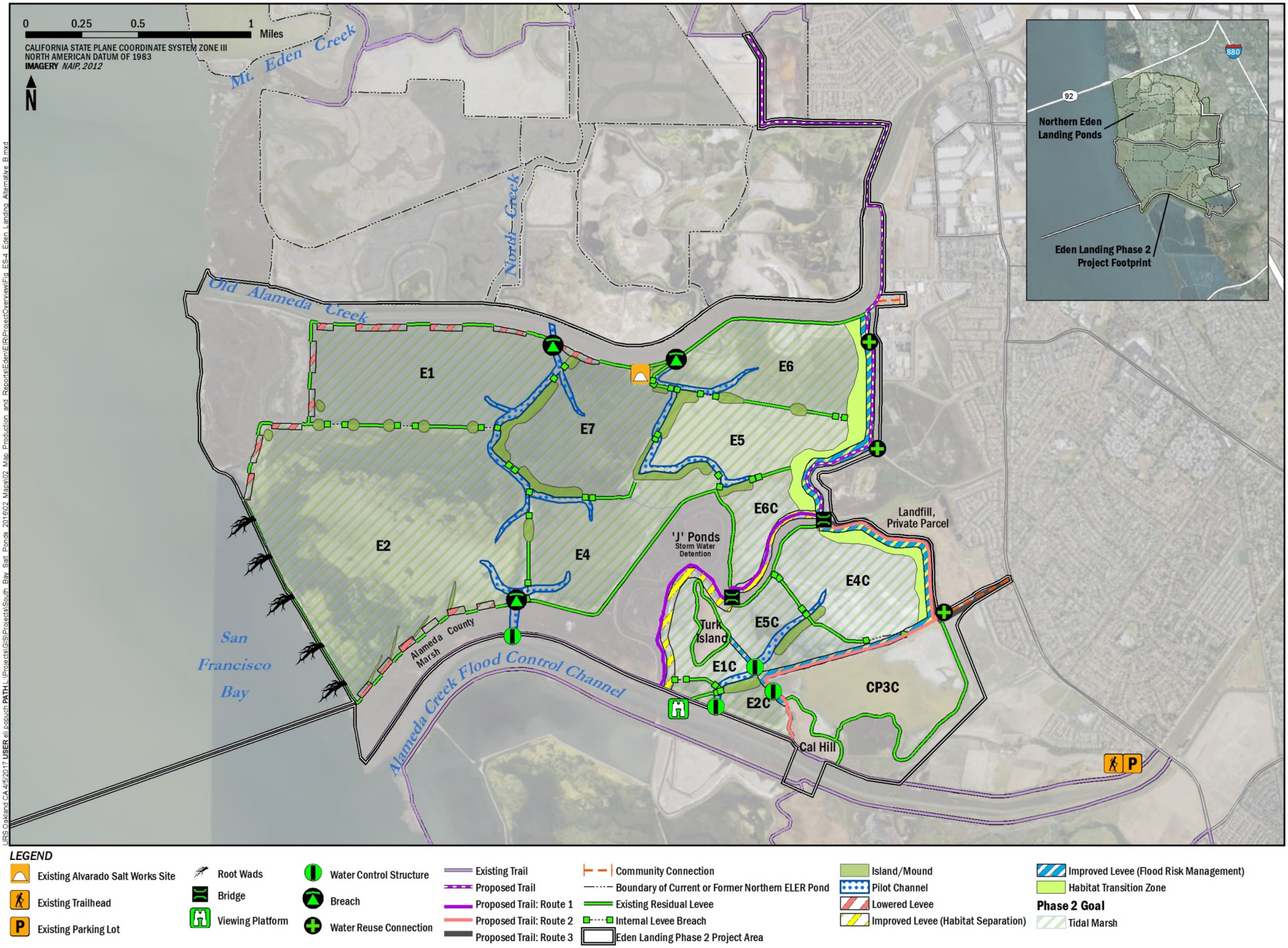
AECOM
South Bay Salt Pond Restoration Project

Figure ES-2
Eden Landing Phase 2 Project Sites



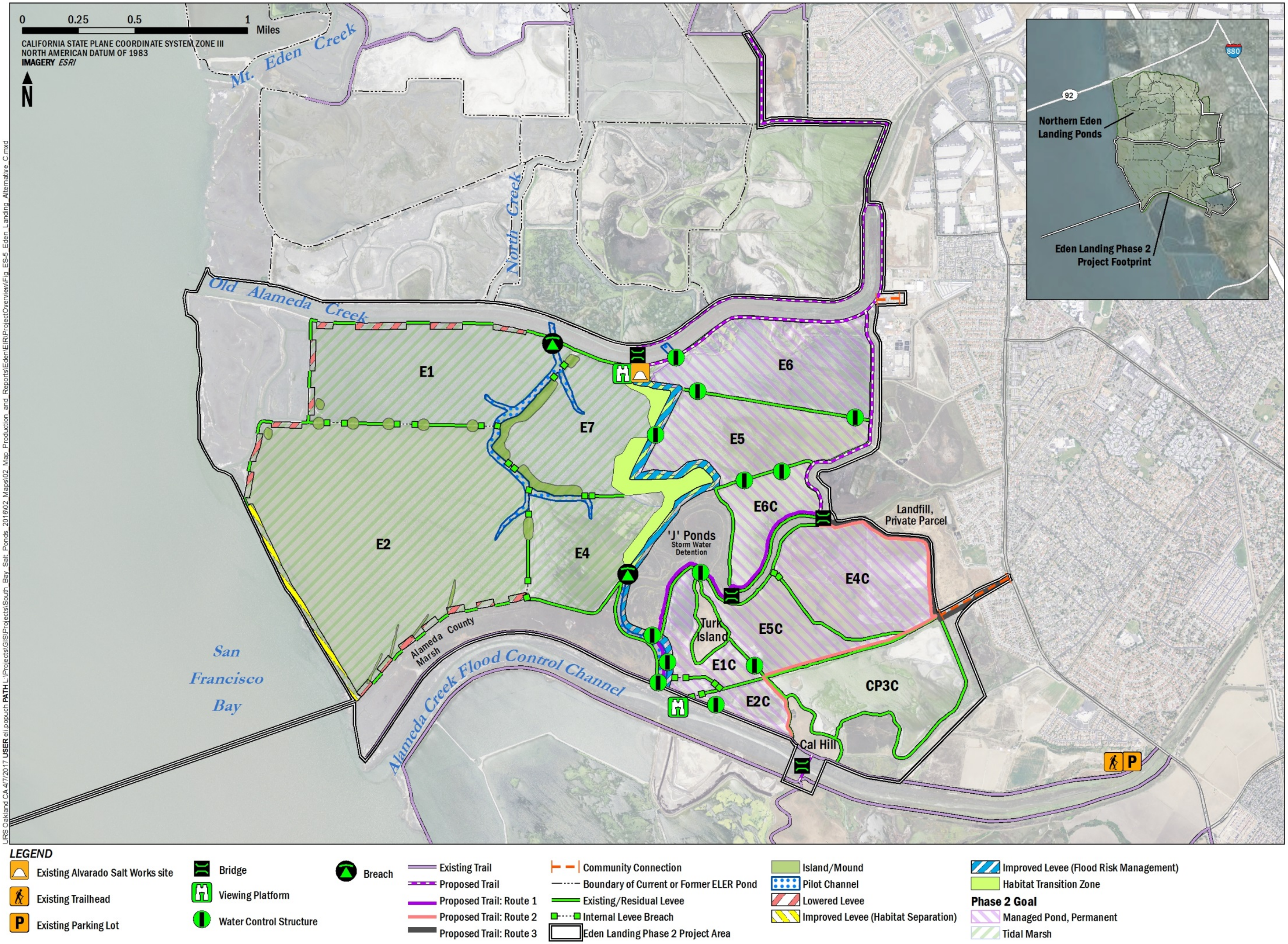
AECOM
South Bay Salt Pond Restoration Project

Figure ES-3
Alternative Eden A



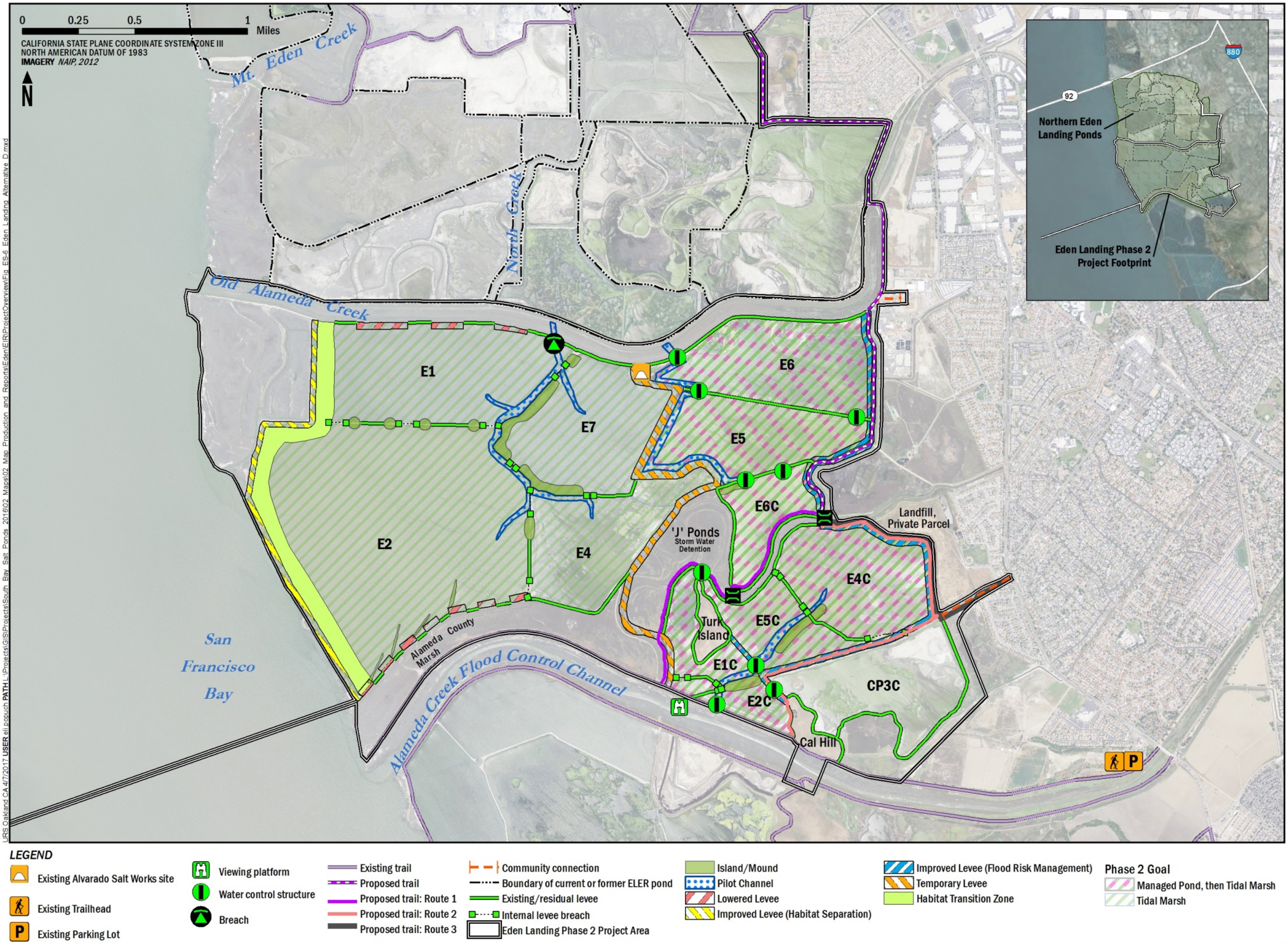
AECOM
South Bay Salt Pond Restoration Project

Figure ES-4
Alternative Eden B



AECOM
South Bay Salt Pond Restoration Project

Figure ES-5
Alternative Eden C



AECOM
South Bay Salt Pond Restoration Project

Figure ES-6
Alternative Eden D

Table ES-1 Components of the Eden Landing Phase 2 Action Alternatives

ACTIONS	ALTERNATIVE EDEN B	ALTERNATIVE EDEN C	ALTERNATIVE EDEN D
Tidal Marsh Restoration	Bay Ponds, Inland Ponds, Southern Ponds	Bay Ponds only	Bay Ponds in stage 1; long-term option in Inland Ponds and Southern Ponds
Managed Pond Restoration	None	Inland Ponds and Southern Ponds (permanent)	Inland Ponds and Southern Ponds (temporary or permanent, depending on AMP)
Levee Raising for Flood Risk Management	Eastern edge of Inland and Southern Ponds	Mid-complex levee (permanent)	Eastern edge of Inland and Southern Ponds; mid-complex levee (temporary or permanent, depending on AMP)
Levee Improvement for Habitat and/or Trails	Parts of E6C's southern levee and E1C's western levee	Western edge of E2	Western edge of Pond E1 and E2
Levee Lowering	Bay, Inland, and Southern Ponds	Bay, Inland, and Southern Ponds	Bay, Inland, and Southern Ponds
Pilot Channels for Draining and Filling	Bay, Inland, and Southern Ponds	Bay, Inland, and Southern Ponds	Bay, Inland, and Southern Ponds
Pilot Channels for Fish Habitat Connectivity	Through ACFCC levee and ACFCWCD marsh into E2 and E4	Through ACFCC levee and ACFCWCD marsh into E4	None
Water Control Structures	Into and between Southern Ponds to simulate full tidal flows; through ACFCC levee for fish connectivity to Bay Ponds	Into and between Inland Ponds and Southern Ponds to allow managed flows; through ACFCC levee for fish connectivity to Bay Ponds	Into and between Inland Ponds and Southern Ponds to allow managed flows (temporary or permanent depending on AMP)
Habitat Transition Zones	Eastern Edge of Inland and Southern Ponds	West of the mid-complex Levee associated with the Inland Ponds	Western edge of the Bay Ponds
Habitat Islands	Bay, Inland, and Southern Ponds	Bay Ponds	Bay and Southern Ponds
Union Sanitary District Connection	Yes	No	No
Connection to Aquifer Reclamation Program wells	Yes	No	No
Trail	Bay Trail spine with 3 route options for southern portion	Inland and Southern Ponds	Inland and Southern Ponds
Viewing Platform	One; along ACFCC	Two total; one along ACFCC and one at Alvarado Salt Works site	One; along ACFCC
Bridges	One necessary to cross ACFCWCD channel; two locations possible	Three total; one necessary to cross ACFCWCD channel (two locations possible); one to cross OAC; one to cross ACFCC	One necessary to cross ACFCWCD channel; two locations possible
Construction Period Only: Dredge Material Placement Infrastructure	An offloading facility in the Bay's deep water channel; floating/submerged pipeline and a potential booster pump between the offloader and the shore; shore pipelines and other infrastructure on and within levees at the Bay and Inland Ponds; potential levee widening at the southern tip of Pond E2 for construction access	An offloading facility in the Bay's deep water channel; floating/submerged pipeline and a potential booster pump between the offloader and the shore; shore pipelines and other infrastructure on and within levees at the Bay Ponds; potential levee widening at the southern tip of Pond E2 for construction access	An offloading facility in the Bay's deep water channel; floating/submerged pipeline and a potential booster pump between the offloader and the shore; shore pipelines and other infrastructure on and within levees at the Bay and Inland Ponds; potential levee widening at the southern tip of Pond E2 for construction access

Alternative Eden A (No Action)

Under Alternative Eden A, the No Action (No-Project) Alternative, no new activities would be implemented as part of the Eden Landing Phase 2 project. The Eden Landing pond complex would continue to be maintained and operated by the CDFW, in accordance with current practices outlined in the *Eden Landing Ecological Reserve System E2 and E2C Operation Plan* (Operations Plan) and the activities described in the AMP. The high priority levees that function as inland flood risk management would continue to be maintained as appropriate and with consultation with the ACFCWCD. Power transmission and distribution lines owned and operated by Pacific Gas and Electric (PG&E) would not be affected by Alternative Eden A. All existing trails and recreation features, as well as limited, seasonal waterfowl hunting access would continue to be maintained, but no new facilities or trails would be constructed. Alternative Eden A is illustrated in Figure ES-3.

Alternative Eden B

Under Alternative Eden B, the entire Phase 2 Eden Landing project area would be restored to tidal marsh in one stage by major levee alterations and improvements. The easternmost levees would be improved to provide flood risk management to the inland communities. Under this alternative the internal levees along the J-ponds and other ACFCWCD-owned channels would also be improved, as needed. The tidal marsh habitats would be enhanced by using remnant levees as habitat islands, constructing habitat transition zones, increasing connectivity for anadromous fish habitat, and levee lowering. This alternative also includes the use of root wads and logs to trap sediment and create beach-like zones on the Bay side of Pond E2. Water control structures would be used during the transition of the Southern Ponds into tidal marsh. Implementation of this alternative would increase wildlife-oriented public access and recreational opportunities in the region. A piped connection from the Alameda County Water District’s nearby Aquifer Reclamation Program wells would be added to deliver brackish groundwater and water habitat transition zones in the Inland and Southern Ponds. Finally, a piped connection with the adjacent USD would be added to deliver treated wastewater from that facility and deliver it onto the habitat transition zone that would be built in the Inland Ponds. This would water the vegetation on that feature and also add a salinity gradient to the marsh that would form there. Alternative Eden B is illustrated in Figure ES-4.

Alternative Eden C

Under Alternative Eden C, the Inland and Southern Ponds would be retained as managed ponds, and the Bay Ponds would be restored to tidal marsh. A mid-complex levee would be constructed mostly by improving existing internal levees along the Inland Ponds, the J-Ponds, and Pond E1C of the Southern Ponds. Several water control structures would be placed within the Inland and Southern Ponds so that a variety of pond characteristics could be modified as necessary to support a range of pond-dependent wildlife. This alternative would implement many of the same habitat enhancements as Alternative Eden B, but in different locations. For example, the habitat transition zone would be built against the mid-complex levee, and the excavated pilot channels would also be in different places. Similar recreational opportunities would be created under this alternative, but additional trails have been proposed. These include a set of trails along the OAC and a bridge to connect the trails over the OAC. These trails would end at the Alvarado Salt Works and a new viewing platform. This alternative also proposes to build a bridge to extend the Bay Trail spine over the ACFCC beyond the ELER boundary. Alternative Eden C is illustrated in Figure ES-5.

Alternative Eden D

Under Alternative Eden D, the Phase 2 Eden Landing ponds would be restored to tidal marsh in a staged approach. Similar to Alternative Eden C, a mid-complex levee would be constructed; however this levee would be temporary. The first stage of this alternative would restore the Bay Ponds to tidal marsh and retain the Inland and Southern Ponds as managed ponds using the temporary mid-complex levee and water control structures. These water control structures would be installed in the Inland and Southern Ponds while they are managed ponds. Once tidal marsh becomes established in the Bay Ponds, the Inland and Southern Ponds would likely be restored to tidal marsh by removing the water control structures and introducing tidal flows to the Inland and Southern Ponds. This end result would be much like Alternative Eden C. However, if ongoing wildlife monitoring conducted under the AMP shows that the pond-associated wildlife species continue to require pond habitat, the Inland Ponds and Southern Ponds could be retained in that managed pond configuration indefinitely. The end result in that case would be much like Alternative Eden C. The proposed recreational features for this alternative are identical to Alternative Eden B, which includes extending the Bay Trail spine through southern Eden Landing on top of improved internal levees and also adding a viewing platform. Alternative Eden D is illustrated in Figure ES-6.

Operations and Maintenance – All Action Alternatives

Operations and maintenance (O&M) activities for all Action Alternatives would continue to follow the existing Operations Plan and regulatory permits and be informed by the AMP and other CDFW management activities. Periodic maintenance of the pond infrastructure would be required following construction. Maintenance activities would include water control structure operation, invasive plant control, patrol, mosquito abatement, levee repairs, and trash removal/vandalism repairs. Some of these, such as the water control structure operation and patrol, would require regular CDFW staff visits to the ponds to perform. The others would be needed only occasionally and would involve larger groups of workers. In addition, ongoing monitoring activities would be necessary, and would be informed by the AMP. These monitoring activities can vary by season, with peak visits occurring during bird-breeding season.

Levees that provide inland flood risk management would need to be maintained to protect against erosion or unplanned breaches. Improved levees would be inspected and maintained annually to uphold slope stability, erosion control, seepage, slides and settlement. It is expected that additional fill would be needed to reduce impacts in areas where settlement occurs, approximately every five years. Most of the levee maintenance along areas subject to tidal flows could be accomplished from the levee crests during low tides. Levees between ponds could be maintained according to season and best practices, conditions or requirements for the protection of sensitive resources.

Under all Action Alternatives, the internal levees within the Bay Ponds would erode naturally and would not be maintained. Under Alternative Eden B, most of the internal levees in the Inland and Southern Ponds would also degrade naturally. However, under Alternative Eden C and D, the internal levees in the Inland and Southern Ponds would be maintained because these ponds would continue to be managed as open water and/or seasonal ponds. External levees connected to ponds being restored to tidal marsh (i.e., the Bay Ponds in all three Action Alternatives, and all of southern Eden Landing in Alternative Eden B) would only be maintained if they support public access routes or would hydraulically separate one pond from another. External levees would be maintained in the managed ponds.

Habitat features such as habitat transition zones and habitat islands would need to be maintained periodically. Habitat transition zones and islands need to be inspected periodically to assess slope stability, erosion, seepage, slides, settlement, invasive vegetation, and so on. These features may occasionally need maintenance, repairs, and/or vegetation plantings or removal. Water control structures would require inspections and maintenance throughout the life of the project. Inspection of these structures would be mandatory every month during the first year and semi-annually thereafter. Maintenance would occur annually or as needed.

Under all Action Alternatives, public access and recreation features would be maintained using similar methods. Trails would be kept clear for safety reasons, trash would be removed, and viewing platforms and interpretive signs would be inspected periodically for signs of vandalism. Trails may occasionally need to be resurfaced or regraded. Each Action Alternative includes at least one bridge. These bridges must be visually inspected every two years and a written report may be required every five years.

Under all Action Alternatives, the existing power distribution line that is located on the southern OAC levee, along the northern edge of ponds E1, E7, and E6 would be removed. The existing power distribution line and poles that run through the Southern Ponds would be retained, and PG&E would continue to have access to operate and maintain these facilities.

S.2 Purpose of the EIS/R

This Draft EIS/R is intended to provide the public and responsible and trustee agencies with information about the potential environmental effects of the SBSP Restoration Eden Landing Phase 2 Project. It will be used by the lead agencies when considering approval of the SBSP Restoration Project.

The Council on Environmental Quality (CEQ) regulations for implementing National Environmental Policy Act (NEPA) (40 CFR 1502.1) state that

> “the primary purpose of an [EIS] is to serve as an action-forcing device to ensure that the policies and goals defined in [NEPA] are infused into the ongoing programs and actions of the federal government. An EIS shall provide full and fair discussion of significant environmental impacts and shall inform decision makers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment.”

California Environmental Quality Act (CEQA) Section 21002.1 states that the purpose of an EIR is to identify the significant effects on the environment of a project, to identify alternatives to the project, and to indicate the manner in which those significant effects can be mitigated or avoided.

Both NEPA and CEQA encourage the preparation of combined environmental planning documents. This document is a joint EIS/R. As noted above, NEPA and CEQA have similar purposes and thus use generally similar concepts and terminologies. In some cases, different terms are used to convey the same meaning. This joint EIS/R primarily uses CEQA terminology; however, many NEPA terms are also used.

S.3 Role of Adaptive Management in the SBSP Restoration Project

The 2007 Final EIS/R acknowledged that significant uncertainties remain with the project because of its geographic and temporal scale. To address these uncertainties, the project was planned to be carefully implemented in phases, with learning from the results incorporated into management and planning decisions. This adaptive management approach is described in the AMP (Appendix D of the 2007 Final

EIS/R), which is a comprehensive plan and program to generate information (applied studies, monitoring, and research) that the Project Management Team (PMT) can use to make decisions about both current management of the project area and future restoration actions to meet project objectives and avoid harmful impacts to the environment.

Adaptive management is essential to keeping the project on track to meet its objectives, and adaptive management was the primary tool that the 2007 Final EIS/R identified for avoiding significant impacts to the environment. Without adaptive management (and its associated information collection), the PMT would not understand the restored system and would not be able to explain its management actions to the public. Furthermore, responses to unanticipated changes would be based on guesswork, which could exacerbate problems. For these reasons, adaptive management is integral to the project, and construction projects are expected to feature applied studies, as called for in the AMP, so that the PMT can learn from project implementation. Adaptive management continues to be a significant part of Eden Landing Phase 2.

Although the preferred alternative in the 2007 Final EIS/R was Programmatic Alternative C, which would restore up to 90 percent of the project's ponds to tidal wetlands in phases, the document also states that if that alternative is not possible without causing undesired environmental impacts, as detected through the AMP and other adaptive management monitoring and applied studies, then the project would stop converting ponds to tidal wetlands. The actual amount of tidal wetlands restored at the end of the 50-year project horizon could be less than 90 percent.

S.4 Summary of Impacts and Mitigation Measures

This section summarizes the impacts and the resulting significance determinations made for each of them, as well as any mitigation measures that were developed to reduce the amounts and types of adverse impacts from the various project alternatives. Note that the program-level mitigation measures developed for the SBSP Restoration Project as a whole were incorporated into the Eden Landing Phase 2 alternatives as part of the project itself. Thus, they are no longer mitigation measures, but simply part of the project designs. The full list of program-level mitigation measures is presented in Chapter 2 of the main text.

S.4.1 Impacts Resulting from Phase 2 Alternatives

Table ES-2 summarizes the results of the impacts analysis that makes up Chapter 3. For each action and no action alternative at the pond complex, the table presents the significance determination for each enumerated impact within each environmental resource.

Potentially Significant Impacts

The impact analysis and significance determination conducted for this Draft EIS/R and explained in full in Chapter 3 identified the potentially significant impacts listed below. These are those impacts that could not be reduced to a less-than-significant level, even after implementation of project-specific mitigation measures or because no appropriate project-level mitigation measures exist that would that have that effect. In these rare cases, these impacts are significant.

- *Eden Landing Phase 2 Impact 3.5-3: Potential habitat conversion impacts to western snowy plovers*. Although transitional mudflat habitat in the Southern Ponds could provide temporary foraging opportunities for western snowy plover until the marsh forms, and islands that would be built on residual levees in the ponds could provide some western snowy plover roosting habitat, there would be a reduction of potential western snowy plover habitat under Alternative Eden B. Also, the proposed Bay Trail spine and optional routes have the potential to bring trail uses close enough to disturb critical habitat and nesting areas. Overall, because the net habitat change would be the reduction of large areas of potential habitat for western snowy plover and because recreational use of proposed trails may disturb individual plovers, the impacts under Alternative Eden B would be potentially significant.

- *Eden Landing Phase 2 Impact 3.6-5: Result in the temporary construction-related closure of adjacent public parks or other recreation facilities, making such facilities unavailable for public use.* Existing parking areas, park access, and some trails would be temporarily closed during portions of the construction work under the Action Alternatives. This approach is necessary to keep the public safe and provide a route through existing parks to bring materials and equipment to the project areas. These impacts are significant and unavoidable.

- *Eden Landing Phase 2 Impact 3.11-1: Potential short-term degradation of traffic operations at intersections and streets due to construction.* A traffic impact analysis was prepared to analyze the impact of construction-related traffic on each of the Action Alternatives; this study found that at the AM peak hour the impact is considered significant. The optimization of the I-880 Southbound Ramps/Whipple Road/Dyer Street intersection would mitigate the impact to less than significant. However, this mitigation is not feasible as this intersection is part of a synchronized series of intersections. This would therefore cause a significant and unavoidable impact for each Action Alternative.

- *Eden Landing Phase 2 Impact 3.13-1: Short-term construction-generated air pollutant emissions.* Construction-generated average daily NO_x emissions would exceed applicable regional significance thresholds during import and placement of dredge materials. Project-specific mitigation measures (discussed below) will be used to reduce NO_x emissions to the greatest extent feasible, but for those options where diesel is used to power the offloading facility and booster pumps, NO_x emissions would still exceed the regional threshold of significance. Therefore, significant and unavoidable impacts would occur for each Action Alternatives if diesel is used to power the construction equipment during import and placement of dredge materials. (Annual emissions would be below General Conformity *de minimis* levels with incorporation of the project-specific mitigation measures. Therefore, construction-related emissions associated with diesel powered construction equipment would conform to the State Implementation Plan, and a formal conformity analysis would not be required.)

Eden Landing Phase 2 Mitigation Measures Identified in the EIS/R

There are two project-level mitigation measures developed for the Eden Landing Phase 2 alternatives. These measures are as follows:

- Mitigation Measure AQ-A, Construction Equipment. The construction contractor shall use off-road construction diesel engines with horsepower (hp) ratings between 50 hp and 750 hp that meet, at a minimum, the Tier 4 California Emissions Standards, unless such an engine is not available for a particular item of equipment. Tier 3 engines will be allowed on a case by case basis when the contractor has documented that no Tier 4 equipment, or emissions equivalent retrofit equipment is available for a particular equipment type that must be used to complete construction. Documentation shall consist of signed written statements from at least two construction equipment rental firms.

- Mitigation Measure AQ-B, Harbor Craft. Harbor craft with a Category 1 or 2 marine engine, such as tugboats, shall meet, at a minimum, United States Environmental Protection Agency Tier 2 marine engine emission standards.

Cumulative Impacts

Chapter 4 of this Draft EIS/R also evaluated the potential environmental impacts of the proposed project when considered together with other projects. The analysis addressed impacts that could occur as a result of project construction and operation, based on the significance criteria provided for each resource discussion in Chapter 3, Environmental Setting, Impacts, and Mitigation Measures.

The analysis of cumulative impacts followed a multi-step approach. First, an evaluation was made as to whether a significant cumulative impact existed within each relevant study area for the impact under consideration. This evaluation was made by reviewing the conclusions of the No Action Alternative in the "Cumulative Impacts" section of the 2007 Final EIS/R. Then those conclusions were re-examined based on an updated list of relevant cumulative impact projects. Next, the Eden Landing Phase 2 project impacts were evaluated as to whether they, in combination with impacts from the other projects, would create a new significant cumulative impact. If so, then a potentially significant impact was found, and mitigation measures from Chapter 3, Environmental Setting, Impacts, and Mitigation Measures, were identified and recommended to reduce this impact to a less-than-significant level. In cases where a significant cumulative impact already existed, even without the SBSP Restoration Project, the Eden Landing Phase 2 project's impacts were examined to determine if they would make a considerable contribution to that impact. If it was determined that the Eden Landing Phase 2 project impacts would not make a considerable contribution to an existing significant cumulative impact, the Phase 2 project-level cumulative impacts were determined to be less than significant.

If an Eden Landing Phase 2 project impact were to have a considerable contribution to a cumulative impact, then mitigation from the project impact analysis in Chapter 3 would be recommended to reduce the project's contribution to cumulative impacts to a level that is less than considerable. Project-specific mitigation measures will be used to reduce NO_x emissions to the greatest extent feasible, but for those options where diesel is used to power the offloading facility and booster pumps during import and placement of dredge materials, NO_x emissions would still exceed the regional threshold of significance.

Table ES-2 SBSP Restoration Project Phase 2 Draft EIS/R Summary Impact Table

IMPACT	EDEN LANDING PHASE 2 ALTS.			
	EDEN A	EDEN B	EDEN C	EDEN D
3.2 Hydrology, Flood Management, and Infrastructure				
Eden Landing Phase 2 Impact 3.2-1: Increased risk of flooding that could cause injury, death, or substantial property loss.	LTS	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.2-2: Alter existing drainage patterns in a manner which would result in substantial erosion or siltation on- or off-site.	LTS	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.2-3: Create a safety hazard for people boating in the project area.	LTS	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.2-4: Potential effects from tsunami and/or seiche.	LTS	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.2-5: Place structures within the 100-year-flood hazard area that would impede or redirect flood flows.	NI	LTS	LTS	LTS
3.3 Water Quality and Sediment				
Eden Landing Phase 2 Impact 3.3-1: Degradation of water quality due to changes in algal abundance or composition.	LTS	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.3-2: Degradation of water quality due to low dissolved oxygen levels.	LTS	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.3-3: Degradation of water quality due to increased methylmercury production or mobilization of mercury-contaminated sediments.	LTS	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.3-4: Potential impacts to water quality from other contaminants.	LTS	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.3-5: Potential to cause seawater intrusion of regional groundwater sources.	LTS	LTS	LTS	LTS
3.4 Geology, Soils, and Seismicity				
Eden Landing Phase 2 Impact 3.4-1: Potential effects from settlement due to consolidation of Bay mud.	LTS	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.4-2: Potential effects from liquefaction of soils and lateral spreading.	LTS	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.4-3: Potential for ground and levee failure from fault rupture.	LTS	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.4-4: Potential effects from consolidation of Bay mud on existing subsurface utility crossings and surface rail crossings.	LTS	LTS	LTS	LTS
3.5 Biological Resources				
Eden Landing Phase 2 Impact 3.5-1: Potential construction-related loss of or disturbance to special-status, marsh-associated wildlife.	NI	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.5-2: Potential construction-related loss of or disturbance to nesting pond associated birds.	NI	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.5-3: Potential reduction in numbers of small shorebirds using San Francisco Bay, resulting in substantial declines in flyway-level populations.	NI	LTS	LTS/B	LTS
Eden Landing Phase 2 Impact 3.5-4: Loss of intertidal mudflats and reduction of habitat for mudflat-associated wildlife species.	NI	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.5-5: Potential habitat conversion impacts to western snowy plovers.	NI	PS	LTS	LTS

Table ES-2 SBSP Restoration Project Phase 2 Draft EIS/R Summary Impact Table

IMPACT	EDEN	LANDING	PHASE 2	ALTS.
	EDEN A	EDEN B	EDEN C	EDEN D
Eden Landing Phase 2 Impact 3.5-6: Potential reduction in the numbers of breeding, pond-associated waterbirds (avocets, stilts, and terns) using the South Bay due to reduction in habitat, concentration effects, displacement by nesting California gulls, and other Project-related effects.	NI	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.5-7: Potential reduction in the numbers of non-breeding, salt-pond-associated birds (e.g., phalaropes, eared grebes, and Bonaparte's gulls) as a result of habitat loss.	NI	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.5-8: Potential reduction in foraging habitat for diving ducks, resulting in declines in flyway-level populations.	NI	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.5-9: Potential reduction in foraging habitat for ruddy ducks, resulting in declines in flyway-level populations.	NI	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.5-10: Potential habitat conversion impacts on California least terns.	NI	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.5-11: Potential loss of pickleweed-dominated tidal salt marsh habitat for the salt marsh harvest mouse and salt marsh wandering shrew, and further isolation of these species' populations due to breaching activities and scour.	NI	LTS/B	LTS/B	LTS/B
Eden Landing Phase 2 Impact 3.5-12: Potential disturbance to or loss of sensitive wildlife species due to ongoing monitoring, maintenance, and management activities.	LTS	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.5-13: Potential effects of habitat conversion and pond management on steelhead.	LTS	LTS/B	LTS/B	LTS/B
Eden Landing Phase 2 Impact 3.5-14: Potential long-term effects to estuarine fish.	NI	LTS/B	LTS/B	LTS/B
Eden Landing Phase 2 Impact 3.5-15: Potential impacts to piscivorous birds.	NI	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.5-16: Potential impacts to dabbling ducks.	NI	LTS	LTS/B	LTS
Eden Landing Phase 2 Impact 3.5-17: Potential impacts to harbor seals.	NI	LTS/B	LTS/B	LTS/B
Eden Landing Phase 2 Impact 3.5-18: Potential recreation-oriented impacts to sensitive species and their habitats.	NI	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.5-19: Potential impacts to special-status plants.	NI	NI	NI	NI
Eden Landing Phase 2 Impact 3.5-20: Colonization of mudflats and marsh plain by non-native *Spartina* and its hybrids.	LTS	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.5-21: Colonization by non-native *Lepidium*.	NI	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.5-22: Increase in exposure of wildlife to avian botulism and other diseases.	NI	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.5-23: Potential impacts to bay shrimp populations.	NI	LTS/B	LTS/B	LTS/B
Eden Landing Phase 2 Impact 3.5-24: Potential impacts to jurisdictional wetlands or waters.	NI	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.5-25: Potential construction-related loss of, or disturbance to, nesting raptors (including burrowing owls).	NI	LTS	LTS	LTS

Table ES-2 SBSP Restoration Project Phase 2 Draft EIS/R Summary Impact Table

IMPACT	EDEN LANDING PHASE 2 ALTS.			
	EDEN A	EDEN B	EDEN C	EDEN D
3.6 Recreation Resources				
Eden Landing Phase 2 Impact 3.6-1: Provision of new public access and recreation facilities, including the opening of new areas for recreational purposes and completion of the Bay Trail spine.	LTS	LTS	LTS/B (1 & 2); LTS (3)	LTS
Eden Landing Phase 2 Impact 3.6-2: Permanent removal of existing recreational features (trails) in locations that visitors have been accustomed to using and that would not be replaced in the general vicinity of the removed feature.	NI	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.6-3: 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.	NI	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.6-4: Result in substantial adverse physical impacts associated with the provision of new or physically altered park and recreational facilities, or result in the need for new or physically altered park and recreational facilities, the construction of which could cause significant environmental impacts.	NI	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.6-5: Result in the temporary construction-related closure of adjacent public parks or other recreation facilities, making such facilities unavailable for public use.	NI	SU	SU	SU
3.7 Cultural Resources				
Eden Landing Phase 2 Impact 3.7-1: Potential disturbance of known or unknown cultural resources.	NI	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.7-2: Potential disturbance of the historic salt ponds and associated structures which may be considered a significant cultural landscape.	NI	LTS	LTS	LTS
3.8 Land Use and Planning				
Eden Landing Phase 2 Impact 3.8-1: Land use compatibility impacts.	NI	LTS	LTS	LTS
3.9 Public Health and Vector Management				
Eden Landing Phase 2 Impact 3.9-1: Potential increase in mosquito populations.	LTS	LTS	LTS	LTS
3.10 Socioeconomics and Environmental Justice				
Eden Landing Phase 2 Impact 3.10-1: Displace, relocate, or increase area businesses, particularly those associated with the expected increase in recreational users.	NI	LTS/B	LTS/B	LTS/B
Eden Landing Phase 2 Impact 3.10-2: Change lifestyles and social interactions.	NI	LTS/B	LTS/B	LTS/B
Eden Landing Phase 2 Impact 3.10-3: Effects disproportionately placed on densely populated minority and low-income communities or effects or racial composition in a community.	NDE	NDE	NDE	NDE
3.11 Traffic				
Eden Landing Phase 2 Impact 3.11-1: Potential short-term degradation of traffic operations at intersections and streets due to construction.	NI	SU	SU	SU
Eden Landing Phase 2 Impact 3.11-2: Potential long-term degradation of traffic operations at intersections and streets during operation.	NI	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.11-3: Potential increase in parking demand.	NI	LTS	LTS	LTS

Table ES-2 SBSP Restoration Project Phase 2 Draft EIS/R Summary Impact Table

IMPACT	EDEN LANDING PHASE 2 ALTS.			
	EDEN A	EDEN B	EDEN C	EDEN D
Eden Landing Phase 2 Impact 3.11-4: Potential increase in wear and tear on the designated haul routes during construction.	NI	LTS	LTS	LTS
3.12 Noise				
Eden Landing Phase 2 Impact 3.12-1: Short-term construction noise effects.	NI	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.12-2: Traffic-related noise impacts during construction.	NI	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.12-3: Traffic-related noise effects during operation.	NI	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.12-4: Potential operational noise effects from O&M activities.	LTS	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.12-5: Potential vibration effects during construction and/or operation.	LTS	LTS	LTS	LTS
3.13 Air Quality				
Eden Landing Phase 2 Impact 3.13-1: Short-term construction-generated air pollutant emissions.	NI	SU/LTSM (diesel); LTSM (electric)	SU/LTSM (diesel); LTSM (electric)	SU/LTSM (diesel); LTSM (electric)
Eden Landing Phase 2 Impact 3.13-2: Potential long-term operational air pollutant emissions.	LTS	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.13-3: Potential exposure of sensitive receptors to TAC emissions.	LTS	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.13-4: Potential odor emissions.	LTS	LTS	LTS	LTS
3.14 Public Services				
Eden Landing Phase 2 Impact 3.14-1: Increased demand for fire and police protection services.	NI	LTS	LTS	LTS
3.15 Utilities				
Eden Landing Phase 2 Impact 3.15-1: Reduced ability to access PG&E towers, stations or electrical transmission lines.	NI	NI	NI	NI
Eden Landing Phase 2 Impact 3.15-2: Reduced clearance between waterways and PG&E electrical transmission lines.	NI	NI	NI	NI
Eden Landing Phase 2 Impact 3.15-3: Reduced structural integrity of PG&E towers.	NI	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.15-4: Changes in water level, tidal flow and sedimentation near storm drain systems.	LTS	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.15-5: Changes in water level, tidal flow and sedimentation near pumping facilities.	LTS	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.15-6: Changes in water level, tidal flow and sedimentation near sewer force mains and outfalls.	NI	NI	NI	NI
Eden Landing Phase 2 Impact 3.15-7: Disrupt Hetch Hetchy Aqueduct service so as to create a public health hazard or extended service disruption.	NI	NI	NI	NI

Table ES-2 SBSP Restoration Project Phase 2 Draft EIS/R Summary Impact Table

IMPACT	EDEN LANDING PHASE 2 ALTS.			
	EDEN A	EDEN B	EDEN C	EDEN D
Eden Landing Phase 2 Impact 3.15-8: Disruption of rail service due to construction of coastal flood levees and tidal habitat restoration.	NI	NI	NI	NI
Eden Landing Phase 2 Impact 3.15-9: Reduced access to sewer force mains due to levee construction.	NI	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.15-10: Increased demands on regional energy supply or substantial increase in peak and base period electricity demand.	NI	LTS	LTS	LTS
3.16 Visual Resources				
Phase 2 Impact 3.16-1: Alter views of the SBSP Restoration Project Area and vicinity.	NI	LTS	LTS	LTS
3.17 Greenhouse Gas Emissions				
Eden Landing Phase 2 Impact 3.17-1: Construction-generated GHG emissions.	NI	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.17-2: Operational GHG emissions.	LTS	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.17-3: Conflicts with applicable GHG emissions reduction plan, policy, or regulation.	LTS	LTS	LTS	LTS

Notes:

Alternative A is the No Action/No Project Alternative.

B = Beneficial; LTS = Less Than Significant; LTSM = Less Than Significant with Mitigation; NDE = No Disproportionate Effect; NI = No Impact; PS = Potentially Significant; SU = Significant and Unavoidable

The levels of significance for the impacts listed above assume that the program-level mitigation measures from the 2007 Final EIS/R and the elements of the Adaptive Management Plan are integral components of the Eden Landing Phase 2 project alternatives, and that management responses would be implemented based on ongoing monitoring and applied studies.

S.5 Environmentally Preferred Alternative

The environmentally preferred alternative is defined by the Council on Environmental Quality as the alternative that best meets the criteria of Section 101(b) of NEPA (42 United States Code [USC] 4331)[1]. The environmentally preferred alternative is a NEPA term for the alternative that will promote the national environmental policy as expressed in NEPA's Section 101. Ordinarily, this means the alternative that causes the least damage to the biological and physical environment, but it also means the alternative that best protects, preserves, and enhances historical, cultural, and natural resources. The SBSP Restoration Project would provide benefits such as increased and improved tidal marshes and other habitats, additional public access and recreation opportunities, reduced risk of unplanned levee failure, and added potential for carbon sequestration. None of these benefits would be realized under the No Action Alternative.

The SBSP Restoration Project's lead agencies will identify an Environmentally Preferred Alternative during preparation of the Final EIS/R with consideration of the public and agency comment on this Draft EIS/R.

S.6 Environmentally Superior Alternative

CEQA Guidelines Section 15126.6 addresses the selection of the Environmentally Superior Alternative among the alternatives proposed. That section states that, if the environmentally superior alternative is the No Project Alternative, then the EIR must also identify and environmentally superior alternative among the other alternatives. However, as noted above, and explained in this Draft EIS/R, the environmentally superior alternative is not the No Project Alternative. The SBSP Restoration Project's Phase 2 action alternatives would bring numerous benefits, none of which would be realized under the No Project Alternative.

The SBSP Restoration Project's lead agencies will identify an Environmentally Superior Alternative during preparation of the Final EIS/R with consideration of the public and agency comments on this Draft EIS/R.

S.7 Areas of Controversy

CEQ Regulations for Implementing NEPA (40 CFR 1502.12) and Section 15123 of the CEQA Guidelines require that an EIS/R identify areas of controversy.

[1] The environmentally preferred alternative is the alternative that will promote the national environmental policy expressed in NEPA (Sec. 101 (b)), as follows:

- Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.
- Ensure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings.
- Attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences.
- Preserve important historic, cultural, and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice.
- Achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities.
- Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

In the 2007 Final EIS/R, the following issues were identified as being of the greatest concern:

- Potential effects on mercury bioaccumulation in the South Bay;
- Trade-offs between habitat restoration and public access/recreation opportunities;
- Trade-offs between tidal and managed pond species;
- The need to first provide flood protection in order to undertake tidal restoration in many areas;
- Availability of funding for implementation of the AMP (monitoring); and
- The potential entrainment of salmonids and estuarine fish in managed ponds.

Many of these areas were addressed by the ongoing monitoring and research projects conducted under the direction of the SBSP Restoration Project's Science Program and AMP. The early results of those monitoring and research questions were used to develop, refine, and analyze the Eden Landing Phase 2 actions. For example, the observed sediment accretion rates in breached ponds were higher than expected; the results of the ongoing biological monitoring indicated which shapes and locations make the most successful habitat islands and also indicated that enhancements in managed ponds can lead to increased bird breeding and success rates even at lower total areas. All of these insights and others were used to develop preliminary alternatives which were configured into the project alternatives to include in this Draft EIS/R for Phase 2 at Eden Landing.

The SBSP Restoration Project's lead agencies, PMT, and other stakeholders use the AMP, results from the Science Program, and other established systems to incorporate new insights and observations into ongoing management actions and into the decisions about how and where to implement future restoration actions. In doing so, these entities seek to collaboratively resolve these Areas of Controversy and address new ones as they develop.

It is expected that other areas of controversy will be identified during the public comment period. The comments from all of the SBSP Restoration Project's stakeholders will be tracked and addressed, and a revised list of areas of controversy will be developed and published as part of the Final EIS/R.

S.8 Issues to be Resolved

CEQ Regulations for Implementing NEPA (40 CFR 1502.12) and Section 15123 of the CEQA Guidelines require that an EIS/R identify Issues to be Resolved. The SBSP Restoration Project's adaptive management approach is intended to address uncertainties regarding the restoration project. Consequently, the AMP identifies applied studies that are intended to resolve key uncertainties and to provide a better understanding of how restoration actions affect environmental resources. The results of these studies and ongoing monitoring would allow for more effective achievement of restoration goals and objectives in each successive phase of implementation, and avoidance of potentially adverse environmental impacts.

The AMP initially proposed applied studies to resolve the following key uncertainties:

- Is there sufficient sediment available in the South Bay to support marsh development without causing unacceptable impacts to existing intertidal habitats?

- Can the existing number and diversity of migratory and breeding shorebirds and waterfowl be supported in a changing (reduced salt pond) habitat area?
- Can restoration actions be configured to maximize benefits to non-avian species both onsite and in adjacent waterways?
- Will mercury be mobilized into the food web of the South Bay and beyond at a greater rate than prior to restoration?
- Can invasive and nuisance species such as *Spartina alterniflora* (or the invasive Spartina hybrid), corvids and the California gull be controlled? If not, how can the impacts of these species be reduced in future phases of the Project?
- Will restoration adversely affect water quality and productivity (food web dynamics)?
- Will trails and other public access features/activities have significant negative effects on wildlife species?
- How will the SBSP Restoration Project gain support from the public now and into the future, including support for continued funding of restoration and management?

During the design and implementation of Phase 1 and Phase 2 projects, some of these questions concerning the effectiveness and cost/benefit trade-offs of particular restoration design elements or management approaches were addressed through examination of specific restoration techniques. The results of those projects informed the conceptual designs for restoration actions and pond locations to include in the Eden Landing Phase 2 project alternatives. Similarly, updated results of those studies and implemented project actions will help eventually guide the selection of the Eden Landing Phase 2 preferred alternative.

As with the discussion above concerning the areas of controversy, the public comment period for this Draft EIS/R is expected to identify Eden Landing Phase 2-specific issues that will need additional study to be resolved. The comments and input received from the general public, regulatory agencies, and other stakeholders, including nearby cities and counties, special districts, businesses, and other interests will be used to develop this list of issues, which will then be included in the Final EIS/R.

1. INTRODUCTION

Phase 2 of the South Bay Salt Pond (SBSP) Restoration Project is a collaborative effort among federal, state, and local agencies working with scientists and the public to develop and implement project-level plans and designs for habitat restoration, flood management, and wildlife-oriented public access. The Project Area is mostly within portions of the former Cargill Inc. (Cargill) salt ponds in South San Francisco Bay (South Bay), which were acquired by the California Department of Fish and Wildlife (CDFW), formerly the California Department of Fish and Game (CDFG) and the United States Fish and Wildlife Service (USFWS) in 2003. The former salt ponds included in this Environmental Impact Statement/Environmental Impact Report (EIS/R) are part of the CDFW-owned and managed Eden Landing Ecological Reserve (ELER, or Reserve) which as a whole covers approximately 4,600 acres in the South Bay. The eleven Reserve ponds in Phase 2 are collectively 2,270 acres.

This Draft EIS/R was prepared by CDFW and USFWS, partnering with the California State Coastal Conservancy (SCC), with technical assistance from the Alameda County Flood Control and Water Conservation District (ACFCWCD) and others to evaluate the potential environmental impacts of the proposed SBSP Restoration Project, Eden Landing Phase 2.

This Draft EIS/R provides a project-level evaluation and analysis of the SBSP Restoration Project, Phase 2 at Eden Landing. The 2007 SBSP Restoration Project Final EIS/R (2007 Final EIS/R) (USFWS and CDFG 2007) was a programmatic EIS/R that analyzed the larger, program-wide details of the SBSP Restoration Project and also included a full project-level analysis for the Phase 1 actions. Where feasible and appropriate, this Draft EIS/R uses information and analysis from the 2007 Final EIS/R for analysis of the project-level impacts of the SBSP Restoration Project, Eden Landing Phase 2.

1.1 Overview of the SBSP Restoration Project

The SBSP Restoration Project is a multi-agency effort to restore tidal marsh habitat, reconfigure managed pond habitat, maintain or improve flood risk management, and provide recreation opportunities and public access in 15,100 acres of former salt-evaporation ponds purchased from and donated by Cargill in 2003.[1] Immediately after the March 2003 acquisition and subsequent transfer of those ponds from Cargill, the landowners, USWFS and CDFW, began implementation of the Initial Stewardship Plan (USFWS and CDFG 2003), which was designed to maintain open water and unvegetated pond habitats with enough water circulation to preclude salt production and maintain habitat values and conditions until long-term restoration actions of the SBSP Restoration Project are implemented. The longer-term planning effort involves a 50-year programmatic-level plan for restoration, flood risk management, and public access. This effort has already seen the implementation of Phase 1 projects, which are described in the 2007 Final EIS/R. The Record of Decision (ROD) signed on January 27, 2009, completed the programmatic level planning process. It was through that planning process that the SBSP Restoration Project developed the

[1] The former salt-production ponds are no longer used for that purpose, and, in many cases, they are operated with salinity conditions ambient with tidal sloughs and San Francisco Bay itself. Some are operated as seasonal ponds that are filled by rainfall along with gravity intake and discharge, and others have been opened to tidal flows by previous actions and are no longer managed ponds. However, for consistency with previous documents associated with the SBSP Restoration Project, this EIS/R has retained the convention of referring to them as “salt ponds” or “ponds”. These are not to be confused with actual salt evaporation ponds still being operated by Cargill.

projects goals and objectives that are discussed further under Section 1.2.1, Purpose and Objectives. These goals and objectives continue to guide the project planning to the present day.

The decision-making and management structure for the SBSP Restoration Project involves collaborative partnerships between public agencies, private organizations, environmental advocates, and the public. The Project Management Team (PMT) provides the day-to-day leadership and management for the project and oversees adaptive management planning and implementation; fundraising; dispute resolution; and outreach to the public, stakeholders, and regulatory and other government agencies. The membership on the PMT consists of representatives from the SCC, the landowning agencies (USFWS and CDFW), the Santa Clara Valley Water District (SCVWD) and the United States Geological Survey (USGS) (the USGS representative serves as the project's Lead Scientist). The Lead Scientist facilitates ongoing communication between scientists working on relevant research and ensures scientific outputs are incorporated into PMT decision making as much as possible. The ACFCWCD and the East Bay Regional Parks District (EBRPD) were also members of the PMT for Phase 1. While not acting as direct partners for Phase 2, representatives from ACFCWCD and EBRPD continue to provide technical assistance to the PMT, and may resume active membership in the future. An Executive Project Manager coordinates and leads the PMT. A representative from the Center for Collaborative Policy also participates in the PMT meetings to maintain ongoing outreach efforts, including those for the project's Stakeholder Forum. The Stakeholder Forum consists of invited representatives from agencies, nonprofit organizations, local business organizations, and elected officials. The Stakeholder Forum advises the PMT on proposed project decisions and represents the project within their communities. The San Francisco Estuary Institute created and maintains the project's website at www.southbayrestoration.org to provide outreach on events, updates on the project status, and presentations on scientific research that is relevant to project. The PMT has met monthly since its inception in 2003.

The planning phase of the SBSP Restoration Project was completed in January 2009 with the signature of the ROD and subsequent regulatory permit issuance. Implementation of the Phase 1 project-level restoration actions in the Reserve began immediately after completion of final designs, and restoration actions were completed in 2014. The final public access and recreation features were completed and opened to the public in May 2016. Phase 1 involved the construction of 3,040 acres of tidal or muted tidal wetlands, 710 acres of enhanced managed ponds, 7 miles of new public access trails, and habitat islands and improved levees.[2] The planning and design for the Phase 2 projects started in 2010, continued for the Alviso and Ravenswood complexes (owned and managed by USFWS and located at the Don Edwards San Francisco Bay National Wildlife Refuge; or Refuge) with the 2015 Phase 2 Draft EIS/R and 2016 Phase 2 Final EIS/R for the Alviso and Ravenswood complexes, and continues for Eden Landing with this Draft EIS/R. The ponds that were not part of Phase 1, nor planned to be part of Phase 2, will continue to be actively managed according to the goals set forth in the Initial Stewardship Plan the Adaptive Management Plan (AMP), the 2007 Final EIS/R, and current operations plans, until further implementation planning is completed and any necessary adaptive management studies are completed.

The following sections describe the goals, objectives, and planning approach set forth in the 2007 Final EIS/R; how they were used to select Phase 1 projects, and how these principles continued to guide the project with the selection of the Phase 2 projects.

[2] The SBSP Restoration Project refers to all former salt pond levees as "levees" even though they were not designed or constructed to perform as true flood protection levees. They are largely earthen berms intended to isolate water for salt production. In keeping with this project's established terminology, this Draft EIS/R maintains the term "levees" throughout.

1.2 Purpose and Need

The Phase 2 actions described in this Draft EIS/R tier from the 2007 Final EIS/R and consist of project-level implementation of the SBSP Restoration Project for some areas of the Reserve. Phase 2 also includes options for incorporating some non-Reserve areas into the project planning and design through collaboration with the entities that own those areas (more detail on this is in Section 1.5, below). Proposed Phase 2 actions are intended to move toward achieving the overall purpose and need, goal, and objectives developed for the SBSP Restoration Project as a whole. The purpose and need, goal, and objectives were developed for the 2007 Final EIS/R by the SBSP PMT with input from the Stakeholder Forum, Science Team, and Regulatory and Trustee Agency Group. As such, Phase 2 has the same purpose and need, goal, and objectives as the SBSP Restoration Project as a whole.

The goal, objectives, and purpose and need are discussed in the following sections.

1.2.1 Goal and Objectives

The overarching goal and six objectives developed for the SBSP Restoration Project, which were adopted by the SBSP Restoration Project Stakeholder Forum on February 18, 2004, and presented in the 2007 Final EIS/R, apply to Eden Landing Phase 2.

Goal

The goal of Phase 2 of the SBSP Restoration Project at Eden Landing is the restoration and enhancement of wetlands in the South Bay while providing for flood management and wildlife-oriented public access and recreation.

Objectives

Consistent with those listed in the 2007 Final EIS/R, the objectives of Phase 2 of the SBSP Restoration Project at Eden Landing are:

1. Create, restore, or enhance habitats of sufficient size, function, and appropriate structure to:
   - Promote restoration of native special-status plants and animals that depend on South Bay habitat for all or part of their life cycles.
   - Maintain current migratory bird species that utilize existing salt ponds and associated structures such as levees.
   - Support increased abundance and diversity of native species in various South Bay aquatic and terrestrial ecosystem components, including plants, invertebrates, fish, mammals, birds, reptiles, and amphibians.
2. Maintain or improve existing levels of flood risk management in the South Bay. [3]
3. Provide public access and recreational opportunities compatible with wildlife and habitat goals.

[3] The 2007 Final EIS/R and other SBSP Restoration Project documents used the term “flood protection” to describe its goals, but the conventional terminology has since changed to be “flood risk management.” This document generally uses the former term to refer to overall Project goals that were established prior to this terminology change but uses the latter term for forward-looking statements and actions that would be taken in the future.

4. Protect or improve existing levels of water and sediment quality in the South Bay and take into account ecological risks caused by restoration.
5. Implement design and management measures to maintain or improve current levels of vector management, control predation on special-status species, and manage the spread of non-native invasive species.
6. Protect the services provided by existing infrastructure (e.g., power lines, railroads).

1.2.2 Purpose and Need for Action

Phase 2 of the SBSP Restoration Project at Eden Landing is needed to address the following:

- Historic losses of tidal marsh ecosystems and habitats in San Francisco Bay (or Bay) and concomitant declines in populations of endangered species (e.g., California Ridgway's rail [(*Rallus obsoletus obsoletus*; formerly California clapper rail)], salt marsh harvest mouse [*Reithrodontomys raviventris raviventris*]);
- Increasing salinity and declining ecological value in several of the ponds within the project area;
- Long-term deterioration of non-certifiable levees (for Federal Emergency Management Agency [FEMA] purposes) within the project area, which could lead to levee breaches and flooding;
- Long-term tidal flood risk management; and
- Limited opportunities in the South Bay for wildlife-oriented recreation.

The purpose of the SBSP Restoration Project is to meet the needs described above through implementing various alternatives to restore tidal marsh habitat, reconfigure managed pond habitat, maintain current levels of flood risk management, and provide recreation opportunities and public access.

1.2.3 Restoration

The 2007 Final EIS/R describes a mix of tidal habitat and managed pond habitat restoration intended to balance the trade-offs between several ecological goals and objectives. The 2007 Final EIS/R stated that the SBSP Restoration Project's preferred alternative was Programmatic Alternative C, which would restore up to 90 percent of the SBSP Restoration Project's ponds to tidal wetlands, in phases, through an adaptive management framework. Programmatic Alternative B would have set a target at 50 percent tidal marsh and 50 percent enhanced managed ponds. In choosing Programmatic Alternative C, the PMT left itself flexibility to work towards that end goal while still acknowledging that the 50/50 balance from Alternative B and the 90/10 balance from Alternative C represented "bookends" of what the long-term restoration outcomes would be and that the actual stopping point of restoration would likely be somewhere between these end-points.

Although restoration of tidal habitat would benefit special-status and native species (Objective 1a), enhancement of managed pond habitats would help maintain the migratory bird species using the existing ponds (Objective 1b). Both habitat types would support an increased abundance and diversity of the native species of the South Bay (Objective 1c). The SBSP Restoration Project's success in balancing these objectives will be evaluated through implementation of the Adaptive Management Plan (AMP), which not only helps the ongoing and short-term management actions and decisions for the SBSPs but also helps determine future restoration targets for each of the ponds to balance tidal marsh restoration with enhancement of managed ponds and the eventual stopping point between the 50/50 and 90/10 bookends described above. Successfully balancing the types of restoration actions means that the SBSP Restoration Project can maximize benefits to the broadest spectrum of sensitive and other wildlife species, while minimizing undesired impacts to the environment. Phase 2 actions at Eden Landing are a continuation of this process.

Other planning considerations that supported the SBSP Restoration Project's objectives were taken into account. Tidal marsh restoration projects were located where they would eventually create a continuous band of tidal marsh (a "tidal marsh corridor") along the edge of San Francisco Bay to provide connectivity of habitat for tidal-marsh-dependent species, particularly the Ridgway's rail and the salt marsh harvest mouse. Also, areas adjacent to the major sloughs that serve as migration corridors for anadromous fish were identified as a high priority for tidal restoration. Where possible, the SBSP Restoration Project seeks to restore broad tidal areas protected from human and predator access.

As an adaptation to future sea level rise, the project is proposing the creation of habitat transition zones as part of Phase 2 actions at Eden Landing. Habitat transition zones involve the beneficial reuse of material to create transitional habitats from the pond or marsh bottom to the adjacent upland habitat along portions of the upland edge. These "habitat transition zones", are sometimes referred to elsewhere as "upland transition zones," "transition zone habitats," "ecotones," or "horizontal levees"; this document uses "habitat transition zones" for these constructed features. Transition zones are specifically called out in documents such as the USFWS's Tidal Marsh Recovery Plan and the recent Science Update to address climate change for the Baylands Ecosystem Habitat Goals Project Report. A gradual transition from submerged Baylands, ponds, or open waters to uplands is largely missing in the current landscape of the South Bay, where there is often an abrupt boundary between the bay or ponds and the built environment. The SBSP Restoration Project's intention in including habitat transition zones in the Eden Landing Phase 2 alternatives is to restore this missing habitat feature. Doing so would:

1. Establish areas in which terrestrial marsh species can take refuge during high tides and storm events, thereby reducing their vulnerability.
2. Expand habitat for a variety of special status plant species that occupy this specific elevation zone.
3. Provide space for marshes to migrate upslope over time as sea-level rise occurs.

Before proposing these features, the SBSP Restoration Project examined the landscape to see if there are any areas adjacent to the project site where this could occur naturally. In general, the best locations for building these features would be located adjacent to open space or park land where the project can provide an even greater extent of transition into upland habitats. However, at the edge of the Bay, these open space areas are often former (now closed and capped) landfills that present a variety of challenges for creating the missing upland habitat. The existing elevation gradient between the restored marsh and the edge of the landfill is usually too steep to provide a gradual transition. Secondly, these landfills would otherwise pose a water quality risk from erosion if tidal action were introduced immediately adjacent to the protective clay liner or un-engineered rip rap slopes. In these instances, it is necessary that the project place material inside the former salt ponds to create the desired slope (15:1 to 30:1).

At other locations, whether the adjacent lands are closed landfills or other forms of public or private development, the actual elevations landward of the project sites are too low to create an uphill slope with the desired habitat functions. Therefore, once new levees are built to protect that area from tidal flooding, the only area remaining to build the transition zones is into the salt ponds. Finally, most of the adjacent property is not within the SBSP Restoration Project's ability to acquire, whether or not it has the desired elevation profile, because it is currently developed. In addition to being very expensive to acquire these areas, it would be infeasible to relocate all of the residences and businesses that have been built adjacent to the salt ponds.

For these reasons, the project plans to use imported fill from upland excavation projects and beneficial reuse of clean dredged material to create habitat transition zones inside the former salt ponds. The transition zones would improve the habitat quality of the restored marsh, particularly for endangered and threatened species, and improve resiliency of the shoreline over time as sea levels rise.

Phase 2 actions at Eden Landing could provide a combination of restored tidal wetlands and enhanced managed ponds. The approach to enhancing the managed ponds was to reconfigure the former salt production ponds to provide many of the ecological benefits, though in a smaller footprint, by providing enhanced water flows, pond depth, and salinity regimes for target species, especially migratory shorebirds and waterfowl, but also nesting terns and shorebirds. The creation of roosting and nesting islands was identified as part of pond enhancement. Reconfigured managed ponds would be located in accessible areas to provide for ease of operation and maintenance (O&M) and dispersed so they are readily available to birds traveling between the ponds and other habitats throughout the South Bay. The project expects to rely on gravity-flow structures as much as possible to minimize the costs of pumping while providing adequate pond habitat to support high densities of birds. Ponds near interpretive opportunities, such as the historical salt works, are to be managed as appropriate to preserve the historic resources of interest.

1.2.4 Flood Risk Management

The second goal of the SBSP Restoration Project (Objective 2) is "to maintain or improve existing levels of flood protection in the South Bay Area". Since the time of project initiation, however, the terminology used by the SBSP Restoration Project to describe its goals has changed from "flood protection" to "flood risk management" to distinguish improvements to existing berm-like salt pond levees from engineered levees specifically designed for flood protection. This document generally uses the former term to refer to overall project goals that were established prior to this terminology change but uses the latter term for forward-looking statements and actions that would be taken in the future.

The project and adjacent areas are in low-lying Bay shoreline that could be vulnerable to coastal flooding from storms and sea-level rise. Recognizing that the changing hydrology in these areas requires the expertise and funding available from local flood protection agencies, the SBSP Restoration Project's management team invited these agencies to join the planning team early in the process. The approach to managing flood risks with tidal restoration projects was to locate the projects in areas where they would not increase the existing flood risk; in addition, existing levees were to be improved to provide increased, if still limited, protection or to raise existing high-ground areas with fill. In areas where this approach was not sufficient, the project sought to work with local flood protection agencies to implement the appropriate measures to protect adjacent areas and allow for tidal and other habitat restoration.

Flood risk management continues to be a significant consideration for Phase 2 at Eden Landing. In Alameda County, the SBSP Restoration Project is working with ACFCWCD to address flood risks at Eden Landing. Analogous efforts are ongoing with the SCVWD and the United States Army Corps of Engineers (USACE) in Santa Clara County, and with the Strategy to Advance Flood Protection, Ecosystems and Recreation along the Bay (SAFER Bay) project, an effort led by the San Francisquito Creek Joint Powers Authority, in San Mateo County. See Section 1.2.8, Phase 2 Planning Process, which provides details about why efforts to plan and undertake environmental compliance for Phase 2 actions at Eden Landing are being conducted separately from those in Santa Clara County and San Mateo County.

1.2.5 Recreation and Public Access

To meet the third goal and project Objective 3 ("provide public access and recreation opportunities compatible with wildlife and habitat goals"), the SBSP Restoration Project incorporates public access features into project design. The 2007 Final EIS/R describes actions to complete the missing segments of the Bay Trail "spine", to create new Bay Trail "spur" trails, and to provide interpretive signage and guided or self-guided walks to cultural features and interpretive stations at strategic locations along the trail network. These elements are continued in Phase 2 at Eden Landing by incorporating public access features into the design. Interpretive stations would be of varying sizes and scope and may include interactive features that can operate independently or be enhanced with the assistance of docents. Viewing platforms are recommended at vista points with interpretive panels or signage to link the viewer with the site location. Although opportunities for waterfowl hunting and sport fishing would be reduced, other public access and recreation features should provide increases in high-quality, varied aesthetic experiences and encourage recreation for greater numbers and varieties of visitors.

Where levees are improved or proposed, trails are to be integrated with the levee structure in some, but not all areas, without impeding the flood risk management function. Tidal access and recreation areas are designed to withstand periodic inundation, if appropriate, and may be in locations that would have more limited access or use, depending on tidal location and habitat requirements. Research on the effects of recreation on habitat use and quality may be undertaken, and new information will be incorporated into the adaptive management process. Access points are designed to be as barrier-free as possible to provide access for visitors of varying abilities and to comply with the Americans with Disabilities Act (ADA). The designs consider city and county standards and would strive to harmonize with existing facilities.

1.2.6 Adaptive Management

The 2007 Final EIS/R acknowledged that significant uncertainties remain with the project because of its geographic and temporal scale. To address these uncertainties, the SBSP Restoration Project was planned to be carefully implemented in phases, with learning from the results incorporated into management and planning decisions. This adaptive management approach is described in the AMP (Appendix D of the 2007 Final EIS/R), which is a comprehensive plan and program to generate information (applied studies, monitoring, and research) that the PMT can use to make decisions about both current management of the project area and future restoration actions to meet project objectives and avoid harmful impacts to the environment.

Adaptive management is essential to keeping the project on track to meet its objectives, and adaptive management was the primary tool that the 2007 Final EIS/R identified for avoiding significant impacts to the environment. Without adaptive management (and its associated information collection), the PMT would not understand the restored system and would not be able to explain its management actions to the public. Furthermore, responses to unanticipated changes would be based on incomplete scientific understanding and anecdotal observations, which could exacerbate problems. For these reasons, adaptive management is integral to the project, and construction projects are expected to feature applied studies, as called for in the AMP, so that the PMT can learn from project implementation.

Although the preferred alternative in the 2007 Final EIS/R was Programmatic Alternative C, which would restore up to 90 percent of the SBSP Restoration Project's ponds to tidal wetlands in phases, the document also states that if that alternative is not possible without causing undesired environmental impacts, as detected through the adaptive management monitoring and applied studies, then the project would stop converting ponds to tidal wetlands. The actual amount of tidal wetlands restored at the end of the 50-year project horizon could be less than 90 percent.

Adaptive management continues to be a significant part of Eden Landing Phase 2. As described below, data will be collected through the AMP-guided Phase 2 project evaluation and design.

1.2.7 Phase 1 Projects

The 2007 Final EIS/R was not just a planning document but also included project-level analysis of several restoration, enhancement, recreation, and flood protection projects that would help fulfill the SBSP Restoration Project's goals and objectives. The selection of the Phase 1 projects considered a variety of factors. The criteria, as listed in the 2007 Final EIS/R, were available funding, likelihood of success, ease of implementation, visibility and accessibility, opportunities for adaptive management and applied studies, value in building support for the project, and certainty of investment.

Phase 1's restoration actions were successfully completed in December 2014; the last of the public access and recreation features were completed in April 2016. At the end of Phase 1, 1,600 acres of tidal and 1,440 acres of muted tidal habitats were opened to tidal inundation. The tidal areas already show signs of estuarine sedimentation and natural vegetative colonization. These tidal habitats will contribute to the recovery of endangered, threatened, and other special-status species; tidal-marsh-dependent species; and the recovery of South Bay fisheries. Also, 710 acres of managed ponds were constructed at a range of water depths to create a variety of depth, hydrology, and salinity regimes through the use of water control structures, grading, and other means. In addition, approximately 7 miles of new trail were built, providing new recreational opportunities. Islands were constructed in Ponds SF2, A16, and E12 and E13.

1.2.8 Phase 2 Planning Process

In 2010, the PMT began Phase 2 planning with a design charrette. The PMT confirmed that the project objectives had not changed from those stated in the 2007 Final EIS/R. The primary evaluation criteria used were similar to those used in Phase 1 project selection: likelihood of progress toward project objectives, opportunities for resolving adaptive management uncertainties, value in continuing to build support for the project, readiness to proceed, and dependency on precedent actions. The last criterion was added because the PMT recognized that with the completion of Phase 1 projects, subsequent project phases were increasingly likely to require completion of other projects or adaptive management studies before SBSP Restoration Project actions could occur. For example, in some areas, proposed flood risk management projects needed to be completed before ponds were opened to tidal action. In other areas, additional data were needed to assess the long-term response of species occupying a particular pond to changes in the project area before a pond could be opened to the tides. The secondary criteria considered were visibility and accessibility, availability of funding, and balance (meaning both a geographic balance of project locations and a balance between the project goals of restoration, public access, and flood risk management). Again, the balance criterion was added to Phase 2 because as more projects are completed, it will require more of the PMT's attention to maintain the geographical balance and the project purpose balance when selecting projects.

The design charrette created a list of initial options that was presented to the Stakeholder Forum, regulatory agencies, and interested parties in 2010. The report on that Phase 2 charrette is provided here as Appendix A, Phase 2: Preliminary Options for Future Actions. After the initial feedback on the design charrette, the PMT proceeded to hire a professional environmental services firm to undertake the required technical analysis of the project elements. The initial project elements included restoration, public access, and flood risk management actions in all three pond complexes: Alviso, Ravenswood, and Eden Landing.[4]

However, early in the design process the PMT realized that the proposed alternatives for Eden Landing would take longer to develop and analyze and that a separation of Phase 2 into landowner-specific design and environmental compliance processes would be necessary. Phase 2 at Eden Landing was likely to include a large flood risk management component to be developed with technical assistance from the ACFCWCD. Due to the technical complexity of the Eden Landing Phase 2 project and other constraints having to do with land ownership, flood risk management, and funding requirements, the PMT decided to pursue those actions under a separate EIS/R process. However, all three pond complexes were included in the scope of Phase 2 planning.

The Council on Environmental Quality (CEQ) regulations for implementing the National Environmental Policy Act (NEPA) (CEQ 2015) and the *2016 California Environmental Quality Act* (CEQA) *Statute and Guidelines* (hereafter "CEQA Statute and Guidelines") (AEP 2016) for CEQA discuss tiering an environmental analysis from program-level documents to project-level documents on the actual issues for decision. Because the Eden Landing Phase 2 actions were not as well defined as early as those at the Don Edwards San Francisco Bay National Wildlife Refuge, the Eden Landing Phase 2 project components were not ready for decision making. Separating out the Eden Landing Phase 2 actions from those at Alviso and Ravenswood was not "piecemealing" (an unacceptable practice in which projects are analyzed incrementally by parts to make the environmental impacts appear smaller to the overseeing agencies) because the three pond complexes are geographically separated and distinct and do not have substantial interactions between them. Although some wildlife species may make use of two or more of these pond complexes, the pond complexes are otherwise quite independent. Further, actions implemented at the Eden Landing Phase 2 project area would have independent utility.

In sum, while the large-scale plans for Phase 2 at the three pond complexes (Ravenswood, Alviso, and Eden Landing) were developed together, the project-level conceptual alternatives, designs, and the NEPA/CEQA documents are being developed separately. In this Eden Landing Phase 2 EIS/R, the Phase 2 actions at the Don Edwards San Francisco Bay National Wildlife Refuge (Alviso and Ravenswood) are treated as a separate project. Therefore, the potential cumulative impacts from the spatially and temporally distinct parts of the larger SBSP Restoration Project are analyzed in Chapter 4, Cumulative Impacts. A full discussion of the Phase 2 designs and environmental clearance processes at the Refuge ponds is available in the Final EIS/R for those pond complexes. That document is available for download from the project's website at: http://www.southbayrestoration.org/planning/phase2/.

In 2012, Opportunities and Constraints Memoranda were prepared for the suite of initial options envisioned by the PMT and presented to the Stakeholder Forum and interested general public for each pond complex. The Opportunities and Constraints Memoranda re-examined the initial options to see if other innovative restorations, flood risk management, or recreation components could be added to the

[4] The term "pond complex" refers to each of the separate regional groups of ponds. In the SBSP Restoration Project, there are three pond complexes: Eden Landing, Alviso, and Ravenswood.

optional actions. These memoranda were circulated to the PMT, and the results were discussed at the project-wide Stakeholder Forum in November of 2012. The project selection and refinement process has also incorporated additional outreach to other project stakeholders. In 2011, working groups for each of the three pond complexes met to discuss the proposed project actions. Annual meetings of the PMT with teams of scientists conducting monitoring and applied research studies have been held since 2011 to enhance coordination between scientists and the members of the PMT. The proposed Phase 2 actions have been discussed and evaluated by the PMT with input from the Science Team at each meeting to incorporate their feedback and to ensure that Phase 2 was considering opportunities for resolving some of the key project uncertainties identified in the AMP. The proposed options were grouped together as appropriate to make multi-objective project alternatives in each pond complex.

For the Eden Landing pond complex, sets of public access, flood risk management, pond enhancement, and tidal restoration options for the eleven ponds in southern Eden Landing were combined to become the Eden Landing Phase 2 project alternatives. A preliminary report on the process of developing, screening, and combining the various components into alternatives was issued in 2014. That document is provided here as Appendix B, Eden Landing Preliminary Alternatives Analysis Report, which explains in detail the processes by which the alternatives were developed, screened, modified, and ultimately selected for inclusion in this Draft EIS/R.

In 2014 and 2015, these preliminary conceptual alternatives for Phase 2 at Eden Landing were evaluated for engineering feasibility and their ability to meet the project’s restoration goals while still providing the necessary flood risk management. These evaluations indicated that different types and combinations of flood risk management would be sufficient to achieve these goals. Revisions to the alternatives were made in early 2016. The result of this process was a set of three Action Alternatives and the required No Action Alternative (also referred to as a “No Project Alternative” under CEQA, but the NEPA term will be used throughout this Draft EIS/R) for each of the pond complexes.

The revised alternatives were presented at a public scoping meeting in June 2016. The public comments from the public scoping meeting are presented as Appendix C, Public Scoping, to this Draft EIS/R.

1.3 Eden Landing Phase 2 Project Location

The SBSP Restoration Project is in South Bay in Northern California (see Figure 2-1). The portions of the SBSP Restoration Project covered in this Draft EIS/R (i.e., Phase 2) consist of the southern half of the ELER, the whole of which is also known as the Eden Landing pond complex (see Figure 2-2). [5]

The Eden Landing pond complex consists of 23 ponds on the shores of the eastern side of the South Bay in Alameda County. The total pond area is 4,600 acres and additional areas of existing marsh comprise the 5,500- acres of the 15,100-acre total acquisition area. The pond complex is bordered on the east by the cities of Hayward, Union City, and Fremont; on the north by State Route (SR) 92; and on the south (across the Alameda Creek Flood Control Channel; ACFCC) by Coyote Hills Regional Park and portions of the Don Edwards San Francisco Bay National Wildlife Refuge. The Phase 1 actions at Eden Landing focused on the northern half of the Reserve and included year-round and seasonal trails, a kayak launch,

[5] As explained above, Phase 2 actions are also being planned for implementation at the Alviso pond complex and the Ravenswood pond complex, which are owned and managed by the USFWS as part of the Don Edwards San Francisco Bay National Wildlife Refuge. Those project actions were analyzed under a separate CEQA/NEPA compliance process, which concluded earlier in 2016.

and a combination of tidal marsh restoration and enhancements to managed ponds to improve habitat for various species. The implementation of these measures was completed in spring of 2016.

The Phase 2 project actions at Eden Landing focus on the ponds in the southern half of the Reserve. The northern and southern halves of the Reserve are separated by the Old Alameda Creek channel. “Southern Eden Landing”, which is the Phase 2 project area considered in this EIS/R, generally extends between the ACFCC and Old Alameda Creek channels and from the Bay itself to the inner and easternmost levees or berms that abut the developed communities and other land uses behind them. Some of the recreation and public access features – the trails, in particular – extend beyond this general boundary to connect to the existing trail networks to the north and across the ACFCC to the south.

1.4 NEPA and CEQA Overview

This Draft EIS/R was prepared in accordance with the CEQ regulations for implementing NEPA (40 Code of Federal Regulations [CFR] 1500–1508) (CEQ 2015) and CEQA (Public Resources Code Section 21000 et seq.) (AEP 2016). The USFWS is the lead agency under NEPA. The CDFW is the lead agency under CEQA.

In the 2007 Final EIS/R for the SBSP Restoration Project (USFWS and CDFG 2007), USACE and the National Aeronautics and Space Administration (NASA) were cooperating agencies [6] under NEPA; however, because NASA’s involvement is limited to activities adjacent to the NASA Ames Research Center, that agency has not been involved in Phase 2 planning. Responsible agencies [7] under CEQA include CDFW, the San Francisco Bay Regional Water Quality Control Board (RWQCB), ACFCWCD, SCVWD, the California State Lands Commission, and the San Francisco Bay Conservation and Development Commission (BCDC). The California State Lands Commission is also a trustee agency.

A Regulatory and Trustee Agency Working Group formed for the program provides ongoing support to the regulatory agencies. This group includes staff of federal, state, local, and other regulatory agencies that provide endangered species recovery guidance and permitting authority for the SBSP Restoration Project.

USFWS, SCC, and CDFW jointly manage Phase 2 of the SBSP Restoration Project in collaboration with USGS and SCVWD. Together, these agencies form the SBSP Restoration Project’s PMT. EBRPD and ACFCWCD continue to provide technical assistance to the PMT. These agencies may resume active membership in the PMT, or be members of the Stakeholder Forum, in the future.

[6] According to Section 1501.6 of the CEQ Regulations, “Upon request of the lead agency, any other Federal agency which has jurisdiction by law shall be a cooperating agency. In addition, any other Federal agency which has special expertise with respect to any environmental issue, which should be addressed in the statement may be a cooperating agency upon request of the lead agency. An agency may request the lead agency to designate it a cooperating agency.”

[7] Responsible agencies is defined in Section 15381 of the CEQA Guidelines as “a public agency which proposes to carry out or approve a project, for which a Lead Agency is preparing or has prepared an EIR or Negative Declaration…[it] includes all public agencies other than the Lead Agency which have discretionary approval power over the project.” It includes both state and local agencies that issue permits or provide funding.

1.4.1 Purpose of the EIS/R

This Draft EIS/R is intended to provide the public and the cooperating, responsible, and trustee agencies with information about the potential environmental effects of the SBSP Restoration Project, Phase 2 at Eden Landing. It will be used by the lead agencies when considering approval of the project.

The CEQ regulations for implementing NEPA (40 CFR 1502.1) state that

> "the primary purpose of an [Environmental Impact Statement; EIS] is to serve as an action-forcing device to ensure that the policies and goals defined in [NEPA] are infused into the ongoing programs and actions of the federal government. An EIS shall provide full and fair discussion of significant environmental impacts and shall inform decision makers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment."

CEQA Section 21002.1 states that the purpose of an Environmental Impact Report (EIR) is to identify the significant effects on the environment of a project, to identify alternatives to the project, and to indicate the manner in which those significant effects can be mitigated or avoided.

Both NEPA and CEQA encourage the preparation of combined environmental planning documents.

1.4.2 Joint EIS/R

This document is a joint EIS/R. As noted above, NEPA and CEQA have similar purposes and thus use generally similar concepts and terminologies. In some cases, different terms are used to convey the same meaning. Examples of these differences in terminologies are shown in Table 1-1. This joint EIS/R primarily uses CEQA terminology; however, many NEPA terms are also used.

Table 1-1 Terms Used in NEPA and CEQA Documents

NEPA TERM	CEQA TERM
Action	Project
Lead Agency	Lead Agency
Cooperating Agency	Responsible Agency
Notice of Intent	Notice of Preparation
Environmental Impact Statement	Environmental Impact Report
Record of Decision	Findings
Purpose and Need for Action	Objectives of the Project
Affected Environment	Environmental Setting
Environmental Consequences	Impacts Analysis and Mitigation Measures
Effect	Impact
Historic Property	Historical Resource

1.4.3 Tiering from a Programmatic Joint Document

Both NEPA and CEQA guidelines have generally the same definition for tiering, which refers to the coverage of general matters in a broader EIS or EIR, with subsequent narrower or ultimately site-specific EISs or EIRs incorporating by reference the general discussions and concentrating solely on the issues specific to the proposed project. NEPA and CEQA encourage agencies to tier the environmental analyses for separate, but related, projects to reduce repetition.

Tiering is appropriate when the sequence of analysis follows from an EIS or EIR prepared for a program to an environmental document for an action or project of lesser scope, as is anticipated for the subsequent phases of the proposed SBSP Restoration Project. The SBSP Restoration Project is being implemented in a series of phases over many years, on the order of several decades. The 2007 Final EIS/R covered the long-term and larger geographic-scale components of the project (i.e., the programmatic components). Therefore, this project-level tiered EIS/R tiers off the 2007 Final EIS/R for the SBSP Restoration Project as a whole. Each subsequent phase will require a separate project-level NEPA/CEQA impact analysis.

NEPA

The CEQ regulations for implementing NEPA address the concept of program- and project-level impact analysis in their definition of "tiering" (43 Federal Register [FR] 56003 Section 1508.28). According to the CEQ regulations, "tiering" refers to the coverage of general matters in broader environmental impact statements (such as national program or policy statements) with subsequent narrower statements or environmental analyses (such as regional or basin-wide program statements or ultimately site-specific statements) incorporating by reference the general discussions and concentrating solely on the issues specific to the statement subsequently prepared. Tiering is appropriate when the sequence of statements or analyses is:

> (a) From a program, plan, or policy environmental impact statement to a program, plan, or policy statement or analysis of lesser scope or to a site-specific statement or analysis.
>
> (b) From an environmental impact statement on a specific action at an early stage (such as need and site selection) to a supplement (which is preferred) or a subsequent statement or analysis at a later stage (such as environmental mitigation). Tiering in such cases is appropriate when it helps the lead agency to focus on the issues which are ripe for decision and exclude from consideration issues already decided or not yet ripe." (43 FR 56003 Section 1508.28)

CEQA

Similarly, the CEQA Statute and Guidelines discusses tiering (AEP 2016); Section 15385 provides the following definition for tiering:

> "'Tiering' refers to the coverage of general matters in broader EIRs … with subsequent narrower EIRs or ultimately site-specific EIRs incorporating by reference the general discussions and concentrating solely on the issues specific to the EIR subsequently prepared."

Tiering is appropriate when the sequence of EIRs is:

> (a) From a general plan, policy, or program EIR to a program, plan, or policy EIR of lesser scope or to a site-specific EIR;
>
> (b) From an EIR on a specific action at an early stage to a subsequent EIR or a supplement to an EIR at a later stage. Tiering in such cases is appropriate when it helps the Lead Agency to focus on the issues which are ripe for decision and exclude from consideration issues already decided or not yet ripe.

1.4.4 EIS/R Format

This document is a project-level tiered EIS/R, which examines the environmental impacts of the specifics of the Phase 2 alternatives, including construction and operation. This Draft EIS/R specifically considers whether Phase 2 alternatives would result in new significant impacts not identified in the 2007 Final EIS/R or if the Phase 2 alternatives would cause a substantial increase in the severity of previously identified impacts. This Draft EIS/R also discusses any pertinent new information or changes in circumstances that could result in new significant impacts not identified in the 2007 Final EIS/R or a substantial increase in the severity of previously identified significant impacts.

Previous mitigation measures identified in the 2007 Final EIS/R are described in Section 2.3, General Mitigation Measures from the 2007 Final EIS/R, and would be implemented where relevant to Phase 2 alternatives. These mitigation measures have been revised or augmented as appropriate for Phase 2 actions. This Draft EIS/R also identifies whether new mitigation measures are required.

1.4.5 Environmental Review Process

Scoping

Scoping, or early consultation with persons or organizations concerned with the environmental effects of a project, is required when preparing a joint EIS/R. CEQ regulations for implementing NEPA (40 CFR 1506.6) require that agencies make diligent efforts to involve the public in preparing and implementing their NEPA procedures. Pursuant to NEPA, a Notice of Intent to prepare an EIS/R for Phase 2 of the SBSP Restoration Project was published in the Federal Register on June 20, 2016. Pursuant to the CEQA Statute and Guidelines, Section 15082, a Notice of Preparation was distributed to responsible agencies and the public on May 24, 2016. These notices announced a public review period during which comments were received on the appropriate scope of the Draft EIS/R.

A public scoping meeting was held on June 30, 2016, to solicit comments on environmental issues to be addressed in the Draft EIS/R. The scoping comments received during the comment period are presented in Appendix C, Public Scoping.

Draft EIS/R

A Notice of Availability for the Draft EIS/R will be published in the Federal Register, advertisements will be placed in several local newspapers, and the Draft EIS/R will be filed with the United States Environmental Protection Agency (USEPA) for federal review in accordance with 40 CFR parts 1506.9 and 1506.10. The publication of the Notice of Availability also serves to meet CEQA requirements. Also, pursuant to the CEQA Statute and Guidelines, the Draft EIS/R, along with a Notice of Completion, will be filed with the Office of Planning and Research for state agency review. USFWS and CDFW will send notices to all who provided scoping comments, expressed interest in this project, or requested such notice in writing. Copies of the Draft EIS/R will be available for public review on the SBSP Restoration Project website (www.southbayrestoration.org) and during regular office hours at the following locations:

- California Department of Fish and Wildlife, 7329 Silverado Trail, Napa, CA, 94558, (707) 944-5500;
- California State Coastal Conservancy, 1515 Clay Street, 10th Floor, Oakland, CA 94612, (510) 286-1015;

- Don Edwards San Francisco Bay National Wildlife Refuge Visitor Center, 2 Marshlands Road, Fremont, CA 94555, (510) 792-0222;
- Offices of the San Francisco District of the United States Army Corps of Engineers, 1455 Market Street, #16, San Francisco, CA 94103, (415) 503-6804; and
- Administrative offices of the Santa Clara Valley Water District, 5750 Almaden Expressway, San Jose, CA 95118-3686, (408) 265-2600.

The Draft EIS/R will also available for public review at the following libraries:

- California State University Library, 25800 Carlos Bee Blvd., Hayward, CA 94542, (510) 885-3000.
- Fremont Main Library, 2400 Stevenson Blvd., Fremont, CA 94538, (510) 745-1424.
- Hayward Public Library, Central Library, 835 C Street, Hayward, CA 9454, (510) 293-8685
- Union City Library, 34007 Alvarado-Niles Road, Union City, CA 94587, (510) 745-1464
- Natural Resources Library, United States Department of the Interior, 1849 C Street NW, Washington, DC 20240–0001, (202) 208-5815.

This Draft EIS/R is being circulated for a 45-day public and agency review period, beginning with the publication of this document (receipt of the Draft EIS/R from the State Clearinghouse and publication of the Notice of Availability in the Federal Register). Copies of the Draft EIS/R are available either directly or through the locations designated above to applicable local, state, and federal agencies and to interested organizations and individuals wishing to review and comment on the report.

The USFWS and CDFW will consider all comments on the Draft EIS/R provided by the public and federal, state, and local agencies within the public review period. In the Final EIS/R, formal responses to these comments will be presented in an appendix to that document.

Future Steps

Future steps will involve preparing the Final EIS/R, EIR certification, and a Mitigation and Monitoring Program (under CEQA).

Final EIS/R

A Final EIS/R will be prepared that incorporates changes suggested by comments on the Draft EIS/R, as appropriate, and responds to all substantive comments received during the Draft EIS/R review period. The Final EIS/R is required to (1) provide a full and fair discussion of the proposed action’s significant environmental impacts; and (2) inform the decision-makers and the public of reasonable measures and alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment. A Notice of Availability for the Final EIS/R will be published in the Federal Register and in local newspapers, and the Final EIS/IR will be filed with USEPA pursuant to 40 CFR parts1506.9 and 1506.10. USFWS and CDFW will provide notices of the Final EIS/R to all who commented on the Draft EIS/R and others who have signed up for noticing. Copies of the Final EIS/R will also be available for review on the SBSP Restoration Project website (www.southbayrestoration.org) and at the locations listed above.

CDFW will not proceed with implementing the SBSP Restoration Project, Phase 2 at Eden Landing until certification of the EIR. Under CEQA Guidelines, CDFW will send other agencies responses to the Draft EIS/R public comments at least 10 days prior to certification of the EIR. The comments and responses from the Draft EIS/R will be compiled and included as an appendix to the Final EIS/R.

Record of Decision

The final step in the NEPA process is the preparation of the ROD, which presents a concise summary of the decision made by a federal agency. The ROD can be published immediately after the Final EIS/R wait period has ended. Federal agencies using the Final EIS/R for permitting or funding decisions would prepare a ROD following a minimum 30-day wait period. The ROD will summarize the proposed action and alternatives considered in the EIS/R, identify and discuss factors considered in the federal agency's decision, and state how these considerations entered into the final decision. If appropriate, the ROD will state how Phase 2 of the SBSP Restoration Project will be implemented at Eden Landing and describe any associated mitigation measures. Final signature of the ROD will follow.

EIR Certification

The final step in the CEQA process is certification of the EIR. In accordance with CEQA, CDFW would make one or more written findings for any significant CEQA impacts, accompanied by a brief explanation of the rationale for each finding. The findings constitute a binding set of obligations that will come into effect when the SCC approves the project. When making the findings, the lead agency must adopt a program for reporting on or monitoring the changes that it has either required in the project or made a condition of approval to avoid or substantially lessen significant environmental effects.

When a lead agency decides to approve a project that will result in significant unavoidable impacts (impacts that cannot be avoided or reduced to less-than-significant levels), the lead agency is required to prepare a Statement of Overriding Considerations. The statement must specify the reasons to support the lead agency's actions based on substantial evidence in the record. According to the CEQA Statute and Guidelines, Section 15093,

> "CEQA requires the decision-making agency to balance, as applicable, the economic, legal, social, technological, or other benefits of a proposed project against its unavoidable environmental risks when determining whether to approve the project. If the specific economic, legal, social, technological, or other benefits of a proposed project outweigh the unavoidable adverse environmental effects, the adverse environmental effects may be considered 'acceptable.'"

A certified EIR indicates the following:

- The document complies with CEQA;
- The decision-making body of the lead agency reviewed and considered the Final EIR before approving the project; and
- The Final EIR reflects the lead agency's independent judgment and analysis.

Within 5 working days after approval of the project, the CEQA lead agency, the SCC, is required to file a Notice of Determination (NOD) with the Office of Planning and Research and the Alameda County Clerk.

Mitigation Monitoring and Reporting Program (CEQA)

CEQA Section 21081.6(a)(1) requires lead agencies to "adopt a reporting or monitoring program for the changes made to the project or conditions of project approval, adopted in order to mitigate or avoid significant effects on the environment." The Mitigation Monitoring and Reporting Program (MMRP) required by CEQA need not be included in the Final EIR. However, throughout this EIS/R, measures have been clearly identified to facilitate establishment of an MMRP. Any mitigation measures adopted as a condition of approval of the project will be included in the MMRP for the SBSP Restoration Project, Phase 2 at Eden Landing to verify compliance.

1.5 Project Background

This section discusses the history of the South Bay tidal marsh, salt pond operations, and the Reserve. It also describes the acquisition of the former salt production ponds in 2003 and related restoration efforts in the South Bay.

1.5.1 Historic Tidal Marsh in South Bay

The San Francisco Bay Estuary was formed about 10,000 years ago, as the ocean entered the Coastal Range through the Golden Gate, and seawater began to fill the Bay. As the rise in water slowed approximately 3,000 years ago, sediments began accumulating in the shallows faster than the seas could cover them, allowing vegetation to begin to colonize and persist on the tidal mudflats along the estuarine margins (Cohen 2000; Collins and Grossinger 2004, as cited in the 2007 Final EIS/R). As recently as 150 years ago, the San Francisco Bay landscape was dominated by tidal marsh habitat. The open-water areas of the Bay were very nearly surrounded by broad expanses of tidal mudflats and even broader areas of tidal marsh (Goals Project 1999). However, that landscape began to undergo vast changes beginning with the earliest European settlements (Orlando et al. 2005). It is estimated that since 1800, over 80 percent of the tidal marsh habitat surrounding San Francisco Bay has been lost (Goals Project 1999). This loss equates to a loss of more than 150,000 acres of tidal marsh estuary-wide. In the South Bay, over 90 percent of the historic tidal marsh area has been lost due to conversions to salt ponds, agricultural areas, and urban developments (Foxgrover et al. 2004). Through the SBSP Restoration Project and other similar projects, that trend of loss is being reversed. Approximately 13,000 acres of tidal habitats around the Bay have been restored, and another 35,000 acres, including the acreage of the SBSP Restoration Project, are included in a restoration planning and design process.

1.5.2 Salt Pond Operations

Solar salt production through the conversion of tidal marsh areas to salt ponds began in the mid-1850s (Siegel and Bachand 2002). Early salt production efforts were small operations scattered throughout the Bay, but by 1936, the Leslie Salt Company emerged as the major player in the salt industry, consolidating the smaller companies into one large operation (EDAW 2005, as cited in 2007 Final EIS/R). In 1936, the Leslie Salt Company produced over 300,000 tons of salt annually on approximately 12,500 acres of salt ponds. By 1959, production had increased to 1 million tons of salt on tens of thousands of acres of salt ponds in the North and South Bay. Cargill acquired the Leslie Salt Company in 1978 and continued producing approximately 1 million tons of salt annually.

The solar salt production process takes several years, with the amount of time depending on seasonal variations in temperature, rainfall, and evaporation rates (Siegel and Bachand 2002). The process begins with the intake of Bay water into an “intake” pond, either through pumps or through a gate that opens at high tide. Once in the system, the Bay water is referred to as brine. The brine flows slowly through a series of ponds called “evaporator” or “concentrator” ponds, with salinity increasing from one pond to the next through evaporation.

When the brine becomes fully saturated with salt, the brine is pumped into “pickle” ponds for storage and then into crystallizer beds for eventual harvesting (USFWS and CDFG 2004). Within a crystallizer bed, evaporation continues and a layer of salt accumulates on the bed. This raw salt is mechanically harvested and sent to Cargill’s processing plant in Newark for further processing before it is ready for consumers. The remaining solution is an extremely saline liquid product known as bittern, which is commercially sold as a dust palliative and a de-icing product. Although much of the former Cargill salt ponds in the South Bay are targeted for restoration in Phase 2 of the SBSP Restoration Project, Cargill will continue to operate its Newark ponds and Newark and Redwood City processing plants, maintaining a production of approximately 600,000 tons of salt annually (USFWS and CDFG 2004).

1.5.3 History of the Reserve

The California Fish and Game Commission designated the then-CDFG (now CDFW) portion of the SBSP Restoration Project Area as part of the ELER. The original 835-acre property was acquired in 1996 and established thereafter as the Reserve when restoration actions were initiated. Because the property acquired in 2003 from Cargill (see below) was contiguous with the Reserve and management goals were similar, the remaining ponds at the Eden Landing pond complex were added to ELER. According to Fish and Game Code Title 14, Section 630, “Ecological Reserves are established to provide protection for rare, threatened or endangered native plants, wildlife, aquatic organisms and specialized terrestrial or aquatic habitat types. Public entry and use shall be compatible with the primary purposes of such reserves...” Public use may include hiking on established designated trails, hunting and fishing; other use allowed within CDFW lands includes scientific studies.

1.5.4 2003 Salt Ponds Acquisition

In October 2000, Cargill proposed to consolidate salt pond operations and transfer the land and salt production rights on 61 percent of its South Bay operation area. Negotiations headed by Senator Dianne Feinstein led to the signing of a Framework Agreement, which laid out the accord for the public acquisition of the 15,100 acres of South Bay salt ponds (including the acquisition of Cargill’s salt-making rights retained on some ponds in 1979) and 1,400 additional acres of crystallizer ponds along the Napa River in the North Bay. The Framework Agreement was signed in May 2002 by the California Resources Agency, Wildlife Conservation Board, CDFG (now CDFW), the SCC, USFWS, Cargill, and Senator Feinstein. Additional negotiations were completed in December 2002 regarding the Phase-out Agreement, which lays out specific details regarding Cargill’s responsibilities for halting salt production in the ponds in question.

The acquisition and restoration of the salt ponds has long been a goal of legislators, resource agencies, and non-governmental organizations (NGOs) working to protect San Francisco Bay. Supporters and signatories of the Framework Agreement included the San Francisco Bay Joint Venture, Save the Bay, National Audubon Society, Citizens Committee to Complete the Refuge, and many other agencies, organizations, and individuals.

The State of California approved the transfer of the salt ponds from Cargill on February 11, 2003. CDFW is now the landowner and land manager of the portions of the SBSP Restoration Project within the ELER.

1.5.5 Restoration in South San Francisco Bay

Phase 2 of the SBSP Restoration Project is a direct outgrowth of the acquisition of salt pond complexes (either in fee ownership or the salt-making rights) from Cargill in 2003 and the continued implementation of the larger SBSP Restoration Project laid out in the 2007 Final EIS/R. The project has focused on how best to manage and restore these lands. There are also existing habitat areas just outside the SBSP Restoration Project boundary that present opportunities to work with the owners of these areas to collaborate on restoration or environmental quality efforts.

One such opportunity involves Cargill's remaining inholdings within or adjacent to Eden Landing. These include Cargill Pond 3C and its levees, as well as Turk Island, "Cal Hill" and the levees that connect to these hills. If Cargill were to sell or donate either of these properties to the SBSP Restoration Project, several recreation and public access opportunities could be developed and included into the project. A similar opportunity exists with some of the Alameda County-owned land near the eastern end of Eden Landing. One of the Phase 2 alternatives for Eden includes recreation and public access components that could be incorporated only if the SBSP Restoration Project acquired them or easements to them from Alameda County. Finally, the "J" ponds owned by ACFCWCD (within the Eden Landing pond complex between Ponds E4, E1C and E6C) would need to be included in some of the restoration and flood risk management actions considered in this document. More detail on these options and the alternatives that result from their inclusion are presented in Chapters 2 and 3 of this Draft EIS/R.

1.6 Intended Uses of the EIS/R and Required Approvals

The lead agencies will use this Draft EIS/R when considering approval of the Phase 2 actions under the SBSP Restoration Project. Responsible agencies that have review and permit authority over the project will also use the Final EIS/R.

Agencies with responsibility for permit approval of certain project elements **may** include the following:

- USACE, under Section 404 of the Clean Water Act;
- USFWS and the National Marine Fisheries Service (NMFS), for Section 7 consultation pursuant to the federal Endangered Species Act regarding "take" of federally listed threatened or endangered species;
- NMFS, for Essential Fish Habitat consultation under the Magnuson-Stevens Fishery Conservation and Management Act;
- The San Francisco Bay RWQCB, for water quality certification under Section 401 of the Clean Water Act;
- The San Francisco Bay RWQCB, for a National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction Activity requiring preparation of a Storm Water Pollution Prevention Plan (SWPPP);

- BCDC, for permit and determination of conformity with the California Coastal Act, the McAteer-Petris Act, the Coastal Zone Management Act of 1972, and the San Francisco Bay Plan;
- The California State Lands Commission, for leases within its jurisdiction, including the submerged lands of the Bay, submerged lands of the sloughs within the SBSP Restoration Project area, and several small areas of state-owned land within the SBSP Restoration Project area;
- Bay Area Air Quality Management District (BAAQMD), may require permits to operate the proposed portable pumps;
- Cities with jurisdiction over the portions of the project area or access routes to it; and
- An easement from Pacific Gas and Electric Company (PG&E).

Other required approvals include easements or modifications to existing easements from nearby landowners for proposed levees that provide flood risk management and trail access.

1.7 Documents Incorporated By Reference

An EIS/R can incorporate by reference all or portions of another document that are a matter of public record or are generally available to the public (CEQ regulations for implementing NEPA [40 CFR 1502.21] and the CEQA Statute and Guidelines, Section 15150). Where all or part of another document is incorporated by reference, it has to be made available for inspection at a public place. Also, the document that is incorporated by reference must be briefly summarized or described in the EIS/R, and the relationship of the referenced document and the EIS/R shall be described.

“Incorporation by reference is most appropriate for including long, descriptive, or technical materials that provide general background but do not contribute directly to the analysis of the problem at hand” (CEQA Statute and Guidelines Section 15150(f)). This statement clearly distinguishes those documents that are incorporated by reference from those that are included as appendices. Materials included as appendices to an EIS/R contribute substantively to the impacts analysis (such as modeling results).

The following documents below are incorporated by reference in this Draft EIS/R.

- SBSP Initial Stewardship Plan and Initial Stewardship Plan EIR/EIS (SCH# 2003032079);
- SBSP Restoration Project Phase 2, Eden Landing Preliminary Alternatives Analysis Report;
- SBSP Restoration Project Phase 2 Opportunities and Constraints for Eden Landing Pond Complex;
- SBSP Restoration Project Hydrodynamics and Sediment Dynamics Existing Conditions Report;
- SBSP Restoration Project Levee Assessment Report;
- SBSP Restoration Project Flood Management and Infrastructure Existing Conditions Report;
- SBSP Restoration Project Water and Sediment Quality Existing Conditions Report;
- SBSP Restoration Project Biology and Habitats Existing Conditions Report;

- SBSP Restoration Project Public Access and Recreation Existing Conditions Report; and
- SBSP Restoration Project Final Cultural Resources Assessment Strategy Memorandum and Historic Context Report.

All of these documents are available for review on the SBSP Restoration Project's official website (www.southbayrestoration.org) and at the SCC's office at 1515 Clay Street, 10th Floor, Oakland, CA 94612. The documents incorporated by reference are described in various chapters and sections of this EIS/R.

1.8 2007 Final EIS/R

The 2007 Final EIS/R evaluated a No Action Alternative and two Action Alternatives for restoring or enhancing the former salt ponds for the SBSP Restoration Project. The two Action Alternatives established a set of "bookends" for the long-term project goals. Under these bookends, Programmatic Alternative B would work toward a gradual restoration to tidal marsh of 50 percent of the total acreage in the area of the SBSP Restoration Project. The other 50 percent would be maintained or improved to enhanced managed ponds. Programmatic Alternative C would continue past the 50 percent tidal marsh restoration goal and end at 90 percent of the total area of the SBSP Restoration area being restored to tidal marsh, leaving only 10 percent in enhanced managed ponds. Alternative A is the No Action Alternative, under which no actions would have been taken.

The 2007 Final EIS/R evaluated the environmental impacts of these alternatives and found that Programmatic Alternative A would not meet the project purpose and need to restore tidal marshes in the South Bay. The 2007 Final EIS/R selected Programmatic Alternative C at that time because the SBSP Restoration Project would need many years and multiple project-level phases to even approach the 50 percent tidal marsh goal of Programmatic Alternative B. As that level of tidal marsh restoration was being approached, the PMT and other stakeholders could use the findings of the AMP and the directed scientific research questions to determine whether to stop at the 50 percent tidal marsh goal or continue toward the 90 percent goal or to some other percentage in between those bookends.

As stated in the ROD, Programmatic Alternative C was chosen as the long-term goal. However, through application of the AMP, the project restoration activities could stop before reaching the full goal of 90 percent tidal marsh restoration for that alternative. The Phase 2 project alternatives evaluated in this Draft EIS/R would advance the program-level goals of both Programmatic Alternatives B and C. Completing Phase 2 would move the larger project closer to the 50 percent tidal marsh/50 percent managed ponds goal of Alternative B, but it would not reach it. Thus, completing Phase 2 would still allow the project to cease restoration activities at some point between the bookends of Programmatic Alternatives B and C.

This page intentionally left blank

2. ALTERNATIVES

This chapter describes the Phase 2 project alternatives proposed at the Eden Landing Ecological Reserve (ELER, or Reserve). The alternatives described herein represent project-level actions that could be implemented as part of the phased restoration efforts associated with the South Bay Salt Pond (SBSP) Restoration Project at the ELER. Section 2.1, Alternative Development Process, describes the process of developing project alternatives proposed to meet the purpose and need and project objectives. Section 2.2, Eden Landing Phase 2 Project Alternatives, describes the Phase 2 alternatives proposed within the Phase 2 project area of the ELER and that are evaluated in this SBSP Restoration Project, Eden Landing Phase 2 Draft Environmental Impact Statement/Report (EIS/R). See Appendix B for the Eden Landing Preliminary Alternatives Analysis Report containing the full description of the initial alternatives, the screening criteria, the selection of alternatives carried over into this Draft EIS/R, and the alternatives considered but eliminated from detailed study. The details of the preliminary design are presented in Appendices C and D which provide the *Southern Eden Landing Restoration Preliminary Design Memorandum* and the *Preliminary Design Memorandum of Dredged Material Placement at Southern Eden Landing*, respectively. Section 2.3, General Mitigation Measures Adapted from the 2007 SBSP Restoration Project Final EIS/R (2007 Final EIS/R), describes the mitigation measures from the 2007 Final EIS/R that are relevant to the Eden Landing Phase 2 alternatives and that would be incorporated into the project design of all Action Alternatives or would be important factors for this Draft EIS/R impact analysis. By incorporating program-level mitigation measures into project-level designs, they become part of that project and are no longer “mitigation.” For that reason, they are included here in the project descriptions for the various alternatives.

2.1 Alternative Development Process

Previously, as part of the National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) review process, the United States Fish and Wildlife Service (USFWS), the California Department of Fish and Wildlife (CDFW), and other agencies had completed the 2007 Final EIS/R for the SBSP Restoration Project. The 2007 Final EIS/R developed long-term, end-project “target” habitat designations for each pond complex under two different programmatic action scenarios:

- Programmatic Alternative B: a split of 50 percent (by total acreage) restoration to tidal marsh and 50 percent restoration to managed ponds; or
- Programmatic Alternative C: a split of 90 percent restoration to tidal marsh and 10 percent restoration to managed ponds.

As discussed in the 2007 Final EIS/R, these program-level alternatives were chosen to be bookends, between which the final balance of restored habitat will ultimately lie. Within that context, Programmatic Alternative C was selected for implementation. Phase 2 project alternatives at ELER present a range of project components, each of which is intended to advance the overall programmatic goals and the mission of the SBSP Restoration Project.

A broad range of alternatives for the Phase 2-level project was considered and developed to meet the Phase 2 purpose and need and project objectives at ELER. NEPA requires development and consideration of a range of “reasonable alternatives.” CEQA requires alternatives that would “minimize significant impacts." A set of screening criteria was developed to assist in decision-making and to elaborate a reasonable range of alternatives for analysis in this Draft EIS/R that would minimize significant impacts. After this set of screening criteria was applied, three Action Alternatives were selected for detailed evaluation, and several alternatives and individual components were eliminated.

The Action Alternatives initially selected for detailed evaluation in Phase 2 at ELER are presented in Appendix B, which is the Alternatives Analysis Report. This report contains the full description of the initial alternatives, the screening criteria, the selection methodology applied to carry forward those alternatives, and the alternatives and components considered but removed from further detailed study. Since that process, more modeling on the combined effect of tidal flows and fluvial runoff on high-water elevations was conducted. The results indicated that, while the same general kinds of restoration and flood risk management[1] concepts would be feasible, the details of the necessary flood protection features and the specifics of where and how tidal flows could be introduced into Eden Landing would need to be changed. That modeling report is presented as Attachment 1, Southern Eden Landing Restoration Preliminary Design: 1D and 2D Hydrodynamic Modeling, of Appendix D, Southern Eden Landing Preliminary Design Memorandum. That modeling effort drove changes to the details of where levee improvements, breaches, levee lowering, channel excavations, and other design details would be made. The Action Alternatives were modified accordingly and new design details were generated Those changes are part of the alternatives analyzed and discussed in this Draft EIS/R.

The actions considered for the Eden Landing Phase 2 project are akin to a stand-alone project under NEPA and CEQA. The actions and the components of the actions themselves could be implemented individually; they are not dependent on other phases of the SBSP Restoration Project. Each of the alternatives herein would accomplish slightly different goals and achieve differing levels and types of habitat restoration, recreation, or flood risk management. These actions are each incremental steps toward the larger programmatic goals.

2.1.1 Eden Landing Pond Complex: Programmatic Context of Phase 2 Alternatives

As discussed in Chapter 1, Introduction, the Phase 2 alternatives proposed at the Eden Landing pond complex are intended to tier from the analysis conducted for the programmatic portion of the 2007 Final EIS/R by advancing additional restoration activities within the southern half of Eden Landing. Larger, program-level alternatives for the SBSP Restoration Project as a whole, and for the pond complexes within it, were analyzed in the 2007 Final EIS/R. Chapter 2 of the 2007 Final EIS/R explained the long-term project goals and the process of developing and selecting the program-level alternatives, and the Adaptive Management Plan (AMP) that will track progress toward those goals from project-level actions and ongoing research and monitoring. The 2007 Final EIS/R covered a 50-year long-range plan for the SBSP Restoration Project at the programmatic level. The 2007 Final EIS/R also covered the Phase 1 projects at the project-level.

The 2007 Final EIS/R assessed the potential environmental consequences associated with two long-term restoration alternatives that applied to the greater SBSP Restoration Program. In consideration of the

[1] The terminology used by the SBSP Restoration Project to describe its goals has since changed from "flood protection" to "flood risk management." This document generally uses the latter term for forward-looking documents.

potential environmental consequences discussed in the 2007 Final EIS/R, the USFWS Record of Decision (ROD) and the CDFW Notice of Determination (NOD) state that the USFWS and CDFW will implement Programmatic Alternative C, the “Tidal Emphasis Alternative.” The USFWS and CDFW will retain the option of stopping tidal marsh restoration before restoring 90 percent of total acreage as tidal marsh if, for example, monitoring shows that pond-dependent species appear to be adversely affected by the loss of pond habitats. In this case, the SBSP Restoration Project may shift future project phases toward enhanced managed pond habitat and achieve an end result of tidal marsh restored habitat that is somewhere between the amounts described in Programmatic Alternative B and Programmatic Alternative C. The Action Alternatives proposed as part of Phase 2 at southern Eden Landing represent the second phase of this long-term restoration project, and are intended to advance the SBSP Restoration Project toward its end goals described in Programmatic Alternative C.

Construction, operation, and maintenance of Phase 2 activities at southern Eden Landing would be independent of activities at Phase 2 ponds within the USFWS-owned Don Edwards San Francisco Bay National Wildlife Refuge (or Refuge) ponds and independent of the previously implemented Phase 1 actions in the ELER as a whole.

The SBSP Restoration Project has an open and lengthy history of public processes to develop alternatives that was initiated with stakeholder forums in 2003. Public input from scoping meetings and public comment periods for the 2007 Final EIS/R, and from the annual stakeholder forums since then, was used to help develop these alternatives. Further, the entire NEPA/CEQA process for the Phase 2 projects at the Refuge informed the design and analysis of the Phase 2 actions at Eden Landing. The Phase 2 NEPA/CEQA process also included a public scoping meeting and a public comment period, which shaped the development of the Action Alternatives presented herein. The most notable change as a result of public comment was the decision to study beneficial reuse of dredged material as part of the design effort for Eden Landing Phase 2.

In developing a broad range of alternatives for the Eden Landing Phase 2 project area, target habitat goals, major recreation and public access goals, and flood risk management issues were considered. Individual components, their variations, and what they were intended to achieve were developed, and these components were bundled as complete alternatives for consideration.

2.1.2 Alternatives Considered But Eliminated from Further Review

A number of alternatives were initially developed and included in the screening process to refine a set of alternatives for inclusion in this Draft EIS/R and in the conceptual designs. The Alternatives Analysis Report presented as Appendix B explains these initial alternatives, the components that constitute each alternative, and the intentions or purposes of each. The report also explains the screening criteria and processes by which these alternatives were considered but eliminated from further review.

2.1.3 Adaptive Management Plan

The AMP was developed by the Project Management Team (PMT) to be an integral component of the SBSP Restoration Project. The AMP allows for lessons learned during the multiple phases of implementing the SBSP Restoration Project to be incorporated in subsequent phases as management plans and designs for future actions are updated. The AMP has created a framework for adjusting management decisions as the cause-and-effect linkages between management actions and the physical and biological responses of the system are more fully understood. The AMP creates a management framework for the SBSP Restoration Project area to avoid irreversible adverse environmental impacts during implementation of the SBSP Restoration Project.

The AMP identifies management triggers that indicate when restoration actions may cause significant adverse environmental impacts. If a management trigger is tripped, further restoration would not occur until a focused evaluation is conducted to assess if a potentially significant impact would result from the SBSP Restoration Project or other factors. Management actions would be implemented to avoid or lessen a significant adverse environmental impact. The AMP also provides a mechanism to adjust, modify, or extend restoration actions implemented in a previous phase to better achieve the project's goals. The findings from ongoing monitoring are used to plan further restoration actions.

The framework of the AMP has been used during the development of the Refuge Phase 2 project alternatives, as evidenced by the inclusion of some ponds that were part of previous restoration actions. For example, Ponds A8 and A8S (part of the Alviso pond complex) were part of Phase 1 actions but were included again in the Phase 2 EIS/R evaluation to assess design actions intended to improve habitat connectivity, quality, and potentially their eventual restoration to full tidal marsh. The AMP and its findings were used to guide the inclusion of these ponds in planning Phase 2 implementation at the Refuge.

Continual implementation of the AMP is an integral component of each alternative considered in the Phase 2 project alternatives. Under all alternatives, monitoring and applied studies will occur, and the AMP will be an integral component in the operations and management decisions at all ponds under all alternatives and for restoration decisions in future project phases. More detail on how the AMP is used to make significance determinations is provided in Section 3.1, Introduction. The full AMP is provided in Appendix D of the 2007 Final EIS/R.

2.1.4 Eden Landing Land Management Plan

The mission of CDFW is to manage California's diverse fish, wildlife, and plant resources, and the habitats on which they depend, for their ecological values and for their use and enjoyment by the public. This management includes habitat protection and maintenance in a sufficient amount and of a sufficient quality to ensure the survival of all species and natural communities. Section 1019 of the California Fish and Game Code requires CDFW to draft and adopt Land Management Plans for any property wholly under its jurisdiction and that was purchased after January 1, 2002. Land Management Plans document management goals and objectives and other necessary information for consistent and effective management of CDFW Wildlife Areas and Ecological Reserves. Land Management Plans describe future conditions and contain long-range guidance to accomplish the purposes for which a refuge or reserve was established. CDFW manages the ELER according to the *Eden Landing Ecological Reserve (Baumberg Tract) Restoration and Management Plan* (CDFG 1999). The *Eden Landing Ecological Reserve System E2 and E2C Operation Plan* (Operations Plan) implemented the Initial Stewardship Plan and describes the current pond management activities that are carried out to meet the goals and objectives for managed ponds within the ELER Phase 2 project area (CDFW 2016).

The broad objectives of the Operations Plan for the Phase 2 ponds at southern Eden Landing include the following:

- Maintain year-round open water habitat of various depths in Ponds E1, E2, E7, E4, E5, and E2C and open water habitat in winter in the other ponds. Muted tidal circulation is provided through culverted connections into Pond E2 and Pond E2C.
- Maintain discharge salinity into San Francisco Bay (or Bay) (via Pond E2) and Alameda Creek Flood Control Channel (ACFCC) (via Pond E2C) at less than 44 parts per thousand (ppt) via muted tidal circulation in Ponds E2 and E2C.
- Cargill Inc. (Cargill) Pond 3C (CP3C) is not owned by CDFW; rather, it is part of the Southern Ponds water management system. Contingent on continuing approval from Cargill, operate CP3C as part of the Southern Ponds system as year-round open water.
- Manage for different waterbird guilds in summer and winter by varying the depths and salinities of the ponds.
- Maintain the prey base for overwintering ducks, migratory shorebirds, and resident waterbirds.

CDFW meets these overarching objectives through the control of tidal flow into and discharge out of the ponds. Tidal flows into and discharge out of the ponds are primarily influenced by (1) pond bottom elevations and (2) existing water control structures' access to tidal flux. These basic parameters are further influenced by seasonal changes in weather and diurnal and annual fluctuations in the tides. As per the Operations Plan, the management of tidal flux primarily affects water surface elevation and salinity and the resulting effects on species use and water quality. The Operations Plan ensures that CDFW is accountable for the management objectives described above, and these objectives are achieved at a pond-specific level.

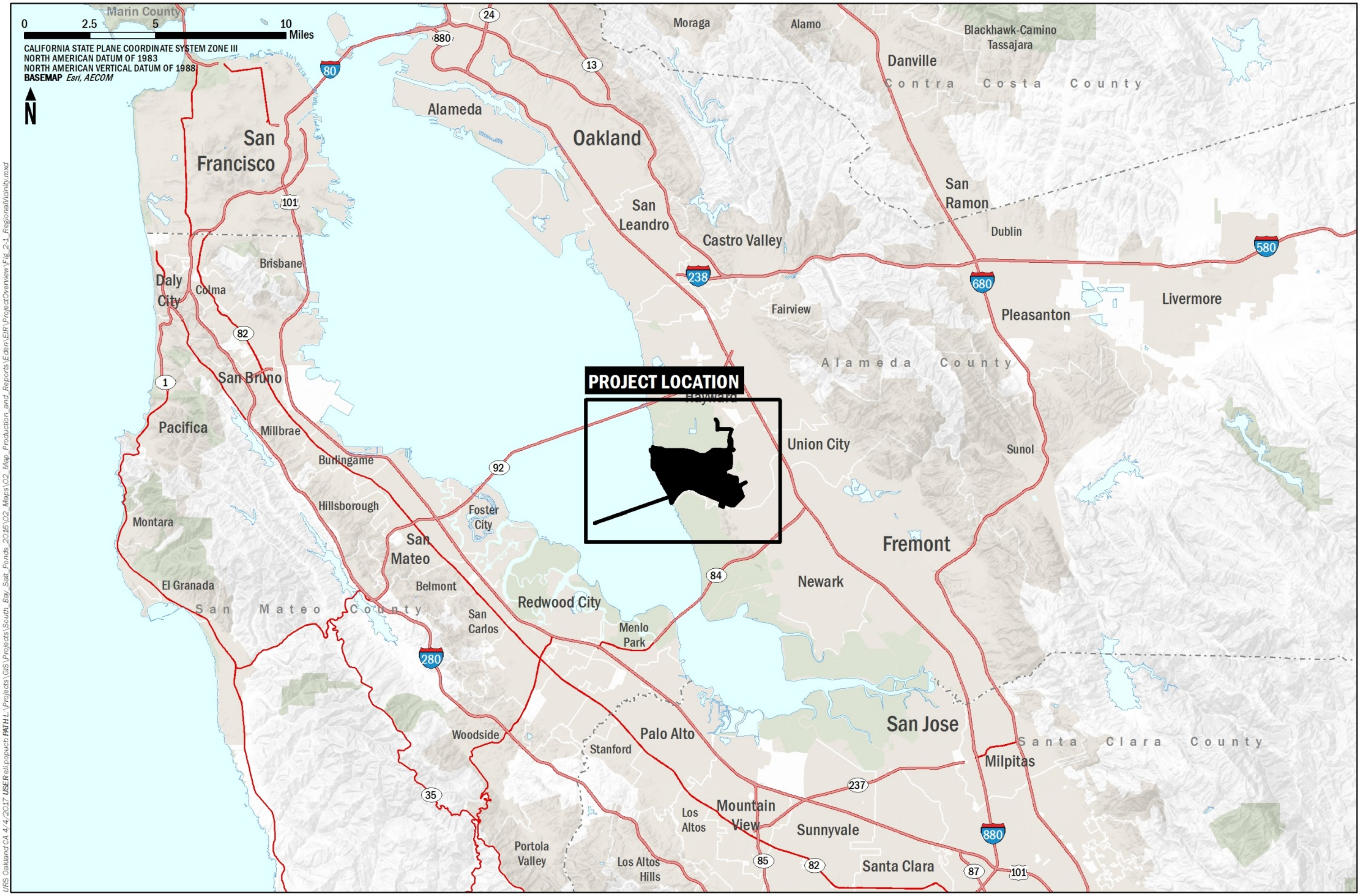
Finally, although not a formal part of the Operations Plan, CDFW operates portions of Eden Landing to include public access for recreational use of hiking trails, interpretive facilities, human-powered craft launching, and waterfowl hunting areas.

2.2 Eden Landing Phase 2 Project Alternatives

The Eden Landing Phase 2 project proposes three Action Alternatives to implement various habitat restoration, flood risk management, and recreation/public access improvements in the southern half of the greater ELER. The Phase 2 project area within ELER is in Alameda County, California (see Figure 2-1, Regional Location, and Figure 2-2**,** Eden Landing Phase 2 Project Sites).

2.2.1 Eden Landing Phase 2 Project Area

The general location of the Eden Landing Phase 2 project area was described in Chapter 1. This section expands on that information and establishes the goals and context for the description of the Phase 2 alternatives that follow.



AECOM

South Bay Salt Pond Restoration Project

Figure 2-1

Regional Location

LEGEND

- Eden Landing Phase 2 Project Area
- Southern Eden Landing Ponds
- The Bay Ponds
- The Southern Ponds
- The Inland Ponds

AECOM
South Bay Salt Pond Restoration Project

Figure 2-2
Eden Landing Phase 2 Project Sites

The Phase 2 project area in the southern portion of Eden Landing is made up of 11 ponds that are described according to three groups.

The groups of ponds within the Phase 2 Eden Landing project area are named according to their location within the overall pond complex and their proximity and similarity to each other. The sub-groups of ponds are intended to simplify the discussion of the ponds and the restoration alternatives that apply to them rather than repeating names of individual ponds. The sub-groups are as follows:

- The Bay Ponds: Ponds E1, E2, E4, and E7 are the four large ponds closest to San Francisco Bay. The Phase 2 actions proposed at these ponds are intended to restore these ponds to tidal marsh. The Bay Ponds are bounded to the south by an Alameda County–owned strip of tidal wetland marsh.
- The Inland Ponds: Ponds E5, E6, and E6C are somewhat smaller ponds in the northeast portion of the complex. These ponds could be restored to tidal marsh or to enhanced managed ponds, depending on which of the Phase 2 Action Alternatives is selected.
- The Southern Ponds: Also called the "C-Ponds," Ponds E1C, E2C, E4C, and E5C are in the southeastern portion of the complex. They are separated from the Bay Ponds and the Inland Ponds by an Alameda County–owned freshwater outflow channel and diked marsh areas known collectively as the "J-Ponds." The Southern Ponds surround a natural hill known as Turk Island and abut another small hill commonly called "Cal Hill" that are private inholdings excluded from the Phase 2 project area. The Southern Ponds could be restored to tidal marsh or to enhanced managed ponds, depending on which of the Phase 2 Action Alternatives is selected.

These pond groups are addressed in the restoration actions, public access improvements, and flood risk management measures considered in the Phase 2 Action Alternatives. The Phase 2 project area incorporates temporary-construction-related disturbance areas and the long-term operational footprint of the project. Each of the alternatives would have slightly different short- and long-term disturbance areas, which are accounted for in the description and impact assessment for each technical resource topic discussed in this Draft EIS/R.

Table 2-1 summarizes the Phase 2 project area and pond groups at Eden Landing, along with the acreages of each as they were presented in the 2007 Final EIS/R. Different estimates of the areas of individual ponds may appear in other documents, and these estimates may differ because they may include the external levees and/or the internal levees or they may have been sampled during different seasons or tidal cycles. Total areas of ponds or pond groups might include uplands adjacent to them or to waterways or marshes between them. To reduce confusion, Table 2-1 presents those values for consistency with those prior documents, but also relates those values to the Phase 2-specific acreages that were developed for and used in the environmental impact analysis in this document. These are the acreages shown on the maps of the alternatives (Figures 2-3 through 2-6).

Table 2-1 Eden Landing Phase 2 Pond Groups and Approximate Acreages

Bay Ponds[1]			Inland Ponds[1]			Southern Ponds[1]		
Pond	Acres in 2007 Final EIS/R	Acres in this EIS/R	Pond	Acres in 2007 EIS/R	Acres in this EIS/R	Pond	Acres in 2007 Final EIS/R	Acres in this EIS/R
E1	290	299	E5	165	169	E1C[2]	150	72
E2	680	687	E6	200	202	E2C	30	37
E4	190	192	E6C	80	85	E4C	175	181
E7	215	222				E5C	95	102
Sub-Total[3]	1,375	1,400	Sub-Total[3]	445	456	Sub-Total[3]	450	392

Notes:

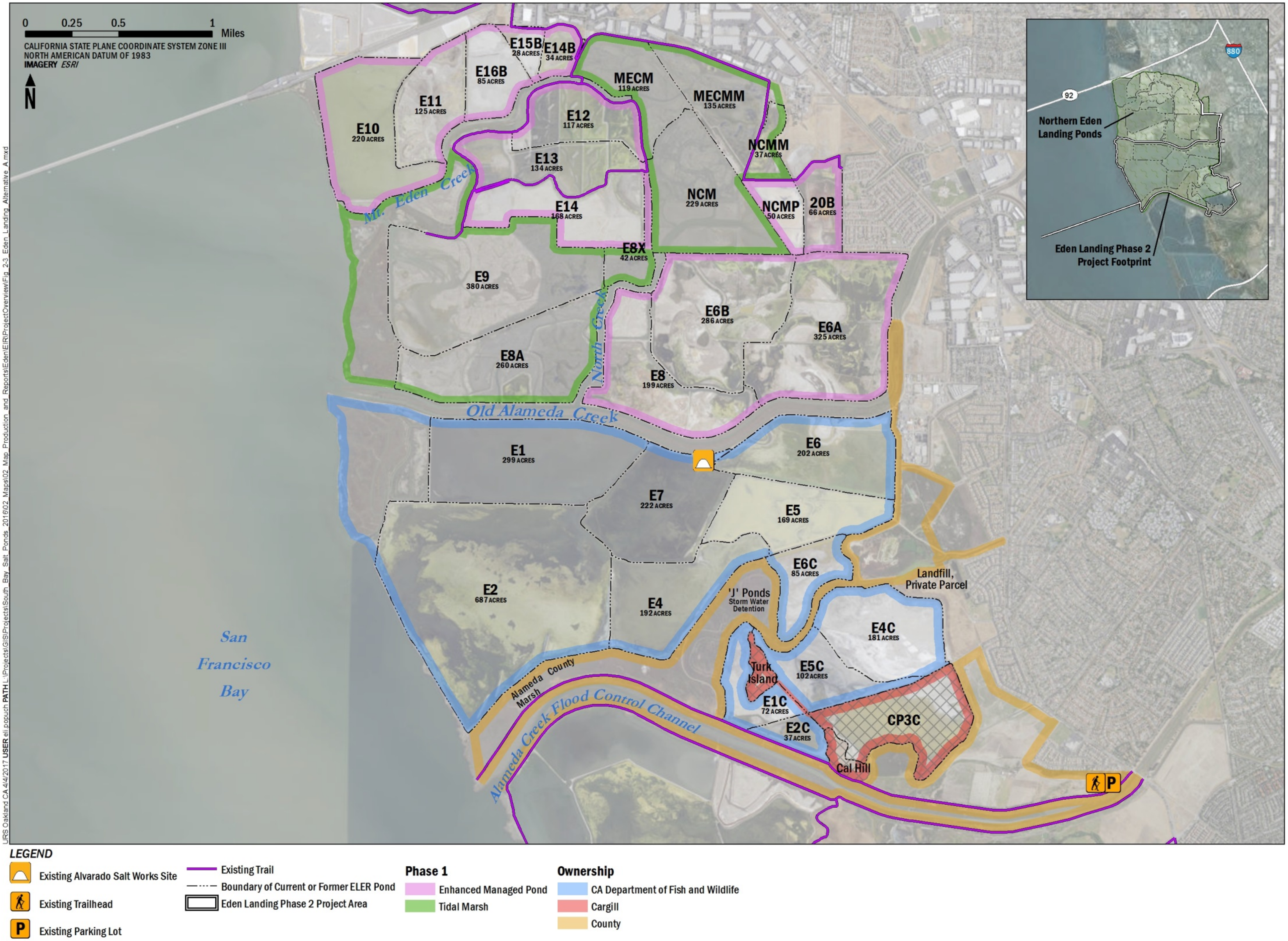
[1] Acreages are those presented in the 2007 Final EIS/R and the measured acreages for the Phase 2 analysis in this EIS/R. Figure 2-3 show the measured Phase 2 acreages for the alternatives in this EIS/R.

[2] The acreage listed for Pond E1C in the 2007 Final EIS/R is 150 acres, but that appears to include the Cargill-owned inholding Turk Island. The difference between those two areas is larger than in other ponds because of this difference.

[3] Total area of Phase 2 Eden Landing Ponds in the 2007 Final EIS/R is 2,270 acres; in this EIS/R, the total area is 2,248 acres.

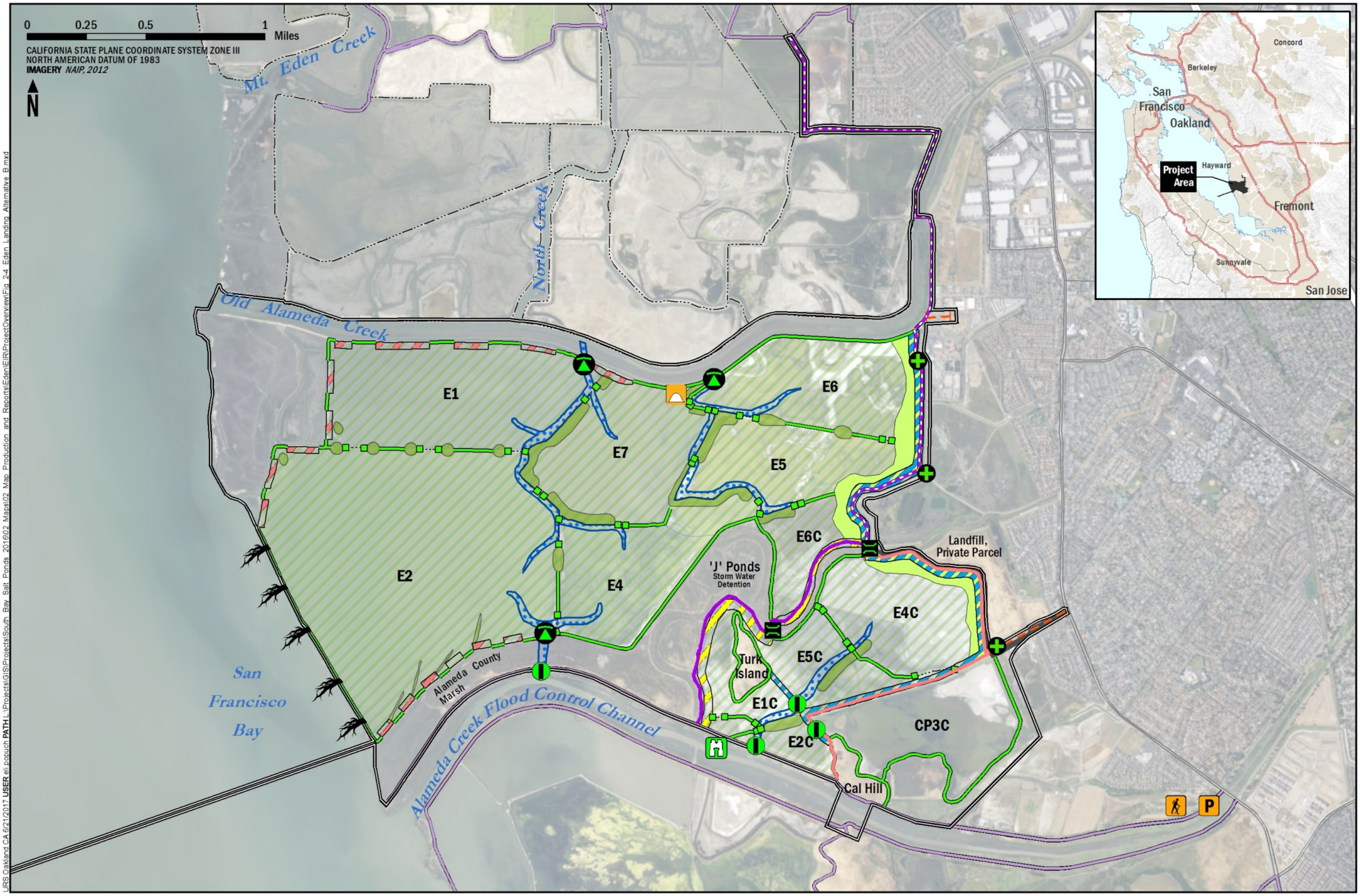
The Eden Landing Phase 2 project area is generally bounded by San Francisco Bay on the west, Old Alameda Creek (OAC) on the north, the federal ACFCC on the south, and to the east, a mix of suburban/urban communities, the Union Sanitary District (USD) Treatment Plant, a county-owned landfill, a Cargill-owned salt pond no longer in production (CP3C) and their upland hill lands, and the miscellaneous Alameda County properties known as the J-Ponds, which are diked areas with detention basins and drainage channels. Although these are the general boundaries of Phase 2 at Eden Landing, some of the options for trails presented below extend beyond the southern pond complex itself and even beyond land or levees currently owned by or with easements held by CDFW as part of the Reserve. CDFW and the SBSP Restoration Project PMT may seek to acquire easements or other rights-of-way access to lands outside the ELER boundaries to improve public access opportunities and connectivity to existing trails and to unify and enhance CDFW’s ability to manage the lands for wildlife and natural habitats.

Within the programmatic portion of the 2007 Final EIS/R, the ELER Phase 2 project area was anticipated to transition to tidal marsh, maintain or improve the current levels of flood risk, and improve recreation and public access through the implementation of project-level actions. Under Programmatic Alternative C in the 2007 Final EIS/R, all of the ponds in the southern ELER are intended to be restored to tidal marsh. However, much of this restoration may be constructed in stages and may require features to improve coastal flood risk management to replace the de facto coastal flood risk management that is currently provided by the intact southern Eden Landing ponds and their surrounding berm-like levees. Under implementation of the alternatives assessed below, future flood risk management would be provided by constructing levee improvements or floodwalls and other changes to existing levees and pond bottom bathymetry to address coastal flood risk protection. Various combinations of these flood risk management measures are included in each of the Phase 2 alternatives.



AECOM
South Bay Salt Pond Restoration Project

Figure 2-3
Eden Landing Phase 2 Alternative Eden A



LEGEND

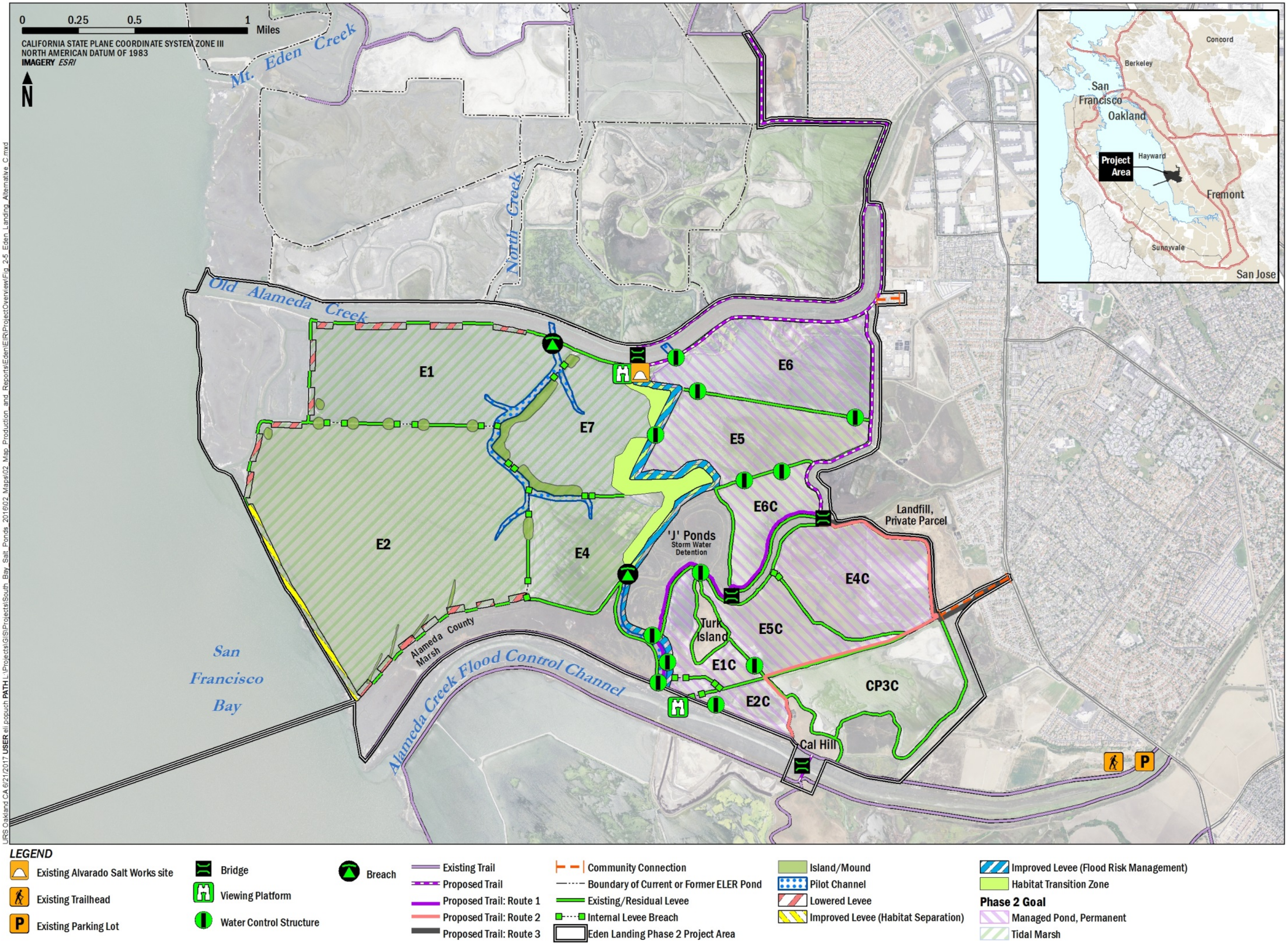
- Existing Alvarado Salt Works Site
- Existing Trailhead
- Existing Parking Lot
- Root Wads
- Bridge
- Viewing Platform
- Water Control Structure
- Breach
- Water Reuse Connection
- Existing Trail
- Proposed Trail
- Proposed Trail: Route 1
- Proposed Trail: Route 2
- Proposed Trail: Route 3
- Community Connection
- Boundary of Current or Former Northern ELER Pond
- Existing Residual Levee
- Internal Levee Breach
- Eden Landing Phase 2 Project Area
- Island/Mound
- Pilot Channel
- Lowered Levee
- Improved Levee (Habitat Separation)
- Improved Levee (Flood Risk Management)
- Habitat Transition Zone

Phase 2 Goal

- Tidal Marsh

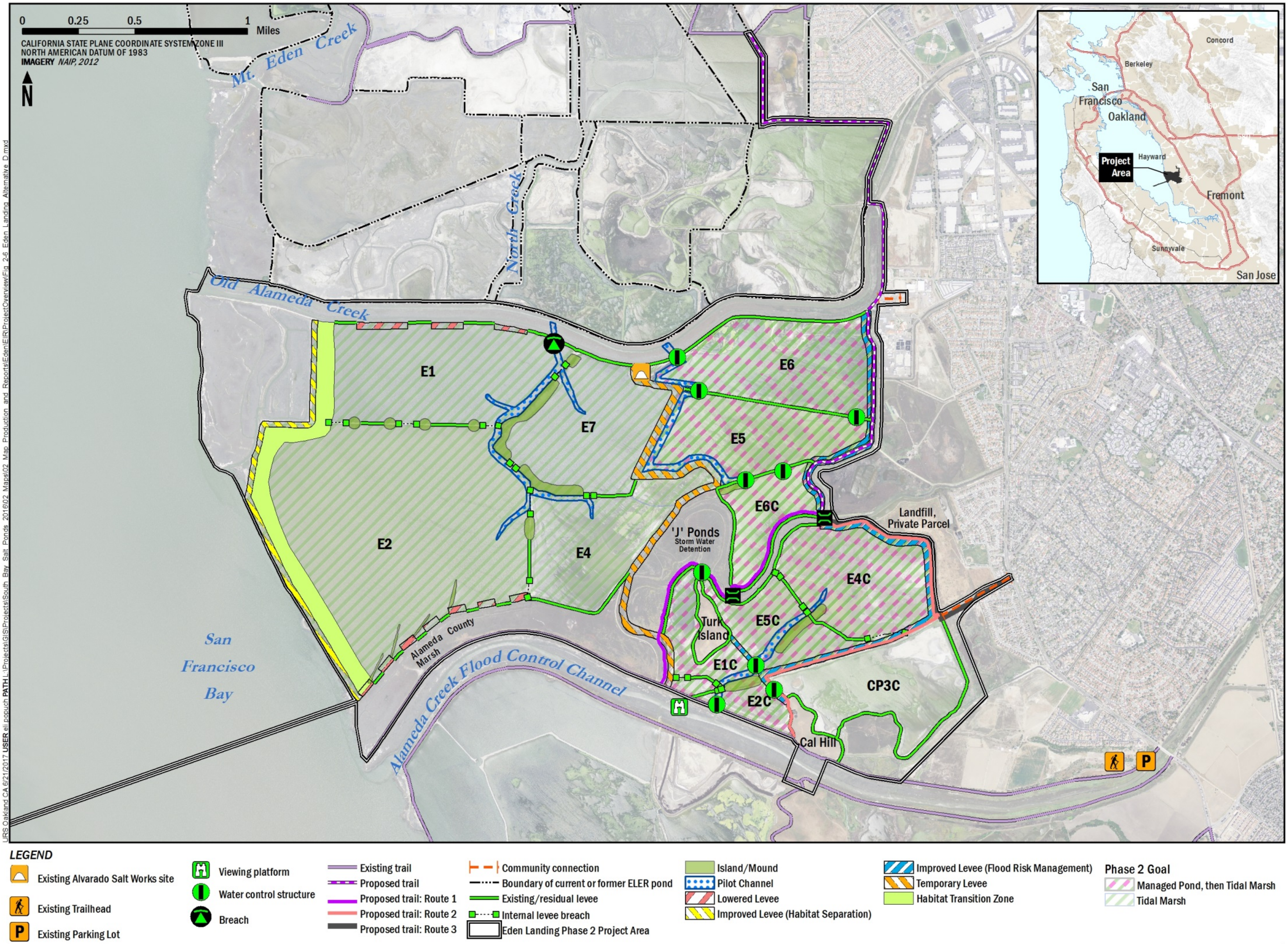
AECOM
South Bay Salt Pond Restoration Project

Figure 2-4
Eden Landing Phase 2 Alternative Eden B



AECOM
South Bay Salt Pond Restoration Project

Figure 2-5
Eden Landing Phase 2 Alternative Eden C



AECOM
South Bay Salt Pond Restoration Project

Figure 2-6

Eden Landing Phase 2 Alternative Eden D

The 2007 Final EIS/R also laid out several goals for the major recreation and public access facilities within the ELER Phase 2 project area. The 2007 Final EIS/R selected Programmatic Alternative C for implementation, but because there is currently some uncertainty as to the extent of tidal restoration that will actually take place, the exact list of program-level public access goals addressed in the Phase 2 Action Alternatives varies. However, they are generally drawn from the options in the 2007 Final EIS/R or are reconfigured and designed to achieve similar purposes.

Public access options from the 2007 Final EIS/R that are included in the ELER Phase 2 alternatives include (but are not limited to) the following goals, all of which are assessed in this Draft EIS/R:

- Maintain the existing trail that runs along the top of the large federal flood protection levee that forms the southern edge of the complex (i.e., the northern edge of the ACFCC). This effort would involve constructing bridge(s) over any breaches that are opened in that levee or using culverts or other water control structures to eliminate the need for open breaches.
- Complete the San Francisco Bay Trail (Bay Trail) spine along the eastern edge of southern Eden Landing to the maximum extent feasible.
- Add a spur trail along the northern edge of Pond E6 from the Bay Trail spine to the site of the former Alvarado Salt Works.
- Convert the above spur trail into a loop by building a footbridge over OAC and a trail back to the Bay Trail spine.
- Add other spur or loop trails and/or viewing platforms as feasible and wildlife-compatible opportunities allow.

2.2.2 Overview of Eden Landing Phase 2 Project Alternatives

This Draft EIS/R assesses the potential impacts associated with a No Action Alternative (Alternative Eden A) and three Action Alternatives (Alternative Eden B, C, and D). Under the No Action Alternative (Alternative Eden A), no new activities would occur in the project area, but ongoing operation and maintenance (O&M) would continue. Under the Action Alternatives, construction measures would be taken to transition the Bay Ponds to tidal marsh and to transition the Inland Ponds and/or the Southern Ponds to tidal marsh or enhanced managed ponds. The long-term decision to operate the Inland Ponds and/or the Southern Ponds in either manner will depend on the wildlife response. In all the Action Alternatives, flood risk management for the communities and infrastructure to the east of the project area would be provided through improvements to existing levees. As noted above, the flood risk management could be provided by some combination of an engineered levee on the eastern edge of the ponds or a mid-complex levee and improvements to existing levees on the western, Bay-facing edge of the ponds. In addition, recreational trails, bridges, viewing platforms and signage, and areas for sport fishing would be established to enhance public access to the area. Access for waterfowl hunting would continue.

In each of the Action Alternatives, upland fill and/or dredged material may be used to enhance existing levees, build engineered levees, or to create habitat transition zones,[2] which would serve as a transition zone between the ecosystems of the ponds and the uplands at the top of pond levees. Depending on the volume of material available, the constructed slope could be steeper to reduce the footprint area of impact on the current landscape. Upland fill material could also be used to improve levees. All imported upland material would be screened in accordance with an approved Quality Assurance Project Plan (QAPP) developed for the SBSP Restoration Project. That QAPP includes protocols for off-site imported material testing, classification, and tracking. Dredged material may also be placed into the ponds to raise the bottom elevations to accelerate marsh formation at these ponds and/or to build habitat features.

Each of the Action Alternatives contains similar project components designed and sited in different places within the project area to achieve slightly different goals. These goals include an emphasis on achieving different ratios of restored tidal marsh and enhanced managed ponds. Components common to each Action Alternative include levee breaches, levee lowering, installation of water control structures, excavation of pilot channels, connectivity for anadromous fish habitat, construction of habitat islands, habitat transition zones, beneficial reuse of dredged material and/or import of upland fill material, water control structures for managed ponds, and fish habitat connectivity. There are also public access and recreation components such as extension of the Bay Trail and improvement of existing trails within and surrounding the ELER Phase 2 project area. The numbers and locations of these features are different in each Action Alternative. These components are included in different combinations and at different locations in each of the Action Alternatives; the components are intended to improve habitat complexity and allow appropriate reserve management. The common components are illustrated on the maps of the components of Alternatives Eden B, C, and D (Figures 2-3 through 2-6). The details (number, dimensions, elevations) of these components in each alternative are presented below.

- Alternative Eden B would restore the entirety of southern Eden Landing to tidal marsh in a single project implementation stage by providing sufficient improvements to the eastern, backside levees to provide the necessary degree of flood risk management. There would also be habitat enhancements, including transition zones, islands made from remnant levees, channel excavation, and levee lowering. Two sections of internal levee improvements would also be made along the J-Ponds and other Alameda County Flood Control and Water Conservation District (ACFCWCD)-owned channels. This alternative also features the inclusion of treated water from USD, inclusion of brackish groundwater from Alameda County Water District’s (ACWD) Aquifer Reclamation Program (ARP) wells, and placement of root wads and logs outside of Pond E2 to help trap sediment and form beach-like areas while providing some erosion protection. The Southern ponds would be connected to the ACFCC through a pair of water control structures and an additional structure within them. The Bay Trail spine would be completed through southern Eden Landing on one of a number of routes. There would be one viewing platform added along the Alameda Creek Regional Trail on the ACFCC levee.
- Alternative Eden C would retain the Inland Ponds and the Southern Ponds as managed ponds and add a number of water control structures to allow the depth and salinity of these ponds to be actively managed for a range of different pond-dependent wildlife. The Bay Ponds would be

[2] A habitat transition zone is a constructed feature with a relatively gentle slope (up to 30:1 [horizontal:vertical]) intended to provide a natural and ecologically beneficial connection between uplands or levees and the adjacent pond bottom.

restored to tidal marsh as in Alternative Eden B through the use of a mid-complex levee that would largely be built on top of the existing internal levees. This alternative would feature a similar range of habitat enhancements at Eden B but in different locations. The same Bay Trail routes through the area would be assessed, but so too would a set of trails on either side of the OAC and a bridge over the OAC to connect them. These trails would form a spur trail to the site of the Alvarado Salt Works and a second viewing platform at that site. Another large bridge could be built over the ACFCC to extend the Bay Trail spine beyond the ELER boundary itself, connecting to existing Bay Trail spine south of the ACFCC in Coyote Hills Regional Park.

- Alternative Eden D is a staged implementation of the tidal marsh restoration outlined in Alternative Eden B. Eden D would make use of a mid-complex levee, as in Alternative Eden C, but that levee function would be temporary and eventually be used for habitat enhancement, including habitat transition zones. This separation of the Bay Ponds from the others would allow those large outer ponds to first be restored to tidal marsh, after which the mid-complex levee would be modified, and the Inland and Southern Ponds would be restored to tidal marsh. Water control structures would be added to the Inland and Southern Ponds for use during the years in which they would be operated as managed ponds and then removed to allow tidal flows. The trail and associated viewing platform would be similar to those in Alternative Eden B.

2.2.3 Alternative Eden A (No Action)

Under Alternative Eden A, the No Action (No-Project) Alternative, no new activities would be implemented as part of the Phase 2 project. The CDFW would continue to maintain and operate the ponds as part of the ELER in accordance with the Operations Plan, the AMP, and current CDFW practices. The levees around the ponds are high-priority levees to be maintained for wildlife habitat purposes and to retain the current, de facto levels of coastal flood risk management provided to the adjacent inland communities. Outboard levees would be expected to be maintained as necessary (or repaired on failure). ACFCWCD would be expected to continue to direct stormwater runoff flows into and out of the J-Ponds and associated channels as needed. The existing Pacific Gas and Electric Company (PG&E) power distribution lines (running along the north side of Ponds E1, E7, and E6, along with the distribution line bisecting Pond E2C and running along the south side of Ponds E5C and E4C, would remain active and be unaffected by long-term operation of the Reserve.

No new recreation or public access features would be added in Alternative Eden A. However, the existing trail along the ACFCC would continue to be maintained, as would the trails and other access features in northern Eden Landing. Alternative Eden A is shown on Figure 2-3.

2.2.4 Alternative Eden B

Alternative Eden B is intended to provide full tidal marsh restoration in a single stage of construction and project implementation. It achieves this habitat restoration objective while providing a primary means of flood risk management by raising and otherwise improving the existing backside levees along the eastern edge of the Inland and Southern Ponds (in particular on Ponds E6, E5, E6C, E4C, E5C, and E2C, as shown on Figure 2-4). This alternative also provides flood storage capacity and some tidal damping within the ponds themselves. The provision of improved flood risk management on these backside levees would enable restoration of all Phase 2 project area ponds (the Bay Ponds, the Inland Ponds, and the Southern Ponds) without the use of an improved mid-complex (see Sections 2.2.5, Alternative Eden C, and 2.2.6, Alternative Eden D;), Bay-facing levee enhancements, or the stepwise approach of allowing the Bay Ponds to become tidal marsh while the Inland and Southern Ponds stay as managed ponds in the short term, eventually transitioning to tidal marsh in the long term (see Section 2.2.6, Alternative Eden D). Details of the proposed improvements and the project features associated with Alternative Eden B are described below. These are organized into common categories of features and improvements that are often shared among all Action Alternatives; however, some are unique only to Alternative Eden B.

Levee Improvements

For Flood Risk Management. The backside levee improvements would be raised to an elevation of 12 feet North American Vertical Datum of 1988 (NAVD88), for a total of approximately 16,500 linear feet. From the hydrodynamic flood modeling summarized in Attachment 1 of Appendix D, a levee raised to this height would provide equal or better de facto flood risk management than the existing conditions, thereby meeting the flood-related objectives of the project. The top width of the raised levees would be 12 feet, and the side slopes would be at 4:1 (h:v). [3]

For Habitat Separation and Enhancement. In Alternative Eden B, the fill material placed on the eastern border of the Inland and Southern Ponds against the backside levee would enhance the current levee and create a habitat transition zone. No other habitat transition zones are proposed as part of Alternative Eden B.

For Recreational Trails. Two levees would be raised to 12 feet NAVD88 to allow construction of a part of the Bay Trail spine along them (the trail routes are discussed below). These non-engineered levee improvements, which are shown in yellow on Figure 2-4, would have the same height and width as other levee improvements for habitat restoration. They would also continue to provide the same level of de facto flood risk management as the existing conditions. These improvements would total approximately 7,500 linear feet.

Levee Breaches and Pilot Channel Excavation

As part of Alternative Eden B, the levees along the northern margins of the Bay Ponds would be breached to introduce tidal flows to Ponds E1 and E6. Two pilot channels would be excavated to connect those proposed breaches to the rest of the Bay Ponds and Inland Ponds. An additional pilot channel would be constructed where a breach is proposed into the south side of Pond E2. A spur of this channel would extend into Pond E4. As shown on Figure 2-4, these channels would be constructed adjacent to the borrow ditches used to construct the interior levees. These channels would be deepened to improve drainage at low tides. This deepening would also improve constructability because the excavators would work from those interior levees. It would also make use of existing channels for better drainage. The northern end of these two pilot channels would extend into the northern channel of the OAC. The southern end of the pilot channel that extends from Pond E1 into Ponds E2 and E4 would facilitate filling and draining these ponds. The planned dimensions of the pilot channel into Pond E1 would be 15 feet wide and 2,500 feet long at an invert elevation of -4 feet NAVD88. The pilot channel in Pond E6 would be 30 feet wide and 2,000 feet long at an invert elevation of -4 feet NAVD88. The pilot channel into Pond E2 would be 30 feet wide and 2,600 feet long at an invert elevation of -4 feet NAVD88.

[3] (h:v) horizontal / vertical

Levee Lowering

Portions of the outer levees around the Bay Ponds would be lowered to mean higher high water (MHHW) (7 feet NAVD88) to provide more frequent levee overtopping, help provide an equal or improved level of de facto flood risk management relative to existing conditions, and increase the hydraulic connectivity between channels and marshes. The approximate locations of these lowered sections are shown on Figure 2-4; the total combined length of lowered levees in this alternative is 12,800 linear feet. The details of the modeling underlying this design concept are in Attachment 1 of Appendix D, and the potential impacts are explained in the appropriate sections of Chapter 3, Environmental Setting, Impacts, and Mitigation Measures.

Water Control Structures

Alternative Eden B emphasizes reestablishment of tidal marsh instead of enhanced managed ponds. As such, fewer water control structures would be necessary to manage tidal exchange and flows between the project area and its connection points to OAC and ACFCC. Alternative Eden B includes construction of four water control structures to manage and allow entry of flows from ACFCC into the Bay Ponds and Southern Ponds. The design details of the proposed water control structures (new structures and modifications to existing structures) are shown in a table in Appendix D, the Southern Eden Landing Preliminary Design Memorandum. Here, it is sufficient to note that most would be circular high-density polyethylene (HDPE) or corrugated metal pipe (CMP) culverts with typical diameters of 36 or 48 inches. At the connections between the ACFCC and the Alameda County–owned wetlands, these structures could instead be 6-foot x 6-foot concrete box culverts.

Fish Habitat Enhancements

One pilot channel would be excavated to provide enhanced fish habitat. This channel would be paired with a water control structure to allow controlled hydraulic connectivity between the ACFCC and Ponds E2 and E4. This channel and its connections are not intended to be necessary for draining and filling the Bay Ponds. Rather, it would be sized, placed, and oriented to allow passage of anadromous steelhead and other native fish from the ACFCC into the large Bay Ponds, which is expected to be beneficial nursery habitat for anadromous and estuarine fish as restored tidal marsh.

This pilot channel would be excavated near the levee between Ponds E2 and E4, across the County-owned high marsh south of the Bay Ponds, and to a culverted connection with the ACFCC. The channel would be approximately 3,100 feet long, 15 feet wide at the top, and set at an invert elevation of 0 feet NAVD88. The water control structure to connect the ACFCC with the channel across the County marsh to Pond E2 could be either a concrete box culvert or an HDPE or CMP culvert; the former may be preferable because it could be a natural-bottom culvert to encourage fish passage.

Habitat Transition Zones

Habitat transition zones would be constructed to increase habitat complexity and quality in the ponds for special-status species. The transition zones in Alternative Eden B would be built on the eastern border of the Inland and Southern Ponds, against the backside levee, one projecting into Inland Ponds E5, E6, and E6C and the other projecting into Pond E4C. The linear extent of these habitat transition zones, which would run in a primarily north-south orientation but be contoured to match the existing pond borders and the above-described constructed levee/floodwall, are approximately 6,000 linear feet and 4,500 linear feet, respectively. The backside habitat transition zones would have a slope as shallow as 30:1 (h:v), but they could be designed and built to be steeper, and thus smaller, depending on the amount of fill material available. The top elevation would be 9 feet NAVD88. A small gap must be maintained between these ponds and their habitat transition zones to accommodate the existing ACFCWCD channel that runs between them to the J-Ponds. Native vegetation would be planted on the habitat transition zones and may require control of invasive, exotic vegetation. The exact types of planted vegetation would be chosen to be appropriate to the elevation of the habitat transition zones along their slope into the ponds themselves. The plant mix would be developed as part of a future project phase. The maintenance of the habitat transition zones is generally limited to removal of invasive plants and mosquito abatement activities, as discussed in Section 2.2.10, Operation and Maintenance.

Habitat Islands

Habitat islands, primarily for nesting birds and upland refugia for other species, would be created from retained segments of levees around either the perimeter or internal levees of southern Eden Landing. Up to two dozen habitat islands could be formed in this way. The material excavated from the levee breaches and nearby pilot channels would be used to increase the remnant levee islands in both footprint and height. The islands would be built to an elevation above MHHW (9 feet NAVD88, not including any topping) to minimize exposure to tidal waters. As shown on Figure 2-4, the islands, because they would be constructed from remnant levees and adjacent pilot channels, would be linear in nature, and the majority of the islands would be located significant distances from recreational trails to avoid habitat disturbance. The proposed island in Ponds E5C and E4C would be located in the middle of the pond adjacent to the pilot channel, because those ponds are relatively higher than others in the pond complex, and the pond bottoms may be accessible with heavy equipment. All other islands would be constructed from existing levees only. Typical island side slopes would be at least 5:1 for stability, but variation based on the existing levee side slopes is expected.

Although most of the islands would be allowed to self-colonize (i.e., vegetation would establish itself on the islands) or be planted with native vegetation, some would be treated to provide unvegetated nesting habitat for western snowy plover, California least tern, or other bird species. Different surface treatments may be employed, depending on the wildlife management needs. For example, the top surface of the islands could be treated to minimize weed establishment and then topped with gravel, oyster shells, and/or sand to prevent vegetation, which is a landscape that is preferred by some species of nesting birds. This minor management decision would depend on the nesting requirements of the target species and may vary between years.

Upland Fill Import and Placement

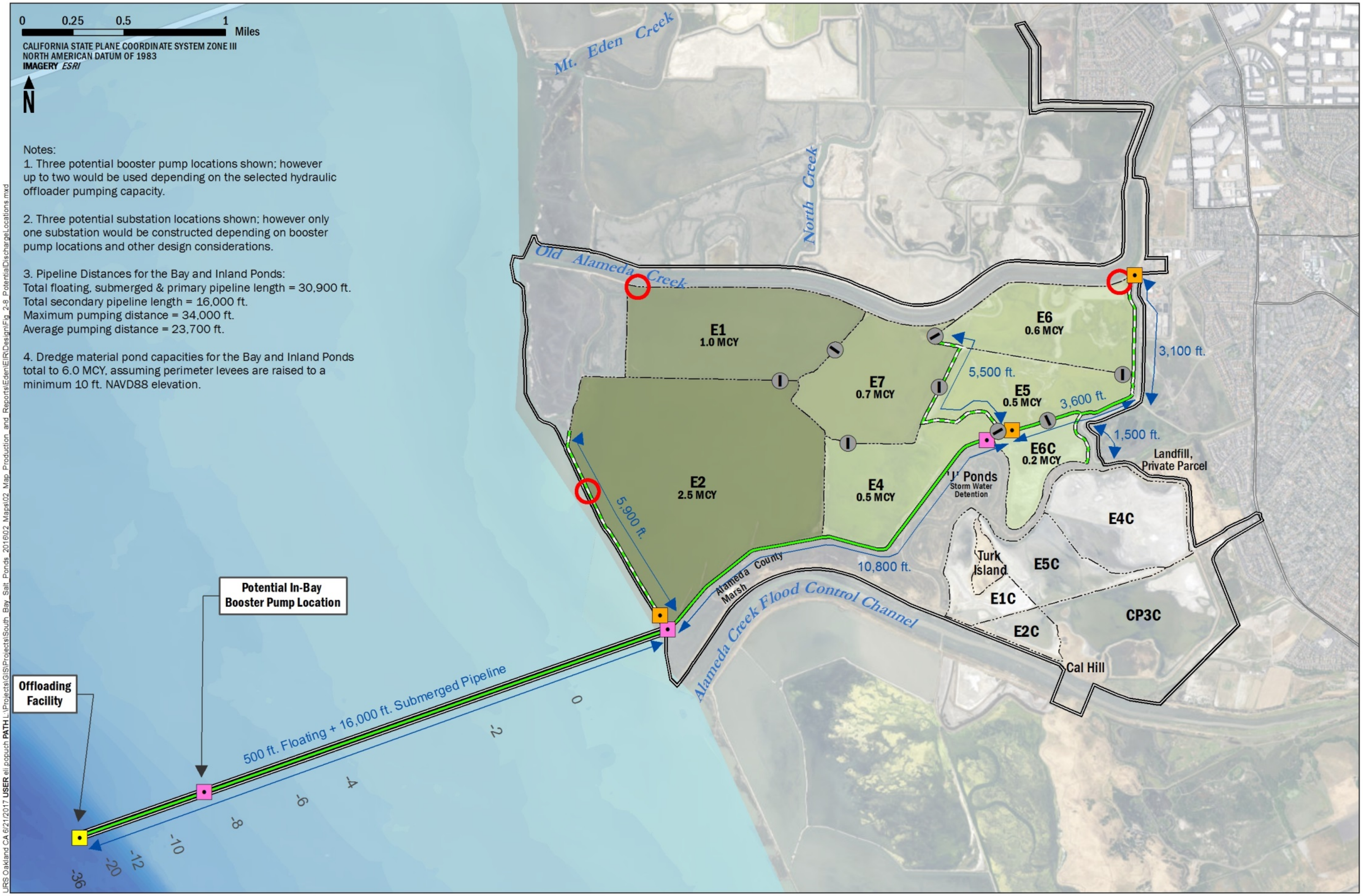
As noted above, upland fill material would be brought in for levee improvements, habitat transition zones, and/or construction of islands (where needed) to fill any gap between the volumes needed for Alternative Eden B and the volumes that can be generated from the levee modifications, channel excavations, and the import of dredge material that are planned under this alternative. Table 2-6 in Section 2.2.9, Tables of Design Details, lists the cut and fill volumes of wet and dry material, as well as the net volume of required imported fill material, in all three Action Alternatives. These volumes represent a worst-case scenario where habitat transition zones would need to be built entirely with upland fill material and no imported dredge material. For Alternative Eden B, the potential impacts associated with traffic, air quality, and noise associated with delivery of upland fill material from offsite is based on the import of up to 92,000 cubic yards (CY) of fill. The assessment of these impacts includes excavation, loading, and delivery of the fill to a disposal site and to the Phase 2 project area via truck. Locally-specific impacts associated with delivery of fill material (such as traffic, noise, and air quality emissions) are evaluated in those chapters of this document.

Dredge Material Import and Placement

Alternative Eden B has the capacity to support beneficial reuse of up to 6 million cubic yards (MCY) of dredged material to create approximately 1,848 acres of tidal habitat in the Bay and Inland Ponds. Placement of the dredged material would allow for a target pond bottom elevation of 6.5 feet NAVD88 prior to breaching the ponds, the same elevation as mean higher water (MHW). Dredged material placement would also require minor levee improvements in some locations to provide adequate freeboard for the dredge material placement process. An additional 83,000 cubic yards of dredged material could also be used to create habitat transition zones. Dredge material would not be placed in the Southern Ponds because the already relatively high pond bottom elevations in those ponds make it unnecessary there and because of the long distance from the offloading facility.

The average annual rate of dredged sediment delivery to the Bay and Inland Ponds is expected to range from 0.9 to 1.8 MCY per year. Dredged material would be sourced from dredging projects around the Bay, which typically provide a range of fine and coarse material, although fines would likely be predominant. Dredging projects wishing to dispose of material at the southern Eden Landing ponds would obtain separate environmental review and permits to dredge and to transport their material to a deep-water transfer point located in the Bay. Only material meeting the San Francisco Bay Regional Water Quality Control Board’s (RWQCB) wetland cover suitability criteria would be accepted.

As part of Alternative Eden B, an offloading facility would be stationed in the Bay for a number of years during the start of construction. Dredge material would be offloaded at this facility, mixed with seawater, and the resulting slurry would be pumped from the offloader via pipelines to the Bay and Inland Ponds. The offloading facility would be located in the deep water channel approximately 3 miles offshore of Pond E2 (see Figure 2-7). The offloading facility would be comprised of a hydraulic offloader, landing barges, temporary mooring piles, delivery vessels, a feed water system, and slurry pipeline. The feed water system would be comprised of an intake pump and fish screen, and would supply water into the delivery vessel (scow or hopper) to create a slurry that the hydraulic offloader (i.e. transfer pump) would pump shoreward via pipeline. The offloading facility would be less than 30,000 square feet in size and approximately 30 temporary mooring piles, 18 to 36 inch in diameter, would be driven to secure the offloader, landing barges, delivery vessels, and supporting equipment.



URS Oakland CA 6/21/2017 USER eli.popuch PATH L:\Projects\GIS\Projects\South Bay Salt Ponds 2016\02 Maps\02 Map Production and Reports\Eden\EIR\Design\Fig 2-8 PotentialDischargeLocations.mxd

LEGEND

- Offloading Facility
- Potential Booster Pump
- Potential Substation Location
- Dredged Material Pipeline: Primary
- Dredged Material Pipeline: Secondary
- Water control structure
- Potential Discharge Location
- Boundary of Current or Former ELER Pond
- Eden Landing Phase 2 Project Area

AECOM
South Bay Salt Pond Restoration Project

Figure 2-7
Dredged Material Design and Potential Discharge Locations

The pipeline transporting the slurry from the offloading facility to the Bay and Inland Ponds would be 24 to 36 inches in diameter and manufactured of steel or high density polyethylene (HDPE). The pipeline would be submerged from the offloading facility to shore during higher portions of the tidal cycle and exposed on the surface of exposed mudflat during the lower range. It would be identified with appropriate signage and lighting according to United States Coast Guard requirements. The pipeline would consist of the following approximate lengths from the offloading facility to the ponds: 500 feet floating, 16,000 feet submerged, 14,400 feet primary onshore, and 16,000 feet secondary onshore. Secondary onshore pipeline lengths include diversions from the primary pipeline to prevent material mounding and support habitat transition zone construction. The minimum, maximum, and average pumping distance would be approximately 16,500 feet, 34,000 feet, and 23,700 feet, respectively, depending on the pond discharge location. Up to two booster pumps would be located along the pipeline route, with potentially one in the Bay, depending on the hydraulic offloader’s pumping capacity. The offloading facility and booster pumps could be powered by diesel fuel or by electricity.

Existing water control structures would be used where possible to manage the slurry placed within the ponds; however, up to eight water control structures could be modified or added to maximize the residence time in the ponds and promote settling of solids. After the solids have settled in the ponds, excess water would be decanted and discharged into the Bay. The Bay and Inland Ponds have the capacity to receive the 0.9 to 1.8 MCY of dredged sediment in 1 year without discharging decant water back to the Bay. When discharge does become necessary, water would be returned to the Bay at either the Bay-front levee of Pond E2, or into OAC from one of the northern ponds (Ponds E1, E7, or E6). The infrastructure used for the import and placement of dredge material would be decommissioned prior to construction of other restoration, flood risk management, and recreational features.

Other details of the pumps, the slurry pipe, and other features are discussed in Section 2.2.7, Construction Methods, and in Appendix E, the Preliminary Design Memorandum of Dredged Material Placement at Southern Eden Landing.

Union Sanitary District Treated Water Reuse

The USD provides wastewater collection, treatment, and disposal services to Fremont, Newark, and Union City. USD’s wastewater treatment plant is immediately east of Pond E6. Given the close proximity to that plant and the desire of USD to occasionally supplement its discharge systems and capacity, further habitat enhancements could be realized by the beneficial reuse of treated water from USD. The treated water could be used to water the vegetation in the habitat transition zones, provide occasional decreases in salinity, and allow the Inland Ponds to experience periods of brackish water conditions.

There are existing subterranean pipes that function as a treated wastewater force main for the East Bay Dischargers Authority. These pipes run in a southeast-to-northwest direction just to the east of the ELER Phase 2 project area. The treated water currently flows through these pipes, which cut across the northeastern corner of ELER, and the treated water is eventually released into San Francisco Bay through a deep water discharge just south of the Oakland airport. Extensions from the existing outflow infrastructure at the USD location would be constructed and equipped with directional control systems to provide USD, in consultation with CDFW, with appropriate management capacity over the quantity and timing of diversion and delivery of treated wastewater to the Inland Ponds.

The USD has also inquired with regard to the SBSP Restoration Project about the potential to incorporate a system of pumps and pipes to allow two-way flows of treated wastewater from its neighboring facility into Pond E6. There are occasions when the USD has a need to store or buffer treated water from its facility to free up capacity for incoming stormwater. Thus, USD had the idea to create temporary detention capacity for 25 million to 50 million gallons of treated waste water in a hydraulically separated portion of Pond E6 and to implement an infrastructure in which USD could then pump that water back out for treatment before discharging it to the Bay. After consideration of this additional component as part of Phase 2 of the SBSP Restoration Project at southern Eden Landing, the project has removed it from further inclusion as part of Phase 2. However, the idea may be implemented in a future phase. At that time, the necessary NEPA and CEQA notifications, analyses, and review processes would be followed before a decision about implementation.

Beneficial Reuse of Groundwater from ACWD's ARP Wells

Another alternative water supply for the habitat transition zone is brackish groundwater from ACWD's ARP wells. ACWD manages groundwater in the Niles Cone groundwater basin (Niles Cone) through programs that protect and improve water supplies for groundwater users and the environment. Since 1962, when supplemental water was first purchased from the State Water Project, ACWD has been engaged in a continuous water replenishment/recharge program in order to sustainably manage the quality and quantity of water in the Niles Cone while balancing and protecting environmental resources. Although there has been substantial improvement in the basin, a considerable volume of saline water still remains in the groundwater aquifers. As a result, ACWD initiated its ARP to restore water quality in the groundwater basin by removing the saline water trapped in the aquifer system.

ACWD has two ARP wells near southern Eden Landing; one immediately adjacent to Ponds E5 and one near E4C. These ARP wells are used to remove trapped saline water from degraded portions of the aquifers in the Niles Cone in order to increase usable groundwater basin storage, to improve overall groundwater quality, and to prevent the movement of the saline water toward production wells. The brackish water from these wells could be used to water the vegetation in the habitat transition zones.

ACFCWCD Infrastructure

Alternative Eden B would continue to allow stormwater to pass from ACFCWCD's detention basin east of the ponds through a water control structure into the J-Ponds to the west. A footbridge would be constructed over the water control structure to allow connectivity with the proposed Bay Trail additions.

Public Access and Recreation Features

For public access and recreation, several features would be included in Alternative Eden B to enhance public access within the Phase 2 project area.

First, the existing trail along the north side of the ACFCC would be retained by using water control structures to connect the Southern Ponds to the ACFCC. In all Action Alternatives, including Alternative Eden B, water control structures (instead of open breaches) would be constructed in the northern ACFCC levee. The SBSP Restoration Project does not plan to affect the existing trail at that location, and the levee would be reconstructed following whatever modifications are made to connect the ACFCC with the Eden Landing ponds. This trail , which is operated by the East Bay Regional Parks District (EBRPD), would thus be retained to allow for full use by pedestrians, bicyclists, and equestrians. All modifications would be sized and rated relative to the existing trail so that access by emergency vehicles and maintenance equipment would not be reduced from the current levels.

Second, the SBSP Restoration Project's goal of completing portions of the Bay Trail spine would be advanced by adding one of several new trail alignments as part of the project. The alignment to complete the Bay Trail spine through the general vicinity of southern Eden Landing is dependent on the availability of levees and other lands not owned by CDFW. The various trail options differ significantly in their routes through the Phase 2 project area, as shown on the Figures 2-4 through 2-6 The trail routes in this alternative would be on a combination of CDFW land and Alameda County land, depending on landowner agreements. Solely on CDFW-owned land, the Bay Trail would extend approximately 16,000 feet from the existing terminus in northern Eden Landing at the junction of NCMP and Pond 20B. The trail would then run south from that point along the eastern border of northern ELER, across the 20-tide-gate structure, over the OAC channel, into southern ELER, and then continue on CDFW levees to the southeast corner of Pond E6C. From there, three routes are proposed to connect the trail to the ACFCC levee. These routes are as follows:

- Route 1: CDFW property only; 7,400 linear feet, to be placed on the levees improved for trails.
- Route 2: CDFW and Cargill property; 10,500 linear feet, to be placed on the eastern and southern levees of the Southern Ponds, where they wrap around CP3C; Cargill owns the levees bordering this pond, and such an alignment would only be completed if Cargill agrees to sell and/or donate its holdings.
- Route 3: CDFW and Alameda County property; 5,300 linear feet, to be placed on the CDFW-owned levee on the eastern side of Pond E4C and then routed onto Alameda County land to the east to the end of Westport Way, where no further trails or road improvements would be added as part of Phase 2. This route would not fully complete the Bay Trail spine through the entirety of southern Eden Landing. This route is not the preference of the SBSP Restoration Project, and it is intended to provide an interim "fall-back" option if either Route 1 or Route 2 cannot be fully completed as part of Phase 2.

In addition to these three routes, two "community connections" would be provided to enhance local public access onto the Bay Trail network. These two new access points to the Bay Trail would be through improvements that would be made to the construction access routes at Westport Way and Vesey Road. Following construction, the driveways, levees, and ramps from the local streets onto the levees would be enhanced, graded, sloped, and surfaced as needed to convert them into entry points for pedestrians and bicycles. These added access points would enhance the ability of local residents to use the trails without needing motor vehicles to get there.

Some of these trails would necessitate various pedestrian or bicycle bridges, as shown in Figures 2-4 through 2-6 Some would be placed on improved levees. However, in all of these cases the portions of the Phase 2 trails that would constitute part of the Bay Trail spine would be in compliance with the Americans with Disabilities Act (ADA) and would meet the Association of Bay Area Governments (ABAG) guidelines for Bay Trail spine segments wherever feasible. Levees with trails would be expected to be a minimum of 12 feet wide with a 3-foot shoulders on either side, totaling 18 feet. Trails not designated as part of the Bay Trail spine would be a minimum of 10 feet wide with a 1-foot shoulder on either side, totaling 12 feet. Some of the trail options shown on the figures would require acquisition of either ownership from Cargill or an easement or other right-of-way provision through lands or properties currently owned by the ACFCWCD. The SBSP Restoration Project intends to coordinate with these other landowners or agencies (such as EBRPD) to develop and implement a trail network through southern

Eden Landing; however, the project cannot do so on its own, and all trail routes discussed in this Draft EIS/R must be considered to be contingent on these external landowners.

The discussion and analysis of Alternative Eden B includes the potential impacts of all of these routes so that maximum flexibility for implementing one or more of them would be retained as ownership and other access agreements are being determined. Other notable design details are in Section 2.2.2, Overview of Eden Landing Phase 2 Project Alternatives, above.

A viewing platform featuring benches, interpretive panels, and/or recreational information would be installed along the ACFCC trail near the southern boundary of the J-Ponds. The location of the platform would be near a trail junction or an interesting habitat feature. The content would include maps of trail routes, restoration actions, habitats, and other features or it may contain environmental education or other interpretive details.

2.2.5 Alternative Eden C

In Alternative Eden C, the Bay Ponds would be restored to tidal marsh as in Alternative Eden B; however, the Inland Ponds and Southern Ponds would be retained as managed ponds and enhanced with water control structures and other habitat enhancement features intended to add operational flexibility and enhance ecological value for these managed ponds. Alternative Eden C is illustrated on Figure 2-5.

The intent described in the 2007 Final EIS/R is to restore all of the Phase 2 project area to tidal marsh; however, because of the need to retain options for adding enhanced managed ponds to offset the loss of managed pond habitats elsewhere in the greater SBSP Restoration Project area, Alternative Eden C was developed as an option to meet the broader goals of the SBSP Restoration Project, which acknowledged that there was a chance that retaining and enhancing managed ponds at southern Eden Landing might necessary to avoid adverse impacts to pond-dependent wildlife. However, should this alternative be selected for construction —and it is implemented—its current design may be altered to further the overall goals and objectives of the greater SBSP Restoration Program. For instance, after the Bay Ponds and other marsh restoration efforts in other parts of the project area and other projects around the Bay have been completed, additional study results from the AMP and other counts or sampling of pond-dependent wildlife species (such as bird guilds and/or bird counts) might demonstrate that these managed ponds are no longer necessary to maintain those species and guilds above the programmatic thresholds of significance. In this situation, the mid-complex levee that separates the tidal Bay Ponds and the J-Ponds from the non-tidal Inland Ponds and Southern Ponds could be removed. Indeed, this option of a two-phased restoration of the Inland Ponds and Southern Ponds is discussed further in Alternative Eden D, below, which shows the mid-complex levee as a temporary, rather than a permanent, feature of the alternative. Alternative Eden C retains this mid-complex levee as permanent, and this alternative is evaluated to address the potential short- and long-term impacts associated with this feature and the long-term effects of the Inland and Southern Ponds operating as managed ponds.

Levee Improvements

For Flood Risk Management. Alternative Eden C would have its primary source of coastal flood risk management maintained by the improved mid-complex levee system, the location and alignment of which is shown on Figure 2-5. That mid-complex levee would be constructed to separate the Inland Ponds and the Southern Ponds from the tidal flows introduced to the Bay Ponds. It would also prevent the tidal flows from the J-Ponds from entering the Inland or Southern Ponds. This separation would allow the Inland

Ponds and Southern Ponds to be maintained as managed ponds. This levee alignment was chosen to make use of the existing internal berms and levees that were constructed for salt production. Rather than construct an entirely new levee alignment, the mid-complex levee would be built almost entirely on top of these levees, which are expected to need compaction and improvement in addition to raising and widening. The total length of this mid-complex levee would be approximately 12,900 linear feet. Its top elevation would be 12 feet NAVD88, and its width would also be 12 feet. The side slopes could be 4:1 (h:v) or flatter. The material for its construction would be imported from a combination of off-site upland sources and material from local cut activities associated with this action alternative. There could also be beneficial reuse of dredged material, as discussed below.

For Habitat Separation and Enhancement. In Alternative Eden C, approximately 5,900 linear feet of perimeter levee along the outer (western) Bay-facing levees of Pond E1 would be raised and improved for habitat enhancement. This improvement is not necessary for flood risk management, though it would reduce wave run-up; rather, the primary purpose is to prevent scour and erosion of the restoring marsh in the Bay ponds behind it. It would be raised to an elevation of 12 feet NAVD88.

Levee Breaches and Pilot Channel Excavation

Similar to Alternative Eden B, Alternative Eden C would breach the north levee at Pond E1 and excavate pilot channels into the Bay Ponds to improve the draining and filling of those ponds and enhance tidal marsh formation. However, unlike Alternative Eden B, only the Bay Ponds would have this feature because the other two pond groups would remain as managed ponds. The channel would be excavated from OAC to Pond E1 and then split into separate channels extending into Ponds E7, E2, and E4. The total combined length of these channels would be 9,750 linear feet. The other channel dimensions are shown in Table 2-12 in Section 2.2.9, Tables of Design Details**.**

A small portion of channel excavation would extend approximately 250 feet from the water control structure on the northern border of Pond E6 across the OAC to the deeper northern channel. That portion would improve flows into and out of these ponds as well.

Levee Lowering

As in Alternative Eden B and as described in Section 2.2.2, Overview of Eden Landing Phase 2 Project Alternatives, on the common components, portions of the levees along the outer margins of the Bay Ponds would be breached and lowered to introduce tidal flows to the Bay Ponds. These levees would be lowered to MHHW (7 feet NAVD88) to provide more frequent levee overtopping, help provide an equal or improved level of flood risk management relative to existing conditions, and increase the hydraulic connectivity between channels and marshes. The approximate locations of these lowered sections are shown on Figure 2-5; the total combined length in this alternative is 12,800 linear feet. The details of the modeling underlying this design concept are in Attachment 1 of Appendix D, and the effects are explained in the appropriate sections of Chapter 3, Environmental Setting, Impacts, and Mitigation Measures.

Water Control Structures

As managed ponds, the boundaries of the Inland and Southern Ponds with OAC, the ACFCC, and the existing Alameda County marsh would have water control structures installed to manage the water quality, depth, salinity, and other aspects of habitat for target species and guilds. There would be up to 11 water control structures to allow maximum operational flexibility of these ponds. In addition, one of these water control structures would be placed into the mid-complex levee between the J-Ponds and the planned pilot channel; this placement would allow the ACFCWCD to rapidly empty detained stormwater in the J-Ponds, if needed.

The water control structures would have combination gates at both the inlets and outlets for maximum operational flexibility in water level and salinity control. A combination gate can be operated as a slide gate to allow flow in both directions or may act as a tide gate for flow in either direction when one is closed. The design details of the proposed water control structures (new structures and modifications to existing structures) are shown in a table in Appendix D, the Southern Eden Landing Preliminary Design Memorandum. Here, it is sufficient to note that most would be circular HDPE or CMP culverts with typical diameters of 36 or 48 inches. At the connections between the ACFCC and the Alameda County–owned wetlands, these structures could instead be 6-foot by 6-foot concrete box culverts.

Fish Habitat Enhancements

The placement and alignment of the mid-complex levee would also augment the separation between the J-Ponds and the existing County-owned high marsh to the west of it (south of Ponds E2 and E4). That separation would allow excavation of a channel between Pond E4 and a newly proposed water control structure (one of the 11 mentioned above) to connect to the ACFCC. This channel and the associated water control structure would be sized, placed, and oriented to allow passage of steelhead and other native fish from the ACFCC into the large Bay Ponds, which are expected to provide nursery habitat for these anadromous and estuarine fish. The channel would be approximately 3,100 feet long, 15 feet wide at the top, and set at an invert elevation of 2.7 feet NAVD88. The water control structure to connect the ACFCC with the channel across the county marsh to Pond E4 could be either a concrete box culvert or an HDPE or CMP culvert; the former may be preferable because it could be a natural-bottom culvert to encourage fish passage.

Habitat Transition Zones

As Figure 2-5 indicates, no habitat transition zones would be built in the Inland Ponds or Southern Ponds under Alternative Eden C. Instead, a large habitat transition zone would be built on the western side of the mid-complex levee and would project into Ponds E7 and E4. The conceptual design for this transition zone—including its top elevation, maximum extent from a 30:1 slope, material sourcing, and so on—are similar to those described in Alternative Eden B. The maximum footprint of this proposed habitat transition zone is approximately 23 acres, and the maximum volume of material needed for its construction would be 75,000 cubic yards.

Habitat Islands

Remnant levees in the Southern Ponds and Bay Ponds would be enhanced to form habitat islands for roosting and/or nesting birds similar to those described in Alternative Eden B. These enhancements are not appropriate in the Inland Ponds because they would intentionally remain hydraulically separated from each other to allow independent management of salinity, water depth, and other conditions to allow a mix of pond habitats for a range of species. Taking down portions of the levees between them would remove this opportunity.

Habitat islands would also be created adjacent to the proposed pilot channels in the Bay Ponds and Southern Ponds. These islands would aid in minimizing haul requirements for small amounts of material within the site. A select group of islands would be treated to create nesting habitat for western snowy plover, California least tern, or other bird species. The top surface of the islands could be treated as described in Alternative Eden B or in some other way to allow management flexibility.

Upland Fill Import and Placement

As with Alternative Eden B, upland fill material would be brought in for levee improvements, habitat transition zones, and/or islands, as needed, to fill any gap between the volumes needed for Alternative Eden B and the volumes that can be generated from the levee modifications, channel excavations, and the import of dredge material that are planned under this alternative. Table 2-6 in Section 2.2.9, Tables of Design Details, lists the cut and fill volumes and the net volume of imported material of all three Action Alternatives. These volumes represent a worst-case scenario where habitat transition zones would need to be built entirely with upland fill material and no imported dredge material. Therefore, the potential impacts associated with the traffic, air quality, and noise for the delivery of up to 59,000 cubic yards of fill are assessed in this document. The assessment of these impacts includes excavation, loading, and delivery of the fill to a disposal site and to the Phase 2 project area by truck. Locally specific impacts associated with the delivery of fill material (such as traffic, noise, and air quality emissions) are evaluated in those sections of Chapter 3, Environmental Setting, Impacts, and Mitigation Measures.

Dredge Material Import and Placement

Alternative Eden C has the capacity to support beneficial reuse of up to 5.0 MCY of dredged material in the Bay Ponds. Placement of this dredged material would allow for a target pond bottom elevation of 6.5 feet NAVD88, the same elevation as MHW, prior to breaching the Bay Ponds and would require minor levee improvements in some locations to provide adequate freeboard for dredged material placement. An additional 46,000 cubic yards of dredged material could also be used to create habitat transition zones. Dredge material would not be placed in the permanent managed ponds (Inland and Southern Ponds). The average annual rate of dredged sediment delivery to the Bay Ponds is expected to range from 0.9 to 1.8 MCY per year.

Dredging projects wishing to dispose of material at Eden Landing would obtain separate environmental review and permits to dredge and to transport their material to a deep-water transfer point located in the Bay. Only material meeting the RWQCB wetland cover suitability criteria would be accepted.

As part of Alternative Eden C, an offloading facility would be stationed in the Bay during the start of construction. Dredge material would be offloaded at this facility, mixed with seawater, and the resulting slurry would be pumped from the offloader via pipelines to the Bay Ponds. The offloading facility would be comprised of a hydraulic offloader, landing barges, temporary mooring piles, delivery vessels, a feed water system, and slurry pipeline. The feed water system would supply water into the delivery vessel (scow or hopper) to create a slurry that the hydraulic offloader would pump shoreward via pipeline. The pipeline transporting the slurry from the offloading facility to the Bay Ponds would be submerged from the offloading facility to shore during higher portions of the tidal cycle and exposed on the surface of exposed mudflat during the lower range. The pipeline would consist of the following approximate lengths from the offloading facility to the ponds: 500 feet floating, 16,000 feet submerged, 10,800 feet primary onshore, and 11,400 feet secondary onshore. Secondary onshore pipeline lengths include diversions from the primary pipeline to prevent material mounding and support habitat transition zone construction. Up to two booster pumps would be located along the pipeline route, with potentially one in the Bay. The offloading facility and booster pumps could be powered by diesel fuel or by electricity.

Existing water control structures would be used where possible to manage the slurry placed within the ponds; however, up to eight water control structures could be modified or added to maximize the residence time in the ponds and promote settling of solids. Once solids have settled in the ponds, excess water would be decanted and discharged into the Bay. Water would be returned to the Bay at either the Bay-front levee of Pond E2, or into OAC from one of the northern ponds (Ponds E1 or E7). The infrastructure used for the import and placement of dredge material would be demolished prior to construction of other restoration, flood risk management, and recreational features.

Other details of the pumps, the slurry pipe, and other features are discussed in Section 2.2.7, Construction Methods, and in Appendix E, the Preliminary Design Memorandum of Dredged Material Placement at Southern Eden Landing.

ACFCWCD Infrastructure

Alternative Eden C would continue to allow stormwater flows to pass from ACFCWCD's detention basin east of the ponds through a water control structure into the J-Ponds to the west. A footbridge would be constructed over the water control structure to allow connectivity with the proposed Bay Trail additions.

Public Access and Recreation

For public access and recreation in Alternative Eden C, the features described above for Alternative Eden B would also be included to retain and enhance the public access experience within the Phase 2 project area. As under Alternative Eden B, the existing trail along the north side of the ACFCC would be retained by using water control structures to connect the Southern Ponds to the ACFCC. Also, the same trail route would be used to extend the Bay Trail from its current end partway through northern Eden Landing to the southeastern corner of Pond E6C. After that, the same three routes through most of southern Eden Landing would be analyzed for possible inclusion. These routes would require a 250-foot-long bridge over eastern end of the Alameda County–owned channel that connects to the J-Ponds and/or a 300–foot–long bridge over the western portion of this channel. All of these trail and bridge options are shown on Figure 2-5, as is the same viewing platform with benches and panels described in Alternative Eden B.

However, Alternative Eden C also includes several additional features for improved recreation and public access. Alternative Eden C proposes to build a bridge over the armored levee breach near Pond E2C across the ACFCC to connect with the existing Bay Trail, which continues to the south. This bridge would have to span at least 600 feet to cross the ACFCC, be high enough in the center to allow for periodic channel dredging, and be high enough over its entire length to allow for 100–year floods. The Bay Trail bridge over the ACFCC is intended to be accessible to pedestrians and bicycles, but not necessarily to maintenance or emergency vehicles, which have sufficient access to and from either side now.

A new Bay Trail spur trail to the former site of the Alvarado Salt Works is also proposed. This spur trail would run 5,900 feet along the northern edge of Pond E6 to a viewing platform and interpretive feature that would be included there to explain the history and the remnant structures at that location. The mid-complex levee would be built to the west of the former salt works site so that its degradation would not be accelerated. From this point, the OAC channel could be bridged for pedestrian and bicycle access, and a parallel trail would run eastward, back to the Bay Trail spine, along the southern levees of

Ponds E6A and A8. The total length of this trail loop is approximately 13,500 feet, and the bridge would be approximately 500 feet.

All of these added trails and viewing platforms would comply with Bay Trail, EBRPD, and San Francisco Bay Conservation and Development Commission (BCDC) guidelines to the maximum extent feasible within the space available on the existing or improved levees and the Bay Trail guidelines for trail width and surfacing.

2.2.6 Alternative Eden D

Alternative Eden D is intended to provide a two-staged approach to tidal marsh restoration in the Eden Landing Phase 2 project area. Alternative Eden D recognizes there is uncertainty in the timing and successful outcomes of the Phase 1 projects that have recently been implemented and the Phase 2 projects at the Refuge ponds. Therefore, Alternative Eden D would allow operation of enhanced managed ponds in the Inland and Southern Ponds until conditions elsewhere within the greater SBSP Restoration Project demonstrated that the goals for managed pond habitat were being achieved and the needs of pond-associated wildlife were being met. Alternative Eden D is illustrated on Figure 2-6.

Selection of Alternative Eden D would provide a means to implement the AMP’s system of delaying the choice of whether to retain and improve some managed ponds or convert everything to tidal marsh until uncertainty has been reduced regarding how much of each habitat type (i.e., managed pond vs. tidal marsh) is necessary to support and enhance the overall ecology and species diversity of the South Bay.

Under Alternative Eden D, the Bay Ponds would be restored to tidal marsh immediately, while the Inland Ponds and Southern Ponds would be at least temporarily retained as enhanced managed ponds. Specific actions to achieve this mix of restored tidal marsh and enhanced managed ponds—and measures to provide flood risk management and recreation opportunities within the ELER Phase 2 project area—are described below.

Levee Improvements

Alternative Eden D includes three primary actions to improve existing levees. Some levee improvements are primarily intended to provide habitat, and others are primarily intended to maintain or improve the de facto levels of flood risk management. Figure 2-6 shows the location of each of the levee improvements described below, and Attachment 1 of Appendix D contains the details of the modeling underlying these design concepts, along with cross sections demonstrating the proposed design of each.

For Flood Risk Management. The existing levees on the east side of the Inland and Southern Ponds would be improved by increasing their top elevation to 12 feet NAVD88. Within the Inland Ponds, approximately 6,000 feet of existing perimeter levee would be raised, spanning from the northeast corner of Pond E6 to the south and west along Ponds E5 and E6C and ending at the eastern corner of Pond E6C. Also, approximately 10,500 feet of perimeter levee along the landside portion of the Southern Ponds, spanning from the northern corner of Pond E4C to the south and east around Pond E4C and then west and south along CP3C and ending at Cal Hill. The existing Cargill access levee to Turk Island would also be raised.

Alternative Eden D would also construct a temporary mid-complex levee separating the Bay Ponds from the Inland Ponds and extending across the J-Ponds and the western end of the Southern Ponds to connect to the ACFCC levee. This route is the same route as the permanent mid-complex levee in Alternative Eden C. It would be approximately 12,900 feet long and would be raised to an elevation of 12 feet NAVD88. Its primary purpose would be to act as a temporary feature separating restored tidal marsh within the Bay Ponds and enhanced managed ponds within the Inland and Southern Ponds; this feature would allow them to be separately restored and managed.

The combined effect of the improved backside levee and the mid-complex levee would provide equal or better flood risk management relative to existing conditions. The planned height of 12 feet NAVD88 is 5 feet above MHHW and would provide a freeboard of about 1.5 to 2.5 feet above the maximum water surface elevation within the ponds during the design hydrologic events.

The temporary mid-complex levee would remain in place until the following two conditions were demonstrated:

1. The Bay Ponds become established as tidal marsh to provide for adequate risk management to inland developed areas for coastal flooding.
2. Wildlife species that make use of managed ponds around southern San Francisco Bay are not adversely affected by the tidal marsh restoration associated with Phase 1 and Phase 2 project actions within the greater South Bay.

Accomplishing the goal of the second condition would indicate that the habitat for species that utilize managed ponds is not being impacted to a degree that it is negatively affecting the species. As such, the creation of additional tidal marsh would not detract from their habitat needs. Therefore, this condition would “free up” the Southern Ponds and Inland Ponds for conversion to tidal marsh. The plan for eventual conversion of all three pond groups to tidal marsh would fit with the intent of the 2007 Final EIS/R for all of southern Eden Landing.

For Habitat Separation and Enhancement. The existing far western bayward levee of Ponds E1 and E2 would be improved with an emphasis on creating upland and transitional habitat, not flood risk management purposes. The internal, pond-facing side of those levees would have an associated habitat transition zone that is discussed in detail below. The side slopes would be constructed at a ratio of 4:1 (H:V) and an elevation of 12 ft NAVD88. This top elevation would extend to a width of at least 12 feet (west to east) for the entire length of approximately 10,900 linear feet.

Levee Breaches and Pilot Channel Excavation

Alternative Eden D proposes a levee breach and pilot channel on the north side of Pond E1 to provide the Bay Ponds with hydrologic connectivity with OAC. The breach would not be armored but would be expected to evolve naturally with erosion or deposition from incoming and outgoing tidal flows from the Bay Ponds as facilitated by the associated pilot channel. The proposed pilot channel is intended to improve the draining and filling of the Bay Ponds and to enhance their tidal marsh restoration progress. Material from breach and pilot channel excavation would be used for levee raising, island or mound creation, or construction of habitat transition zones proposed as part of the project.

Alternative Eden D would also construct a pilot channel from OAC on the east side of the temporary mid-complex levee to allow increased flow between Ponds E6, E5 and E6C via proposed water control structures within the Inland Ponds. Another pilot channel would extend from ACFCC through the Southern Ponds, establishing greater hydrologic connectivity between Ponds E2C, E1C, E5C, and E4C.

The total combined length of all pilot channels associated with Alternative Eden D would be 21,700 linear feet. The individual lengths and dimensions of the proposed pilot channel and its tributaries are provided in Appendix D, the Southern Eden Landing Preliminary Design Memorandum, and are shown on Table 2-12 in Section 2.2.9, Tables of Design Details.

Levee Lowering

As with Alternatives Eden B and Eden C, portions of the levees along the outer margins of the Bay Ponds would be breached and lowered to introduce tidal flows to the Bay Ponds. However, unlike Alternatives Eden B and Eden C, the western levee along Pond E2 would not be lowered, because Alternative Eden D would construct a habitat transition zone (described below) along the east side of that levee that would face into the pond.

Levee lowering on the north side of Pond E1 and south side of Pond E2 is planned to facilitate frequent levee overtopping by tides, but would still provide an equal or improved level of flood risk management relative to existing conditions. The levee-lowering locations would also increase the hydraulic connectivity between channels and marshes. The approximate locations of these lowered sections is shown on Figure 2-6; the total combined length of lowered levees in Alternative Eden D is 9,000 linear feet. The details of the modeling underlying this design concept are in Attachment 1 of Appendix D and the effects are explained in the appropriate sections of Chapter 3, Environmental Setting, Impacts, and Mitigation Measures.

Water Control Structures

Similar to Alternative Eden C, the Inland and Southern Ponds would have water control structures installed at their boundaries with OAC and the ACFCC. These installations would enable these ponds to function as enhanced managed ponds in the short term by facilitating their ability to manage water quality, depth, salinity, and other aspects of the habitat for certain species within these ponds. In total, Alternative Eden D would construct nine water control structures. One water control structure would be constructed at the boundary with OAC, and another at the boundary with the ACFCC. The remaining seven water control structures would be internal to the Inland and Southern Ponds.

Unlike Alternative Eden C, Alternative Eden D does not propose water control structures on the temporary mid-complex levee and therefore would not provide hydrologic connectivity with the Bay Ponds, at least until the mid-complex levee is breached or altered to allow an exchange of flows.

Each of the nine proposed water control structures will have combination gates at both the inlets and outlets for maximum flexibility in water level control. A combination gate can be operated as a slide gate to allow flow in both directions or may act as a tide gate in both directions when closed. The design details of the proposed water control structures (new structures and modifications to existing structures) are shown in a table in Appendix D, the Southern Eden Landing Preliminary Design Memorandum. Here, it is sufficient to note that most structures would be circular HDPE or CMP culverts with typical diameters of 36 or 48 inches. At the connections between the ACFCC and the Alameda County–owned wetlands, these could instead be 6-foot by 6-foot concrete box culverts.

Fish Habitat Enhancement

Unlike Alternatives B and C, Alternative Eden D would not add components specifically for fish passage enhancements. As enhanced managed ponds, the proposed water control structures at the Inland and Southern Ponds may not be designed specifically to allow fish passage.

Habitat Transition Zones

A habitat transition zone is proposed on the east (internal) side of the westernmost Bay-facing levee of Pond E2. The habitat transition would be larger than—but constructed similarly to—those described in Alternatives Eden B and Eden C. However, it would not have the treated water from USD delivered to it. The total footprint of this habitat transition zone would be approximately 32 acres and consist of 96,000 cubic yards of fill material. Some of this material could come from the channel excavations and breaches that are also part of Alternative Eden D, but these are relatively small sources compared with the total quantity of material needed. Thus, most of the material for this habitat transition zone would be imported from off-site upland sources and/or from dredging projects.

Levee Enhancement for Habitat Separation

Approximately 10,900 linear feet of perimeter levee along the outer (western) Bay-facing levees of Ponds E1 and E2 would be raised and improved for habitat separation and enhancement. This improvement is not necessary to retain the current levels of de facto flood risk management, though it would reduce wave run-up. The primary purpose of this improvement is to provide a base for the habitat transition zone described above and to prevent periodic wave overtopping and subsequent scour and erosion of the restoring marsh in the Bay Ponds behind it. The levee would be raised to an elevation of 12 feet NAVD88.

Habitat Islands

Remnant levees in the Bay Ponds and Southern Ponds would be enhanced to form habitat islands for birds similar to those described in Alternative Eden C. These enhancements are not appropriate in the Inland Ponds because they would intentionally remain hydraulically separated from each other to allow independent management of salinity, water depth, and other conditions to allow a mix of pond habitats for a range of species. Taking down portions of the levees between them would remove this opportunity.

Habitat islands would also be created adjacent to the proposed pilot channels in the Bay Ponds and Southern Ponds. These locations would aid in minimizing haul requirements for small amounts of material within the site. A select group of islands would be treated to create nesting habitat for western snowy plover, California least tern, or other bird species. The top surface of the islands could be treated as described in Alternative Eden B or in some other way to allow management flexibility.

Upland Fill Import and Placement

Upland fill material would be brought in for levee improvements, habitat transition zones, and/or islands as needed to fill any gap between the volumes needed for Alternative Eden D and the volumes that can be generated from the levee modifications, channel excavations, and the import of dredge material that are planned under this alternative.

Table 2-6 in Section 2.2.9, Tables of Design Details, lists the cut and fill volumes and the net volume of imported material of all three Action Alternatives. These volumes represent a worst-case scenario where habitat transition zones would need to be built with upland fill material instead of imported dredge material. Therefore, the potential impacts associated with traffic, air quality, and noise for the delivery of up to 154,000 cubic yards of fill are assessed in this document. The assessment of these impacts considers excavation, loading, and delivery of the fill to a disposal site and to the Phase 2 project area by truck. Locally specific impacts associated with delivery of fill material (such as traffic, noise, and air quality emissions) are evaluated in those sections in Chapter 3, Environmental Setting, Impacts, and Mitigation Measures.

Dredge Material Import and Placement

Alternative Eden D has the capacity to support beneficial reuse of up to 6 MCY of dredged material in the Bay and Inland Ponds. Placement of this dredged material would allow for a target pond bottom elevation of 6.5 feet NAVD88, the same elevation as MHW, prior to breaching the Bay Ponds and would require minor levee improvements in some locations to provide adequate freeboard for dredged material placement. An additional 96,000 cubic yards of dredged material could also be used to create habitat transition zones. Dredge materials would likely be placed in the Bay Ponds prior to the Inland Ponds. Dredge material would not be placed in the Southern Ponds because of the relatively high pond bottom elevations in those ponds and due to distance from the offloading facility.

Dredging projects wishing to dispose of material at Eden Landing would obtain separate environmental review and permits to dredge and to transport their material to a deep-water transfer point located in the Bay. Only material meeting the RWQCB wetland cover suitability criteria would be accepted.

As part of Alternative Eden D, an offloading facility would be stationed in the Bay during the start of construction (see Figure 2-7). Dredge material would be offloaded at this facility, mixed with seawater, and the resulting slurry would be pumped from the offloader via pipelines to the Bay and Inland Ponds. The offloading facility would be comprised of a hydraulic offloader, landing barges, temporary mooring piles, delivery vessels, a feed water system, and slurry pipeline. The feed water system would supply water into the delivery vessel (scow or hopper) to create a slurry that the hydraulic offloader would pump shoreward via pipeline. The pipeline transporting the slurry from the offloading facility to the Bay and Inland Ponds would be submerged from the offloading facility to shore during higher portions of the tidal cycle and exposed on the surface of exposed mudflat during the lower range. The pipeline would consist of the following approximate lengths from the offloading facility to the ponds: 500 feet floating, 16,000 feet submerged, 14,400 feet primary onshore, and 16,000 feet secondary onshore. Secondary onshore pipeline lengths include diversions from the primary pipeline to prevent material mounding and support habitat transition zone construction. Up to two booster pumps would be located along the pipeline route, with potentially one in the Bay. The offloading facility and booster pumps could be powered by diesel fuel or by electricity.

Existing water control structures would be used where possible to manage the slurry placed within the ponds; however, up to eight water control structures could be modified or added to maximize the residence time in the ponds and promote settling of solids. Once solids have settled in the ponds, excess water would be decanted and discharged into the Bay. Water would be returned to the Bay at either the Bay-front levee of Pond E2, or into OAC from one of the northern ponds (Ponds E1, E7, or E6). The infrastructure used for the import and placement of dredge material would be demolished prior to construction of other restoration, flood risk management, and recreational features.

Other details of the pumps, the slurry pipe, and other features are discussed in Section 2.2.7, Construction Methods, and in Appendix E, the Preliminary Design Memorandum of Dredged Material Placement at Southern Eden Landing.

ACFCWCD Infrastructure

Alternative Eden D would continue to allow stormwater flows to pass from the ACFCWCD's detention basin east of the ponds. Due to the temporary mid-complex levee, stormwater flows would be contained within the J-Ponds until they could be pumped back to OAC, as is the current practice.

Public Access and Recreation

The public access and recreation features in Alternative Eden D are the same as those in Alternative Eden B. Existing trails and access points would be retained. The Bay Trail spine would be completed through southern Eden Landing, using the same route to the corner of Pond E6 and then using one of the three optional routes described above. The viewing platform would be installed as described above.

2.2.7 Construction Methods

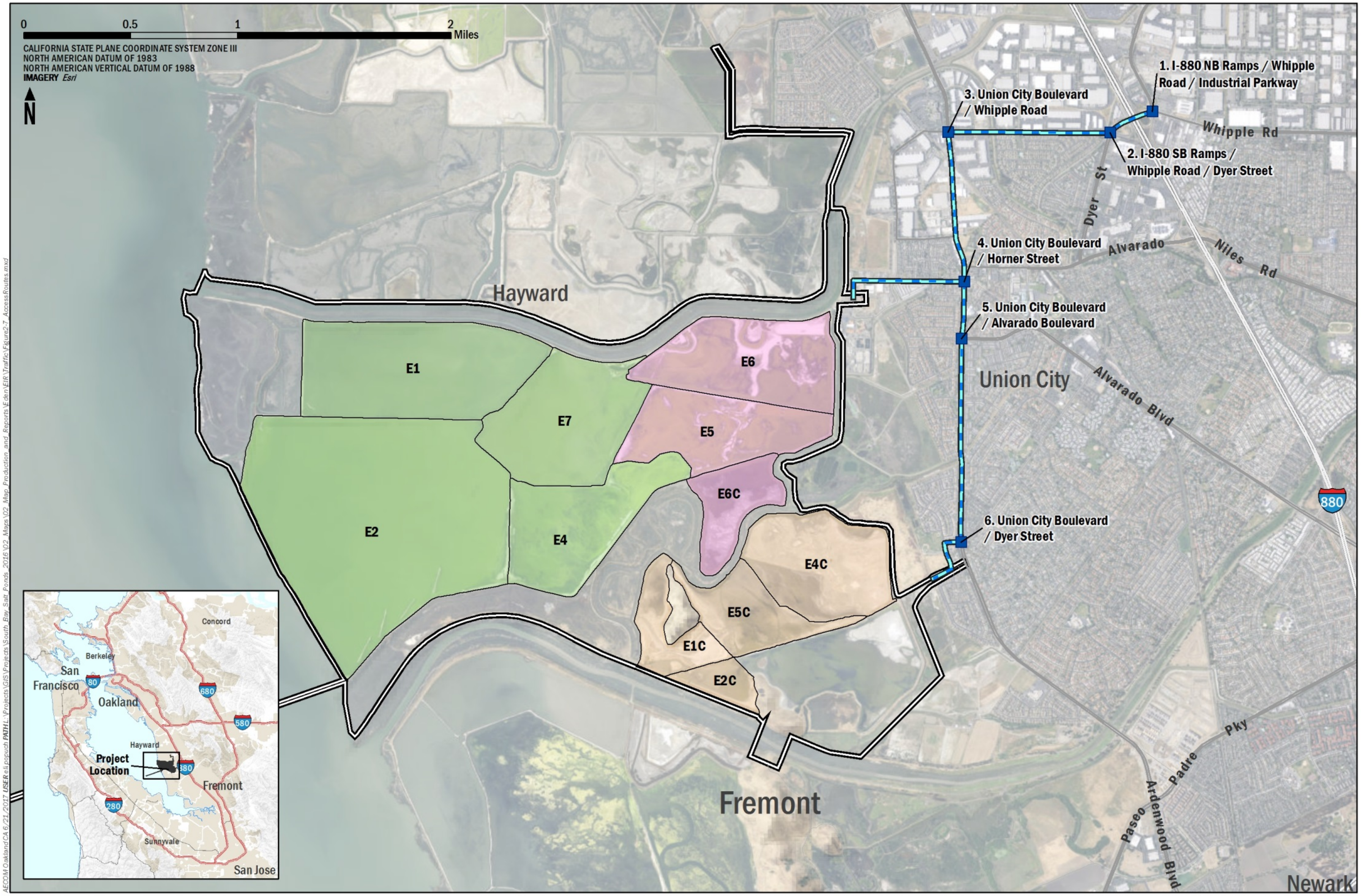
This section summarizes the construction methods that are presented in more detail in the design memorandums included as Appendix D. This section describes the planned access routes to the ponds, the construction sequence, the implementation of each component of the project, and the construction equipment.

Access

The ponds would likely be accessed by construction crews from Interstate 880, from which various arterials, collectors, and local streets provide access through Union City to two main gated entrances to southern Eden Landing. The gated entrances are inaccessible to the public. The primary access is near the USD headquarters, at the end of Horner Street. Access to the Southern Ponds is at the end of Westport Way via Carmel Way (near Sea Breeze Park) off Union City Boulevard. These access routes are shown on Figure 2-8. Access within the pond complex is via former salt pond levee maintenance roads. Public foot and road access is currently permitted at some locations within the pond complex.

Construction crews would typically consist of fewer than a dozen people, but there could be multiple crews at the Phase 2 project area on any given day because of its large size. Heavy vehicles would avoid crossing structures in the levees if the vehicle exceeds the weight-bearing capacity. If such avoidance is not possible, engineer-approved precautions would be taken to avoid damaging the structures.

Construction staging areas would be established as needed on existing levee-top roads within Eden Landing.



LEGEND

- Study Intersection
- Construction Access Route
- The Bay Ponds
- The Southern Ponds
- The Inland Ponds

AECOM
South Bay Salt Pond Restoration Project

Figure 2-8
Access Routes

Dredge Material Placement

Construction Sequencing

Construction will be implemented by procuring the services of a general contractor with experience in performing dredged material offloading activities, marine pile driving, levee improvements, and working within and near tidal waters and Bay mud.

The sequence of construction tasks for dredge material placement may include the following:

- Pre-construction pond management: Lower pond water levels to lowest possible levels for improved site access.
- Mobilization: Develop staging areas and other facilities. Mobilize equipment to the site using ground transportation.
- Site preparation:
    - Temporary mooring piles would be driven in the deep water channel to secure the offloader, landing barges, delivery vessels, and supporting equipment; the submerged pipeline would be installed; and in-water equipment would be installed (i.e., the offloader, landing barges, floating pipeline, support equipment, and booster pump). The offloading facility, in-Bay booster pump, and floating and submerged pipeline would be floated into position at high tides.
    - Where necessary, levees would be cleared and grubbed; raised (requiring cut, haul, and fill); and various water control structures would be installed to facilitate distribution of the dredge sediments.
    - Onshore equipment would be installed (i.e., booster pumps and onshore pipelines). If the offloading facility and booster pumps are powered by electricity, the electrical infrastructure would also be installed (i.e., a substation, overhead transmission line, and submarine power cables).
- Dredged material placement: Dredge material would be offloaded at the deep-water transfer point in the Bay; slurry material would be pumped and placed in the ponds; habitat transition zones would be constructed using dredge material. As needed, offseason demobilization, equipment storage, and re-mobilization could also occur.
- Decommissioning:
    - In-water equipment would be demobilized (i.e., offloader, barges, floating pipeline, support equipment, and booster pump) and the offshore piles and submerged pipeline and support structure would be demolished.
    - Onshore equipment would be demolished (shore booster pump; shore pipeline; water control structures). If powered by electricity, the onshore substation, overhead transmission line, submarine power cables would also be demolished.
- Demobilization: Construction materials would be removed via ground transportation.

Other restoration, flood risk management, and recreational features would be constructed following demobilization of the dredged material placement equipment. These restoration features includes channel excavation, levee lowering and raising, habitat island creation, internal and external levee breaching, water control structure removal/ modification, habitat transition zone construction (if needed), and recreational trail and bridge construction.

Individual Components

Construction features used for dredge material placement are shown on Figure 2-7. Dredge material placement components would be constructed, used, and then demolished prior to the construction of other restoration, flood risk management, and recreational features.

Offloading Facility. The offloading facility would offload material from barges and scows and transport the material via pipeline to the Bay and Inland Ponds for placement.[4] The offloading facility would be comprised of an hydraulic offloader, temporary mooring dolphins, landing barges, an auxiliary feed water pump, pipelines, delivery vessels, and support equipment. Support equipment would include barges, tug boats, crew boats, and site security. The hydraulic offloader would be held in position with 10 to 30 steel pipe piles securing the offloading facility. All materials and equipment would contain the appropriate signage and navigation lighting in accordance with U.S. Coast Guard requirements. Material barges or scows (delivery vessels) would range in capacity from 800 to 6,000 cubic yards and would draft up to 18 feet. Given the required water depth for the delivery vessels and offloading equipment, the offloading facility would be positioned approximately 3 miles offshore, past the mudflats and shallow depths bordering Pond E2.

Depending on the material type and selected equipment, an offloading facility and booster pump system could be sized to pump material a range of distances, ranging from within the inner pond levee nearest the bay (Pond E2), approximately 3 miles, to the farthest inland extent of the ponds (Pond E6), approximately 6 miles. Most likely a 120-foot-long by 50-foot-wide hydraulic offloader, with an approximate 24 inch suction and discharge pipe, would provide the main pumping capacity to place material in the Bay and Inland Ponds. An auxiliary feed water system would slurry the dredged material in scows by agitation with water jets, allowing the hydraulic offloader to suction the slurry through the snorkel and transport the material via pipeline to shore. The slurry would contain approximately 10 to 40 percent solids by volume. Feed water would be sourced from a screened intake located at the offloader in the deep water channel. Fish screens would comply with NMFS and CDFW design guidelines to protect species of concern.

Pipelines. A network of approximately 46,900 feet of pipeline would be installed to transport sediment slurry from the hydraulic offloader to and around the Bay and Inland Ponds. The pipeline would be comprised of approximately 500 feet of floating pipeline, 16,000 feet of submerged pipeline, 14,400 feet of primary shore pipeline, and 16,000 feet of secondary shore pipeline.[5] Secondary shore pipeline could support the spread of material throughout the ponds and allow for sand mounding along the proposed habitat transition zone locations.

The floating, submerged and shore pipelines would range in size from 24 to 36 inches in diameter and would be comprised of steel and/or HDPE. Submerged pipeline would be anchored on the Bay bottom

[4] Alternative Eden C would receive dredged material in only the Bay Ponds.
[5] In Alternative Eden C, only the Bay Ponds would receive dredge material and therefore the primary onshore pipeline length would be reduced to 10,800 feet and the secondary onshore pipeline length would be 11,400 feet.

with precast concrete pipe weights to reduce navigation hazards and vulnerability to wind and wave action, and they would be identified with signs and lights per United States Coast Guard guidelines. Portions of the submerged pipeline may be floated above the shallow mudflats if there is a concern of water flow around the pipeline during low tide. The outboard levee would be minimally graded to transition the pipeline from the mudflats to the levee. The onshore pipeline would be secured with stakes on existing levees currently used for maintenance access, or on levee shoulders as necessary to sustain equipment access. Existing vegetation on levees would be avoided where possible. Abrupt pipeline turns would be supported with concrete blocks as necessary. The pipeline would undergo repair and replacement due to typical wear and tear during the dredge material placement component of the construction. The type of pumped material (sand and gravel versus silt and clay) would influence the frequency of repair and replacement.

Booster Pumps. Given the distance from the offloading facility to the point of discharge in the Bay and Inland Ponds, one or more in-line booster pumps would be required and would be located along the discharge line to increase the pumping production rate and facilitate delivery of the slurry to the ponds. Typically boosters are needed every 2 to 5 miles and allow for an additional pumping distance of about 2 miles. The specific locations of the booster pumps would depend on the pumping capacity of the selected offloader and desired discharge location. For instance, two boosters may be required if slurry is pumped to the northeast corner of the Inland Ponds (approximately 6.1 miles). Booster pumps may be located along the pipeline in the Bay and/or on pond levees. If located within the Bay, a floating or jack-up booster pump barge may be pile-secured depending on water depth and wind/wave action. A jack-up booster pump may be held in place with up to four spuds, while a floating booster pump barge would be secured with approximately 4 piles (each 24 to 36 inches in diameter). Both booster pumps require at least 8 feet of water depth for crew changes with a skiff and to provision it with fuel, and typically range in size from 3,500 to 7,200 square feet. If located on land, a booster pump may be used at multiple locations depending on pumping distance and material type. A booster pump station would be approximately 5,000 square feet in size and would likely require temporary placement of material within the ponds for adequate space and access around the equipment.

Levee improvements. Levees would be improved to an elevation of 10 feet NAVD88 in the Bay and Inland Ponds during the dredge material placement component of the construction to provide sufficient slurry capacity to reach the target pond bottom elevation of 6.5 feet NAVD88, the same elevation as MHW. The 2 feet of freeboard between the maximum slurry elevation and levee crest would provide allowances for wind waves generated within the ponds and captured precipitation. Up to 10,000 cubic yards of material would be sourced from onsite existing levees that are currently above elevation of 10 feet NAVD88. The southern levee of Pond E2 and northern levees of Ponds E1 and E7 are proposed for levee lowering. Material would not be sourced from levees proposed for improvement in the restoration component, so as to avoid lowering and raising the same levees in different phases of the construction. Material would be sourced from approximately 5,500 linear feet of relatively high levees, and be used to improve 20,400 linear feet of levees identified for improvement.

Water Control Structures. Existing water control structures are believed to be sufficient to manage the dredged material slurry. However, depending on their invert elevation, location within the ponds, and the selected slurry discharge point within the ponds, additional water control structures may temporarily be installed to manage the dredged material slurry. Up to eight new or replaced water control structures, likely no larger than approximately two 48 inch HDPE pipes per structure, would allow for controlled exchange between the Bay and Inland Pond levees. The structures would be temporary, designed to span the approximated time period anticipated for dredge material placement (less than 10 years).

Discharge Structures. Decant discharge structures would be used to return decant water to the Bay or sloughs after solids settlement in the ponds. Because the location of the slurry pipe outlet would change with material type and volume placed, multiple discharge locations are considered along the levees between Pond E2 and the Bay, and Ponds E1, E6 and OAC. Likely no more than two locations would be used during different phases of dredged material placement.

Decant discharge structures typically have stop logs or variable height weirs on the upstream side to allow for the controlled decant of the ponded water on the downstream side; therefore, existing water control structures would likely have to be modified to discharge decant water.

Power. The offloading facility and booster pumps may be powered by diesel fuel or electricity. If diesel were to power the construction equipment during dredge material placement, a large diesel generator barge would be moored near the offloading facility in the deep-water channel. Booster pumps and onshore equipment would have individual diesel generators that would be maintained by land- and water-based crews.

If electricity were used to power construction equipment during dredge material placement, the electrical infrastructure necessary to bring power to the offloading facility and booster pumps would include a substation, overhead transmission line, and submarine power cables (described below).

- <u>Electric Substation:</u> Construction of an electric substation would be required to interface with the PG&E power system and transform the voltage from 138 kilovolts (kV) to 12.47 kV, and to provide distribution power to construction equipment including booster pumps, the offloading facility, and other plant loads. Additional transformers and electrical equipment would be required at pump locations to transform the voltage to a useable voltage, likely 2300 volts (V) or 4140 V. The substation site would also include a small unmanned control building/enclosure to house auxiliary controls and protective relay systems. The substation would be supported by a large concrete pad (with foundation piles) and would encompass an area approximately 12,000 square feet in size. The substation would likely be located on a Bay front levee, which would require temporary placement of material within the ponds for adequate space and access around the equipment. Alternatively, the substation could be located on a perimeter levee (potentially near a shore booster pump), or near the high voltage line on USD's property.

- <u>Overhead transmission line:</u> The project interconnection would consist of a 138 kV line segment extending from the existing PG&E transmission line located east of the southern Eden Landing ponds to the proposed 138 kV substation. Tubular steel pole structures approximately 70 to 100 feet in height would be required to support overhead transmission conductors and shield wires. The PG&E line would be looped into the substation where the voltage would be transformed to a lower voltage that is suitable for the proposed distribution system. From the high voltage line near the USD property, approximately 17,700 feet (3.4 miles) of overhead power cables would be installed to reach the shore's edge at the southwest corner of Pond E2.

- <u>Submarine power cables:</u> Submarine power cables would carry electric power from the shore's edge to the potential in-Bay booster pump and offloading facility. The submerged power cables would be laid on the Bay bottom and would extend approximately 16,000 feet (3 miles) offshore to the offloading facility.

Equipment List

Probable construction equipment used during the dredge material placement portion of the construction includes the following:

- Flatbed trucks (mobilization and demobilization, water control structures, shore booster pumps, shore pipelines, substation)
- Floating barges with pile drivers and cranes (piles)
- Equipment barges/cable reel barges (piles, submerged pipeline, and submerged power cables)
- Work tugs (piles, submerged pipeline, submerged power cables, and in-water equipment – offloader, landing barges, floating pipeline, support equipment, and booster pumps)
- Dozers (clear and grub levees, levee improvements)
- Excavators (levee improvements, water control structures, shore pipelines, shore booster pump)
- Dump trucks (levee improvements, decommissioning of water control structures, substation, and overhead power cables)
- Compactors (levee improvements, water control structures, shore booster pump, substation)
- Water trucks (levee improvements, demolition of water control structures)
- Concrete trucks (water control structures, shore booster pump, substation)
- Impact/vibratory hammers (water control structures, overhead power cables)
- Pumps (dewatering)
- HDPE pipe fusers (water control structures, shore pipeline)
- Generators (water control structures, shore pipeline)
- Bucket trucks (overhead power cables)
- Hydraulic offloader (material offloading)
- Booster pumps (pumping material to shore)
- Amphibious low ground pressure (LGP) dozers (material placement, habitat transition zones)
- Crew/survey boats (various)

This equipment list does not include smaller items such as fuel service, maintenance service, personal vehicles, small tools and equipment.

Restoration, Flood Risk Management, and Recreational Components

Construction Sequencing

Construction of the restoration features will be implemented by procuring the services of a general contractor with experience in performing restoration activities, levee improvements, and working within and near tidal waters and bay mud.

Currently, the Bay and Inland Ponds are hydraulically separated from the Southern Ponds. Therefore, almost all construction at the Southern Ponds may be phased separately from construction at the Bay and Inland Ponds (with levee raising in the Southern Ponds being the exception because it requires excavated material from levee lowering in the Bay Ponds). If construction is performed in the Bay, Inland, and Southern Ponds concurrently (i.e., unphased throughout the project site), the sequence of construction tasks for Alternative Eden B may include the following:

- <u>Pre-construction pond management</u>: Lower pond water levels to lowest possible levels for improved site access.

- Mobilization: Develop submittals, staging areas, and other facilities. Mobilize equipment to the site using ground transportation.
- Site preparation: Where necessary, clear and grub work areas, scarify slopes, and repair/raise low access roads in preparation for the work.
- Demolition: Demolish existing structures and backfill as identified.
- USD connection: Construct, if included in project.
- Bridges: Construct pedestrian bridges. Construction methods may include cofferdams, foundation piles, cast-in-place concrete abutments, and placement of riprap scour protection.
- Water control structures: Excavate trenches and temporarily store material. Install HDPE or CMP pipe using flatbed trucks for delivery, loaders for lowering pipe in place, and HDPE pipe fuser to connect pipe sections (if necessary). Install valves.
- Internal breaches, channels, and habitat islands: Excavate internal breaches and channels. Place material nearby to create habitat islands. Use dozers to move material laterally as necessary to construct habitat islands with excavated material.
- OAC island cuts: Construct limited temporary roads (with mats and material) as necessary to excavate island cuts in existing OAC marsh. Load material on trucks and place on-site as habitat islands/habitat transition zones.
- Habitat transition zones: Use excess on-site material as it becomes available or import material from off-site locations to place and grade for construction of habitat transition zones. Scarify slopes before placement. Shape material with a dozer.
- Lowered and raised levees: Working from the levee top, excavate material, load onto trucks, transport on-site, and place at locations of levee raising. If excess material is available, use material to build habitat transition zones.
- External breaches and raised levees: Excavate external breaches with long reach excavators. Aquatic or land-based excavators may be used for this and other project components. Haul material on-site to complete levee raises. Import material to raise levees, as needed.
- Trails and viewing platforms: Grade and compact proposed trail pathways. Import, place, and compact trail base material. Geotextile fabric may be laid out, gravel compacted in-place, and quarry fines compacted on top to create an accessible surface. Create viewing platforms at-grade, off-set from the main trail pathway; or if elevated, drill platform foundations and assemble on-site using small power tools.
- Signage and benches: Install trails, signage, and benches on identified levees.
- Demobilization: Demobilize equipment via ground transportation.

A similar task construction sequence may be performed if Alternatives Eden C and Eden D are selected; however, with the construction of a mid-complex levee, the contractor may choose to phase tasks between the Bay Ponds (planned to be tidal habitat) and the Inland and Southern Ponds (planned to be managed ponds). For instance, if the Inland and/or Southern Ponds are desired to be managed pond habitat for species, their project features may be constructed after completion of the features within the Bay Ponds (including the mid-complex levee). These alternatives may involve some sequence constraints, such as constructing the habitat transition zones before lowering access levees (Alternative Eden D).

It is assumed that the bottom of the Bay and the Inland Ponds will not support LGP equipment without the construction of a temporary access road. It is also assumed that the bottom of the Southern Ponds, with the possible exception of Pond E2C, will support LGP equipment for the construction of channels within the pond bottoms. It is also assumed that fill will be imported at a rate that ensures an efficient construction operation. All fill is assumed to be imported from a dirt broker at no cost to the project.

The final equipment and sequencing will be developed by the selected contractor based on the contractor's detailed work plan.

Individual Components

Levee breaching. Breaching would be accomplished from the levee crest using excavators and hauling material to locations receiving fill for levee improvement or habitat transition zone construction.

Levee lowering. Lowering would be accomplished by using an excavator and loader and hauling removed material to locations receiving fill for a habitat transition zone or island construction.

Pilot channel excavation. The excavation would be accomplished by using an excavator and loader and hauling removed material to locations receiving fill for levee improvement, habitat transition zone, or island construction.

Levee improvements. Levee improvement would require clearing of vegetation, debris, and grooving. Fill would be placed in 8-inch-thick lifts and compacted either through a vibratory hand-tamper or a roller to achieve 90 percent compaction. Borrow material would be sourced from off-site stockpiles. On-site sources would include excavated material from levee lowering and breaching activities. Levee crests destined for trail access would be finished with a 4-inch-thick layer of crushed gravel to provide all-weather access and to be compliant with ADA, where the trails are part of the Bay Trail system or where project partners (e.g., city, county, or state agency) have compliance obligations.

Habitat transition zones. The habitat transition zones would be constructed by placing material at roughly 30:1 (h:v) side slopes and compacting it sufficiently to make it stable but loose enough to enable vegetation establishment. Slope protection would be further maintained by establishment of native vegetation. Hydroseeding or other seeding method with a native plant mix, development of a planting scheme, and invasive plant control would aid in establishing desirable vegetative habitat.

Habitat islands. All habitat islands would be formed from undisturbed existing levees in their current locations. The excavators and other equipment working on the level breaching and lowering and the channel excavation would leave portions of the levee in place and thus create habitat islands. Depending on the management needs and the types of birds that utilize the islands, the top surface of these proposed islands could be treated with lime and then surfaced with a combination of rock, oyster shell, and/or sand. The designs for similar islands at the Refuge ponds include a 12-inch-thick sand layer underlain by 6-inch-thick crushed rock to cover surficial cracks and prevent weed establishment. The sand layer could be covered with a 4-inch-thick layer of oyster shells, if available, to prevent vegetation from establishing; this landscape is typically preferred by some nesting birds, including western snowy plover. Similar designs could be used here if sufficient material is available. However, a reduced thickness for those layers is possible, and the topping could be omitted for other bird species that would prefer vegetated cover.

Dewatering. Installing water control structures would be done in dry conditions. Installation of cofferdams would thus be required at these locations to facilitate the construction of abutments and wingwalls. Pumped water removed from the cofferdams would be discharged into adjacent ponds for decanting (i.e., letting sediment loads settle out) and for other water quality management purposes before releasing the water to the Bay.

Trails, viewing platforms, signs, and benches. All rebuilt trails on existing levees (e.g., on the ACFCC levee trail) that would be raised or modified as part of this project would be resurfaced to match the existing conditions. There are several options for new trail construction, all of which would have similar designs to comply with Bay Trail design guidance whenever practicable. The trails that would be placed on improved levees would be built following the necessary increases in elevation and/or width. Eroded or uneven surfaces on existing levees would be regraded and surfaced for ADA compliance. Surfacing materials would include decomposed granite with timber or concrete edging. These materials would be placed with dump trucks and bulldozers, and they would be compacted as necessary with rollers.

New viewing platforms would not be raised on elevated structures but would instead be placed on widened areas on the top of existing or improved levees or at trail junctions. The viewing platforms would be graded and surfaced to provide space for benches and signage. The benches would be constructed of wood or high-density plastic and placed on cast-in-place concrete abutments. The signage at the platforms would be mounted on pedestals, and a bench would be located near each panel featuring a sign or maps.

PG&E distribution lines. The existing PG&E local distribution that runs through the Southern Ponds would remain in place in all three Action Alternatives. The realization of this condition may require pouring higher concrete foundations around the existing tower foundations to raise them above the expected higher water levels in the adjacent ponds. Where necessary, this action would involve small cofferdams or other ways to isolate and dewater the concrete foundations. The existing, non-functional PG&E distribution line that runs along the northern levees of Ponds E1, E7, and E6 would be removed in all of the Action Alternatives. Excavators with cutting or sawing attachments and haul trucks would be used to perform this task. PG&E coordination would be part of all activities involving the utility's infrastructure, and PG&E designs and work crews would likely be used as well.

Equipment List

Probable construction equipment used during construction of the restoration features includes the following:

- Long reach excavator(s) and drag-line excavator (working off crane mats in soft areas)
- Amphibious excavator(s) (for channel excavation)
- End dump trucks (for on-site and off-site hauling)
- LGP trucks (for on-site hauling)
- LGP dozer(s) (for material pushing around site)
- LGP loader(s) (for material loading into trucks)
- LGP backhoe (for trenching)
- Motor grader (for levee road leveling and upkeep)
- Temporary matting (wood or plastic for equipment support)
- Water truck(s) (dust control, moisture conditioning)

- Compactor(s) (material compaction)
- HDPE pipe fuser (culvert construction)
- Crane(s) (equipment/material loading/unloading)
- Auger drill (bridge and/or water control structure foundation piles)

This equipment list does not include smaller items such as fuel service, maintenance service, personal vehicles, and small tools and equipment.

2.2.8 Preliminary Schedule

The construction schedule will be driven by construction work windows, the volume of earthwork (see next section), weather conditions, and contractor means and methods.

Work Windows and Regulatory Considerations

Certain special-status species may be affected by construction activities. The presence of these species may limit construction activities or require certain avoidance and minimization measures. The limits and requirements for each special-status species and their habitats will be addressed during the permitting phase of the project. However, the timing considerations below will be incorporated into detailed designs and project planning to reduce the overall potential for adverse impacts and the need for mitigation. In general, construction activities will occur within permitted work windows to avoid impacts to special-status and other sensitive species.

In-water construction work for the dredge material component (e.g., pile driving) would be restricted by dredging work windows, which span from June 1 through November 30 to protect steelhead and other protected species in the deep water portions of the South Bay.

In-channel construction for the restoration features will likely be limited to the period April 15 to October 15. Considerations include:

- Steelhead could be present from December 15 to April 30. In-channel work between April 15 and April 30 within sloughs should have an approved biological monitor present and should be done at low tides whenever possible.
- Longfin smelt and sturgeon could be present year-round. In-channel work should be conducted at low tide whenever possible.

Onshore construction activities in bird-nesting areas could be limited during the periods listed for each species:

- March 1 to September 15 for western snowy plover
- March 1 to September 1 for terns, avocets, and stilts
- February 1 to September 1 or earlier (as allowed) for California Ridgway's rail

Negative results for pre-construction surveys and monitoring efforts could lengthen the permitted construction periods. Work in the spring and summer (March to August) is not prohibited, but approved buffer zones could be implemented to allow work to continue during nesting seasons.

Timing and Duration

Construction is expected to begin in 2018. Total construction duration is expected to range from 6 to 10 years.

Dredge Material Placement

Most dredging projects occur during the dredging work window, between June 1 and November 30; however, material could potentially be received year-around as the offloading and placement of dredged material is not constrained by this dredging work window.

Mobilization and site preparation to receive dredged material would span approximately 9 months. The Bay and Inland Ponds may receive dredged material for 3 to 7 years, depending on the rate of the dredged material delivery to the southern Eden Landing ponds. Decommissioning and demobilization would occur over approximately 4.5 months after dredged material placement is complete. Table 2-2 shows the expected duration for the dredge material component of the construction period.

Table 2-2 Preliminary Construction Duration for Dredge Material Placement

Alternative	Duration (months)
Alternative Eden B	53 to 93
Alternative Eden C	42 to 74
Alternative Eden D	53 to 93

Notes: Duration is from mobilization to final demobilization for the dredge material component and includes sequential, seasonal down time.

Restoration, Flood Risk Management, and Recreational Components

Assuming a construction window of September 1 through March 1, a preliminary estimate of the restoration, flood risk management, and recreational components of the construction is shown in Table 2-3. These durations would spread out over multiple construction seasons to comply with seasonal avoidance of wildlife impacts and/or because of material availability constraints. Construction work would generally proceed for 5 to 7 months a year and then cease until the next construction season.

Table 2-3 Preliminary Construction Duration for the Restoration, Flood Risk Management, and Recreational Components

Alternative	Duration (months)
Alternative Eden B	18 to 29
Alternative Eden C	26 to 27
Alternative Eden D	25 to 27

Notes: Duration is from initiation of mobilization to final demobilization for the restoration component and includes sequential, seasonal down time. The lower range assumes that habitat transition zones are built during dredge material placement. The upper range assumes that habitat transition zones are built with upland fill material.

If habitat transition zones are constructed using upland fill material, the construction durations will be primarily controlled by the availability of upland fill material that can be imported to the project site. Durations shown in Table 2-3 assume that sufficient fill material is available to allow for continuous construction during the construction windows but that the quantity available only allows for one habitat transition zone construction crew at a time. Habitat transition zone construction durations are estimated to be 7, 3.5, and 4.5 months (five 8-hour working days per week, with 4.35 weeks per month) for Alternatives Eden B, Eden C, and Eden D respectively (assuming single crews), which is a significant portion of the construction duration. From experience at Inner Bair Island at Don Edwards San Francisco

Bay National Wildlife Refuge, if fill material will be provided by an independent dirt broker at no cost to the project, it is recommended that these durations be increased if they are used for permitting or scheduling.

Other construction elements were allowed to occur concurrently with multiple crews provided that they made reasonable sense. The estimate is based on the assumption that some heavy construction activities may be permitted to occur during the nesting habitat window under the watch of a biological monitor.

2.2.9 Tables of Design Details

This section presents summary tables of the design information excerpted from the design memorandums in Appendices C and D.

Material Placement Volumes for Dredge Material

The estimated volumes of dredge material placement and levee earthwork associated with the dredge material component of the Eden Landing alternatives are detailed in Table 2-4. These estimates are based on the preliminary design. In order to improve portions of the existing levees for dredge material placement, up to 10,000 cubic yards of material would be sourced from onsite levees.

Table 2-4 Dredged Material Placement and Levee Earthwork Volumes

Feature	Pond	Alternative Eden B		Alternative Eden C		Alternative Eden D	
		Dredge Material (CY)	Onsite Material (CY)	Dredge Material (CY)	Onsite Material (CY)	Dredge Material (CY)	Onsite Material (CY)
Bay Ponds	E1	1,052,000	800	1,052,000	800	1,052,000	800
	E2	2,449,000	0	2,449,000	0	2,449,000	0
	E7	723,000	0	723,000	2,900	723,000	2,900
	E4	501,000	0	501,000	1,900	501,000	1,900
Inland Ponds	E6	571,000	0	0	0	571,000	0
	E5	477,000	0	0	0	477,000	0
	E6C	217,000	4,400	0	0	217,000	4,400
Habitat Transition Zones		83,000	0	46,000	0	96,000	0
Total		6,073,000	5,200	4,771,000	5,600	6,086,000	10,000

Note:
[1] Dredge material placement volume when levees are improved to 10 feet.
[2] Earthwork volume needed to improve perimeter levees to 10 feet NAVD88. Volumes to raise Pond E7 and E4 levees to 10 feet NAVD88 are for raising the eastern internal levees if the Bay Pond were to receive phased placement of dredged material. If the Bay and Inland Ponds were to receive dredged material in the same phase, the internal Pond E7 and E4 levees would not need to be improved.
CY = cubic yards

Dredged material placed within the ponds will increase the amount of excavation required during the restoration component of the construction period. This additional excavation volume is listed in Table 2-5 for the Action Alternatives. The dredge material that is excavated for the channels would be used to create additional island habitats, similar to other excavated channel material.

Table 2-5 Additional Material Excavation and Placement Required with Dredged Material Placement by the Restoration Alternative

Location	Additional Channel Excavation Volume (CY)		
	Alternative B	Alternative C	Alternative D
Bay Ponds	53,000	53,000	53,000
Inland Ponds	45,000	0	43,000

CY = cubic yards

Earthwork Volumes for the Restoration, Flood Risk Management, and Recreational Components

From the preliminary design, the estimated volumes of earthwork proposed for the Eden Landing alternatives are detailed in Table 2-6. Because the levees consist of dry, compacted material, material excavated from levee lowering and external breaches is most suitable for construction of raised levees. Wet bay mud generated from pilot channel excavation will be used to construct the habitat islands. Material from the excavation of internal levee breaches will also be used to construct habitat islands to minimize hauling small amounts of material far distances around the site. Habitat transition zones will be constructed with any excess excavation material from levee breaches and lowered levees and will be supplemented with imported material, if needed.

Table 2-6 shows that in Alternative Eden B, approximately 155,000 cubic yards of dry material will be excavated, of which 91,000 cubic yards will be placed on levees to raise them. The remaining 64,000 cubic yards will be used to help build habitat transition zones and trails, although an additional 92,000 cubic yards of material will need to be imported to construct the Alternative Eden B habitat transition zones. Also, approximately 240,000 cubic yards of wet material will be excavated and used to create habitat islands throughout the complex in this Eden B.

Other design details are shown in Tables 2-7 through 2-15.

Table 2-6 Preliminary Earthwork Volumes

Dry Material Excavation and Placement						
	Alternative Eden B		Alternative Eden C		Alternative Eden D	
	Cut (CY)	Fill (CY)	Cut (CY)	Fill (CY)	Cut (CY)	Fill (CY)
Levee Raising						
Inland Ponds landside levee	—	9,000	—	—	—	9,000
Southern Ponds landside levee	—	44,000	—	—	—	44,000
Bay Trail levee	—	38,000	—	—	—	—
Bay levee	—	—	—	2,000	—	9,000
Mid-complex levee	—	—	—	81,000	—	81,000
Levee Lowering						
OAC / Ponds E1 & E7 levee	-28,000	—	-28,000	—	-28,000	—
Fringing marsh/Ponds E1 & E2	-17,000	—	-17,000	—	-	—
ACFCC / Pond E2 levee	-25,000	—	-25,000	—	-25,000	—
Levee Breaches						
External	-85,000	—	-42,000	—	-41,000	—
Total	-155,000	91,000	-112,000	83,000	-94,000	143,000
Net Dry Material	**-64,000**		**-29,000**		**49,000**	

Wet Material Excavation and Placement						
	Alternative Eden B		Alternative Eden C		Alternative Eden D	
	Cut (CY)	Fill (CY)	Cut (CY)	Fill (CY)	Cut (CY)	Fill (CY)
Pilot Channels						
Bay Ponds	-80,000	—	-80,000	—	-80,000	—
Inland Ponds	-71,000	—	-2,000	—	-39,000	—
Southern Ponds	-13,000	—	—	—	-13,000	—
Fish passage channel	-18,000	—	-1,000	—	—	—
Levee Breaches						
Internal	-58,000	—	-37,000	—	-38,000	—
Habitat Islands						
Throughout complex	—	240,000	—	120,000	—	170,000
Total	-240,000	240,000	-120,000	120,000	-170,000	170,000
Net	**0**		**0**		**0**	

Imported Upland Fill Placement						
	Alternative Eden B		Alternative Eden C		Alternative Eden D	
	Cut (CY)	Fill (CY)	Cut (CY)	Fill (CY)	Cut (CY)	Fill (CY)
Habitat Transition Zones						
Inland Ponds landside levee	—	101,000	—	—	—	—
Southern Ponds landside levee	—	46,000	—	—	—	—
Mid-complex levee	—	—	—	75,000	—	—
Bay levee	—	—	—	—	—	96,000
Trails						
Imported trail base	—	9,000	—	13,000	—	9,000
Total	0	156,000	0	88,000	0	105,000
Excess Dry Material Excavation	-64,000		-29,000		49,000	
Net Fill Import	**92,000**		**59,000**		**154,000**	

Note: Levee raise volumes assume a conservative levee crest width of 16 feet, as opposed to a minimum 12 feet.

Table 2-7 Proposed Raised Levees

Levee Raising Location	Alternative Eden B	Alternative Eden C	Alternative Eden D	Purpose
	Linear Feet	Linear Feet	Linear Feet	
Inland Ponds landside levee	6,000	—	6,000	Flood risk management
C-Pond landside levee	10,500	—	10,500	Flood risk management
Bay Trail levee (Pond E6C–ACFCC)	7,500	—	—	Bay Trail
Bay levee	—	5,900	10,900	Habitat
Mid-complex levee	—	12,900	12,900	Habitat
Total	**24,000**	**18,800**	**40,300**	

Table 2-8 Proposed Lowered Levees

Levee Lowering Location	Alternative Eden B	Alternative Eden C	Alternative Eden D
	Linear Feet	Linear Feet	Linear Feet
OAC / Ponds E1 & E7 levee	5,400	5,400	5,400
Fringing marsh / Ponds E1 & E2	3,800	3,800	—
ACFCC / Pond E2 levee	3,600	3,600	3,600
Total	**12,800**	**12,800**	**9,000**

Table 2-9 External Levee Breach Design

Location	Width (ft.) (perpen. crest)	Length (ft.) (parallel crest)	Bottom Elev. (ft. NAVD88)	Slope	Purpose	Applicable Alternatives
OAC / Pond E6	200	160	-4	3H:1V	Hydraulic connectivity	B
OAC / Pond E1 (east)	150	380	-4		Hydraulic connectivity	B, C, and D
OAC / Pond E1 (west)	150	30	0		Remove existing pump	B, C, and D
Alameda County wetlands / Ponds E2/E4	100	50	2.7 or higher		Fish passage	B
Alameda County wetlands / Pond E2	100	50	2.7 or higher		Fish passage	C

Table 2-10 Internal Levee Breach Design

Location	Width (ft.) (perpen. crest)	Length (ft.) (parallel crest)	Bottom Elev. (ft. NAVD88)	Slope	Purpose	Applicable Alternatives
Ponds E1/E2 (west)	50	120	-4	3H:1V	Hydraulic connectivity	B, C, and D
Ponds E1/E2 (mid)	50	120	-4			B, C, and D
Ponds E1/E2 (east)	50	120	-4			B, C, and D
Ponds E1/E7	75	50	-4			B, C, and D
Ponds E2/E7	75	50	5 (EG)			B, C, and D
Ponds E7/E4	75	100	-4			B, C, and D
Ponds E2/E4 (north)	50	50	-4			B, C, and D
Ponds E2/E4 (south)	50	50	6 (EG)			B, C, and D
Ponds E7/E6 (west)	25	25	5 (EG)			B
Ponds E7/E6 (east)	75	100	-4			B
Ponds E5/E7	75	110	-4			B
Ponds E4/E5	75	50	5 (EG)			B
Ponds E6/E5 (west)	50	50	0			B
Ponds E6/E5 (east)	50	50	0			B
Ponds E5/E6C	100	50	-4			B
Ponds E1C/E2C donut	100	100	2.7			B, C, and D
Pond E2C donut (west)	50	50	2.7			B, C, and D
Pond E2C donut (east)	50	50	2.7			B, C, and D
Pond E4C/E5C (mid)	20	50	2.7			B and D
Pond E4C/E5C (south)	20	50	2.7			B and D

Note: EG = Existing Ground

Table 2-11 Proposed Habitat Transition Zones

Habitat Transition Zone Location	Alternative Eden B	Alternative Eden C	Alternative Eden D
	Linear Feet	Linear Feet	Linear Feet
Inland Ponds landside levee	6,000	—	—
C-Pond landside levee	4,500	—	—
Mid-complex levee	—	7,800	—
Bay levee	—	—	10,900
Total	**10,500**	**7,800**	**10,900**

Table 2-12 Pilot Channel Design Details

Location	Top Channel Width (ft.)	Length (ft.)	Existing Elev. (ft. NAVD88)	Design Bottom Elev. (ft. NAVD88)	Design Slope	Applicable Alternatives
Bay Ponds Channel						
OAC island cut near Pond E1 breach	15	250	7	0	1H:1V	B, C, and D
Pond E1 borrow ditch	30	2,500	6	-4		B, C, and D
Pond E2 borrow ditch	30	2,600	6	-4		B, C, and D
Pond E4 borrow ditch	30	1,400	6	-4		B, C, and D
Pond E1 spur	15	600	4.5	0		B, C, and D
Pond E2 spur	15	2,200	4	0		B, C, and D
Pond E7 spur	15	900	4.5	0		B, C, and D
Pond E4 spur	15	300	5	0		B, C, and D
Inland Ponds Channel						
OAC island cut near Pond E6 breach	15	250	7.5	0	1H:1V	B
Pond E6 borrow ditch	30	2,000	5	-4		B
Pond E7 borrow ditch	30	1,000	6	-4		B
Pond E5 borrow ditch	30	3,400	6	-4		B
Pond E6 spur	15	1,300	5	0		B
OAC island cut near Pond E7 culvert	15	250	7.5	0		C and D
Pond E6 borrow ditch (culvert route)	30	2,000	5	0		D
Pond E5 borrow ditch (culvert route)	30	4,400	5.5	0		D
Southern Ponds Channel						
Ponds E2C–E1C channel	30	1,600	5.5	2.7	1H:1V	B and D
Pond E5C channel	30	2,000	5.5	2.7		B and D
Pond E4C channel	30	700	5.5	2.7		B and D
Fish Passage Channel						
ACFCC to Ponds E2 and E4	15	3,100	7.5	0	1H:1V	B
ACFCC to Pond E4 borrow ditch	15	3,100	7	2.7		C

Table 2-13 Water Control Structure Design Details

<table>
<tr><th>Location</th><th>(Number), Size, Type</th><th>Length (ft.)</th><th>Existing Invert Elev. (ft. NAVD88)</th><th>Design Invert Elev. (ft. NAVD88)</th><th>Purpose</th><th>Applicable Alternatives</th></tr>
<tr><td>ACFCC / Pond E2C (existing)</td><td>(2) 48 in. dia. HPDE/CMP</td><td>170</td><td>2.7</td><td>—</td><td rowspan="10">Hydraulic connectivity (Alt. B) or Pond management (Alt. C and D)</td><td rowspan="3">B, C, and D</td></tr>
<tr><td>ACFCC / Pond E2C</td><td>(2) 48 in. dia. HPDE/CMP</td><td>170</td><td>—</td><td>2.7</td></tr>
<tr><td>Ponds E1C/E5C (south)</td><td>(2) 48 in. dia. HPDE/CMP</td><td>60</td><td>—</td><td>2.7</td></tr>
<tr><td>Ponds E1C/E5C (north)</td><td>(1) 48 in. dia. HPDE/CMP</td><td>50</td><td>—</td><td>2.7</td><td>C and D</td></tr>
<tr><td>Ponds E2C/CP3C (existing)</td><td>(1) 48 in. dia. HPDE/CMP</td><td>60</td><td>Unknown</td><td>—</td><td>B and D</td></tr>
<tr><td>OAC / Pond E6</td><td>(2) 48 in. dia. HPDE/CMP</td><td>150</td><td>—</td><td>0</td><td rowspan="5">C and D</td></tr>
<tr><td>Ponds E6/E5 (west)[1]</td><td>(1) 48 in. dia. HPDE/CMP</td><td>40</td><td>—</td><td>0</td></tr>
<tr><td>Ponds E6/E5 (east)[1] (existing)</td><td>(1) 48 in. dia. HPDE/CMP</td><td>40</td><td>—</td><td>0</td></tr>
<tr><td>Ponds E5/E6C (west)[2] (existing)</td><td>(1) 36 in. dia. HDPE/CMP</td><td>60</td><td>Unknown</td><td>0</td></tr>
<tr><td>Ponds E5/E6C (east)[2] (existing)</td><td>(1) 36 in. dia. HDPE/CMP</td><td>60</td><td>Unknown</td><td>0</td></tr>
<tr><td>ACFCC / Ponds E2 & E4 via Alameda County wetlands</td><td>(1) 6 ft. x 6 ft. concrete box or (3) 48 in. diam. HDPE/CMP</td><td>200</td><td>—</td><td>2.7</td><td>Fish passage</td><td>B</td></tr>
<tr><td>Ponds E7/E5</td><td>(1) 48 in. dia. HPDE/CMP</td><td>50</td><td>—</td><td>0</td><td>Culvert redundancy</td><td rowspan="4">C</td></tr>
<tr><td>ACFCC / Alameda County wetlands</td><td>(1) 6 ft. x 6 ft. concrete box or (3) 48 in. diam. HDPE/CMP</td><td>200</td><td>—</td><td>2.7</td><td>Fish passage</td></tr>
<tr><td>Alameda County wetlands / Pond E1C</td><td>(1) 48 in. dia. HPDE/CMP</td><td>30</td><td>—</td><td>2.7</td><td>Fish passage/pond management</td></tr>
<tr><td>Alameda County wetlands / J-Ponds</td><td>(1) 48 in. dia. HPDE/CMP</td><td>50</td><td>—</td><td>2.7</td><td>Detention basin management</td></tr>
</table>

Notes:

1. Ponds E6/E5 (west) and (east) could be combined into a single set of culverts to reduce costs.
2. Ponds E5/E6C (west) and (east) could be combined into a single set of culverts to reduce costs.

Table 2-14 Trail Details

<table>
<tr><th>Location</th><th>Length (ft.) (parallel crest)</th><th>Purpose</th><th>Applicable Alternatives</th></tr>
<tr><td>N. Eden Landing Ponds to E6C</td><td>16,000</td><td rowspan="7">Public Access / Recreation</td><td>B, C, and D</td></tr>
<tr><td>Pond E6C to ACFCC</td><td></td><td></td></tr>
<tr><td>Route 1: CDFW Property only</td><td>7,400</td><td rowspan="3">B, C, and D</td></tr>
<tr><td>Route 2: CDFW & Cargill Property</td><td>10,500</td></tr>
<tr><td>Route 3: CDFW & Alameda County Property</td><td>11,900</td></tr>
<tr><td>Alvarado Salt Works Loop</td><td>13,500</td><td>C</td></tr>
<tr><td>S. ACFCC levee connection</td><td>NA (bridge)</td><td>C</td></tr>
</table>

Table 2-15 Bridge Details

<table>
<tr><th>Location</th><th>Length (ft.)</th><th>Purpose</th><th>Applicable Alternatives</th></tr>
<tr><td>Across J-Ponds from Ponds E6C to E4C</td><td>250</td><td rowspan="4">Public access / recreation</td><td>B, C, and D</td></tr>
<tr><td>Across J-Ponds from Ponds E6C to E5C</td><td>310</td><td>B, C, and D</td></tr>
<tr><td>Across OAC to Alvarado Salt Works</td><td>500</td><td>C</td></tr>
<tr><td>Across ACFCC at Cal Hill</td><td>600</td><td>C</td></tr>
</table>

2.2.10 Operations and Maintenance

O&M activities for the components of the pond clusters within ELER would continue to follow the ELER Operations Plan practices, regulatory permits, applicable Alameda County operations, and be informed by the AMP and other CDFW management activities.

Periodic maintenance of the pond infrastructure would be required following construction. Maintenance would require a staff person to travel to the ponds one or two times a week to perform activities such as water structure control operation, invasive plant control, and vandalism repairs. In addition, AMP monitoring activities would occur, which would require additional workers (e.g., staff, consultants) to access the pond clusters. The frequency of visits to the pond clusters to conduct AMP monitoring activities would depend on the actual activities and would vary by season (e.g., during the bird-breeding season, there would be more trips to the site than during the non-breeding season).

Levee maintenance would be continued for existing levees as necessary for habitat management and to continue to provide the current levels of de facto flood risk management, as part of the O&M activities described above and consistent with existing O&M permits. CDFW has O&M permits from the United States Army Corps of Engineers (USACE), the RWQCB, and the BCDC that were issued for the Phase 1 actions, for the program-level project, and permits for more general levee O&M unrelated to project-specific actions. Levee maintenance activities could include the placement of additional earth on top of ("topping") or on the pond side of the levees ("beaching") as the levees erode or subside, with the level of settlement dependent on geotechnical considerations. In general, pond levees that are improved for flood risk management purposes would likely exhibit the greatest degree of settlement. Levees that require erosion control measures would also require routine inspections and maintenance. Improved levees would be inspected and maintained for slope stability, erosion control, seepage, slides, and settlement on an annual basis. Maintenance is expected at approximately 5- to 10-year intervals to add additional fill material in areas where erosion or settlement occurs. Most of the maintenance work along areas subject to tidal flows can be accomplished from the levee crests by ground-based equipment or from water by dredge equipment. Levees between ponds could be maintained according to season and best practices, conditions or requirements for the protection of sensitive resources. If the levees that provide de facto flood risk management are improved to provide an equivalent to or certification of Federal Emergency Management Agency (FEMA) 100-year flood protection, a detailed levee maintenance plan would be required for certification to comply with FEMA standards.

The internal levees within the Bay Ponds would not be maintained and would be allowed to erode naturally over time. The same would be true for most internal levees in the Inland Ponds and Southern Ponds in Alternative Eden B. In Alternatives Eden C and D, however, the Inland Ponds and Southern Ponds would be enhanced managed ponds, so their internal levees would be maintained.

Around ponds being restored to tidal marsh (i.e., the Bay Ponds in all three alternatives, and all ponds in Alternative Eden B), the external perimeter levees along the northern, southern, and western borders would only be maintained in those cases where they supported a public access trail or were part of hydraulically separating one pond from another. In enhanced managed ponds, the external levees would be maintained. In other cases, notably near sections of levees that were lowered, they would not be maintained; the plan and expectation is that they would degrade over time as part of marsh restoration.

Water control structures would require inspection of the structural integrity of gates, pipes, and approach way; removal of obstructions to flow passage; and preventative maintenance such as visual checks of the functionality of gates and seals and removal of debris. Inspection would occur approximately every month for the first year and semi-annually thereafter. Maintenance would be required on an annual basis. O&M would be accomplished during low tides in tidal ponds and sloughs and under appropriate conditions in the managed ponds, depending on the method and means used (floating dredge or land-based equipment).

Maintenance of habitat transition zones would include inspections and maintenance for slope stability, vegetation establishment, erosion control, seepage, slides, and settlement on an annual basis. As necessary, vegetation removal would occur to prevent colonization of invasive species. Fill material would be placed, when needed, to respond to areas where erosion has been observed. Maintenance activities would also be informed by the AMP if an AMP management trigger is reached, especially a trigger related to a biological resource (e.g., salt marsh harvest mouse) that would utilize habitat transition zone as habitat.

Maintenance of the nesting islands may require weed/vegetation removal as often as quarterly and the placing of fill material (sand, gravel, and/or oyster shells) before the onset of the nesting period in some years. Nesting islands would also be periodically examined for erosion.

Ponds opened to full tidal flows need little to no operations or maintenance beyond the control of invasive plants discussed above. In managed ponds, however, operations and maintenance of water levels would be more actively performed. The managed ponds in Alternative Eden C and Alternative Eden D could differ across the three Action Alternatives, depending on the species or guild of birds for which they were managed. Generally, however, the following principles would apply:

- CDFW staff would operate the water control structures and provide additional maintenance and cleaning as needed.
- The water levels in ponds managed for western snowy plover or other species using dry salt pannes would be actively drawn down and dried out in advance of the nesting season for those species.
- The water levels in ponds managed for small shorebirds and dabbling ducks would be actively managed year-round by opening and closing the water control structures as needed to maintain seasonally appropriate desired surface elevations, flows, and water quality in the different ponds. Generally, these ponds would be shallower than those managed for diving ducks. The salinity of these ponds would also be somewhat controlled through the use of the water control structures.
- The water levels in ponds managed for diving ducks, larger piscivorous species, or other pond-dependent species or guilds would be similarly managed, but would be deeper and the pond water would be recirculated more frequently than in the ponds managed for small shorebirds.

Maintenance of public access and recreation features is similar across the Action Alternatives. The viewing platforms would be designed to minimize maintenance utilizing durable and sustainable materials as much as possible to prevent degradation and the need for frequent maintenance. All features would need to be checked periodically for defacement of interpretive boards and other forms of vandalism. All Action Alternatives would also include occasional trail maintenance to keep them safe and accessible. There would be a need for trash removal along trails, and more intensive efforts would be needed at staging areas and trailheads.

Bridges placed in publicly accessible areas must be visually inspected every 2 years and a report on their condition may be required every 5 years. There is at least one bridge in each Action Alternative, and Alternative Eden C has three bridges. A safety railing would be installed on both sides of the bridge deck(s). These railings would be simplified steel-tube railings for walking or cyclist protection or similar.

2.3 General Mitigation Measures Adapted from the 2007 Final EIS/R

In developing the 2007 Final EIS/R for the SBSP Restoration Project, the USFWS, CDFW, and other lead and partner agencies developed program-wide comprehensive mitigation measures that could be expanded into actions when designing the project-level phases to implement the SBSP Restoration Project or direct the environmental analyses for the future phases. The intent of these mitigation measures was to avoid or reduce the environmental effects of any project alternative through the project design or focus the impact analysis on key impact issues recognized in the 2007 Final EIS/R. When mitigation measures are developed in program-level NEPA and CEQA documents and adopted by the lead agencies and other project partners, the expectation is that those measures will be included as part of the project-level designs whenever it is feasible to do so. With few exceptions, this project-level Draft EIS/R has followed this practice and will implement those measures as standard parts of the project designs; therefore, these measures need not be repeated in each of the alternatives described above.

The notable exception, a program-level mitigation measure that is not feasible to implement, is Mitigation Measure 3.12-1: Timing of construction-related truck trips. That measure is discussed at length below.

This section presents the mitigation measures from the 2007 Final EIS/R that are common to and relevant to the Phase 2 alternatives included in this project-level Draft EIS/R. These measures are incorporated into the project design of all Action Alternatives; they are thus part of the Phase 2 projects and not actually “mitigation measures.” For this reason, they are included in this chapter. These measures have been edited for relevancy with Phase 2 actions.

2.3.1 Surface Water, Sediment, and Groundwater Quality

SBSP Mitigation Measure 3.4-5c: Actions to Minimize Illegal Discharge and Dumping

The SBSP Restoration Project will undertake the following activities to ensure that existing programs and practices avoid impacts due to illegal discharge and dumping:

- Plans for recreational access in the SBSP Restoration Project area will include appropriate trash collection receptacles and a plan for ensuring regular collection and servicing.
- “No Littering” or similar signs will be posted in public access areas.

SBSP Mitigation Measure 3.4-5d: Monitoring Sediments to Follow Existing Guidance and Comply with Emerging Regulations

Sediment monitoring data will be used to determine appropriate disposal or beneficial re-use practices for sediments. If sediment monitoring data indicate that tidal scour outside a levee breach could remobilize sediments that are significantly more contaminated than Bay ambient conditions, the SBSP Restoration Project will consult with the appropriate regulatory agencies regarding other potentially required actions.

SBSP Mitigation Measure 3.4-5e: Urban Runoff Management

The project proponents will notify the appropriate Urban Runoff Program of any physical changes (such as breaches) that will introduce urban discharges into the project area and request that the Urban Runoff Program consider those changes when developing annual monitoring plans.

SBSP Mitigation Measure 3.4-6: CDFW and USFWS (Project Proponents) Will Coordinate with Alameda County Water District to Ensure That the Following Activities Take Place

If any abandoned wells are found before or during construction they will be properly destroyed by the project as per local and state regulations by coordinating such activities with the local water district. If abandoned wells are located during restoration or other future activities within ACWD boundaries, a well destruction work plan will be prepared in consultation with ACWD (as appropriate) to ensure conformance to ACWD specifications. The work plan will include consulting the databases of well locations already provided by ACWD. The project will properly destroy both improperly abandoned wells and existing wells within the project area that are subject to inundation by breaching levees. Well destruction methods will meet local, county, and state regulations.

The project proponents will also lend support and cooperation with any well identification and destruction program that may be undertaken as part of the Shoreline Study or other projects.[6]

2.3.2 Cultural Resources

SBSP Mitigation Measure 3.8-1: Discovery of Unknown Resources

Background

Restoration actions planned for the SBSP Restoration Project area shall be treated as individual archaeological projects. The overall record search for this EIS/R was performed in June 2006. A new record search shall be performed for any projects within the SBSP Restoration Project area where the previous record search is more than 5 years old.

Site Survey

Prior to the beginning of any project construction activity that could affect the previously un-surveyed portions of the project area, qualified professional archaeologists shall be retained to inventory all portions of the restoration site that have not been examined previously or have not been examined within the last 15 years. The survey(s) shall be conducted during a time when the ground surfaces of potential project sites are visible so the natural ground surface can be examined for traces of prehistoric and/or historic-era cultural resources. If the survey(s) reveal(s) the presence of cultural resources on the project site (e.g., unusual amounts of shell, animal bone, bottle glass, ceramics, and structure/building remains), and those resources have not been dealt with sufficiently in any Cultural Landscape documentation, the resources shall be documented according to current professional standards. The resources shall be evaluated for potential eligibility to the National Register of Historic Places (NRHP) or the California Register of Historical Resources (CRHR). Depending on the evaluation, additional mitigation measures may be required, including avoidance of the resource through changes in construction methods or project design or implementation of a program of testing and data recovery, in accordance with all applicable federal and state requirements.

Pre-Construction Contractor Education

Prior to any project-related construction, a professional archaeologist shall be retained to address machinery operators and their supervisors, preferably by giving an on-site talk to the people who will perform the actual earth-moving activities. This will alert the operators to the potential for finding historic or prehistoric cultural resources.

Construction Monitoring

Any project-related construction that occurs within 100 feet (30 meters) of a known prehistoric resource shall be monitored by a qualified professional archaeologist and a Native American monitor. If elements of the known resource or previously unknown cultural resources are encountered during project construction, all ground-disturbing activities shall halt within a 100-foot radius of the find. The

[6] It is worth noting that, as part of the Initial Stewardship Plan, Cargill was required to seal or otherwise close abandoned wells at the time the ponds were transferred to the CDFW and USFWS. Unsealed wells are thus unlikely to be found on the Eden Landing property.

archaeologist shall identify the materials, determine their possible significance, and formulate appropriate measures for their treatment in consultation with the Native American monitor, Most Likely Descendant (MLD), or appropriate Native American representative and the appropriate Lead Agency. Potential treatment methods for significant and potentially significant resources may include, but would not be limited to, no action (i.e., resources determined not to be significant), avoidance of the resource through changes in construction methods or project design, or implementation of a program of testing and data recovery, in accordance with all applicable federal and state requirements. These measures shall be implemented prior to resumption of project construction.

Unanticipated Finds

If contractors identify possible cultural resources, such as unusual amounts of bone, stone, or shell, they shall be instructed to halt operation in the vicinity of the find and follow the appropriate contact procedures. Work shall not resume in the vicinity of the find until a qualified professional archaeologist has had the opportunity to examine the finds. The archaeologist shall identify the materials, determine their possible significance, if the finds are prehistoric, formulate appropriate measures for their treatment in consultation with the Native American monitor, MLD, or appropriate Native American representative and the appropriate Lead Agency. Potential treatment methods for significant and potentially significant resources may include, but would not be limited to, no action (i.e., resources determined not to be significant), avoidance of the resource through changes in construction methods or project design, or implementation of a program of testing and data recovery, in accordance with all applicable federal and state requirements. These measures shall be implemented prior to resumption of project construction.

Human Remains

California law recognizes the need to protect interred human remains, particularly Native American burials and associated items of patrimony, from vandalism and inadvertent destruction. The procedures for the treatment of discovered human remains are contained in California Health and Safety Code Section 7050.5 and Section 7052 and California Public Resources Code Section 5097. The California Health and Safety Code require that if human remains are found in any location other than a dedicated cemetery, work is to be halted in the immediate area.

The appropriate agency or the agency's designated representative shall be notified. The agency shall immediately notify the county coroner and a qualified professional archaeologist. The coroner is required to examine all discoveries of human remains within 48 hours of receiving notice of a discovery on private or state lands (Health and Safety Code Section 7050.5[b]). If the coroner determines that the remains are those of a Native American interment, then coroner shall contact the Native American Heritage Commission within 24 hours.

The Native American Heritage Commission shall identify the person or persons it believes to be the most likely descended from the deceased Native American. The MLD may make recommendations to the landowner or the person responsible for the excavation work for means of treating or disposing of, with appropriate dignity, the human remains and any associated grave goods, as provided in Public Resources Code Section 5097.98. The landowner or his authorized representative shall rebury the Native American human remains and associated grave goods with appropriate dignity on the property in a location not subject to further subsurface disturbance if: (1) the Native American Heritage Commission is unable to identify an MLD or (2) the MLD fails to make a recommendation within 24 hours after being notified by the commission or (3) if the landowner or his authorized representative rejects the recommendation of the descendant, and the mediation by the Native American Heritage Commission fails to provide measures acceptable to the landowner.

SBSP Mitigation Measure 3.8-2: Cultural Landscape, Inventory of Resources, Treatment of Finds

In June 2012 the USFWS and California State Historic Preservation Officer (SHPO) signed a Memorandum of Agreement (FWS0407121A) that established a set of stipulations and a treatment plan that would allow the USFWS to carry out the project while satisfying the requirements of Sections 106 and 110(b) of the National Historic Preservation Act (NHPA). On consultation with the SHPO, the USFWS developed a historic properties treatment plan that will be implemented prior to and during the project. This historic properties treatment plan and the mitigation measures established within this treatment plan are hereby incorporated by reference. Appendix F contains a copy of the Memorandum of Agreement (MOA) and historic properties treatment plan.

2.3.3 Traffic

SBSP Mitigation Measure 3.12-1: Timing of Construction-Related Truck Trips

This mitigation measure required the landowner (CDFW) to include in construction plans and specifications the requirement that construction-related truck trips, specifically deliveries of fill and equipment, shall occur outside the weekday am and pm peak commute traffic hours. This mitigation measure is not feasible to implement in the Phase 2 actions because of the large amount of upland material that needs to be imported by truck to the ponds in relatively condensed periods of time.

Finding source projects with sufficient quantities of upland fill material is difficult for several reasons. The excavation must occur in a year and season when the SBSP Restoration Project can accept it. Stockpiling material or moving it more than once is cost prohibitive and would increase environmental impacts. Then, to be used in a restoration project, the material must pass a screening to demonstrate its lack of contamination. The source project should also be located close enough to the restoration project that bringing it there would both have fewer environmental impacts and be less expensive than bringing to a landfill or other destination. Successfully meeting all of those criteria is likely to limit the number of suitable source projects. It would not, then, be feasible to further constrain the source project and dirt broker/haulers by limiting the hours of material delivery to the non-peak commute periods. Assuming these entities would be willing to comply, their own costs would increase, and they would pass that on to the SBSP Restoration Project, raising associated costs by an estimated 30 percent at a minimum.

Collectively, these barriers make the implementation of the restricted hours from MM 3.12-1 infeasible. However, importantly, the nearest likely disposal site for upland fill material generated at projects in Alameda County or Contra Costa County is at a former quarry in Fremont, just north of the eastern landing of the Dumbarton Bridge. This location means that, in the absence of the SBSP Restoration Project, the likely haul route for transporting the material would go past one or more of the Phase 2 pond clusters. The traffic, air quality, and noise impacts are expected to be equal to or worse than the impacts if the material cannot be used at the Phase 2 project locations and has to go to the default disposal site.

For these reasons, the SBSP Restoration Project will not uniformly be implementing this mitigation measure and instead conducted a full analysis of the number of truck trips and the impacts associated with them. These are presented in Chapter 3, Environmental Setting, Impacts, and Mitigation Measures.

SBSP Mitigation Measure 3.12-3: Parking at Recreational Facilities

The landowner (CDFW), in coordination with the cities with jurisdiction over the proposed recreation improvements (where applicable), shall design recreational facilities with sufficient parking spaces to accommodate the projected increase in vehicles that access the site, unless adequate off-site parking is available to meet the demand for parking spaces.

SBSP Mitigation Measure 3.12-4: Video Record of Road Conditions

If residential streets are part of the designated haul route for any future phases of the SBSP Restoration Project, the landowners shall prepare a video record of road conditions prior to the start-up of construction for the residential streets affected by the project. The landowner (CDFW) or its contractors shall prepare a similar video of road conditions after project construction is completed. The pre- and post-construction conditions of haul routes shall be reviewed by staff of the local Public Works Department. An agreement shall be entered into prior to construction that will detail the pre-construction conditions and post-construction requirements of the roadway rehabilitation program.

2.3.4 Noise

SBSP Mitigation Measure 3.13-1: Short-Term Noise Effects

The landowners shall include in construction plans and specifications the following requirements:

- Locate all construction equipment staging areas at the farthest distance possible from nearby noise-sensitive land uses.
- Construction equipment shall be properly maintained and equipped with noise control, such as mufflers, in accordance with manufacturers' specifications.
- All construction activities shall be limited to the days and hours or noise levels designated for each jurisdiction where work activities occur, as specified below:
- City of Hayward: Construction activities shall occur between 7 a.m. and 7 p.m. Monday through Saturday and 10 a.m. to 6 p.m. on Sundays and holidays only.
- City of Union City: Construction activities shall occur between 8 a.m. and 8 p.m. Monday through Friday, 9 a.m. and 8 p.m. on Saturdays, and 10 a.m. to 6 p.m. on Sundays and holidays.
- City of Fremont: There are no restrictions for temporary construction activities.
- Alameda County: Construction activities shall occur between 7 a.m. and 7 p.m. Monday through Friday and 9 a.m. to 8 p.m. on Saturdays and Sundays.

SBSP Mitigation Measure 3.13-2: Traffic-Related Noise

The landowners shall include in construction plans and specifications the following requirements:

- Contractors shall use haul routes that minimizes traffic through residential areas.

SBSP Mitigation Measure 3.13-4: Operation of Portable Pumps

Where portable pumps would be operated in the vicinity of sensitive receptors such that noise levels would exceed noise standards established by affected jurisdictions, the landowners shall enclose the portable pump to ensure that a reduction of up to 10 decibels (dB) at 50 feet (15 meters) is achieved and the noise levels of affected jurisdictions are met, as necessary and appropriate.

2.3.5 Air Quality

The project design features would include a number of fugitive dust control measures, as discussed in the 2007 Final EIS/R for the SBSP Restoration Project. The control measures described in the 2007 Final EIS/R reflect the Bay Area Air Quality Management District (BAAQMD) Basic Control Measures, as outlined in the BAAQMD 1999 CEQA Guidelines. BAAQMD has since revised this guidance and has updated this list of best management practices with additional control measures. Therefore, mitigation is required to meet the BAAQMD's updated Basic Construction Mitigation Measures Recommended for All Proposed Projects (BAAQMD 2010, 2011). Mitigation Measure 3.13-1 would require the implementation of these additional control measures.

Mitigation Measure 3.13-1: Basic Construction Mitigation Measures

The following Basic Construction Mitigation Measures shall be implemented for all construction sites within the project area:

- Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations [CCR]). Clear signage shall be provided for construction workers at all access points.
- All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified visible emissions evaluator.
- Post a publicly visible sign with the telephone number and person to contact at the lead agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The BAAQMD's phone number shall also be visible to ensure compliance with applicable regulations.

These control measures, in addition to those included in the project design features, would meet BAAQMD Basic Construction Mitigation Measures Recommended for All Proposed Projects (BAAQMD 2010, 2011).

SBSP Mitigation Measure 3.14-1: Short-Term Construction-Generated Emissions

The following Basic Control Measures shall be implemented at all construction sites within the project area, regardless of size:

- Water all active construction areas at least twice daily, and more often during times of high wind.
- Cover all trucks hauling soil, sand, and other loose materials or require all trucks to maintain at least 2 feet (0.6 meter) of freeboard.

- Pave, gravel, apply water three times daily, or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas, and staging areas at construction sites.
- Sweep daily (with water sweepers) all paved access roads, parking areas, and staging areas at construction sites and public access trails and staging areas, as necessary.
- Sweep streets daily (with water sweepers) if visible soil material is carried onto adjacent public streets.

The following Enhanced Measures shall be implemented at construction sites larger than 4 acres:

- Hydroseed or apply (non-toxic) soil stabilizers to inactive construction areas (previously graded areas inactive for 10 days or more).
- Enclose, cover, water twice daily, or apply (non-toxic) soil binders to exposed stockpiles (e.g., dirt, sand).
- To the extent practicable, limit traffic speeds on unpaved roads to 15 miles per hour (mph).
- Install sandbags or other erosion control measures to prevent silt runoff to public roadways.
- Replant vegetation in disturbed areas as quickly as possible.
- Install wheel washers or cleaners (large cobble rock, etc.) for all exiting trucks, or wash off the tires or tracks of all trucks and equipment leaving the site.

These additional Optional Measures shall be implemented if further emission reductions are necessary to meet a BAAQMD requirement or address other concerns:

- Suspend excavation and grading activity when winds (instantaneous gusts) exceed 25 mph.
- Limit the area subject to excavation, grading, and other construction activity at any one time.

SBSP Mitigation Measure 3.14-3a: TAC emissions

Toxic air contaminant (TAC) emissions from construction within 500 feet (152 meters) of sensitive receptors will require the following:

- Pursuant to BAAQMD Rule 6, the project shall ensure that emissions from all off-road diesel-powered equipment used on the project site do not exceed 40 percent opacity for more than 3 minutes in any one hour. Any equipment found to exceed 40 percent opacity (or Ringelmann 2.0) shall be repaired immediately, and the USFWS, CDFW, and BAAQMD shall be notified within 48 hours of identification of noncompliant equipment. A visual survey of all in-operation equipment shall be made at least weekly, and a monthly summary of the visual survey results shall be submitted throughout the duration of the project, except that the monthly summary shall not be required for any 30-day period in which no construction activity occurs. The monthly summary shall include the quantity and type of vehicles surveyed as well as the dates of each survey. BAAQMD and/or other officials may conduct periodic site inspections to determine compliance.
- USFWS and CDFW shall provide a plan for approval by BAAQMD demonstrating that the heavy-duty (more than 50 horsepower) off-road vehicles to be used in the construction project,

including owned, leased, and subcontractor vehicles, would achieve a project-wide fleet average 45 percent particulate reduction compared to the most recent California Air Resources Board (CARB) fleet average. Acceptable options for reducing emissions may include use of late-model engines, low-emission diesel products, alternative fuels (e.g., Lubrizol, Puri NOx, biodiesel fuel) in all heavy-duty off-road equipment.

- USFWS and CDFW shall require in construction plans and specifications that the model year of all off-road construction moving equipment shall not be older than 1996.
- USFWS and CDFW shall require in construction plans and specifications a provision that prohibits contractors from operating pre-1996 heavy-duty diesel equipment on forecast Spare-the-Air Days or on days when air quality advisories are issued because of special circumstances (e.g., wildfires, industrial fires).
- USFWS and CDFW shall minimize idling time to 5 minutes for all heavy-duty equipment when not engaged in work activities, including on-road haul trucks while being loaded or unloaded on-site.
- Staging areas and equipment maintenance activities shall be located as far from sensitive receptors as possible.

In addition, where feasible and applicable, USFWS and CDFW shall do the following:

- Establish an activity schedule designed to minimize traffic congestion around the construction site.
- Periodically inspect construction sites to ensure construction equipment is properly maintained at all times.
- Require the use of low-sulfur fuel (diesel with 15 parts per million or less).
- Utilize United States Environmental Protection Agency (USEPA)-registered particulate traps and other appropriate controls to reduce emissions of diesel particulate matter and other pollutants at the construction site.

SBSP Mitigation Measure 3.14-3b: Health and Safety Plan

The landowners and/or their contractors shall prepare a Health and Safety Plan that includes project-specific monitoring procedures and action levels for dust. The portion of the plan that relates to the control of toxic contaminants contained in fugitive dust shall be prepared in coordination with BAAQMD. The recommendations of BAAQMD to prevent the exposure of sensitive receptors to levels above applicable thresholds (probability of contracting cancer for the Maximally Exposed Individual [MEI] that exceeds 10 in one million or if ground level concentrations of non-carcinogenic contaminants result in hazard index greater than one for the MEI) shall be implemented. The Health and Safety Plan, applicable to all excavation activities, shall establish policies and procedures to protect workers and the public from potential hazards posed by hazardous materials (including notification procedures to nearby sensitive receptors within 1,000 feet informing them of construction activities that may generate dust containing toxic contaminants). The plan shall be prepared according to federal and California Occupational Safety and Health Administration (OSHA) regulations. The landowners and/or its contractors shall maintain a copy of the plan on-site during construction activities.

3. ENVIRONMENTAL SETTING, IMPACTS, AND MITIGATION MEASURES

3.1 Introduction

3.1.1 Chapter Organization

The sections in Chapter 3 are organized into three broad categories: Physical Environment, Biological Environment, and Social and Cultural Environment. A fourth category, the South San Francisco Bay Shoreline Study, was included as Section 3.2 in the 2007 South Bay Salt Pond (SBSP) Restoration Project Final Environmental Impact Statement/ Report (2007 Final EIS/R), but it was summarized in a few paragraphs in Chapter 1 of this document and is not included in Chapter 3 of this Draft EIS/R. Sections 3.2 through 3.17 present the environmental setting, impacts, and mitigation measures for the SBSP Restoration Project, Eden Landing Phase 2. Topics addressed in these sections are required by the National Environmental Policy Act (NEPA) and/or the California Environmental Quality Act (CEQA). The environmental resource sections for each of these categories are listed below.

Physical Environment

3.2 Hydrology, Flood Management, and Infrastructure

3.3 Water Quality

3.4 Geology, Soils, and Seismicity

Biological Environment

3.5 Biological Resources

Social and Cultural Environment

3.6 Recreation Resources

3.7 Cultural Resources

3.8 Land Use

3.9 Public Health and Vector Management

3.10 Socioeconomics and Environmental Justice

3.11 Traffic

3.12 Noise

3.13 Air Quality

3.14 Public Services

3.15 Utilities

3.16 Visual Resources

3.17 Greenhouse Gas Emissions

Each of the above sections in Chapter 3 (Sections 3.2 through 3.17) is divided into three parts: Physical Setting, Regulatory Setting, and Environmental Impacts and Mitigation Measures. These are described in further detail below. Cumulative effects for each of the environmental resources listed above are evaluated in Chapter 4.

3.1.2 Environmental Setting and Impact Analysis

Physical Setting

The physical setting includes the regional setting as well as the project setting. The regional setting presents the existing conditions within the greater South Bay for the environmental topic. In most cases, the regional setting covers the SBSP Restoration Project area. In other cases, the regional setting provides information on a broader area extending beyond the immediate project vicinity (e.g., geology). The 2007 Final EIS/R covered the regional setting in great detail, and so this project-level document does not focus on that and instead includes it only to the extent necessary for that resource impact analysis.

The project setting provides the existing conditions specific to the SBSP Restoration Project's Phase 2 alternatives for each environmental topic. Project setting information is presented for the Eden Landing pond complex, with an emphasis on the southern half of Eden Landing, which comprises the Phase 2 project area.

Regulatory Setting

Where the SBSP Restoration Project's Phase 2 ponds fall within the jurisdiction of federal, state, and local regulatory agencies, the project would be subject to the laws, regulations, and policies of those agencies. These regulations are intended to guide development to reduce adverse effects on sensitive resources, or offer general guidance on the protection of such resources. The regulatory framework sections describe the rules that may be applicable to Phase 2 for each issue area. These rules may also set the standards (significance criteria or thresholds of significance, as described below) by which potential project impacts are evaluated.

Environmental Impacts and Mitigation Measures

Significance Criteria

The Environmental Impacts and Mitigation Measures section presents the significance criteria (also referred to as thresholds of significance under CEQA) against which potential effects are evaluated and the potential impacts that would result from implementation (construction and operation) of the Phase 2 No Action Alternatives and the Phase 2 Action Alternatives. (The equivalent CEQA terms are "No Project Alternatives" and "project alternatives," but the NEPA terms will be used throughout.)

As defined by CEQA Guidelines 15064.7(a), a threshold of significance is an identifiable quantitative, qualitative, or performance standard for a particular environmental effect. Although the Council of Environmental Quality (CEQ) Regulations for Implementing NEPA do not identify any specific criteria for evaluating impacts, NEPA regulations adopted by the federal lead agencies were considered as the significance criteria were developed. The significance criteria against which the Phase 2 Action

Alternatives are assessed include the criteria listed in Appendix G of the CEQA Guidelines and the specific criteria provided in the 2007 Final EIS/R. The criteria have been updated to address newer CEQA requirements; to be geographically specific, where appropriate; and to address SBSP Restoration Project–specific topics.

The significance criteria presented in this Draft EIS/R provide rational bases for determining whether the SBSP Restoration Project would have significant environmental effects and as such, are presented before the evaluation of potential effects in Sections 3.2 through 3.17.

Characterization of Impact Significance

Impact evaluations for the Action Alternatives are assessed based on the existing conditions (existing baseline) at each Phase 2 pond cluster, not the conditions anticipated to occur or develop under the No Action Alternative. This approach is consistent with the CEQA Guidelines and the approach used in the 2007 Final EIS/R.

In determining the significance of impacts, many CEQA documents generally categorize impacts as “significant” or “less than significant” based on stated significance criteria. CEQA defines significance as a substantial or potentially substantial adverse change to the environment (Section 15382). The definition of significant in terms of what is a “substantial” or significant effect is left to the lead agencies to determine. In CEQA, the point at which the severity of an impact changes from less than significant to significant is called the significance threshold (see discussion of significance criteria, above).

Pursuant to Section 1508.27 of the CEQ Regulations for Implementing NEPA, “significantly” as used in NEPA requires consideration of both context and intensity. Context can include the society as a whole (human, national), the affected region, the affected interests, and the locality. Intensity refers to the severity of impact.

In this Draft EIS/R, the context is explained in the impact discussions presented in Sections 3.2 through 3.17. The intensity or severity of impacts is generally characterized using CEQA terminology. To determine whether impacts might be significant, potentially adverse impacts are identified and evaluated using the significance criteria developed for each environmental resource.

Although CEQA focuses on adverse impacts, NEPA addresses both adverse and beneficial impacts. Section 1508.8 of the CEQ Regulations for Implementing NEPA states that “effects [or impacts] may also include those resulting from actions which may have both beneficial and detrimental effects.” Consequently, this Draft EIS/R identifies both potentially adverse and potentially beneficial impacts of the SBSP Restoration Project. The following terms are used in this Draft EIS/R to characterize project impacts:

- Potentially significant: Adverse environmental effects would occur (impacts would exceed the significance criteria or thresholds defined for each environmental issue), and no mitigation measures are available to reduce impacts to levels below the significance criteria. In other documents, these are often described as “potentially significant and unavoidable”
- Less than significant with mitigation: Potentially adverse environmental effects would occur, but mitigation measures would be implemented to reduce adverse effects to less-than significant levels.
- Less than significant: Environmental effects would not exceed the significance criteria.

- No impact: No adverse environmental effects would occur.
- Beneficial (NEPA only): No adverse environmental effects would occur, and conditions would improve, creating a beneficial effect.

Both NEPA and CEQA address the potential for mitigation to reduce environmental impacts. CEQA states that "an EIR shall describe feasible measures which could minimize significant adverse impacts" (CEQA Guidelines Section 15126.4[a][1]) (AEP 2016). According to Section 1508.20 of the CEQ Regulations for Implementing NEPA, mitigation is intended to do one of the following:

- Avoid the effect or impact altogether by not taking a certain action or parts of an action;
- Minimize the effect or impact by limiting the degree or magnitude of the action and its implementation;
- Rectify the effect or impact by repairing, rehabilitating, or restoring the affected environment; or
- Reduce or eliminate the effect or impact over time by preservation and maintenance operations during the life of the action.

A significant impact that cannot be mitigated to a less than significant level is considered unavoidable.

Presentation of Impacts

In Sections 3.2 through 3.17 of this Draft EIS/R, the impacts of the SBSP Restoration Project, Phase 2, long-term alternatives are presented in the following order for each impact and for each of the four pond clusters:

- Phase 2 No Action Alternative; and
- Phase 2 Action Alternatives.

Project-level impacts are presented as Phase 2 Impact 3.X-Y, where X is the section number and Y is impact number. The project-level impacts detail the specific design information that was developed for use in the impact evaluation. To the extent possible, quantitative analyses are provided for the project-level impact analyses. All impact analyses consider changes in the environment over the 50-year planning period.

Adaptive Management Plan and its Relationship to the Impact Analysis

As stated in Chapters 1 and 2 of this Draft EIS/R, the Adaptive Management Plan (AMP) is an integral component of the SBSP Restoration Project, Eden Landing Phase 2. The AMP allows for lessons learned from earlier phases to be incorporated into subsequent phases as management plans and designs for future actions are made. As importantly, it also allows the decisions about the specific actions and components of each project phase to be made based on the outcomes of previous project phases and to adjust the balance of restoration options between tidal marsh and enhanced managed ponds as needed to avoid significant impacts to one species. This approach to phased tidal restoration acknowledges that uncertainties exist and provides a framework for adjusting management decisions as understanding of the cause-and-effect linkages between management actions and the physical and biological response of the system are more fully understood. Adaptive management is used to maximize the ability to achieve the Project Objectives (benefits). Another key aspect of the adaptive management approach is to avoid adverse environmental impacts by triggering specific pre-planned intervention measures if monitoring reveals that aspects of the ecosystem are evolving (responding to prior interventions) along undesirable trajectories.

Monitoring key attributes of the physical, chemical, and biological conditions of the South Bay ecosystem may detect early signs of unexpected or uncertain adverse effects. The AMP identifies management triggers that indicate when restoration actions may cause a significant adverse environmental impact. The management triggers are intended to provide a warning to decision-makers before a significant impact occurs. If a management trigger is tripped, the restoration would be halted or modified until a focused evaluation is conducted to assess if a potentially significant impact would result from the SBSP Restoration Project or other factors. If the focused evaluation determines that the SBSP Restoration Project would cause a significant impact, an adaptive management action to avoid the significant impact would be implemented. Ongoing monitoring would determine the effectiveness of the adaptive management action. The project decision-makers would use these results to determine whether the progression along the restoration "staircase" should continue (i.e., additional tidal restoration should occur). If the focused evaluation and/or monitoring results indicate that a significant impact would still occur, even with implementation of the adaptive management action, then additional tidal restoration activities would cease. This cessation could happen at any point along the restoration staircase (described in more detail in the Executive Summary of the 2007 Final EIS/R) between the Alternatives B and C bookends of 50 percent tidal marsh/50 percent managed ponds and 90 percent tidal marsh/10 percent managed ponds.

As mentioned above, triggers were developed and selected to provide the opportunity to modify the phasing and design of future phases or change pond management before thresholds of significance are exceeded. These decisions about future restoration options (e.g., choosing whether a particular salt pond would be restored to a tidal marsh or retained and enhanced as a managed pond) and the designs and plans that would go into them are termed "staircase" issues because they address where on the staircase between the pre-project conditions and the 90 percent/10 percent balance the SBSP Restoration Project might ultimately stop. Many of the resources that could be impacted by the project are directly affected by these staircase-issue decisions. These include weighing the habitat needs of pond-dependent bird species against marsh-dependent species, or balancing the goal of providing public access and recreation features with the need to not disturb sensitive wildlife species. The AMP provides a formal context in which to evaluate these aspects of the staircase issues and how they would be shaped by the selection and implementation of actions in each phase of the SBSP Restoration Project. Consequently, many of the most wide-reaching and long-term potentially significant impacts identified in this Draft EIS/R would be avoided through implementation of the AMP.

The adaptive management approach similarly ensures that no significant impacts would occur in association with construction and/or operation of the project. As such, the AMP is not a mitigation measure identified in this Draft EIS/R to reduce potentially significant impacts, but rather it is an integral part of the project that would avoid significant impacts through the restoration triggers-management actions feedback loop.

For the other environmental issue areas that the AMP does not address (e.g., non-staircase issues such as air quality), mitigation measures are identified (as needed) to reduce potentially significant impacts to less than significant levels. If feasible mitigation measures are not identified for a potentially significant impact concerning a non-staircase issue, then it would remain potentially significant.

Phase 2 No Action Alternative

The Phase 2 No Action impact discussion presents a project-level evaluation of the No Action Alternative at Eden Landing. As listed and explained in Chapter 2, this No Action Alternative is named with the letter "A" and the name "Eden" to distinguish it from the Phase 2 alternatives at the Don Edwards San Francisco Bay National Wildlife Refuge that were addressed in a previous EIS/R. Thus, the No Action Alternative at Eden Landing is named "Alternative Eden A".

The Phase 2 No Action Alternative focuses on the environmental changes that would occur if the Phase 2 actions were not implemented. These ponds are currently managed under the general principles and practices described in Programmatic Alternative C; therefore, the Phase 2 No Action Alternatives would result in the continued implementation of Programmatic Alternative C at these ponds.

Programmatic Alternative C was selected and is being implemented for the SBSP Restoration Project as a whole. Yet at any particular location within the overall project footprint, it would be possible to select a No Action Alternative under Phase 2 and still move forward with a Phase 2 action alternative at other ponds. In some cases, geographic distinctions are identified that are unique to the Phase 2 ponds. Where there are similarities between the impacts resulting from Programmatic Alternative A and the Phase 2 No Action Alternatives, the program-level discussions from the 2007 Final EIS/R are referenced.

Phase 2 Action Alternatives

The Phase 2 action alternatives are the second phase of long-term Programmatic Alternatives B and C. Because potential impacts from implementation of the Phase 2 actions would generally be similar to those identified for Alternatives B and C, many of the impacts and mitigation discussions are similar. To reduce redundancy, impact discussions and mitigation measures presented in the 2007 Final EIS/R for the SBSP Restoration Project long-term alternatives are referenced in the Phase 2 impact discussions to the extent possible. Also, as noted in Chapter 2, program-level mitigation measures from the 2007 Final EIS/R have been adopted and incorporated into the designs at the project level, making them part of the project and not a mitigation measure.

Avoidance and Minimization Measures for Less than Significant Impacts

As discussed above, impacts of Phase 2 of the SBSP Restoration Project are characterized as potentially significant, less than significant with mitigation, less than significant, no impact, or beneficial. Where potential impacts are considered to be less than significant, effects would not exceed the identified thresholds, and mitigation measures were not identified in Chapter 3's resource-specific Sections 3.2 through 3.17, to further reduce impacts.

Three categories of less than significant impacts were identified in Chapter 3 of the 2007 Final EIS/R and are described below. This section reviews the availability or absence of mitigation measures that would further reduce less than significant impacts.

- **Impacts that would be reduced to less than significant levels with the implementation of management actions identified in the Adaptive Management Plan.** The AMP, presented in Appendix D of the 2007 Final EIS/R and summarized in Section 2.3 of that document and again in this Draft EIS/R, identifies management actions that are intended to optimize environmental resources affected by the project and reduce impacts to acceptable, less than significant levels. These management actions address sediment dynamics, water quality, biological resources, and recreation and public access. The AMP identifies management triggers that would be tripped before a significant environmental impact occurs in order to warn decision-makers and give them time to implement the appropriate management actions to address the potential impact. These management actions would generally be applied even if management triggers are not tripped, to further improve environmental conditions for the resource areas addressed by the AMP.

- **Impacts that would be considered less than significant with implementation of mitigation measures identified in the Draft EIS/R.** Certain impacts that are identified as potentially significant would be reduced to less than significant levels with implementation of mitigation measures. Because these mitigation measures include a variety of Best Management Practices that would cumulatively achieve greater reduction than the minimum acceptable to reach the less than significant threshold, the implementation of these mitigation measures would likely be effective in further reducing the impact.
- **Impacts that are so minor that additional mitigation measures are not warranted or impacts where no additional measures would be feasible.** This category of impacts covers the remaining less than significant impacts of the project

3.1.3 Baseline Conditions

Baseline conditions are typically "the physical environmental conditions in the vicinity of the Project, as they exist at the time the Notice of Preparation (NOP) is published" (CEQA Guidelines Section 15125(a)) (AEP 2016). However, given that the 2007 Final EIS/R, on which this document is tiered, was published in 2007, almost 9 years before the Phase 2 Draft EIS/R is scheduled to be released, the baseline conditions described in the 2007 Final EIS/R were updated as needed. The NOP for Phase 2 was published in May of 2016, and for the purposes of this Draft EIS/R, the baseline conditions are set in spring of 2016. Under this timeline, the Phase 1 actions are complete and are included in the baseline conditions.

This page intentionally left blank

3.2 Hydrology, Flood Management, and Infrastructure

This section of the Draft Environmental Impact Statement/Report (EIS/R) characterizes the existing hydrology and flood management within the Eden Landing Phase 2 project area and analyzes whether implementation of the project would cause a substantial adverse effect on hydrological resources. The information presented is based on review of federal, state and local plans, and other pertinent regulations, which are presented in the regulatory framework setting section. Using this information as context, an analysis of the hydrology, flood management, and infrastructure environmental impacts of the project is presented for each alternative. Program-level mitigation measures described in Chapter 2, Alternatives, would be implemented as part of the project. Therefore, this section only includes additional mitigation measures as needed.

3.2.1 Physical Setting

Methodology

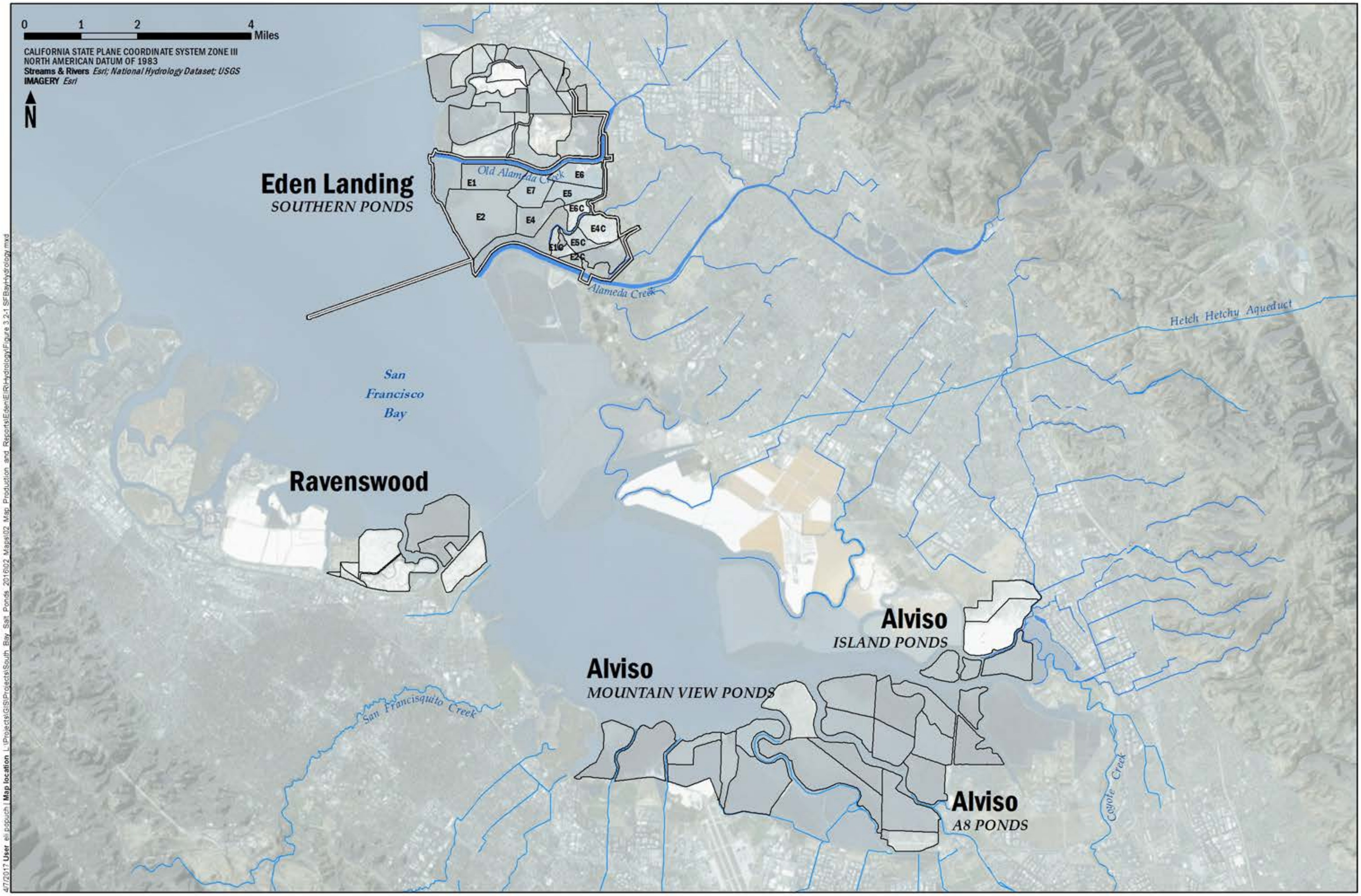
The development of the baseline conditions, significance criteria, and impact analysis is commensurate with and reliant on the analysis conducted in the 2007 South Bay Salt Pond (SBSP) Restoration Project Final Environmental Impact Statement/Report (2007 Final EIS/R). The baseline condition specific to the Eden Landing Phase 2 ponds is based on current conditions in these areas. The primary sources of data used to describe recent conditions include the *Eden Landing Ecological Reserve System E2 and E2C Operation Plan* (Operations Plan; California Department of Fish and Wildlife [CDFW] 2016) and the Self-Monitoring Reports (CDFG 2008, CDFW 2015).

Regional Setting

The regional setting provides information regarding the South San Francisco Bay (South Bay), the SBSP Restoration Project area, the Eden Landing pond complex, and upland watersheds (see Figure 3.2-1). The South Bay is defined as the portion of San Francisco Bay (or Bay) south of Coyote Point on the western shore and San Leandro Marina on the eastern shore. The South Bay is both a geographically and hydrodynamically complex system, with freshwater tributary inflows, tidal currents, and wind interacting with complex bathymetry (i.e., bed surface elevation below water).

Climate and Precipitation. The South Bay has a Mediterranean climate characterized by mild, wet winters and dry, warm summers. Air temperatures are mild due to proximity to the ocean. Winter weather is dominated by storms from the northern Pacific Ocean that produce nearly all the annual rainfall, while summer weather is dominated by sea breezes caused by differential heating between the hot interior valleys and the cooler coast. The South Bay typically receives about 90 percent of its precipitation in the fall and winter months (October through April), with the greatest average rainfall occurring in January. The average annual rainfall in the counties surrounding the South Bay is approximately 20 inches, although the actual rainfall can be highly variable due to the influence of local topography.

Hydrodynamics. The South Bay can be characterized as a large shallow basin, with a relatively deep main channel surrounded by broad shoals and mudflats. Tidal currents, wind, and freshwater tributary inflows interact with bathymetry to define the residual circulation patterns and residence time, and determine the level of vertical mixing and stratification. The most obvious hydrodynamic response is the daily rise and fall of the tides, although much slower residual circulation patterns also influence mixing and flushing processes within the South Bay.



LEGEND

- River
- Eden Landing Phase 2 Project Area
- South Bay Salt Ponds

AECOM

South Bay Salt Pond Restoration Project

Figure 3.2-1

Rivers and Streams

The tides in San Francisco Bay are mixed semidiurnal tides (i.e., two high and two low tides of unequal heights each day). The tides exhibit strong spring-neap variability with the spring tides, which have a larger tidal range, occurring approximately every 2 weeks during the full and new moon. Neap tides, which have a smaller tidal range, occur approximately every 2 weeks during the moon's quarter phases. The tides also vary on an annual cycle, in which the strongest spring tides occur in late spring/early summer and late fall/early winter, and the weakest neap tides occur in spring and fall. The enclosed nature of the South Bay creates a mix of progressive and standing wave behavior, which causes tidal amplification as waves move southward (i.e., the tidal amplitude is increased by the harmonic addition of original waves plus reflected waves).

One of the most important factors influencing circulation patterns in the South Bay is bathymetry. Bathymetric variations create different flow patterns between the San Mateo Bridge and Dumbarton Bridge and in areas south of the Dumbarton Bridge. Circulation patterns also differ between the deep main channel and the shoals. Currents in the South Bay are driven predominantly by tidally and wind-forced flows and their interaction with the bathymetry. Typically, winds drive a surface flow, which then induces a return flow in the deeper channels (Walters et al. 1985). In terms of circulation, the most significant winds are onshore breezes that create a horizontal, clockwise circulation pattern during the spring and summer. Density-driven currents occur when adjacent water bodies have differing densities, such as differences in temperature and/or salinity. Although density-driven currents are generally uncommon in the South Bay, in years of heavy rainfall, fresh water can flow from the Delta through the Central Bay and into the South Bay. In such events, the freshwater flows southward along the surface, while the more saline South Bay water flows northward along the bottom (Walters et al. 1985).

Currents and circulation affect the tidal excursion – the horizontal distance a water particle travels during a single flood or ebb tide. The tidal excursion varies between 6.2 and 12.4 miles within the main channels, and it ranges between 1.9 and 4.8 miles within the subtidal shoals; much smaller excursions occur on the intertidal mudflats (Cheng et al. 1993; Fischer and Lawrence 1983; Walters et al. 1985). Tidal dispersion is the dominant form of transport in the South Bay and the primary mechanism that controls residence times. Residence time is usually characterized as the average length of time a water parcel spends in a given waterbody or region of interest (Monsen et al. 2002). It is typically shorter during the winter and early spring during wet years and considerably longer during summer and/or drought years (Powell et al. 1989; Walters et al. 1985). Residence time also varies with seasonal freshwater inflow and wind conditions.

The volume of water in the South Bay between mean low water and mean high water is the "tidal prism" of the South Bay. Tidal prism, in combination with bathymetry, determines the patterns and speed of tidal currents and subsequent sediment transport. The tidal prism for the South Bay is approximately 666,000 acre-feet, the majority of which is contained between the San Francisco-Oakland Bay Bridge and San Mateo Bridge (Schemel 1995). At mean lower low water, the volume of water in the far South Bay (south of the Dumbarton Bridge) is less than half the volume present at mean higher high water (MHHW). In addition, surface water area coverage at mean lower low water is less than half that at MHHW, indicating that over half of the far South Bay consists of shallow mudflats exposed at low tides (Schemel 1995).

Sea-Level Rise. Sea-level rise refers to an increase in mean sea level with respect to a land benchmark. Global sea-level rise can be a result of global warming from the expansion of sea water as the oceans warm or from the melting of ice over land. Local sea-level rise is affected by global sea-level rise plus tectonic land movements and subsidence (which can be of the same order as global sea-level rise.) Atmospheric pressure, ocean currents, and local ocean temperatures also affect local rates of sea-level rise.

Salinity. Salinity in the South Bay is governed by salinity in the Central Bay, exchange between the South Bay and Central Bay, freshwater tributary inflows to the South Bay, and evaporation. In general, the South Bay is vertically well mixed (i.e., there is little tidally averaged vertical salinity variation) with near oceanic salinities (33 parts per thousand [ppt]).

Seasonal variations in salinity are driven by variability in freshwater inflows. High freshwater inflows typically occur in winter and early spring in wet years when fresh water from the San Francisco Bay Delta (Delta) intrudes into the South Bay. For example, during wet years when Delta outflow exceeds approximately 200,000 cubic feet per second (cfs), fresh water from the Delta intrudes into the South Bay during the winter and spring months, pushing surface salinities below 10 ppt. During dry years, when Delta outflows are small, near surface salinity in the South Bay remains high (*i.e.,* greater than 20 ppt) (PWA et al. 2005). As Delta and tributary inflows decrease in late spring, salinity increases to near oceanic salinities. High freshwater inflows can result in circulation patterns driven by density gradients between the South Bay and Central Bay (Walters et al. 1985).

Sediment Characteristics. Bay habitats such as subtidal shoals, intertidal mudflats, and wetlands are directly influenced by sediment availability, transport, and fate, specifically the long-term patterns of deposition and erosion. The main losses of sediment from the South Bay are exports to the Central Bay and sediment capture within marsh areas and restored ponds. Sediments that are carried on flood tides into a marsh or restored pond are typically deposited, causing the marsh or mudflat area to increase in elevation. Sediments can also be carried out with ebb tides if cohesive sediment deposition is inhibited. The rate of sedimentation in a marsh or restored pond depends on the suspended sediment concentration (SSC) near the marsh or restored pond location, the elevation of the ground surface, and the degree of tidal exchange.

The capacity of many sloughs and channels in the South Bay has been gradually reduced by sediment deposition. Under natural conditions, channels adjacent to marsh lands experienced daily scouring from tidal flows. When these areas were diked off to create salt ponds, the scouring flows were reduced. Subsequent sedimentation has constricted channels, reducing cross-sectional areas and decreasing channel conveyance.

Historically, fringing marsh along the east shoreline has eroded, while marsh along the west shoreline has eroded and accreted (equating to no net change). The historical trend in marsh erosion suggests that more mudflat loss is expected along the higher-energy east shore than the west shore.

SSCs in the South Bay exhibit short-term variability, primarily in response to variations in tidally driven resuspension, wind-driven resuspension, and riverine input from local tributaries and sloughs. In the winter and early spring, the main sources of suspended sediments are local tributaries and the Central Bay. Extremely wet years can also deliver turbid plumes of sediment from the Delta into the South Bay. This influx of sediment enters the system and is continually reworked and transported as it is deposited and resuspended by tidal and wind-driven currents. There is typically little direct input of suspended sediment in the dryer summer months; however, SSCs are often high due to increased wind-wave resuspension and reworking of previously deposited sediments.

The transport and fate of suspended sediment has the potential to affect the transport and fate of contaminants, such as metals and pesticides, and the distribution of nutrients. Increasing SSCs are also directly correlated with increasing turbidity and decreasing light availability, thus affecting photosynthesis, primary productivity, and phytoplankton bloom dynamics.

Flood Hazards. Flood hazards in the South Bay result primarily from coastal flooding (tides, storm surge, and wind wave action) and fluvial flows (rainfall runoff) from the adjacent watersheds. Flooding can also be caused by backed-up storm drains or, much less commonly, by tsunamis or seiche waves.

Coastal flooding normally results from exceptionally high tides, increased by storm surge[1], climatic events, and wind-wave action. Coastal flooding can occur when high Bay water levels, in concert with wind waves, lead to erosion and/or overtopping of coastal barriers. The highest astronomic tides occur for a few days each summer and winter due to the relative positions of the earth, moon, and sun. The highest Bay water levels typically occur in the winter when storm surges are coincident with the higher astronomic tides. Salt ponds in the South Bay dissipate wind-wave action and act as large reservoirs to store overtopped waters. Floods resulting solely from coastal processes have been rare due to the de facto flood protection provided by existing pond levees (United States Army Corps of Engineers [USACE] 1988). Note that, while the term “levee” is used to describe these features of the former salt production infrastructure throughout this Draft EIS/R and in the SBSP Restoration Project as a whole, these features were never engineered or constructed to provide flood protection and are more like berms than true flood levees. Nevertheless, to be consistent with previous project documents, this Draft EIS/R retains the use of “levees” for these features.

Fluvial flooding occurs when rivers, creeks, and other natural or constructed channels are overtopped. Fluvial flooding has been the primary source of historical flood damage in developed areas adjacent to the South Bay. An extensive network of flood control levees has been constructed along various channel reaches to protect adjacent developed areas from channel overtopping. These leveed reaches are designed to convey large fluvial discharges during high Bay tides; however, the levees can be overtopped when high runoff conditions and high tides exceed the design capacity of the leveed channel. Out-of-bank flooding can also occur in areas adjacent to non-leveed channels when the runoff exceeds the carrying capacity of the channel. Flooding also results from local drainage that collects behind bayfront levees when discharges to the Bay (either by pumps or gravity flow) are inadequate.

Levees. Levees in the South Bay, and specifically levees in the SBSP Restoration Project area, were typically constructed with Bay mud (weak clays and silts) dredged from adjacent borrow ditches or pond areas. Soils were not compacted during levee construction, and levees have continued to settle and deform. These levees have been augmented from time to time with Bay mud fill to compensate for subsidence, consolidation of levee fill material, and weak underlying Bay mud deposits. In general, levees are low to moderate in height and have fairly flat, stable slopes. Some dikes were constructed from imported soil, riprap, broken concrete, and other predominantly inorganic debris, and these dikes typically have steeper slopes than the levees constructed of Bay mud.

Outboard levees (i.e., bayfront and slough/creek levees adjacent to tidal waters) were built to enclose evaporation ponds on former tidal marshes and mudflats and to protect the salt ponds from Bay inundation. Inboard levees (i.e., inland pond levees) are predominantly former salt pond levees that offer the last line of defense against flooding of low-lying inland areas. Internal levees separate the individual

[1] Storm surge is an increase in water level caused by atmospheric effects and strong winds over shallow areas, which combine to raise water elevations along the shore.

salt ponds from each other and are typically smaller than the outboard levees. Generally, pond levees were not designed, constructed, or maintained following well-defined standards (USACE 1988).

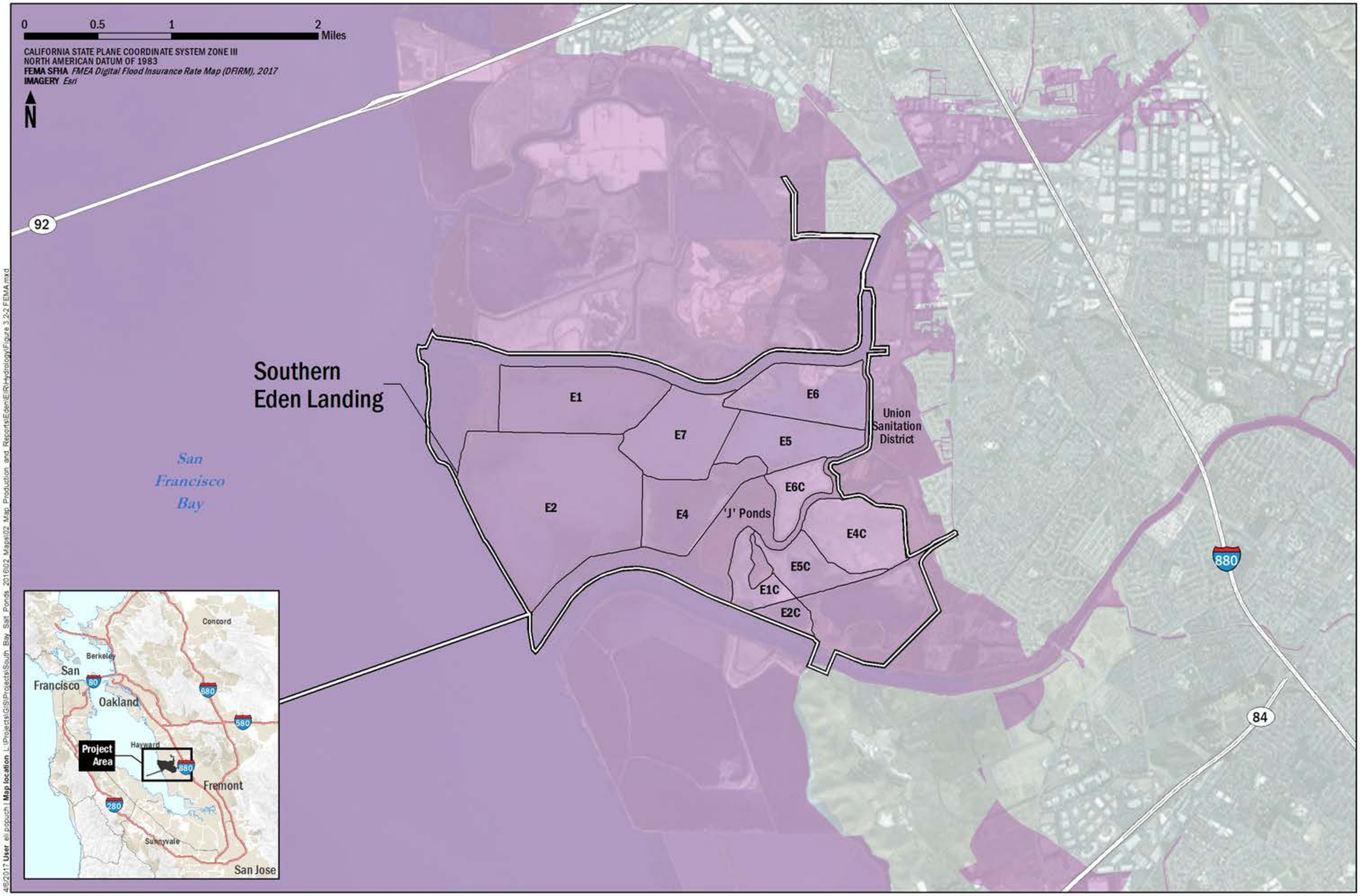
Existing levees provide flood risk management, and former salt ponds act as temporary storage during coastal flooding conditions. Waves break against outboard levees, which can be safely overtopped. If, however, there is an unexpected breach and ponds fill, waves could overtop internal levees, reducing flood-protection capabilities. When tidal action is introduced to the salt ponds, either through restoration or passively through deterioration of the levees, the effectiveness of the salt pond complexes acting as flood-protection mechanisms is reduced. Although most of the shoreline in the South Bay consists of levees that do not meet the Federal Emergency Management Agency (FEMA) or USACE flood protection standards, the absence of a history of significant tidal flooding indicates that these levees do provide flood risk management (USACE 1988).

Floodplains. FEMA and USACE have developed flood maps for the South Bay that include delineation of the 100-year floodplain. FEMA delineation of the coastal floodplain in the South Bay is based on the assessment that pond levees provide for a reduction of wave action but do not prevent inundation from high Bay water levels. Therefore, FEMA-designated 100-year base flood elevations are a function of the 100-year still-water elevations. The still-water flood elevation is defined by FEMA as the projected elevation that floodwaters would assume in the absence of waves resulting from wind. For fluvial systems, FEMA determines the 100-year base flood elevations by using the MHHW as the downstream tidal water surface elevation (tidal boundary) coupled with the 100-year flood for upstream flow conditions. The FEMA floodplain data shown on Figure 3.2-2 are from Flood Insurance Rate Maps (FIRMs) effective in 2009 (Alameda County). In general, pond levees would not meet FEMA criteria and are not certified as flood-protection facilities as defined in FEMA's certification requirements (FEMA 1998). This is because (1) levee failure comprised of overtopping, degradation, and breaching is likely to result in flooding of inland areas[2], and there are no calculations to show that they are designed for the 100-year event, and (2) maintenance records indicate frequent maintenance is required, but the required maintenance program for certification, including a commitment by a public entity, does not exist.

Tsunami and Seiche. Tsunamis are long-period, low-amplitude ocean waves that pose an inundation hazard to many coastal areas around the world. Tsunami waves are generated when the floor of an ocean, sea, bay, or large lake is rapidly displaced on a massive scale or when there is a large underwater landslide. While the wave height of a tsunami in the open ocean is generally low, the tsunami waves change shape as the seafloor ramps up near coastlines and water depth becomes shallow, trapping wave energy and potentially causing the wave height to increase dramatically. Tsunami waves at coastlines can range in size from barely perceptible on tide gauge recordings to heights upwards of 100 feet (30 meters). Upon reaching the coastline, the momentum of the tsunami waves may carry them inland for some distance, and they may run up on land to elevations greater than the wave height at the coast.

Borrero et al. (2006) evaluated historical and hypothetical tsunami-induced wave heights in San Francisco Bay, focusing on the Central Bay and the North Bay. The largest hypothetical tsunami-induced wave was caused by a very large earthquake (greater than 9.0 on the Richter scale) on the Alaska-Aleutian subduction zone. Modeling results predicted a 16.4-foot wave entering San Francisco Bay, but the wave height was quickly reduced to less than 3.2 feet as it passed under the San Francisco–Oakland Bay Bridge and was further reduced as it passed through the Central Bay.

[2] Analysis was conducted by USACE in the original San Francisco Bay Shoreline Study (USACE 1988, 1989).



LEGEND

Special Flood Hazard Area

Eden Landing Phase 2 Project Area

Southern Eden Landing Ponds

AECOM

South Bay Salt Pond Restoration Project

Figure 3.2-2

FEMA Special Flood Hazard Areas

A seiche is a wave that oscillates in lakes, bays, or gulfs from a few minutes to a few hours as a result of seismic or atmospheric disturbances. The geometry of the basin and frequency of oscillation have the potential to amplify the waves. Tsunami waves can create seiches when they enter embayments. Geologic-induced seiche events have not been documented in the Bay and meteorological effects can be quickly dissipated due to the connection with the Pacific Ocean.

Project Setting

This section describes the physical setting of the Eden Landing Phase 2 area, located on the east shore of the Bay south of the San Mateo Bridge. Actions taken under the Phase 1 of the SBSP Restoration Project are included in the setting for Phase 2 actions.

The SBSP Restoration Project is a program to restore tidal marsh habitat, reconfigure and enhance managed pond habitat, maintain or improve current levels of flood risk management, and provide recreation opportunities and public access. The SBSP Restoration Project (described in the 2007 Final EIS/R) would restore a mosaic of tidal and managed pond habitats in the South Bay. A continuous band of tidal marsh (a "tidal marsh corridor") along the edge of the Bay would provide connectivity of habitat for tidal marsh-dependent species. Tidal habitats would experience tidal inundation of Bay water, and marshes would be created through estuarine sedimentation and natural vegetative colonization. Habitat transition zones would be restored in some areas. Managed ponds would encompass a range of water depths and salinity regimes through the use of flow control structures, grading, and other means. The SBSP Restoration Project lands reflect the diversity of wildlife habitats that could be restored to tidal wetlands, brackish marsh, managed ponds, seasonal wetlands, riparian habitat, freshwater marshes and adjacent uplands.

Eden Landing Phase 1 actions included tidal salt marsh habitat restoration, managed pond reconfiguration and enhancement, recreation and public access features, and maintenance of the existing levels of de facto flood protection provided by the former salt-production levees. Full tidal action was restored to former Ponds E9, E8A and E8X in 2011. Ponds E12 and E13 were reconfigured to create 230 acres of high quality shallow water foraging areas at varying salinities and six constructed nesting islands. Pond E14 was enhanced for shorebird management.

Eden Landing Phase 2 of the SBSP Restoration Project is a direct outgrowth of the acquisition of the Eden Landing pond complex and of the continued implementation of the larger SBSP Restoration Project laid out in the 2007 Final EIS/R.

Eden Landing Pond Complex

The 5,500-acre Eden Landing (formerly Baumberg) pond complex, shown in Figure 2-3, is owned by the CDFW and is located on the eastern shore of the South Bay, between the San Mateo Bridge and the Alameda Creek Flood Control Channel (ACFCC).

Tributaries

The tidal sloughs located within the Eden Landing pond complex are the ACFCC, Old Alameda Creek (OAC), Mt. Eden Creek, and North Creek. Dry Creek is a tributary to Alameda Creek, located about 6 miles upstream of its mouth and 0.5 miles upstream of the confluence of Alameda Creek with the ACFCC and OAC. Ward Creek is a tributary to OAC.

The largest of the tidal sloughs is the ACFCC (formerly known as Coyote Hills Slough). The ACFCC receives flow from Alameda Creek, which drains an area of 633 square miles of land, stretching from Mt. Diablo in the north to Mt. Hamilton in the south, and east to Altamont Pass. The 12-mile-long ACFCC is the primary flood conveyance channel for the Alameda Creek watershed. The flood protection project was constructed from the west end of Niles Canyon and extends through the City of Fremont to the Bay. The ACFCC is enclosed with levees for most of its length and is tidally influenced in the vicinity of the SBSP Restoration Project area. It was originally constructed by the USACE to provide protection from the "Standard Project Flood." The Standard Project Flood is defined as a major flood that can be expected to occur from a severe combination of meteorological and hydrological conditions that is considered reasonably characteristic of the geographical area and is equivalent to a flood flow of 52,000 cfs downstream of Dry Creek. Due to significant sedimentation, channel capacity adjacent to the salt ponds has been reduced to approximately the 100-year flood. The ACFCC is currently owned and maintained by the Alameda County Flood Control and Water Conservation District (ACFCWCD).

Before Alameda Creek was diverted into the ACFCC, it entered the Bay through OAC, located in the central portion of Eden Landing to the north of the ACFCC. OAC is a tidal slough that drains a watershed area of about 22 square miles. The creek consists of two excavated channels, lined by outside levees with an interior marshplain "island." The creek conveys urban runoff from southern Hayward and the Alvarado district of Union City. On the landward side of the salt pond complex, approximately 3.4 miles upstream of the Bay, a large gated structure has been installed to prevent tidal waters from extending further upstream. The 20-tide gate structure allows upstream runoff to enter the lower reaches but prevent tidal water from reaching upstream. The current channel capacity is estimated at the 15-year flood (4,000 cfs), although effective conveyance is reduced during high flow events due to the gated structure. All tributary inflow connections to OAC are located upstream from the tidal gates.

Mt. Eden Creek drains a small area south of State Route (SR) 92 in the City of Hayward. The slough receives flood flows from only one local pump station. The North Creek tributary connects tidal ponds in northern Eden Landing to OAC. Tidal action was restored to both North Creek marsh and Mt. Eden Creek marsh along with several miles of sloughs that connect these marshes to the Bay. These SBSP Phase 1 tidal marsh restoration actions were completed in 2011.

Sediment Characteristics

Alameda Creek can have highly episodic sediment discharge to the Bay. In the most extreme case, in water year 2003, Alameda Creek transported 76 percent of its annual sediment load in one day and 83 percent in the seven-day period during the storm and on the recession limb of the hydrograph. This one-day and seven-day load constituted 35 percent and 38 percent respectively of the total measured 11-year suspended sediment load for water years 2000 to 2010 (McKee et al 2013).

Sediment from the Alameda Creek watershed historically deposited within the Eden Landing pond complex is a mix of sand, silt, and clay. Ponds within the Eden Landing pond complex are composed of 38 percent sand, 39 percent silt, and 23 percent clay and, on average, slough channels are composed of 13 percent sand, 54 percent silt, and 33 percent clay (United States Geological Survey [USGS] 2005).

Sediment accretion allows mudflat areas and pond bottoms to increase to elevations at which marsh vegetation can establish itself. The rate of estuarine sedimentation in natural and restored marshes depends on sediment supply, settling velocities, and the period of marsh inundation. Sediments are carried into a marsh and deposited during flood tides as currents slacken. The rate of sedimentation decreases as mudflats and marsh plains rise in elevation and the period of tidal inundation decreases. Colonizing vegetation on accreting mudflats increases the rate of sedimentation by enhancing sediment trapping and contributing organic material to the sediment. Sediment deposits consolidate over time and can reduce the rate of net accretion.

Pond bottoms in the Eden Landing pond complex are currently at relatively high topographic elevations compared with the Bay. The sediment accretion rate in the Eden Landing ponds are expected to be lower than sedimentation rates measured near the recent breaches in the Alviso pond complex in the far South Bay, which have been in the range of 0.4 to 8 inches per year (Borgnis et al. 2013).

Flood Hazards

The Eden Landing pond complex is exposed to wind wave action due to westerly and northwesterly winds crossing the Bay. Consequently, the outboard levees and exposed tidal marshes are prone to erosion and potential flooding. However, flood studies completed by the USACE in the 1980s found little risk of coastal flood damage in the vicinity of the Eden Landing pond complex due to the lack of adjacent development and the presumption that the levees would be maintained to facilitate salt production (USACE 1988).

The southern Eden Landing ponds lie within the Alameda Creek watershed. ACFCWCD has jurisdiction over the watershed and all drainage ways leading to the Eden Landing pond complex. FEMA has published flood study results for the tributaries to Eden Landing in the community specific Flood Insurance Studies. These studies provide fluvial flood event discharges for various recurrence intervals. The FEMA-designated 100-year floodplain extends landwards from the southern Eden Landing ponds to the Union Sanitary District (USD) Wastewater Treatment Plant and to some industrial and residential developments. Additional areas near the ACFCC and along Ward Creek (a tributary to OAC) are also within the FEMA-designated 100-year floodplain and can be affected by fluvial flows.

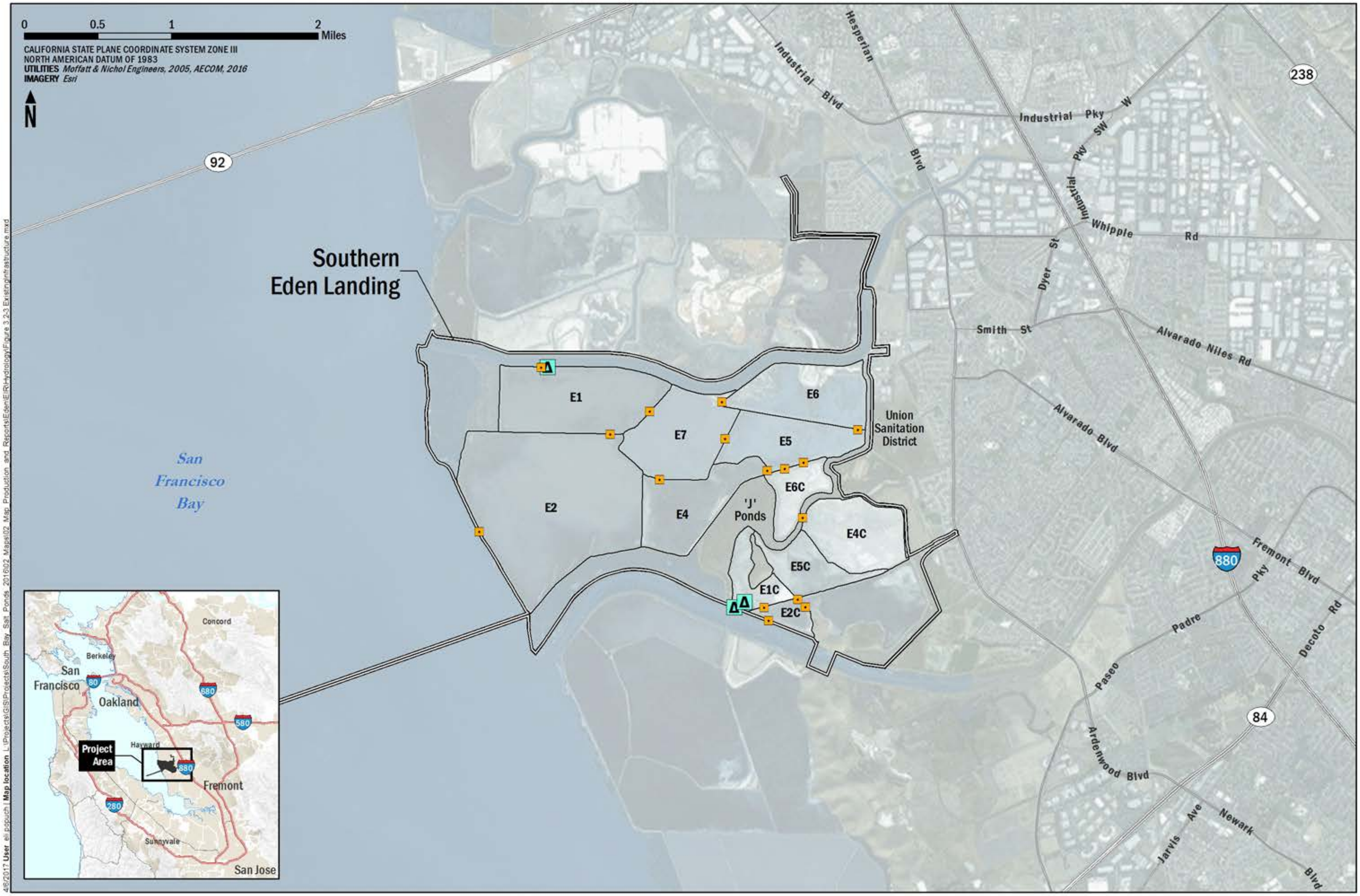
Eden Landing Phase 2 Ponds

Eden Landing Phase 2 actions consist of modifications to the entire southern half of the Eden Landing pond complex. At southern Eden Landing, there are 11 ponds that this document describes as being in three groups: the Bay Ponds, the Inland Ponds, and the Southern (or C-) Ponds. Existing infrastructure at these ponds are shown in Figure 3.2-3.

In general, water enters ponds directly from the Bay on high tides or through hydrologically linked sloughs, flows to one or more ponds through water control structure(s), and discharges at low tide. The ponds discharge at tide stages lower than pond water elevations. Discharge occurs for approximately 13 to16 hours per day (based on predicted tides and spring or neap tide cycle variation). Pond intake of Bay/slough water occurs at elevations above pond water levels (CDFW 2015).

Bay Ponds

The Bay Ponds (Ponds E1, E2, E4, and E7) are located on the south central portion of Eden Landing. The Bay Ponds are the four large ponds located closest to the Bay, bordered to the north by the OAC, and bordered to the south by Alameda County-owned wetlands and the ACFCC. Ponds E2 and E4 are connected to each other with two large breaches and a deteriorating levee while the other ponds are separated with intact levees and water control structures. The Bay Ponds are relatively large, 1,394 acres in size, and includes Ponds E1 (299 acres), E2 (687 acres), E4 (192 acres) and E7 (222 acres). The average bottom elevation of these ponds is about 4.5 feet (NAVD88).



LEGEND

- Water Control Structure
- Pump Station
- Eden Landing Phase 2 Project Area
- Southern Eden Landing Ponds

AECOM

South Bay Salt Pond Restoration Project

Figure 3.2-3

Existing Infrastructure at the Eden Landing Phase 2 Project

The Bay Ponds are currently operated as circulation ponds while maintaining discharge salinities to the Bay at less than 44 ppt (CDFW 2016). The intake pond E1 can receive water from OAC through four 48-inch gates and through a 30,000 gallon per minute (gpm) pump, although the pump is rarely used. Pond E2 discharges water to the Bay through two 48-inch gates.

Summer operations circulate flow through Pond E1 to Pond E2, while Ponds E7 and E4 are allowed to draw down. During the summer season, water is also transferred periodically from the Bay Ponds to the Inland Ponds to replace water lost from the Inland Ponds due to evaporation. Limited amounts of flow move from Pond E1 to E7 to E6 to E5 to E4 and finally to E2. Daily inflows through the tide gates at Pond E1 average 55 cfs.

During the winter, the Bay Ponds are used to circulate water through the Inland Ponds. Inflow from Pond E1 circulates through Ponds E7, E6, E5, E6C, and E4 to the discharge at Pond E2. Water from Pond E1 is diverted to Pond E7 to circulate through Ponds E6 and E5 (and E6C) to reduce salinity in those ponds. The higher salinity water in Ponds E6 and E5 (and E6C) is then recirculated and mixed in Pond E4 and discharged through Pond E2 to the Bay. The estimated average total winter circulation inflow is approximately 8 cfs. The winter operation period is normally November through April.

The existing outboard salt pond levee at Pond E2 provides some measure of de facto flood risk management to inland areas. The bayward-facing levee protects against high surface water elevations and waves. The bayward ponds provide storage and dissipate residual wave energy. Internal levees separate the individual salt ponds from each other. If the bayward ponds fill due to an unexpected breach, the internal salt pond levees then provide some level of flood risk management from high water levels and waves.

Inland Ponds

The Inland Ponds (Ponds E5, E6, and E6C) are somewhat smaller ponds located in the eastern portion of the pond complex. They are bordered to the north by OAC, to the east by Cargill owned property and by the USD wastewater treatment plant, and to the south by an Alameda County-owned freshwater outflow channel and diked marsh areas known as the “J-Ponds.” Discharge pipes from the wastewater treatment plant run below the northeast corner of Pond E6. The Inland Ponds include Ponds E6 (202 acres), E5 (169 acres), E6C (85 acres). The average bottom elevation of these ponds is about 4.8 feet (NAVD88).

CDFW operates Ponds E6, E5, and E6C as batch ponds. This means that Ponds E6, E5, and E6C have low salinity in the spring and CDFW allows for evaporation to increase salinity during the summer months, similar to seasonal ponds. During the summer, these ponds are either allowed to draw down and dry, or are managed for mostly open water conditions with higher salinity (40 to 120 ppt) and no circulation flow. In the winter, the ponds are operated to have continuous circulation with low volume discharges to maintain higher water levels.

There is a section of higher ground on the landward side of the Pond E6 (*i.e.*, near the USD Wastewater Treatment Plant), but ACFCWCD’s detention basin located east of the Inland Ponds is only partially protected by levees. The detention basin would inundate from the adjacent slough and from surrounding areas during flood events. Residential areas to the east are generally on higher ground.

Southern Ponds

The Southern Ponds (Ponds E1C, E2C, E4C, and E5C, which are sometimes referred to as the C- Ponds) are in the southeastern portion of the Eden Landing pond complex. They are separated from the Inland

Ponds and the Bay Ponds by the J-Ponds. The Southern Ponds include E4C (181 acres), E5C (102 acres), E1C (72 acres), and E2C (37 acres). Cargill Pond CP3C is not part of the Eden Landing Ecological Reserve (ELER, or Reserve) (i.e., it is not owned by CDFW), but is hydrologically linked to Pond E2C and by agreement with Cargill is operated as part of the Southern Ponds system. The average bottom elevation of these ponds is about 5.0 feet (NAVD88).

Ponds E1C, E4C, and E5C are seasonal ponds with open water in the winter, shallow water conditions in the fall and spring, and mostly dry conditions during the summer. Ponds E1C, E4C, and E5C are periodically filled from Pond E2C during the spring through fall and are operated as open water ponds in winter with water levels approximately 1-foot deep. These ponds can have increased salinity due to the high surface area and shallow water, which is then diluted prior to discharge via mixing in Pond E2C.

Ponds E2C and CP3C are operated as a separate continuous circulation system. CP3C's bottom is generally open water, while E2C's bottom is exposed during neap tides, though it remains wetted. The estimated circulation flow at Pond E2C is 26 cfs (daily average) during the summer and approximately 2 cfs during the winter.

Landward of the Pond E4C is an area of high ground, where a capped landfill is located on a private parcel. Residential areas to the east are also generally on higher ground.

3.2.2 Regulatory Setting

This section provides a description of the implementing agencies involved in flood management in the Eden Landing Phase 2 area and a brief summary of the regulatory setting: the primary laws and regulations related to flood management, hydrodynamics, and sediment transport in the region.

Flood Management Implementing Agencies

Flood risk assessments and some flood-protection projects are conducted by federal agencies, including FEMA and USACE. The flood management agencies and cities implement the National Flood Insurance Program under the jurisdiction of FEMA and its Flood Insurance Administration. The FEMA-designated flood risk assigned to geographic areas along the Bay is illustrated on Flood Insurance Rate Maps (FIRMs). FEMA FIRMs show base flood elevations (which include predicted water surface elevations landward of shoreline and river barrier crests for the design event) and special flood hazard zones.

USACE also conducts studies on flood hazards and participates in flood management projects in which they have regulatory jurisdiction, as stated in Section 10 of the Rivers and Harbors Appropriation Act of 1899 (often simply referred to as the Rivers and Harbors Act or RHA). All significant USACE construction projects are subject to authorization by Congress pursuant to the Water Resources Development Act. Additionally, USACE is given authority to pursue projects in which Congress has determined a federal interest in joint flood protection/ ecosystem restoration (Executive Order 11988). USACE has developed principles and guidelines for designing and constructing flood-protection measures for coastal, estuarine, and river environments. USACE also has previously conducted studies on flood hazards and risks as part of the original San Francisco Bay Shoreline Study (USACE 1988, 1989, 1992).

Other agencies responsible for flood management include the local flood control districts and city public works departments. The local flood control districts have local jurisdiction for the development of flood-protection projects. The flood control districts' authority is derived from enabling legislation passed by the State of California. In the Eden Landing pond complex, the relevant flood control district is ACFCWCD. Local flood control districts are responsible for providing flood protection to the counties and cities in their jurisdiction and are the issuing agency for encroachment permits for storm drain outfalls into flood-protection channels.

Laws and Regulations

The SBSP Restoration Project falls under the jurisdiction of many federal, state, and local agencies with respect to specific aspects of planning, restoration, and management. The following section summarizes the primary laws and regulations affecting flood management, hydrodynamics, and sediment transport within the Eden Landing Phase 2 area.

Federal Regulations

Federal Clean Water Act. Section 404 of the Clean Water Act (CWA) regulates all activities resulting in the discharge of dredged or fill material into waters of the United States, which includes wetlands. Section 404 gives USACE the principal authority to regulate discharges of dredged or fill material, under oversight by the United States Environmental Protection Agency (USEPA). While the USACE is given authority to issue permits allowing such discharges, the USEPA is given the authority to veto permit decisions.

Rivers and Harbors Act. The RHA prohibits the unauthorized alternation or obstruction of any navigable waters of the United States. As defined by the RHA, navigable waters include all waters that are:

- Historically, presently, or potentially used for interstate or foreign commerce; and
- Subject to the ebb and flow of tides.

Regulations implementing Section 10 of the RHA are coordinated with regulations implementing CWA Section 404. The RHA specifically regulates construction of structures in, under, or over navigable waters; deposition or excavation of material in navigable waters; and all work affecting the location, condition, course, or capacity of navigable waters.

The RHA is administered by the USACE. If a proposed activity falls under the authority of RHA Section 10 and CWA Section 404, the USACE processes and issues a single permit. For activities regulated only under RHA Section 10, such as installation of a structure not requiring fill, permit conditions that protect water quality during construction may be identified in a letter of permission. A letter of permission is a type of individual permit issued by the USACE, through an abbreviated processing procedure, for certain activities subject to RHA Section 10.

Coastal Zone Management Act. The Coastal Zone Management Act of 1972 requires that federal actions be consistent with state coastal plans. The San Francisco Bay Conservation and Development Commission (BCDC) Bay Plan is approved under the Coastal Zone Management Act. To implement this provision, federal agencies make "consistency determinations" on their proposed activities, and applicants for federal permits, licenses, other authorization, or federal financial assistance make "consistency certifications." BCDC then has the opportunity to review the consistency determinations and certifications and to either concur with them or object to them.

Executive Order 11988–Floodplain Management. Executive Order 11988 requires federal agencies to recognize the values of floodplains and to consider the public benefits from restoring and preserving floodplains. Under this order, the USACE is required to take action and provide leadership to avoid development in the base floodplain; reduce the risk and hazard associated with floods; minimize the impact of floods on human health, welfare, and safety; and restore and preserve the beneficial and natural values of the base floodplain.

National Flood Insurance Acts. The National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973 were enacted to reduce the need for flood-protection structures and to limit disaster-relief costs by restricting development on floodplains. FEMA was created in 1979 to administer the National Flood Insurance Program and to develop standards for fluvial and coastal floodplain delineation.

State Regulations

Public Trust Doctrine. Public lands under the jurisdiction of the California State Lands Commission (CSLC) include fee lands owned by the State and easement interests in lands which are held in public trust. The CSLC has jurisdiction and management authority over all ungranted tidelands (*e.g.*, tidal sloughs), submerged lands, and the beds of navigable lakes and waterways. On tidal waterways, the State's sovereign fee ownership extends landward to the high tide line, except where there has been fill or artificial accretions or the boundary has been fixed by agreement or court decision. Use of public trust lands is generally limited to water dependent or related uses, including commerce, fisheries, and navigation, environmental preservation, and recreation. Public trust lands may also be kept in their natural state for habitat, wildlife refuges, scientific study, or use as open space.

McAteer-Petris Act. The McAteer-Petris Act of 1965 established the BCDC as a temporary state agency in charge of preparing the Bay Plan. In 1969, the act was amended to make the BCDC a permanent agency and to incorporate the policies of the Bay Plan into state law. Under the McAteer-Petris Act and the Bay Plan, any agency or individual proposing to place fill in, to extract materials from, or to substantially change the use of any water, land, or structure in BCDC's jurisdiction is required to secure a San Francisco Bay Permit. BCDC grants San Francisco Bay permits for projects that meet either of the following guidelines:

- The project is necessary to the safety, welfare, or health of the public in the entire Bay Area; or
- The project is consistent with the provisions of the implementing regulations and the Bay Plan.

The types of San Francisco Bay permits include region-wide, administrative, and major permits. The type of permit issued depends on the nature and scope of the proposed activities.

California Water Code. The California Water Code ensures that the water resources of California are put to beneficial use to the fullest extent of which they are capable and that the conservation of water is exercised in the interest of the people and for the public's welfare. All projects in California must abide by Division 5 of the California Water Code, which sets the provisions for flood control. The California Water Code includes a number of provisions that pertain to local and state flood management and flood protection. Section 8100 et seq. of the code contains guidelines for the construction of public works and improvements, including the protection and restoration of watersheds, levees or check dams to prevent overflow or flooding, conservation of the floodwaters, and the effects of construction projects on adjacent counties (especially upstream and downstream along a river). Section 12840 et seq. of the code contains provisions related to flood-prevention projects.

California Fish and Game Code Sections 1600 to 1616. In accordance with Sections 1601 to 1607 of the California Fish and Game Code, the CDFW regulates projects that affect the channel, flow, or banks of rivers, lakes, or streams. Section 1602 requires public agencies and private individuals to notify and enter into a streambed or lake alteration agreement with the CDFW before beginning construction that would:

- Substantially divert or obstruct the natural flow of any river, stream or lake;
- Substantially change or use any material from the bed, channel or bank of any river, stream, or lake; or
- Deposit debris, waste or other materials that could pass into any river, stream or lake.

Sections 1600 to 1616 may apply to any work undertaken within the 100-year floodplain of a body of water or its tributaries, including intermittent stream channels. In general, these sections are construed as applying to work within the active floodplain and/or associated riparian habitat of a stream, wash, or lake that provides benefits to wildlife and fish. Sections 1600 to 1616 typically do not apply to drainages that lack defined beds and banks, such as swales, or to very small bodies of water and wetlands. Lake or streambed alteration agreements may impose conditions to protect water quality during construction.

Local Regulations

Alameda County Flood Control and Water Conservation District Act. The Alameda County Flood Control and Water Conservation District Act created ACFCWCD in order to:

- Provide for control of flood and storm waters of the district and of streams which flow into the district;
- Conserve waters for beneficial and useful purposes by spreading, storing, retaining and causing the waters to percolate into the soil within or without the district, or to save or conserve the waters in any manner and protect the watercourses, watersheds, harbors, public highways, life and property in the district from such waters;
- Prevent waste of water or diminution of the supply in, or exportation from, the district;
- To obtain, retain and reclaim drainage, storm, flood and other waters for beneficial use in the district;
- To engage in incidental recreation activities; and
- Control and distribute any water including sewage water, and to acquire and operate facilities for collection and disposal of sewage, waste, and storm water.

The ACFCWCD Land Development Division reviews design documents and issues permits for developments that may disturb watercourses. Where appropriate, permits issued for development may require mitigation for disturbances.

3.2.3 Environmental Impacts and Mitigation Measures

Overview

This section describes environmental impacts and mitigation measures related to hydrology, flood management, and infrastructure. It includes a discussion of the criteria used to determine the significance of impacts. Potential impacts were characterized by evaluating direct, indirect, short-term (temporary), and long-term effects. Impact evaluations for the Action Alternatives are assessed based on hydrodynamic modeling of the southern Eden Landing ponds (provided in Attachment 1, Southern Eden Landing Restoration Preliminary Design: 1D and 2D Hydrodynamic Modeling, of Appendix D, Southern Eden Landing Preliminary Design Memorandum), the existing conditions described in Section 3.2.2 above, and the anticipated future conditions that would occur under the No Action Alternative. This approach is consistent with the California Environmental Quality Act (CEQA), which requires that project impacts be evaluated against existing conditions. This approach is also consistent with the National Environmental Policy Act (NEPA), where Action Alternatives are compared to the No Action Alternative and an environmental baseline for comparison that can be either the existing conditions or the future no-action conditions.[3] In this case, the No Action Alternative represents no change from current management direction or level of management intensity provided in the Adaptive Management Plan (AMP) and other Reserve management documents and practices.

Significance Criteria

Hydrology and flood risk were assessed by comparing expected conditions in the future under each alternative against the baseline conditions. For the purposes of this Draft EIS/R, the project is considered to have adverse impacts on hydrology or flooding if it would:

- Increase the risk of flooding that could cause injury, death, or substantial property loss;
- Alter existing drainage patterns in a manner which would result in substantial erosion or siltation on- or off-site;
- Create a safety hazard for people boating in the project area;
- Result in inundation by a seiche, tsunami, or mudflow;
- Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems; or
- Place structures within the 100-year-flood hazard area that would impede or redirect flood flows.

The SBSP Restoration Project, Eden Landing Phase 2 alternatives would not create or contribute runoff. This criteria is intended for evaluation of urban land uses and does not apply to the proposed project’s Eden Landing Phase 2 actions.

As explained in Section 3.1.2, while both Council on Environmental Quality (CEQ) Regulations for Implementing NEPA and the CEQA Guidelines were considered during the impact analysis, impacts identified in this Draft EIS/R are generally characterized using CEQA terminology. Please refer to Section 3.1.2 for a description of the terminology used to explain the severity of the impacts. For the purpose of this NEPA/CEQA impact assessment, the thresholds of significance are applied to changes from baseline conditions that result from factors within the control of the project proponents. Also note that the impacts and the thresholds of significance in this Draft EIS/R are similar to those evaluated in the 2007 Final EIS/R with an additional discussion of structures placed within the 100-year flood hazard area.

[3] More discussion of this topic is presented in Section 3.1 of this Draft EIS/R.

Program-Level Evaluation Summary

Three programmatic-level alternatives were considered and evaluated in the 2007 Final EIS/R. This included Programmatic Alternative A – the No Action Alternative, Programmatic Alternative B – the Managed Pond Emphasis, and Programmatic Alternative C – the Tidal Habitat Emphasis. At the program level, the decision was made to select Programmatic Alternative C and implement Phase 1 actions. Therefore, a summary of the impacts for Programmatic Alternative C from the 2007 Final EIS/R is provided below.

The determination was made in the 2007 Final EIS/R that Programmatic Alternative C would result in less than significant impacts for the following:

- Coastal flood risk landward of the area of the SBSP Restoration Project;
- Fluvial flood risk;
- Levee erosion along channel banks downstream of tidal breaches; and
- Potential interference with navigation.

Impacts from coastal flood risk due to regional changes in Bay bathymetry and hydrodynamics were considered potentially significant in areas outside the SBSP Restoration Project if levees were not adequately maintained.

Under Programmatic Alternative C, the Tidal Habitat Emphasis, implementation of the AMP would maintain or improve levels of coastal and fluvial flood protection[4] landward of the area of the SBSP Restoration Project. For example, salt pond levees would be inspected and regularly maintained and levees would be improved (e.g., raise, widen, or armor the levee) as needed, in accordance with the AMP. Programmatic Alternative C would also be designed such that levees downstream of breaches are either no longer required for flood protection, are adequately maintained, or are protected from erosion (e.g., by a band of marsh between the levee and the channel, setting the levee back from the eroding channel, or by armoring the levee). Therefore, the widening and deepening of sloughs would not substantially affect nearby flood control projects.

Project-Level Evaluation

Phase 2 Impact 3.2-1: Increased risk of flooding that could cause injury, death, or substantial property loss.

Alternative Eden A (No Action). The existing levees within the SBSP Restoration Project area were originally built to create ponds for commercial salt production. The pond levees were not constructed to provide flood protection, and were not engineered to conform to flood or other engineering standards. The levees and the salt ponds themselves, however, provide partial protection from coastal flooding as they are a barrier to waves and high tides from the Bay. The ponds also provide storage of water due to wave-

[4] The 2007 Final EIS/R and other SBSP Restoration Project documents used the term “flood protection” to describe its goals, but the conventional terminology has since changed to be “flood risk management”. Not only can this distinguish improvements to existing berm-like salt pond levees from engineered levees specifically designed for flood protection, but it also reflects a general shift in terminology used by our partner organizations. This document generally uses the former term to refer to overall Project goals that were established prior to this terminology change but uses the latter term for forward-looking statements and actions that would be taken in the future.

induced overtopping of bayfront levees. Salt pond levees need to be actively maintained to provide this partial flood risk management.

Under Alternative Eden A (No Action), no new activities would be implemented as part of Phase 2. The CDFW is maintaining the ponds at southern Eden Landing as part of the Reserve in accordance with the AMP and other Reserve management documents and practices. The ponds are currently managed as either seasonal ponds or circulation ponds to provide a variety of water depths during summer and winter seasons and for the current water quality management which involves circulating water, as needed, to control pond discharge salinity. These southern Eden Landing ponds would continue to be managed through the activities described in the AMP, and in accordance with CDFW practices.

The outboard salt pond levee at Pond E2 (the bayward-facing levee) would continue to provide partial coastal flood risk management from high water surface elevations and from waves. The outboard salt pond levee would be repaired, as needed, if there was an unexpected breach. The mudflats and fringing marsh near Pond E1 would continue to dissipate wave energy, causing fewer waves from the Bay to be transmitted shoreward.

Under the No Action Alternative, it is assumed that levees would be maintained and unanticipated breaches in the Eden Landing complex ponds would be repaired to maintain current levels of de facto flood risk management. Adaptive management would also be used to actively monitor and assess existing flood-protection measures. Therefore, effects to coastal and fluvial flood risk would be minimal, and impacts would be less than significant.

Alternative Eden A Level of Significance: Less than Significant

Alternative Eden B. Under Alternative Eden B, pond bottom elevations would be raised and tidal inundation would be introduced to the Bay and Inland Ponds. Minor levee improvements would occur at the Bay and Inland Ponds prior to placement of dredge materials (i.e., low-lying levees would be raised to 10 feet NAVD88 and some of the higher levees would be lowered). After placement of the dredge materials, levees along the northern margins of Ponds E1 and E6 would be breached to OAC and the levee on the southern edge of Pond E2 would be breached to the Alameda County wetlands, which in turn would be connected to the ACFCC via a water control structure (more detail on this below). Pilot channels would be excavated to connect these breaches to the rest of the Bay and Inland Ponds. Portions of the outer levees around the Bay Ponds would be lowered to MHHW (7 feet NAVD88) to provide more frequent levee overtopping, and internal levees would be breached to increase the hydraulic connectivity between channels and marshes, alter circulation and sedimentation patterns, and increase habitat complexity. Levee materials would be used locally to improve the landside levees (discussed below) or for habitat islands. Alternative Eden B also includes construction of four water control structures to manage flows from the ACFCC into the Bay Ponds and Southern Ponds. One of these would provide the aforementioned southern connection into the Bay Ponds; this is for fish habitat connectivity and, depending on gate operations, would provide a minor contribution to the filling and draining of the ponds. The other water control structures would allow muted tidal flows to the Southern Ponds.

Under Alternative Eden B, the Bay, Inland, and Southern Ponds would fill and drain on a daily basis. Without placement of dredge materials, the Bay Ponds and Inland Ponds would initially fill to water surface elevations between 5.0 and 5.6 feet NAVD88, inundating the majority of the pond bottoms during the highest tides. During the peak of the spring tide (the highest tide in a 2-week cycle), the ponds may not completely drain, and water could be ponded for several days. When these peak tides recede, the ponds would drain more fully. With placement of dredge materials, the Bay Ponds and Inland Ponds would fill with the highest tides of the day and drain during low tide.

The Southern Ponds would have muted tidal flow because of the water control structures. These ponds would initially fill to water surface elevations between 5.8 and 6.3 feet NAVD88, which would inundate most of the pond bottoms during the highest tides, except for Pond E4C where a large portion of the pond would remain dry. Low-flow channels and portions of Pond E2C are not expected to completely drain during even with the lowest tides.

Tidal scour is expected to widen and deepen OAC in the area between the levee breaches and the Bay until equilibrium conditions are met. Similarly, some scouring could occur in the ACFCC, between the water control structures and the Bay, due to the increased tidal prism; however, the effects to ACFCC are expected to be minor because of the relatively large capacity in the flood control channel.

Alternative Eden B includes raising the existing backside levees along the eastern edge of the Inland and Southern Ponds to an elevation of 12 feet NAVD88 (in particular, Ponds E6, E5, E6C, E4C, E5C, and E2C). In addition to these flood risk management measures, levees at Ponds E1C and E6C would also be raised for habitat separation and to extend the Bay Trail through Eden Landing. Other levee improvements would be made between Pond E1C and Pond E5C to provide Cargill access to Turk Island.

With the exception of the pilot channel through the Alameda County wetlands connecting the water control structure on the ACFCC to the levee breach on Pond E2, the existing hydraulic connections between the Alameda County wetlands, the J-Ponds, and the ACFCWCD’s detention basin would be unchanged. Currently stormwater temporarily detained in the J-Ponds is pumped out, as these ponds do not drain to the Bay. There is a small levee separating the J-Ponds from the County wetlands. The County wetlands are also at a higher elevation than the J-Ponds.

With implementation of Alternative Eden B, levee breaches would allow tidal inundation in the Bay and Inland ponds and water control structures would provide muted tidal flows in the Southern Ponds. Because of these changes, the backside levees of the Inland Ponds and Southern Ponds would be subject to tidal flows with additional erosive forces. However, these backside levees would be raised and enhanced such that the current level of flood risk management would be improved or maintained.

Water from the Bay, Inland, and Southern Ponds would cause the tidal prism to change in OAC and in the ACFCC. Water that drains from the ponds into the channels on the ebb tide could delay fluvial flood flows in these channels from reaching the Bay. If flow in the channel is constrained, this would cause short-term effects on upstream fluvial flood conditions. However, breaching the Bay and Inland Ponds and increasing tidal flows in the Southern Ponds would improve hydraulic connectivity and cause tidal scouring in these channel. This would improve tidal drainage and provide additional fluvial discharge capacity. Lowering portions of the outer levees around the Bay Ponds would also allow fluvial flows that enter into the ponds to pass through the ponds and over the lowered sections to the Bay when tides are high. This would also improve drainage conditions during large fluvial flows. Therefore, effects to upstream fluvial flood conditions are expected to be minimal.

Monitoring and adaptive management would be used to verify that the Eden Landing Phase 2 actions are performing as intended. Changes to coastal and fluvial flood risk would be minimal for the above-mentioned reasons, and therefore impacts would be less than significant.

Alternative Eden B Level of Significance: Less than Significant

Alternative Eden C. Under Alternative Eden C, pond bottom elevations would be raised and tidal inundation would be introduced to the Bay Ponds, and the Inland and Southern Ponds would become enhanced managed ponds. Minor levee improvements would occur to the Bay Ponds prior to placement of dredge materials. When dredge material placement is complete, the northern levee at Pond E1 would be breached to OAC, the southern levee at Pond E4 would be breached to the Alameda County wetlands, and internal levees would also be breached. Portions of the outer levees around the Bay Ponds in areas away from the bayfront would be lowered to MHHW (7 feet NAVD88) and pilot channels would be excavated into the Bay Ponds to improve drainage and enhance tidal marsh formation. Water control structures would be installed in the Inland Ponds and Southern Ponds to manage water quality, depth, salinity, and other aspects of habitat for certain species, including those at the boundaries with OAC, the ACFCC, the J-Ponds, and the Alameda County wetlands.

Alternative Eden C would have its primary source of coastal flood risk management maintained by an improved mid-complex levee system raised to an elevation of 12 feet NAVD88. The mid-complex levee would be constructed to separate the Inland Ponds and Southern Ponds from the tidal flows introduced to the Bay Ponds. It would also prevent the tidal flows from the Alameda County wetlands from entering into the Inland Ponds or Southern Ponds. In addition to these flood risk management measures (which also allow the necessary habitat separation), the bay-facing levee at Pond E2 would also be raised to an elevation of 12 feet NAVD88, where needed, for the purpose of habitat restoration. This levee is currently between 12 and 14 feet NAVD88 for almost all of its length, and therefore improvements to this levee are expected to be minor.

Phase 2 improvements would affect coastal and fluvial flooding in a manner similar to improvements under Alternative Eden B. The Bay Ponds would not provide coastal flood risk management to landward areas from high water levels because levees would be breached, but they would continue to provide some level of protection from waves. Tidal flow in OAC would increase, and to a lesser extent, tidal flow in the ACFCC could also increase (depending on water control structure operations at the Alameda County wetlands). Breaching the Bay Ponds would improve hydraulic connectivity and may cause tidal scouring in these channels, improving tidal drainage, and providing additional fluvial discharge capacity.

Monitoring and adaptive management would be used to verify that the Phase 2 actions are performing as intended. Changes to coastal and fluvial flood risk would be minimal, and therefore impacts on coastal and fluvial flooding would be less than significant.

Alternative Eden C Level of Significance: Less than Significant

Alternative Eden D. Under Alternative Eden D, pond bottom elevations would be raised in the Bay and Inland Ponds, tidal flows would be introduced to the Bay Ponds, and the Inland Ponds and the Southern Ponds would remain as managed ponds until tidal or muted tidal flow is introduced at some future point. Minor levee improvements would occur to the Bay and Inland Ponds prior to placement of dredge materials. The northern levee at Pond E1 would be breached to OAC, portions of the outer levees around the Bay Ponds would be lowered, and internal levees within the Bay Ponds would be breached. Water control structures would be constructed in the Inland Ponds and Southern Ponds to manage water quality, depth, salinity, and habitat. Pilot channels would be excavated in the Bay, Inland, and Southern Ponds to improve circulation or drainage, and in the case of the Bay Ponds, to enhance tidal marsh formation.

Alternative Eden D would construct a temporary mid-complex levee separating the Bay Ponds from the Inland Ponds, extending across the J-Ponds and the western end of the Southern Ponds to the ACFCC.

The mid-complex levee would allow the tidal marsh habitat in the Bay Ponds and the enhanced managed ponds in the Inland Ponds and Southern Ponds to be separately restored and managed. The levees on the landward side of the Inland Ponds and Southern Ponds would also be improved by raising levee elevations to 12 feet NAVD88. The landward levee would provide coastal flood risk management if, and when, tidal or muted tidal flows are introduced to the Inland Ponds and Southern Ponds. The combined effect of the temporary mid-complex levee and the improved backside levee would provide equal or better flood risk management, as compared to existing conditions.

With pond bottom elevations raised due to the placement of dredge materials, tidal marsh habitat is expected to develop in the Bay Ponds relatively quickly. Since mudflats and fringing marsh serve to dissipate wave energy, development of mudflats in the Bay Ponds would cause less wave energy from the Bay to be transmitted shoreward and would potentially decrease rates of erosion on landward levees. Decreased erosion may reduce the need for frequent levee maintenance by those entities responsible for maintaining these levees. Tidal or muted tidal flow would be introduced to the Inland and Southern Ponds at some future point. Tidal marsh habitat is also expected to develop relatively quickly after introduction of tidal flows to the Inland and Southern Ponds because pond bottom elevations would be relatively high due, in part, to placement of dredge materials in the Inland Ponds.

Phase 2 improvements would affect coastal and fluvial flooding in a manner similar to improvements under Alternative Eden B. Breaching the Bay Ponds would improve hydraulic connectivity and cause tidal scouring in OAC. This would improve tidal drainage and provide additional fluvial discharge capacity. Monitoring and adaptive management would be used to verify that Phase 2 actions are performing as intended. Changes to coastal and fluvial flood risk would be minimal for the above-mentioned reasons, and therefore impacts on coastal and fluvial flooding would be less than significant.

Alternative Eden D Level of Significance: Less than Significant

Phase 2 Impact 3.2-2: Alter existing drainage patterns in a manner which would result in substantial erosion or siltation on- or off-site.

Alternative Eden A (No Action). Under Alternative Eden A (No Action), existing pond operations and drainage patterns would be maintained. The ponds would continue to be managed as seasonal ponds or for limited circulation through gated control structures. Because the flows are limited, the potential for erosion from circulating water within the ponds and for sediment accretion within the ponds is minimal. Impacts would be less than significant.

Alternative Eden A Level of Significance: Less than Significant

Alternative Eden B. Under Alternative Eden B, pond elevations would be raised in the Bay and Island Ponds and some of the dredge material placement infrastructure, including the offloading facility and submerged pipelines, would be placed on mudflats or in open waters of the Bay. Although tidal inundation patterns would not change during project construction, the piles securing the offloading facility and the precast concrete pipe weights securing the submerged pipelines could cause minor amounts of localized erosion. Once dredge material placement is complete, the Bay Ponds and Inland Ponds would be breached to tidal flows; therefore, existing drainage patterns within the ponds and tidal flows in adjacent sloughs and channels would be altered. Water control structures would also be constructed in the Southern Ponds, allowing increased muted tidal flow with regular filling and draining. Tidal scour would widen pond breaches, and widen and deepen adjacent sloughs, until equilibrium conditions are met. Sediment from the incoming tide would settle out within the ponds as they fill and drain. Additional marsh channels would form near the breaches, allowing the ponds to drain faster. Vegetation would become established at high pond elevations, stabilizing sediments and increasing habitat complexity. Widening and deepening OAC and increasing scour in the ACFCC could increase erosion at the adjacent levees. These effects would be monitored through the AMP, and corrective actions could be implemented if downstream levees do not meet performance standards.

Breaching Ponds E1 and E6 would increase sediment accretion in the Bay Ponds and Inland Ponds. (Accretion rates are expected to be lower if pond bottom elevations were raised to 6.5 feet NAVD88, the same elevation as mean higher water [MHW]). Muted tidal flows through water control structures at the Southern Ponds could also increase sediment accretion rates. The increased sediment demand would be met by inflow from local tributaries, sediment influx from the Bay, or from nearby sediment deposits in sloughs, channels, mudflats, or marshes. In the South Bay, suspended sediment loads from local drainages are likely to deposit in slough and channels or pass through to the Bay margin where it could be available for wetland maintenance or restoration (Barnard et al. 2013). If naturally supplied sediment sources are exceeded, breaching the salt ponds has the potential to cause erosion in adjacent mudflats. However, ongoing monitoring of mudflats near breaches made as part of Phase 1 and the Initial Stewardship Plan has not detected increases in erosion in nearby mudflats.

The South Bay has experienced net accretion for several decades with deposition occurring in the deepest channels of the Bay (Jaffe and Foxgrover 2006). Strong winds cause significant wave generation, sediment resuspension, and basin-wide circulation. Bottom currents are seasonally reversing and non-tidal surface currents are generated by prevailing summer and winter storm winds and winter freshwater inflows. Sediment concentrations in South Bay are generally higher during flood tides as wind waves resuspend sediments, particularly when the westerly and northwesterly winds occur in the summer and fall. This results in a net sediment flux toward the southeast. Sediment concentrations in sloughs and channels peak during the lowest spring tides, when turbid water occurs at the shoals (Barnard et al. 2013).

In order to meet the sediment deficit without scouring mudflats, SBSP restoration efforts (as a whole) would either be phased over time to match sediment demands with the rate at which sediment naturally enters the South Bay, or ponds would be partially filled with clean dredged sediments and/or upland material. Alternative Eden B includes the option of raising pond bottom elevations through the import of dredge material during the construction phase of the project. The dredge material would be deposited in a slurry and sediments would have the opportunity to settle. After water from the slurry is decanted, sediments are more likely to become consolidated and remain in place when tidal flows are introduced to the Bay Ponds and Inland Ponds. Areas near the external levee breaches would scour, but sediments deposited within the deep interior of the ponds are likely to remain. If the sediments are not cohesive or do not have the opportunity to consolidate, additional sediment would be scoured from the ponds with the initial outgoing tides. This sediment would likely remain in the South Bay, move back and forth through the breached levee with the tides, and over time, be reworked and redeposited in the ponds or nearby mudflats.

Sediment demand in the Bay Ponds and Inland Ponds is not expected to exceed the rate at which sediment naturally enters the Bay because the size of the ponds is small compared to the size of the South Bay and because concurrent, nearby tidal marsh restoration efforts are limited. Effects to neighboring mudflats would be monitored through the AMP, and corrective actions would be implemented if performance metrics are not met (i.e., phasing future tidal restoration within the project vicinity or importing fill material during the tidal restoration efforts). Therefore, impacts from erosion and accretion due to changes in existing drainage patterns would be less than significant.

Alternative Eden B Level of Significance: Less than Significant

Alternative Eden C. Under Alternative Eden C, pond elevations in the Bay Ponds would be raised, and the Bay Ponds would be breached to OAC and to the Alameda County wetlands. Effects from tidal scour and sediment demand would be similar to the effects described above under Alternative Eden B, with the exception that the overall sediment demand from the restoration effort would be less because the Inland Ponds and Southern Ponds would remain as managed ponds. Effects to neighboring mudflats would be monitored through the AMP, with corrective actions implemented if performance standards are not met. Therefore, impacts from erosion and accretion due to changes in existing drainage patterns would be less than significant.

Alternative Eden C Level of Significance: Less than Significant

Alternative Eden D. Under Alternative Eden D, pond elevations in the Bay and Inland Ponds would be raised, the Bay Ponds would be breached to OAC and the Inland Ponds and Southern Ponds would initially remain managed ponds. Tidal or muted tidal flows would be introduced to the Inland Ponds and Southern Ponds during future restoration efforts by the removal of the water control structures and/or by leaving the structures open to allow complete filing and draining. Effects from tidal scour and sediment demand would be similar to the effects described above under Alternative Eden B, with the exception that the overall sediment demand from the restoration effort would phased over a period of decades instead of being implemented at once. Effects to neighboring mudflats would be monitored through the AMP, with corrective actions implemented if performance standards are not met. Therefore, impacts from erosion and accretion due to changes in existing drainage patterns would be less than significant.

Alternative Eden D Level of Significance: Less than Significant

Phase 2 Impact 3.2-3: Create a safety hazard for people boating in the project area.

Alternative Eden A (No Action). With the exception of the deep water channel in the center of the Bay, the project vicinity currently contains few navigable sloughs and waterways that are not actively dredged – major sloughs have silted in over a period of decades, reducing navigability. At low tide, navigation into or out of shallow sloughs can be problematic. Small craft (e.g., kayaks) are more amenable to the shallow water environments and are more likely to navigate tidal sloughs than larger watercraft.

Under Alternative Eden A (No Action), existing operations and pond circulation patterns would be maintained. Sloughs and channels adjacent to the ponds have unconsolidated sediment transported during winter storm events. These sloughs and channels would continue to be shallow, with reduced navigability, unless actively dredged. Maintaining existing management practices would not increase safety hazards for boating. Impacts would be less than significant.

Alternative Eden A Level of Significance: Less than Significant

Alternative Eden B. Under Alternative Eden B, pond bottom elevations would be raised in the Bay and Island Ponds and some of the dredge material placement infrastructure, including the offloading facility and submerged pipelines, would be placed on mudflats or in open waters of the Bay. Submerged pipelines would be anchored to the Bay floor with precast concrete pipe weights, reducing potential navigation hazards. The offloading facility and associated equipment, and the floating pipeline would contain the appropriate signage and navigation lighting as per United States Coast Guard guidelines. This would include displaying lights at night and in periods of restricted visibility on the floating pipeline. Lights would be spaced sufficiently in number to clearly show the pipeline's length and course.

The Bay and Inland Ponds would be breached to tidal flows. Unless explicitly allowed pursuant to a change of CDFW policy and a compatibility determination, navigation within the restored ponds would not be allowed. As part of the compatibility determination, the CDFW could restrict navigation according to season (e.g., no access during breeding season), by type of access (e.g., non-motorized versus motorized), or type of use (e.g., waterfowl hunting only). Water control structures would also be constructed in the Southern Ponds to allow muted tidal flow; these structures would act as physical barriers and prevent boat entry into the Southern Ponds.

Breaching levees to OAC would widen and deepen this slough. However, immediately after breaching, tidal currents through the breaches and in the slough downstream of the breaches would be stronger. High current velocities (e.g., peak values of approximately 5 to 7 feet per second [fps]) and turbulent flow may occur in the immediate vicinity of the breaches. These flows may limit safe navigation of small watercraft within the slough to certain periods of the tide cycle (e.g., near slack tide). Navigation in the immediate vicinity of the breaches could be dangerous until the channel scoured sufficiently. CDFW would restrict navigation in the vicinity of the breaches in the short term, as needed, for safety.

Due to compliance with signage and navigation lighting on construction equipment, restrictions on boating in restored ponds, and due to the creation of physical barriers to boat entry in the Southern Ponds, the Phase 2 actions would not result in significant adverse impacts to navigation. Larger channel cross-sectional areas would reduce the short-term velocity increases associated with the breaches and provide improved navigation in the long term. Therefore, impacts would be less than significant.

Alternative Eden B Level of Significance: Less than Significant

Alternative Eden C. Under Alternative Eden C, short-term potential impacts and the physical barriers and regulatory prohibitions to navigation would be similar to those discussed under Alternative Eden B. Project actions would not result in significant adverse impacts to navigation.

Alternative Eden C Level of Significance: Less than Significant

Alternative Eden D. Under Alternative Eden D, short-term potential impacts and the physical barriers and regulatory prohibitions to navigation would be similar to those discussed under Alternative Eden B. Project actions would not result in significant adverse impacts to navigation.

Alternative Eden D Level of Significance: Less than Significant

Phase 2 Impact 3.2-4: Potential effects from tsunami and/or seiche.

Alternative Eden A (No Action). Eden Landing is subject to tsunami and/or seiche events, although tsunamis in the South Bay are expected to be both very rare and very small. Under Alternative Eden A, it is assumed that levees would be maintained and unanticipated breaches in the southern Eden Landing ponds would be repaired to maintain current levels of flood risk management; however, no direct improvements would occur as part of regular maintenance that would improve levee performance during a tsunami and/or seiche.

Although unlikely, if a tsunami were to overtop a bay-facing levee, ponds and adjacent areas may be flooded and erosion of levee slopes may be accelerated. Existing warning systems would allow for evacuation of the shoreline in the event of a tsunami, so inundation by a tsunami would not expose people to potential injury or death. Therefore, impacts to the existing environmental conditions or proposed conditions of a tsunami and/or seiche would be less than significant.

Alternative Eden A Level of Significance: Less than Significant

Alternative Eden B. Under Alternative Eden B, selected perimeter levees around the Bay Ponds would be breached and lowered and these levees would be allowed to degrade over time, potentially decreasing performance during a tsunami and/or seiche. However, the backside levees of the Inland Ponds and Southern Ponds would be raised to provide increase flood risk management from these levees and this activity would also increase levee performance during a tsunami and/or seiche. The Bay Ponds and Inland Ponds would also transition to tidal marsh, over time, and the addition of habitat transition zones in the Inland Ponds would provide additional protection against tsunamis and/or seiches.

This alternative would not include construction of habitable structures. Warning systems would allow for evacuation of the shoreline in the event of a tsunami, so inundation by a tsunami would not expose people to potential injury or death. Therefore, impacts to existing or proposed conditions resulting from tsunami and/or seiche would be less than significant.

Alternative Eden B Level of Significance: Less than Significant

Alternative Eden C. Impacts resulting from Alternative Eden C would be the same as those described under Alternative Eden B, with the exception that only the Bay Ponds would be restored to tidal marsh habitat, habitat transition zones would be built in the Bay Ponds, and the mid-complex levee would provide the necessary additional flood risk management. Impacts to existing or proposed conditions resulting from tsunami and/or seiche would be less than significant.

Alternative Eden C Level of Significance: Less than Significant

Alternative Eden D. Impacts resulting from Alternative Eden D would be the same as those described under Alternative Eden B, with the exception that habitat transition zones would be built in the Bay Ponds and the mid-complex levee would provide the additional flood risk management, until marsh develops in the Bay Ponds and tidal and/or muted tidal flows are subsequently introduced to the Inland Ponds and/or Southern Ponds. Impacts to existing or proposed conditions resulting from tsunami and/or seiche would be less than significant.

Alternative Eden D Level of Significance: Less than Significant

Phase 2 Impact 3.2-5: Place structures within the 100-year-flood hazard area that would impede or redirect flood flows.

Alternative Eden A (No Action). Under Alternative Eden A (No Action), new activities would not be implemented as part of Phase 2 and new structures would not be placed in 100-year flood hazard areas that would impede or redirect flood flow. There would be no change compared to existing conditions, and therefore there would be no impacts when compared to existing conditions.

Alternative Eden A Level of Significance: No Impact

Alternative Eden B. Under Alternative Eden B, two new bridges would be constructed between the Inland and Southern ponds to extend the Bay Trail through Eden Landing. These bridges would be open to pedestrian and bicycle use but would also be driveable by maintenance or emergency vehicles. These bridges would span the connection between the J-Ponds and ACFCWCD's detention basin and would be constructed to allow for Alameda County equipment access under the bridge, if necessary. These crossings would require bridge abutments on the channel banks and may also require support piers in the water channel. These bridge components could obstruct the ability of the channel to convey peak flows by reducing its channel capacity and possibly by raising flood elevations locally.

However, these bridges would be designed to allow the same volume of water to pass along the same flow path. The cross-sectional area of the bridge support piers would be small (possibly 4-foot diameter piers), when compared to width of the channel (200 to 300 feet). Therefore, the amount of flow that would be redirected around the piers would be minimal and would not raise water surface elevations at the bridge crossing in a manner that would cause flooding in new areas. This ACFCWCD channel is only used for temporary detention of very large fluvial outflows, and the ACFCWCD has control over the rate and timing of flows into and out of this channel to and from the J-Ponds.

Although pier construction methods have not been determined, it is possible that these crossings would require in-water work for pier construction. Design of these bridge crossings would include measures to minimize the effects of placing piers in a flood hazard area (e.g., the shape and alignment of the piers would be designed to minimize adverse hydraulic effects such as local scouring and backwater effects). Because the existing flow conveyance capacity at each crossing would be maintained and effects from pier construction techniques would be minimized, impacts would be less than significant.

Alternative Eden B Level of Significance: Less than Significant

Alternative Eden C. Impacts described under Alternative Eden C would be the same as those described under Alternative Eden B, with the exception that additional pedestrian and bicycle (not vehicle-accessible) bridges would also be constructed to span OAC and the ACFCC. These additional bridges would allow for the 100-year flood event to pass underneath the bridges with sufficient freeboard. Floating structures (such as maintenance dredging and Coast Guard equipment) would also be able to pass under the bridge over the ACFCC at MHHW tide.

Because the existing flow conveyance capacity at each crossing would be maintained and effects from pier construction techniques would be minimized, impacts would be less than significant.

Alternative Eden C Level of Significance: Less than Significant

Alternative Eden D. Impacts described under Alternative Eden C would be the same as those described under Alternative Eden B. Because the existing flow conveyance capacity at each crossing would be maintained and effects from pier construction techniques would be minimized, impacts would be less than significant.

Alternative Eden D Level of Significance: Less than Significant

Impact Summary Table

Phase 2 impacts and levels of significance are summarized in Table 3.2-1. The levels of significance are those remaining after implementation of program-level mitigation measures, project-level design features, the AMP, and other Reserve management documents and practices. The hydrology, flood management, and infrastructure analysis required no project-level mitigation measures in order to reduce the impacts to a level that was less than significant.

Table 3.2-1 Phase 2 Summary of Impacts – Hydrology, Flood Management, and Infrastructure

IMPACT	ALTERNATIVE EDEN A	ALTERNATIVE EDEN B	ALTERNATIVE EDEN C	ALTERNATIVE EDEN D
Phase 2 Impact 3.2-1: Increased risk of flooding that could cause injury, death, or substantial property loss.	LTS	LTS	LTS	LTS
Phase 2 Impact 3.2-2: Alter existing drainage patterns in a manner which would result in substantial erosion or siltation on- or off-site.	LTS	LTS	LTS	LTS
Phase 2 Impact 3.2-3: Create a safety hazard for people boating in the project area.	LTS	LTS	LTS	LTS
Phase 2 Impact 3.2-4: Potential effects from a tsunami and/or seiche.	LTS	LTS	LTS	LTS
Phase 2 Impact 3.2-5: Place structures within the 100-year-flood hazard area that would impede or redirect flood flows	NI	LTS	LTS	LTS

Notes:

Alternative Eden A is the No Action (No Project Alternative under CEQA).

LTS = Less than Significant

NI = No Impact

3.3 Water Quality and Sediment

This section of the Draft Environmental Impact Statement/Report (EIS/R) describes the existing water quality within the Eden Landing Phase 2 project area at southern Eden Landing and analyzes whether implementation of the project would cause a substantial adverse effect on water quality. Given that many of the water quality constituents of concern are found in and exchange with sediment, sediment distribution and composition is described here as well. The information presented is based on a review of existing water and sediment quality within the area, and other pertinent federal, state, and local regulations, which are presented in Section 3.3.2, Regulatory Setting. Section 3.3.1, Physical Setting, is included to establish the origin and environmental context of the resources. Using this information as context, an analysis of the water quality-related environmental impacts of the project is presented for each alternative in Section 3.3.3, Environmental Impacts and Mitigation Measures. The program-level mitigation measures described in Chapter 2, Alternatives, would be implemented as part of the project. Therefore, this section only includes additional, project-level mitigation measures as needed.

3.3.1 Physical Setting

Methodology

The development of the baseline conditions, significance criteria, and impact analysis in this section is commensurate to and reliant on the analysis conducted in the 2007 South Bay Salt Pond (SBSP) Restoration Project Final EIS/R (2007 Final EIS/R), which was both a programmatic EIS/R and a project-level Phase 1 EIS/R. Information regarding water quality in the San Francisco Bay (or Bay) and the Eden Landing Phase 2 project area was primarily based on data collected by the San Francisco Estuary Institute (SFEI) Regional Monitoring Program (RMP), the California Department of Fish and Wildlife (CDFW), the Alameda County Water District (ACWD), the Alameda County Flood Control and Water Conservation District (ACFCWCD), as well as the Adaptive Management Plan (AMP) special studies and other special studies conducted for the SBSP Restoration Project.

Regional Setting

Surface Water and Sediment Quality

The former salt ponds at Eden Landing are at the interface between the urban environment and the South Bay. The regional setting includes the South Bay, the SBSP Restoration project area, the Eden Landing pond complex, and upland watershed areas. Water quality conditions for mercury and other metals, legacy pollutants, and general water quality conditions (e.g., dissolved oxygen) are discussed in this section. Regional water and sediment quality are also discussed in comparison to water and sediment quality guidelines, criteria, and objectives established by the San Francisco Bay Regional Water Quality Control Board (RWQCB).

Mercury. Mercury occurs naturally in the Bay environment and has been introduced as a contaminant in various chemical forms from a variety of anthropogenic sources. Ambient levels of mercury in Bay sediments are elevated above naturally occurring background levels. Although mercury often resides in forms that are not hazardous, it can be transformed through natural processes into toxic methylmercury.

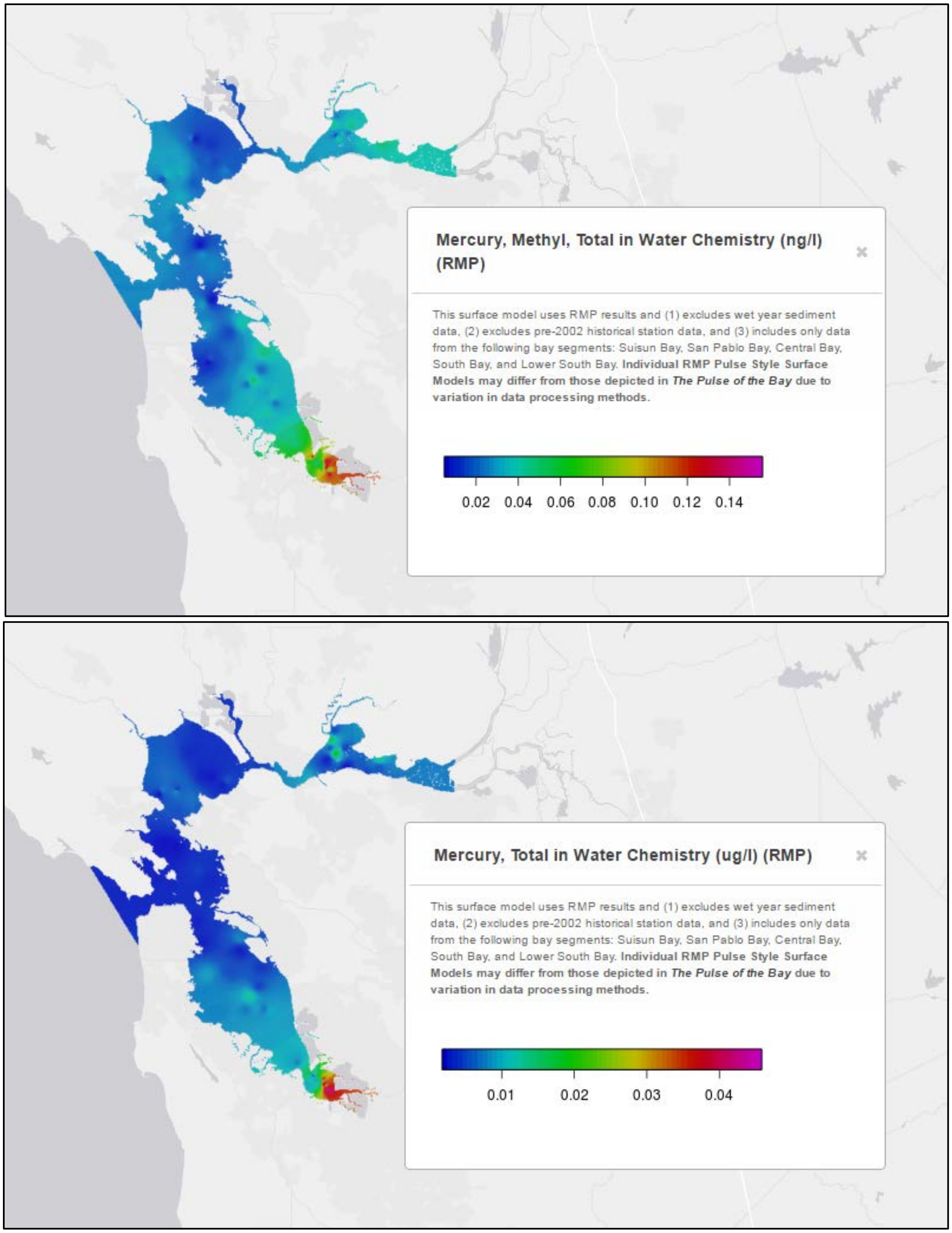
The primary concern with mercury contamination in the Bay is the accumulation of methylmercury in organisms, particularly at the top of aquatic food webs. Methylmercury typically represents only about 1 percent of the total of all forms of mercury in water or sediment, but it is the form that is readily accumulated in the food web and poses a toxicological threat to exposed species (SFEI 2012). Elevated methylmercury levels in fish can result in mercury exposure in humans who consume contaminated fish. Elevated levels of methylmercury can also adversely affect the health and fitness of fish and birds.

Methylmercury is produced in aquatic ecosystems through the methylation of inorganic mercury by microorganisms. Methylmercury has a complex cycle, influenced by many processes that vary in space and time. The rate of methylation is a function of an array of variables, including mercury levels, mercury speciation, oxidation reduction potential, microbial activity, sulfate levels, salinity, pH, dissolved oxygen, dissolved organic carbon, turbidity, solar radiation, and vegetation type. Although the interaction of these variables is not fully understood, wetlands are known to be significant sites of microbial methylation and potentially important sources of methylmercury to aquatic food webs (Benoit et al. 2003; Wiener et al. 2003). Natural accretion processes in salt marshes continually supply fresh layers of mercury-contaminated Bay sediments, which can release mercury in a form that can become biologically available to mercury-methylating bacteria and subsequently bioaccumulate in the food chain. Because of the complex interactions between biological/physical processes, it is difficult to predict mercury concentrations in fish or other aquatic organisms, or birds, based on water or sediment mercury concentrations.

Mercury and methylmercury concentrations in surface waters and sediment have been assessed by regional monitoring activities in the Bay (*e.g.*, RMP) and by monitoring activities conducted for the SBSP Restoration Project. The lower South Bay and the South Bay typically have higher mercury and methylmercury concentrations in Bay waters than other sections of the Bay (see Figure 3.3-1) likely due to historic mining activities in the Guadalupe River watershed. During 2009 to 2015, methylmercury water concentrations in the lower South Bay averaged 0.1 nanogram per liter (ng/L) and concentrations in the South Bay, north of the Dumbarton Bridge, averaged 0.04 ng/L (SFEI 2016). Total mercury concentrations in Bay waters had a similar pattern, with high concentrations in the South Bay (9 ng/L) and highest concentrations in the lower South Bay (24 ng/L). No regulatory guidelines exist for methylmercury concentrations in surface water — regulatory guidelines for methylmercury target fish tissue concentrations.

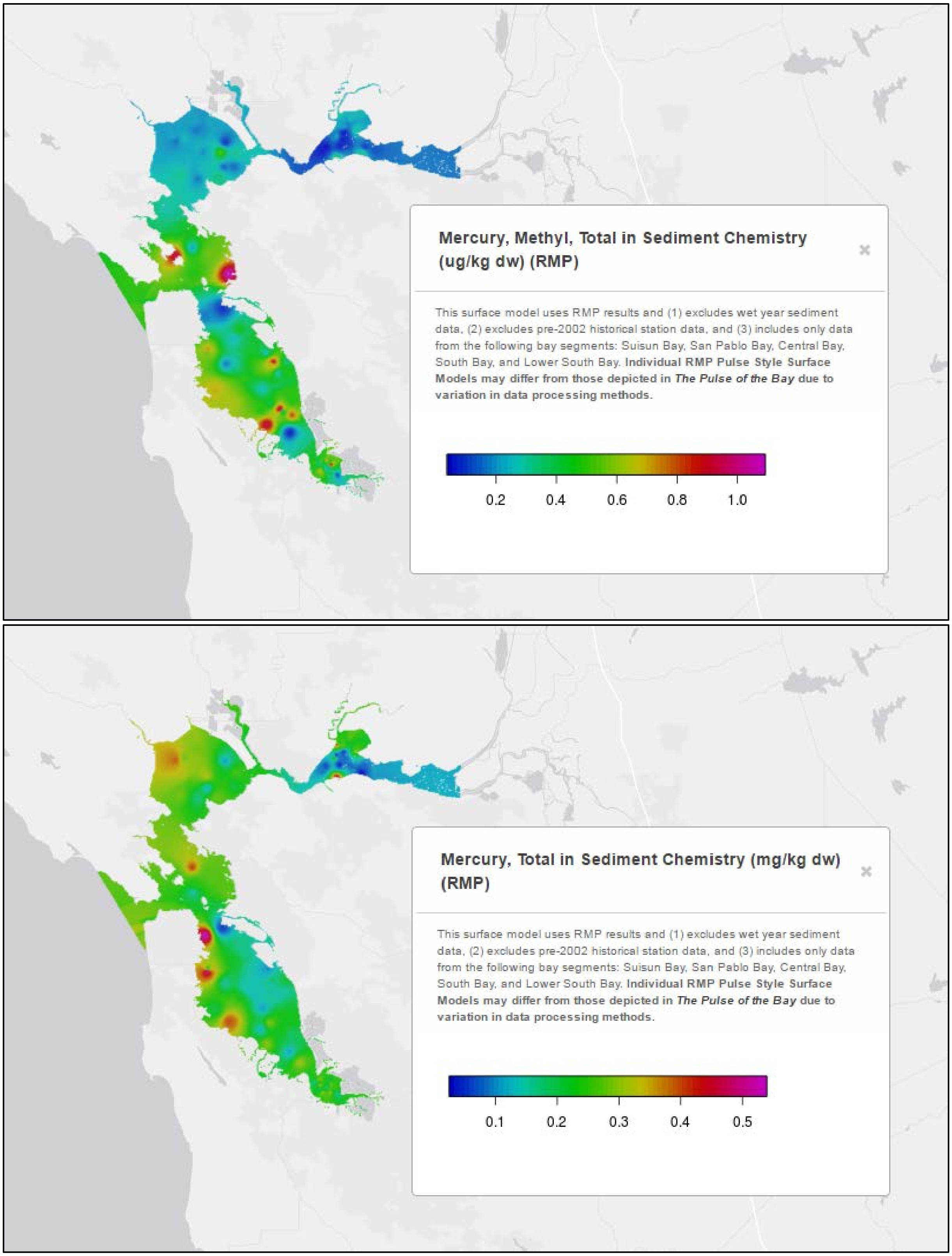
In contrast to the distribution pattern found in water (discussed above), higher concentrations of mercury and methylmercury in sediments are found in several section of the Bay (see Figure 3.3-2). During 2009 to 2015, methylmercury concentrations in sediment were, on average, highest in the Central Bay (0.63 microgram per kilogram [µg/kg]), while mercury concentrations were highest in the lower South Bay (0.27 milligram per kilogram [mg/kg]) (SFEI 2016). Mercury concentrations in Bay sediment do not appear to be increasing or decreasing (SFEI 2015). No regulatory standards exist for methylmercury or mercury concentrations in sediment.

Sediment samples collected in South Bay salt ponds typically contained total mercury concentrations either similar to or slightly greater than ambient mercury concentrations in the Bay (Brown and Caldwell et al. 2005). Preliminary results from monitoring tidal marsh restoration suggest that breaching salt ponds is not causing increases in food web mercury. For example, recent monitoring of marsh restoration projects in the North Bay indicates that opening ponds to tidal action is not leading to increased mercury in the food web. Fish monitoring in the Napa River region in 2012 and 2013 found that mercury concentrations in breached wetlands were not elevated relative to managed ponds and established tidal marshes (SFEI 2015, Robinson et al. 2014).



Source: SFEI, 2016

Figure 3.3-1. Mercury and Methylmercury Concentrations in the Bay



Source: SFEI, 2016

Figure 3.3-2. Mercury and Methylmercury Concentrations in Bay Sediments

Other Metals. Metals are present in the environment due to both natural conditions and anthropogenic influences. Depending on the chemical nature of the metal, ecological risks could result from concentrations elevated above toxic thresholds or bioaccumulation levels.

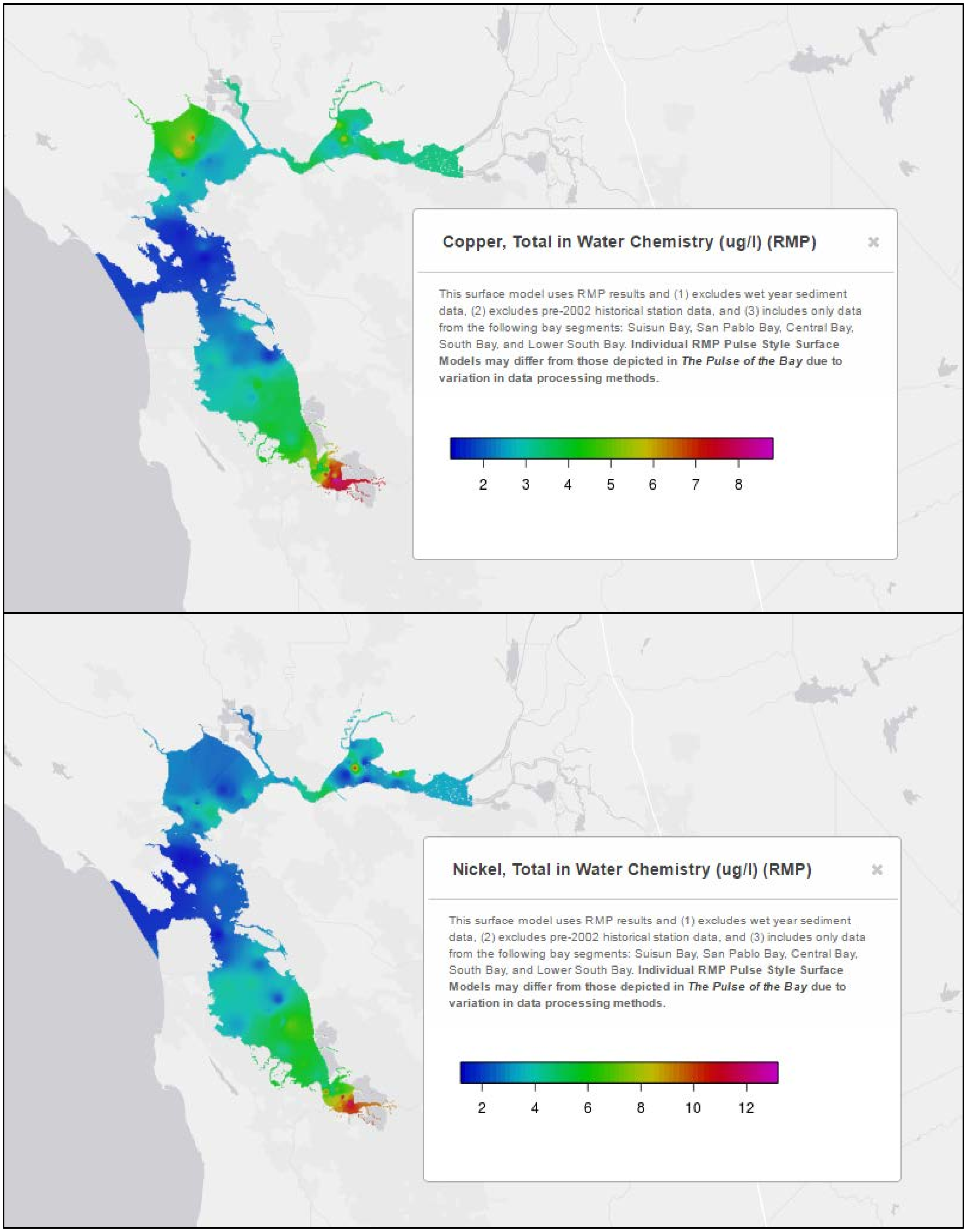
Copper and nickel are of particular concern for the Bay because ambient concentrations of dissolved copper and nickel in Bay waters can approach water quality objectives established in the Water Quality Control Plan for San Francisco Bay (Basin Plan) – 6.9 micrograms per liter (µg/L) and 11.9 µg/L, respectively. Copper and nickel concentrations are shown in Figure 3.3-3. During 2009 to 2015, total copper concentration in Bay waters averaged 5.9 µg/L in the lower South Bay and 3.7 µg/L in the South Bay north of the Dumbarton Bridge, which is greater than the Bay-wide average (3.6 µg/L) (SFEI 2016). Total nickel concentrations averaged 7.9 µg/L in the lower South Bay, and 5.0 µg/L in the South Bay north of the Dumbarton Bridge, which is also greater than the Bay-wide average concentration (4.5 µg/L).

Metals tested in SBSP Restoration Project area waters include arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, and zinc; in general, metal concentrations were low. However, dissolved nickel concentrations often exceed the water quality objectives and dissolved lead and dissolved arsenic concentrations have also exceeded their water quality objectives in at least one pond (Brown and Caldwell et al. 2005). South Bay and the SBSP Restoration Project area sediments were also tested for metals, including arsenic, cadmium, chromium, copper, lead, nickel, selenium, silver and zinc, and, in general, these metals were detected at concentrations similar to their respective RWQCB ambient criteria. Within the SBSP Restoration Project area, the spatial distribution of the detected metal concentrations suggests that there is not a localized metals impact.

Organic Chemicals. Bioaccumulative pollutants such as polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), and legacy organochlorine pesticides are of general concern in the Bay because concentrations in fish often exceed human-health-based criteria for fish consumption. PCBs are a class of organic chemicals that do not break down quickly in the natural environment and have been found to pose bioaccumulation risks.

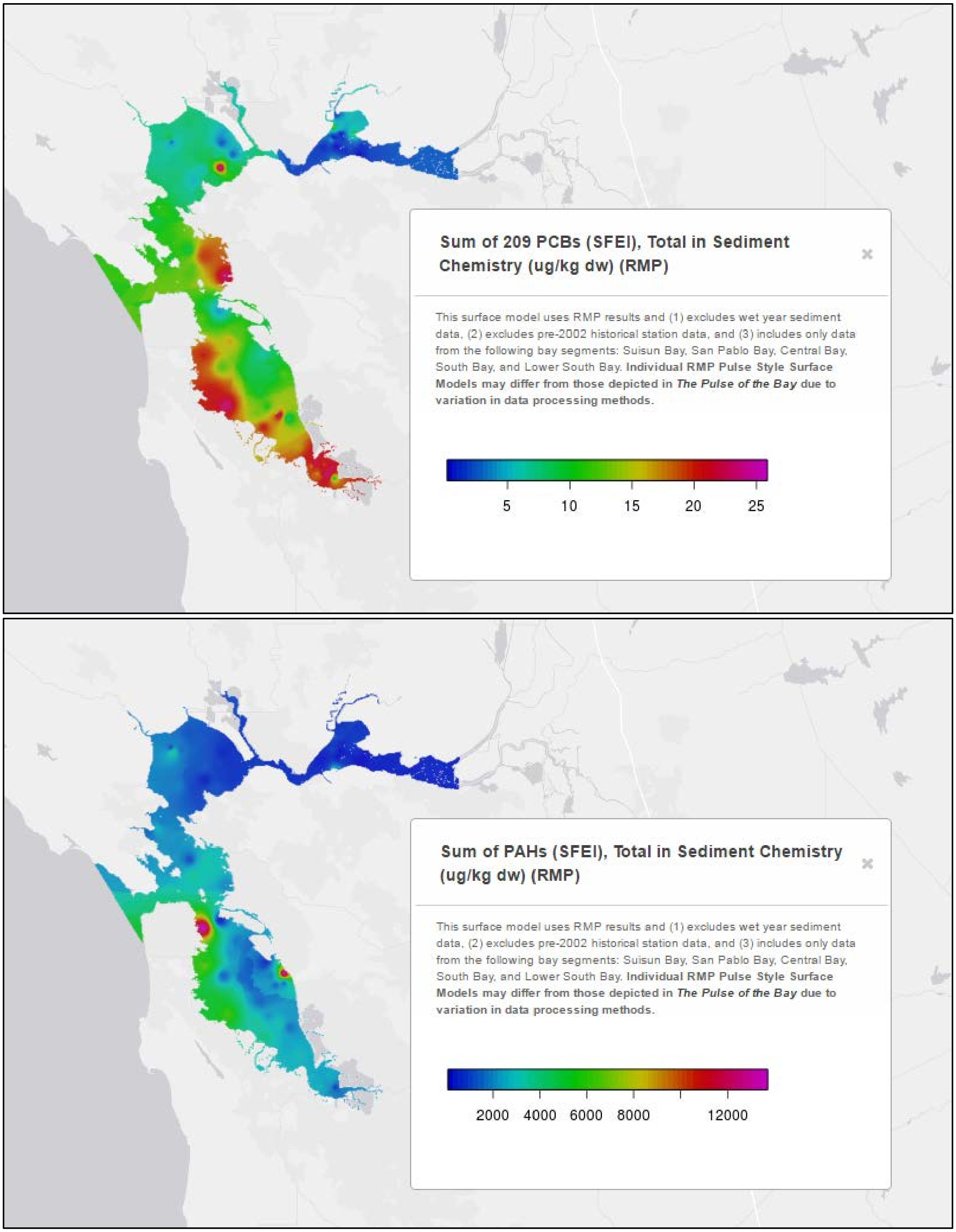
Concern for PCBs in the Bay is primarily due to concentrations in sport fish. PCB concentration in the South Bay consistently exceeded human-health-based criteria for fish consumption (0.17 ng/L), but rarely exceeded saltwater aquatic-life-based criteria (30 ng/L). PCB concentrations in Bay sediments are higher in the southern arm of the Bay (see Figure 3.3-4), likely due to historic and ongoing stormwater runoff from industrial areas and legacy PCB cleanup sites, such as military facilities, in this region (SFEI 2015). The lower South Bay and the South Bay north of the Dumbarton Bridge have PCB concentrations greater than Bay-wide averages (19.7 and 13.9 µg/kg, respectively, as compared to 12.3µg/kg) (SFEI 2016). Many of the highest concentrations have been observed along the shoreline of southwestern Central Bay and western South Bay.

PAHs are known to be environmentally persistent and pose a concern for bioaccumulation. PAH data for the South Bay exceeded human-health-based criteria for fish consumption (8.8 ng/L), but are below the saltwater aquatic-life-based criteria. PAH concentrations in Bay sediments are higher in the southern arm of the Bay (see Figure 3.3-4), likely due to runoff from the extensive paved surfaces in this region (SFEI 2015). The Central Bay has the highest PAH concentration in sediment (3.9 mg/kg), on average, of any Bay segment (SFEI 2016). The South Bay (3.1 mg/kg) and lower South Bay (2.3 mg/kg) also has PAH concentrations higher than the Bay-wide average of 2.2 mg/kg.



Source: SFEI, 2016

Figure 3.3-3. Copper and Nickel Concentrations in the Bay



Source: SFEI, 2016

Figure 3.3-4. PCB and PAH Concentrations in Bay Sediments

Organochlorine pesticides (including chlordanes and dichloro-diphenyl-trichloroethanes [DDTs]) are also environmentally persistent and pose a concern for bioaccumulation. Chlordane and DDT concentrations in South Bay surface waters typically exceed human-health-based criteria. Chlordanes in South Bay sediments are often greater than ambient values and sediment DDTs are similar to or greater than ambient values.

Within the SBSP Restoration Project area, sediments contained either non-detectable concentrations of organic constituents, or concentrations were found below ambient values (United States Fish and Wildlife Service [USFWS] and California Department of Fish and Game [CDFG] 2003). The Initial Stewardship Plan's sampling of the SBSPs focused primarily on the Alviso pond complex, but some samples were collected in both the Eden Landing and the Ravenswood pond complexes.

General Water Quality Conditions. Salinity in the open Bay waters below the Dumbarton Bridge varies with the daily tides and is typically near seawater levels at 28 to 33 parts per thousand (ppt), because the South Bay receives relatively little freshwater inflow except during the wet season, when local stream discharges can cause salinity to decrease to 20 ppt or lower (Schemel et al. 2003; USFWS and CDFG 2003). For more information regarding how hydrodynamics can affect salinity, see Section 3.2, Hydrology, Flood Management, and Infrastructure.

Historical salinity concentrations in the salt ponds varied considerably, ranging from as low as the Bay concentration to brines with salinity concentrations several times that of the Bay. However, these concentrations have been reduced as ponds have been operated for limited circulation.

Dissolved oxygen levels are generally above the water quality objective of 5 milligrams per liter (mg/L) in the open Bay, but frequently below it in some sloughs on the Bay margins (SFEI 2015). Diurnal and/or tidal cycling is particularly important for dissolved oxygen in sloughs and ponds, which is influenced by both circulation and respiration of algae. Algal growth in salt ponds can cause dissolved oxygen and pH levels to vary significantly over the course of a day. These levels vary because during daylight hours, photosynthesis produces oxygen and consumes dissolved carbon dioxide. At night, respiration produces dissolved carbon dioxide and consumes oxygen. Therefore, significant algal growth causes dissolved oxygen and pH levels to peak during the late afternoon and to be at their lowest levels before dawn. Diurnal and/or tidal cycling can also influence salinity, pH, temperature, and dissolved oxygen levels.

Under ideal conditions, photosynthesis generates dissolved oxygen faster than the system can consume it. The resulting dissolved oxygen surplus becomes depleted as respiration continues through the night. Whether or not the surplus that has accumulated throughout the day is sufficient to prevent a hypoxic event depends on a number of factors, the most influential of which being water temperature and daily solar input. Several researchers have linked hypoxic events to relatively high water temperatures during warmer months (Tyler, Brady et al. 2009). Continuous monitoring of dissolved oxygen in a representative pond in the South Bay was conducted as a part of the AMP. The data show low dissolved oxygen in the late morning when the tide is also low or outgoing (Figure 3.3-5).

Low dissolved oxygen levels have been observed in a number of the South Bay salt ponds, including the Eden Landing ponds, notably in the late-summer/early-fall when temperatures, winds and evaporation were highest. High wind and ambient temperature also result in greater evaporation and are of greatest concern during neap tide cycles, when circulation is reduced (CDFW 2015).

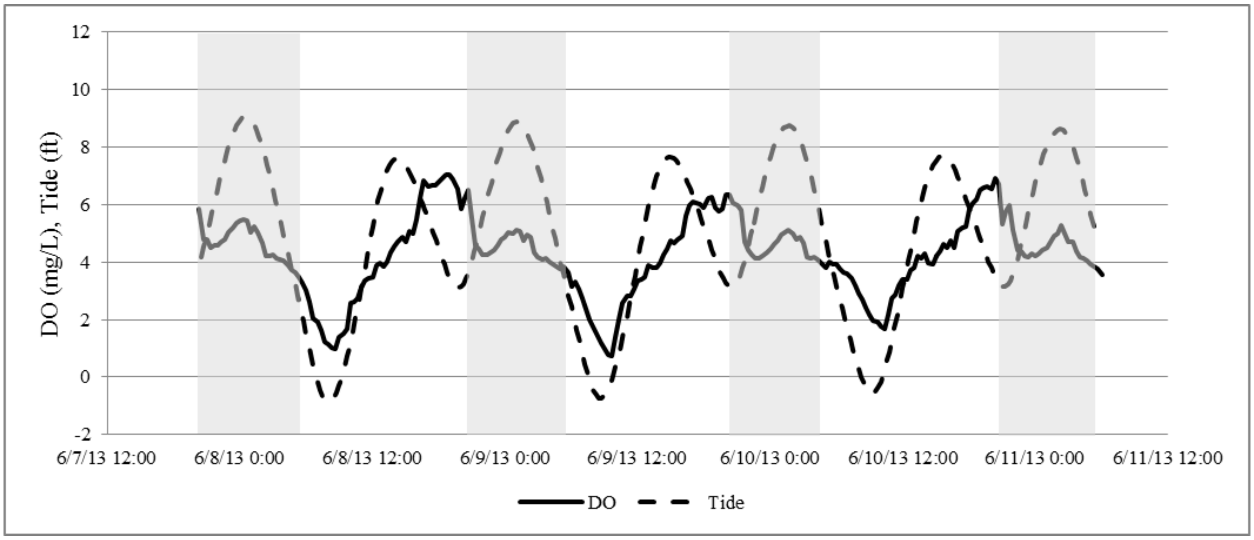


Figure 3.3-5. Time Series (80-hour) Plot of Dissolved Oxygen and Tide Height in Pond A21, 6/7/13 to 6/11/13 Spring Tide, New Moon.

Continuous monitoring data from within former salt ponds show that pH levels can vary significantly and are often above the Basin Plan objective of 8.5. However, receiving water data have also shown that high pH levels from pond discharges are quickly normalized in nearby sloughs and the Bay (RWQCB 2008).

Due to shallow water depths and limited tidal exchange, water temperature in the salt ponds is elevated and varies widely throughout the day. Annual water temperatures within the ponds generally range from 40 to 80 degrees Fahrenheit (°F) and generally track air temperature (RWQCB 2008).

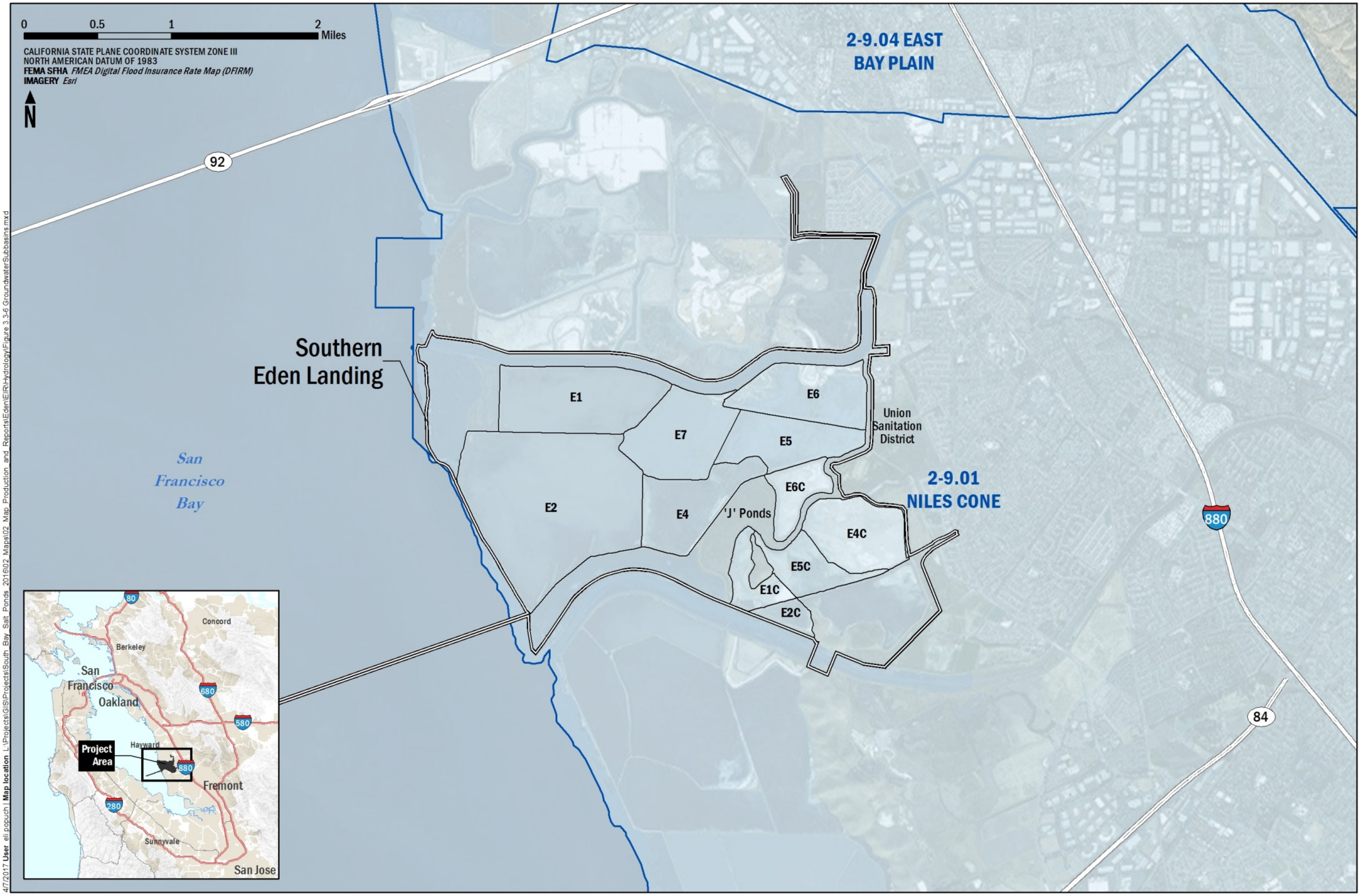
Groundwater

This section characterizes the existing physical setting with respect to groundwater. Groundwater can be affected by surface water conditions through surface water/groundwater interactions.

The Santa Clara Valley groundwater basin underlies the East Bay and the South Bay. The groundwater subbasin located at and near the Eden Landing pond complex is the Niles Cone subbasin (Niles Cone subbasin 2-09.01, or Niles Cone; see Figure 3.3-6).

Groundwater levels have previously been depleted by withdrawing groundwater at rates faster than it recharges naturally. However, groundwater levels have been restored in the past 40 years by regional groundwater management actions, and today, groundwater flow is generally bayward, providing a measure of protection from salinity intrusion.

Holocene Bay muds underlie almost the entire original Bay, including the SBSP Restoration Project area. The Holocene Bay muds are thin at the margins of the Bay, but can be as much as 30 to 50 feet thick beneath the Bay. The Bay mud is relatively impermeable to both infiltration and groundwater flow.



4/7/2017 User eli.popuch | Map location L:\Projects\GIS\Projects\South Bay Salt Ponds 2016\02 Maps\02 Map Production and Reports\Eden\EIR\Hydrology\Figure 3.3-6 GroundwaterSubbasins.mxd

LEGEND

- Groundwater Subbasin
- Eden Landing Phase 2 Project Area
- Southern Eden Landing Ponds

AECOM

South Bay Salt Pond Restoration Project

Figure 3.3-6

Santa Clara Valley Groundwater Subbasins

Groundwater Aquifers. The Niles Cone groundwater basin is an alluvial aquifer system consisting of unconsolidated gravel, sand, silt, and clay. The gravel and sand deposits are the aquifers, and the silt and clay layers form the aquitards. A series of relatively flat lying aquifers are separated by extensive clay aquitards in the Niles Cone below the Hayward Fault. These aquifers include (from shallowest to deepest) the Newark Aquifer, the Centerville Aquifer, the Fremont Aquifer, and the deep aquifers. The Newark Aquifer, an extensive permeable gravel and sand layer, is located between 40 and 140 feet below ground surface. Its thickness ranges from less than 20 feet at the western edge of the basin to more than 140 feet at the Hayward Fault. The Newark Aquifer is overlain by a thick layer of silt and clay called the Newark Aquiclude; layers of sand and silt within the Newark Aquiclude create a shallow water-bearing zone. An extensive thick clay aquitard separates the Newark Aquifer from the Centerville Aquifer. The Centerville Aquifer, the top of which lies at an average depth of 180 to 200 feet below ground surface, overlies a thick clay aquitard, which in turn overlies the Fremont Aquifer, which exists in the interval of 300 to 390 feet below ground surface. The Centerville and Fremont Aquifers are considered to be one combined aquifer (Centerville-Fremont Aquifer) in some parts of the basin, but in areas near the Bay, these two aquifers are isolated from each other a thick layer of silt and clay. The deepest water-bearing units, referred to collectively as the deep aquifers, are present at approximately 400 feet below ground surface and are deeper and separated from the overlying Fremont Aquifer by a regional aquitard (ACWD 2017).

The Newark Aquifer is generally considered to be in communication with the Bay. This is documented by a review of groundwater monitoring data from the Santa Clara Valley Water District (SCVWD) and ACWD that shows water levels are stable and not fluctuating substantially seasonally from pumping, as is typical of deeper wells. According to the California Department of Water Resources (DWR), interconnections between the Bay and the Newark Aquifer in the Niles Cone area may exist due to dredging of the shipping channel in the Dumbarton Bridge area. ACWD and SCVWD groundwater monitoring data that indicate high salinity in shallow wells also support the existing hydraulic interconnection between the Bay and shallow groundwater.

The relatively thin Holocene Bay muds at the margins of the Bay do not currently isolate the shallow Newark aquifer between the current outboard and inboard salt pond levees. However, Bay mud and fine-grained alluvial deposits do generally create differences in hydraulic head that are evidence of hydraulic separation. Upland of the inboard salt pond levees, the fine-grained alluvial deposits alone cause confinement of groundwater and a measure of protection for the water supply aquifers (the water-bearing zones).

Groundwater Recharge. The ACWD provides retail water service primarily to the cities of Fremont, Newark, and Union City. For over 100 years, ACWD has managed the groundwater of the Niles Cone through programs that protect and improve water supplies. ACWD is identified in the Sustainable Groundwater Management Act as one of 15 agencies that were created by statute to manage groundwater: ACWD's groundwater statutory service area includes the cities of Fremont, Union City, and Newark, and the southern portion of the City of Hayward. The Niles Cone is a coastal aquifer system hydraulically connected to the Bay and is subject to saltwater intrusion when groundwater levels fall below mean sea level (msl) in the Newark Aquifer. The saltwater intrusion was first noticed in the 1920's and occurred due to historical pumping that created chronic overdraft of the basin. Since 1962, when supplemental water was first purchased from the State Water Project, ACWD has been engaged in a continuous water replenishment/recharge program in order to sustainably manage the quality and quantity of water in the Niles Cone while balancing and protecting environmental resources. ACWD's recharge efforts, in addition to ACWD's use of imported water, have caused water levels to slowly rise above sea level. As a result, water levels in the Newark Aquifer were restored above sea level in 1972 and the hydraulic gradient water returned to its natural bayward direction in the Newark Aquifer.

Although there has been substantial improvement in the groundwater basin, a considerable volume of saline water still remains in the aquifers. As a result, in1974, ACWD initiated its Aquifer Reclamation Program (ARP) to restore water quality in the groundwater basin by removing the saline water trapped in the aquifer system. ACWD has a total of eleven ARP wells. Brackish groundwater from five of the ARP wells is used as the source water for ACWD's Newark Desalination Facility, with any excess pumped brackish groundwater discharged to the Bay through flood control channels under an existing National Pollutant Discharge Elimination System (NPDES) permit. The quality of groundwater in the basin is improved as recharge water replaces the pumped brackish groundwater.

Groundwater Quality. The shallow Newark Aquifer near the Eden Landing pond complex has high salinity due to its hydraulic connection with the Bay and the historical salt ponds. Although monitoring data are not available for most of the salt pond area, ACWD monitors salinity in several shallow wells located near the eastern edge of the salt ponds between State Route (SR) 92 and the Alameda Creek Flood Control Channel (ACFCC). Historically, pumping impacts in the Niles Cone have resulted in significant cross-communication between the shallow (Newark), intermediate (Centerville-Fremont), and deeper aquifer (350 to 600 feet below ground surface) as documented in older reports on saltwater intrusion in the area. Data indicate that salinities up to 3.9 ppt are present beneath the City of Newark (approximately 10 percent of the concentration found in seawater), but salinity in the Eden Landing pond complex in the Centerville-Fremont Aquifer is generally lower (below 0.5 ppt salinity).

ACWD has two ARP wells near the southern Eden Landing ponds, immediately adjacent to, and east of, Ponds E5 and E4C. The brackish ARP wells have chloride concentrations ranging from 2,000 to 12,000 mg/L from water in the Newark Aquifer (approximately 10 to 60 percent of the concentration found in seawater) (ACWD 2017).

Project Setting

Eden Landing Phase 2

This section describes the physical setting of the Eden Landing Phase 2 area, which includes the entire southern half of the Eden Landing pond complex. A small portion of the South Bay is also included in the Eden Landing Phase 2 area. The water quality of the South Bay is described above in more detail in the Regional Setting.

The southern Eden Landing ponds are operated as either circulation ponds or as seasonal ponds. Circulation ponds have limited (sometimes muted tidal) inflows and outflows through water control structures. Seasonal ponds are typically allowed to dry out in the summer through seepage and evaporation, but water levels can also be actively managed through periodic inflows.

Bay Ponds

The Bay Ponds (Ponds E1, E2, E4, and E7) are in the western portion of southern Eden Landing. The Bay Ponds are operated for circulation during summer and winter. In October, higher salinity water from Ponds E6 and E5 is mixed in Pond E4 and discharged through a water control structure in Pond E2. Salinity in the discharge is typically maintained below 44 ppt (CDFW 2016).

CDFW monitored instantaneous salinity, dissolved oxygen, and pH concentrations during periods of continuous circulation in 2007 (from late May to early November).[1] Mean daily salinity ranged from about 36.8 to 53.8 ppt. Daily mean pH values in Pond E2 ranged from 8.15 to 8.61 during that same period (CDFG 2008).

Low dissolved oxygen levels in the salt ponds are common and dissolved oxygen levels can fall below 3.3 mg/L at the point of discharge (i.e., at the Pond E2 water control structure). Low dissolved oxygen conditions occur during extended periods of high air and water temperatures and appear to be indicative of natural dissolved oxygen variations found in sloughs or lagoon systems. Dissolved oxygen levels below the Basin Plan standard of 5.0 mg/L have been observed in sloughs not affected by any pond discharge, and this concentration is considered to be within the natural range of variation in functional slough and lagoon environments of the South Bay. Correspondingly, low dissolved oxygen water of Bay origin has been observed at pond intake locations, such as Pond E1 (CDFW 2016).

During periods of continuous circulation in 2007, daily mean dissolved oxygen concentrations in Pond E2 were measured below 5.0 mg/L approximately 21 percent of the time, and of those days, daily mean dissolved oxygen was below 3.3 mg/L on one day. Adaptive management actions were triggered when the tenth percentile value of the instantaneous dissolved oxygen concentrations, when calculated on a calendar weekly basis, fell below 3.3 mg/L. During periods of continuous circulation in 2007, calendar-weekly tenth percentile dissolved oxygen values were below the 3.3 mg/L trigger approximately 67 percent of the time (CDFG 2008).

Several operational strategies have been implemented in the Eden Landing ponds to address low dissolved oxygen conditions in pond discharges. CDFW evaluated management practices where discharge structures were closed during periods of time when dissolved oxygen concentrations were expected to be below the 3.3 mg/L trigger. Because dissolved oxygen concentrations have a strong diurnal pattern, ceasing discharge from approximately 10 pm to 10 am avoided most periods of low dissolved oxygen; however, daily discharge timing was not found to be practicable over a sustained period due to staff and budget constraints. Instead, weekly discharge timing was used to minimize discharge of low dissolved oxygen water. Weekly discharge timing involved discharging greater volumes of water when daytime tides were lowest, resulting in more volume discharged during the day when dissolved oxygen concentrations were higher. CDFW found that substantially reducing discharge volume for an extended duration did not improve pond water quality because of the lower turnover and higher residence time resulting in less circulation and less mixing of in-pond waters. Reducing residence time of water in the ponds appeared to improve overall dissolved oxygen levels. Muted tidal intake and discharge provided for the greatest circulation and mixing in the ponds (CDFG 2008).

Total mercury and methylmercury concentrations were analyzed in sediment cores collected from 2003 to 2005 in the Bay Ponds. Total mercury concentrations ranged from 0.08 to 0.145 mg/kg (USGS 2005), which is less than average sediment concentrations in the Bay. Methylmercury concentrations in sediment ranged from 0.256 to 2.17 µg/kg, which, with the exception of one sample collected in Pond E7, is greater than average sediment concentrations in the Bay.

[1] Continuous monitoring data was collected by instruments deployed in Eden Landing ponds from 2004 to 2009. The most recent continuous monitoring data for the southern Eden Landing ponds is from 2007.

Inland Ponds

The Inland Ponds (Ponds E5, E6, and E6C) are in the eastern portion of southern Eden Landing. The Inland Ponds typically have salinity values between 30 and 120 ppt, with higher salinities in the summer, when these ponds either are managed for open water conditions without circulation or are allowed to draw down. Lower salinities are found in the winter, when circulation is used for dilution. Salinity higher than 135 ppt is not desired because gypsum would precipitate in the ponds (CDFW 2016).

Total mercury and methylmercury concentrations were analyzed in sediment cores collected in January 2005 from the Inland Ponds. Total mercury concentrations ranged from 0.066 to 0.091 mg/kg (USGS 2005), which is less than average sediment concentrations in the Bay. Methylmercury concentrations ranged from 0.325 to 0.819 µg/kg, which, with the exception of one sample collected in Pond E6C, is greater than average sediment concentrations in the Bay.

Southern Ponds

The Southern Ponds (Ponds E1C, E2C, E4C, and E5C; referred to as the C-Ponds in some documents) are in the southeastern portion of southern Eden Landing. Ponds E5C, E4C and E1C are seasonal or batch ponds characterized by salinities ranging from low (35 to 40 ppt) to medium (40 to 80 ppt), with increased salinity in the summer due to evaporation. Pond salinity is decreased with additional inflows from Pond E2C.

Pond E2C operates with muted tidal circulation at the intake/discharge water control structure along ACFCC. Intake and discharge volumes are approximately 25 percent of the total volume in Ponds E2C and CP3C (CDFW 2016). Periodically water from Ponds E5C, E4C and E1C is mixed with water from Pond E2C prior to discharge.

CDFW monitored instantaneous salinity, dissolved oxygen, and pH concentrations during periods of continuous circulation in 2007 (from late May to early November). Daily mean salinity values at Pond E2C ranged between 27 and 49 ppt during this period. Daily mean pH values in Pond E2C ranged from 7.9 to 8.9 during the same period (CDFG 2008). While pH levels were above 8.5 for some periods within the pond, the pH in E2C receiving waters did not appear to be elevated during monitoring and there did not appear to be any adverse effect from brief periods of elevated pH.

During periods of continuous circulation in 2007, daily mean dissolved oxygen in Pond E2C was measured below 5.0 mg/L approximately 34 percent of the time, and of those days, daily mean dissolved oxygen was below 3.3 mg/L 8 percent of the time. During the same time period, 68 percent of the time calendar-weekly tenth percentile “trigger” values were below 3.3 mg/L (CDFG 2008).

Total mercury and methylmercury concentrations were analyzed in sediment cores collected in January 2005 from the Southern Ponds. Total mercury concentrations ranged from 0.054 to 0.161 mg/kg (USGS 2005), which is less than average sediment concentrations in the Bay. Methylmercury concentrations ranged from 0.413 to 1.79 µg/kg, which is greater than average concentrations in the Bay.

3.3.2 Regulatory Setting

Regulatory Authorities and Enabling Legislation

Federal and state agencies are authorized to ensure adequate surface water, sediment, and groundwater quality with respect to potential restoration impacts. The agencies, their enabling legislation, and their roles in establishing and implementing policies are described below.

The United States Environmental Protection Agency (USEPA) carries out the mandates set forth in federal Clean Water Act (CWA). The CWA requires that waters of the United States be protected by adopting and implementing a program of water quality standards. Water quality standards consist of defined beneficial uses of water and numeric or narrative criteria to protect those beneficial uses. The USEPA is authorized to delegate its authority to state agencies. In situations where a state fails to carry out the mandates of the CWA by enacting policies and regulations, the USEPA is authorized to promulgate federal regulations by which the state must abide. This federal-state relationship is the basis for USEPA's promulgation of the California Toxics Rule (CTR), which establishes numeric criteria for toxic pollutants.

In California, the State Water Resources Control Board (SWRCB) is the lead agency with delegated authority to implement the CWA. The SWRCB's authority is enabled by California's Porter-Cologne Water Quality Control Act (Porter-Cologne). The SWRCB is responsible for implementing statewide water quality standards programs. The SWRCB has delegated many duties to the nine Regional Water Quality Control Boards (RWQCBs), which are defined by distinct hydrologic regions. The SBSP Project Restoration area is within the jurisdiction of the San Francisco Bay RWQCB. The RWQCB is responsible for developing the water quality standards that are adopted in the Basin Plan after following the scientific and public review procedures set forth in Porter-Cologne Sections 13240–13245. The Basin Plan lists the beneficial uses of water and the water quality objectives [2] to protect those beneficial uses. The beneficial uses and water quality objectives are described below under "Existing Water Quality Standards Programs."

The Basin Plan also includes a plan of implementation that guides the RWQCB in carrying out its duties. Those duties include:

- Issuing NPDES permits, as authorized by CWA Section 402, to regulate discharges to navigable waters of the United States and their tributaries;
- Issuing state waste discharge requirements, as authorized by Porter-Cologne Sections 13260–13274, to regulate discharges to land and other discharges not requiring federal NPDES permits;
- Issuing water quality certifications as authorized by CWA Section 401 to projects with a federal component that may affect water quality, such as dredging and filling activities that require a CWA Section 404 certification from the United States Army Corps of Engineers;
- Issuing conditioned waivers of waste discharge requirements, as authorized by Porter-Cologne Section 13269, for discharges and other activities that are not considered to threaten the beneficial uses of waters;

[2] The distinction between objectives and criteria is important, as federal criteria are viewed as guidelines to be considered, whereas state-adopted objectives have force of law.

- Requiring monitoring data from permitted dischargers, as authorized by Porter-Cologne Sections 13225-c and 13267; and
- Conducting enforcement, as authorized by Porter-Cologne Sections 13300–13365, against parties that fail to apply for necessary permits or comply with existing permits and requirements.

The RWQCB also participates in many regional collaborative programs to monitor water quality and implement projects to protect and improve water quality. Examples of such collaborations include the San Francisco Bay RMP, the San Francisco Bay Clean Estuary Partnership, and the SWRCB's Surface Waters Ambient Monitoring Program. The RWQCB is also responsible for administering water-quality-related state grant programs.

There are two publicly owned water districts responsible for groundwater resources in the overall SBSP Restoration Project area: ACWD and SCVWD. Both of these agencies carry out their missions by operating groundwater recharge facilities, conducting monitoring at guard wells, ensuring that unused wells are properly abandoned, and encouraging water conservation by municipalities in their respective service areas. However, the SCVWD has no authority or responsibility in the Eden Landing portion of the SBSP Restoration Project area.

The responsibility for protection of stormwater quality is assigned to the countywide stormwater programs in the SBSP Restoration Project area. The Alameda Countywide Clean Water Program represents 15 municipal government co-permittees, the ACFCWCD, and the Zone 7 Water Agency. This stormwater program implements stormwater quality management plans with regulatory oversight from the RWQCB. The stormwater quality management plans describe a coordinated program of monitoring, watershed assessment, inspections, illicit discharge control, construction controls, municipal maintenance, and public education.

In the northern portion of the South Bay, the East Bay Dischargers Authority operates a deep-water outfall in the Bay that discharges secondary-treated effluent from four different municipal treatment plants. Also, the Union Sanitary District (USD) operates a treatment wetland to the north of the southern Eden Landing ponds. All of these municipal dischargers operate under NPDES permits issued and enforced by the RWQCB. There are numerous ongoing cleanup operations in the region that extract groundwater, remove pollutants (primarily fuels and organic solvents), and discharge the treated groundwater under coverage by the NPDES general permit for groundwater discharge administered by the RWQCB. Periodic spills of toxic materials (e.g., brines, chemicals) are subject to enforcement by the RWQCB.

The California Department of Toxic Substances Control (DTSC) regulates hazardous wastes. It derives its authority from Title 22 of the California Code of Regulations. Any areas known to have hazardous wastes in need of remediation near the SBSP Restoration Project area would be listed in the DTSC Envirostar database (http://www.envirostor.dtsc.ca.gov/public/).

Existing Water Quality Standards Programs

San Francisco Bay Region Basin Plan and California Toxic Rule

The existing water quality standards program implemented by the RWQCB is defined in the Basin Plan. The Basin Plan lists numerous beneficial uses of water that apply in the project and regional setting. The most relevant beneficial uses are ocean, commercial, and sport fishing; estuarine habitat; industrial service supply; fish migration; navigation; preservation of rare and endangered species; contact and non-contact recreation; shellfish harvesting; spawning; reproduction and/or early development of fish; and wildlife habitat. Designated groundwater beneficial uses include municipal and domestic supply, agricultural supply, and industrial service supply.

To protect these beneficial uses, the Basin Plan lists both narrative and numeric water quality objectives for surface and groundwater. Narrative objectives provide general guidance to avoid adverse water quality impacts. Narrative objectives relevant to this analysis include salinity, sediment (i.e., total suspended solids [TSS]), sulfides, toxicity, biostimulatory substances, bioaccumulation, and population and community ecology. Those narrative objectives are listed in Table 3.3-1. Numeric water quality criteria included in the Basin Plan establish objectives for trace metals, dissolved oxygen, turbidity, temperature, pH, bacteriological pathogens, and un-ionized ammonia. Numeric water quality criteria are summarized in Tables 3.3-2 through 3.3-4.

The Basin Plan specifies site-specific objectives for copper in the Bay and site-specific objectives for nickel in the South Bay, as shown in Table 3.3-2. The implementation plan establishes copper control measures to prevent increases in ambient dissolved copper concentrations, and metal translators are used to provide a ratio for total to dissolved copper and nickel concentrations for segments of the Bay.

Table 3.3-1 Basin Plan Narrative Water Quality Objectives Relevant to this Analysis

PARAMETER	NARRATIVE OBJECTIVE
Toxicity	All waters shall be maintained free of toxic substances in concentrations that are lethal to or that produce other detrimental responses in aquatic organisms. Detrimental responses include, but are not limited to, decreased growth rate and decreased reproductive success of resident or indicator species. There shall be no acute toxicity in ambient waters. Acute toxicity is defined as a median of less than 90 percent survival, or less than 70 percent survival, 10 percent of the time, of test organisms in a 96-hour static or continuous flow test. There shall be no chronic toxicity in ambient waters. Chronic toxicity is a detrimental biological effect on growth rate, reproduction, fertilization success, larval development, population abundance, community composition, or any other relevant measure of the health of an organism, population, or community. The health and life history characteristics of aquatic organisms in waters affected by controllable water quality factors shall not differ substantially from those for the same waters in areas unaffected by controllable water quality factors.
Turbidity	Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses. Increases from normal background light penetration or turbidity relatable to waste discharge shall not be greater than 10 percent in areas where natural turbidity is greater than 50 NTU [nephelometric turbidity units].
Sediment	The suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses. Controllable water quality factors shall not cause a detrimental increase in the concentrations of toxic pollutants in sediments or aquatic life.
Suspended material	Waters shall not contain suspended material in concentrations that cause nuisance or adversely affect beneficial uses.
Settleable solids	Waters shall not contain substances in concentrations that result in the deposition of material that cause nuisance or adversely affect beneficial uses.
Floating material	Waters shall not contain floating material, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect beneficial uses.

PARAMETER	NARRATIVE OBJECTIVE
Sulfides	All water shall be free from dissolved sulfide concentrations above natural background levels. Sulfide occurs in Bay muds as a result of bacterial action on organic matter in an anaerobic environment. Concentrations of only a few hundredths of a milligram per liter can cause a noticeable odor or be toxic to aquatic life. Violation of the sulfide objective will reflect violation of dissolved oxygen objectives as sulfides cannot exist to a significant degree in an oxygenated environment.
Oil and grease	Waters shall not contain oils, greases, waxes, or other materials in concentrations that result in a visible film or coating on the surface of the water or on objects in the water, that cause nuisance, or that otherwise adversely affect beneficial uses.
Biostimulatory substances	Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses. Changes in chlorophyll-a and associated phytoplankton communities follow complex dynamics that are sometimes associated with a discharge of biostimulatory substances. Irregular and extreme levels of chlorophyll-a or phytoplankton blooms may indicate exceedance of this objective and require investigation.
Bioaccumulation	Many pollutants can accumulate on particles, in sediment, or bioaccumulate in fish and other aquatic organisms. Controllable water quality factors shall not cause a detrimental increase in concentrations of toxic substances found in bottom sediments or aquatic life. Effects on aquatic organisms, wildlife, and human health will be considered.
Population and community ecology	All waters shall be maintained free of toxic substances in concentrations that are lethal to or that produce significant alterations in population or community ecology or receiving water biota. In addition, the health and life history characteristics of aquatic organisms in waters affected by controllable water quality factors shall not differ substantially from those for the same waters in areas unaffected by controllable water quality factors.
Salinity	Controllable water quality factors shall not increase the total dissolved solids or salinity of waters of the state so as to adversely affect beneficial uses, particularly fish migration and estuarine habitat.
pH	The pH shall not be depressed below 6.5 nor raised above 8.5. This encompasses the pH range usually found in waters within the basin. Controllable water quality factors shall not cause changes greater than 0.5 units in normal ambient pH levels.
Dissolved oxygen	For all tidal waters, the following objectives shall apply in the Bay: Downstream of Carquinez Bridge 5.0 mg/L minimum Upstream of Carquinez Bridge 7.0 mg/L minimum For nontidal waters, the following objectives shall apply to waters designated as: Cold water habitat 7.0 mg/L minimum Warm water habitat 5.0 mg/L minimum The median dissolved oxygen concentration for any three consecutive months shall not be less than 80 percent of the dissolved oxygen content at saturation. Dissolved oxygen is a general index of the state of the health of receiving waters. Although minimum concentrations of 5 mg/L and 7 mg/L are frequently used as objectives to protect fish life, higher concentrations are generally desirable to protect sensitive aquatic forms. In areas unaffected by waste discharges, a level of about 85 percent of oxygen saturation exists. A three-month median objective of 80 percent of oxygen saturation allows for some degradation from this level, but still requires a consistently high oxygen content in the receiving water.

Table 3.3-2 Basin Plan Surface Water Objectives for Metals (µg/L)

PARAMETER	WATER QUALITY OBJECTIVE SOUTH OF HAYWARD SHOALS		WATER QUALITY OBJECTIVE NORTH OF HAYWARD SHOALS	
	CONTINUOUS (4-DAY AVERAGE)	MAXIMUM (1-HOUR AVERAGE)	CONTINUOUS (4-DAY AVERAGE)	MAXIMUM (1-HOUR AVERAGE)
Arsenic	36	69	36	69
Cadmium	9.3	42	9.3	42
Chromium	50	1100	50	1100

PARAMETER	WATER QUALITY OBJECTIVE SOUTH OF HAYWARD SHOALS		WATER QUALITY OBJECTIVE NORTH OF HAYWARD SHOALS	
	CONTINUOUS (4-DAY AVERAGE)	MAXIMUM (1-HOUR AVERAGE)	CONTINUOUS (4-DAY AVERAGE)	MAXIMUM (1-HOUR AVERAGE)
Copper	6.9	10.8	6.0	9.4
Lead	8.1	210	8.1	210
Nickel	11.9 [1]	62.4 [1]	8.2	74
Selenium (total recoverable)	5	20	5	20
Silver	—	1.9	—	1.9
Zinc	81	90	81	90

Notes:
[1] Lower South Bay (south of Dumbarton Bridge)
Hayward Shoals = Little Coyote Point to the Oakland Airport

Table 3.3-3 Other Numeric Surface Water Criteria

PARAMETER	EVALUATION CRITERIA
Dissolved oxygen	5 mg/L[1, 5]
Mercury (total, including organic compounds)	0.051 µg/L,[2, 6] see also Table 3.3-4, below
PCBs	0.17 ng/L[2, 7]
PAHs	15.0 µg/L[1, 8]
Dioxins and furans	0.014 picogram (pg)/L[3 ,9]
Chlordanes	2.2 ng/L[2]
DDTs	0.59 ng/L[2]
TPH-diesel	200 mg/L[4]

Notes:
RWQCB, Water Quality Control Plan, San Francisco Bay Basin. Surface waters greater than 10 ppt salinity.
40 CFR Part 131.38 (California Toxics Rule [CTR]), May 18, 2000.
National Recommended Water Quality Criteria – Correction, USEPA, April 1999.
USEPA Multi-Sector Permit Benchmark Values.
Dissolved oxygen = water quality objective for tidal waters downstream of Carquinez Bridge.
Mercury = 0.051 µg/L, 30-day average (CTR). Applies south of Dumbarton Bridge.
PCB = 30-day average, water quality criteria value for human health for consumption of organisms, 10-6 risk.
PAH = water quality objective for 24-hour averaged level, salinity over 10 ppt.
Dioxins and furans = water quality criteria value for human health for consumption of organisms, 10-6 risk.

Table 3.3-4 Numeric Criteria for Mercury

LOCATION	BASIN PLAN WATER QUALITY OBJECTIVE FOR TOTAL MERCURY
San Francisco Bay	2.1 µg/L, 1-hour average in water
	0.2 mg/kg in fish, wet weight, trophic level 3 and 4 (larger fish which humans consume)
	0.03 mg/kg in fish, wet weight, 3 to 5 cm in length (smaller fish which wildlife consumes)

Notes:
The Basin Plan objectives listed above are applicable in marine waters— those in which the salinity is equal to or greater than 10 ppt, 95 percent of the time. For waters in which the salinity is between fresh and marine, that is between 1 and 10 ppt, the applicable objectives are the more stringent of the freshwater or marine objectives. For mercury, the marine objectives are more stringent.

The Basin Plan includes numeric water quality objectives for mercury concentrations in fish. Although water quality criteria and objectives are traditionally expressed as mass of pollutant per unit mass of water (e.g., μg/L), the Clean Water Act enables expression of criteria and objectives in alternative units. For bioaccumulative pollutants such as mercury, guidance by USEPA requires states to develop numeric criteria or objectives that are based on pollutant concentrations in fish tissue and then implement the tissue-based criteria or objectives by translating the tissue-based values to water-based and sediment-based metrics. The fish tissue targets for the Bay mercury are 0.2 mg/kg wet weight for trophic level 3 and trophic level 4 fish, and 0.03 mg/kg wet weight for smaller fish (3 to 5 centimeters in length) that are the prey of wildlife. These objectives are summarized in Table 3.3-4. To achieve the human health and wildlife targets and to attain water quality standards, the Bay-wide suspended sediment mercury concentration target was set at 0.2 mg/kg mercury in dry sediment. (This does not translate directly to a numeric guideline for sediments within the SBSP Restoration Project area. Rather, the evaluation of impacts considers the potential of a project activity to raise or lower the average concentration of mercury in the Bay near where the activity takes place.)

The Basin Plan includes a fish tissue concentration target for PCBs in the Bay that is used to protect beneficial uses. A sediment concentration goal of 1 μg/kg PCBs is used to support the fish tissue target of 10 μg/kg PCBs, wet weight. Currently, ambient Bay sediments are approximately ten-fold higher than the sediment concentration goal of 1 μg/kg. The impact of project activities on the concentration of PCBs in ambient Bay sediments has been evaluated with reference to this goal and other environmental indicators of ecological risk, as appropriate.

In addition to the Basin Plan, the CTR specifies numeric aquatic life criteria for 23 priority toxic pollutants and numeric human health criteria for 57 priority toxic pollutants. These criteria apply to all inland surface waters and enclosed bays and estuaries of the San Francisco Bay region, although Tables 3-3 and 3-4 of the Basin Plan include numeric water quality objectives for certain of these priority toxic pollutants that supersede the CTR criteria (except south of the Dumbarton Bridge). Human health criteria are further identified as for consumption of “water and organisms” and “organisms only.” These objectives are applied with consideration to the beneficial use of the waterbody.

Applicable water quality objectives are affected by both geography and salinity. Numeric and narrative objectives from the Basin Plan and most CTR numeric criteria apply to Bay waters. The Basin Plan and the CTR also establish different numeric objectives for freshwater and saltwater. Freshwater is defined as having salinity less than 1 ppt more than 95 percent of the time, whereas saltwater is defined as having salinity greater than 10 ppt more than 95 percent of the time. Conditions between these two endpoints define estuarine waters, in which case the more stringent (lower) of either the freshwater or the saltwater objectives apply.

SWRCB Sediment Quality Objectives

The SWRCB sediment quality objectives are based on chemical concentrations, bioassays, and benthic community conditions. The *Water Quality Control Plan for Enclosed Bays and Estuaries*, Part 1, *Sediment Quality* (SWRCB 2009) contains the following narrative water quality objective: “pollutants in sediments shall not be present in quantities that, alone or in combination, are toxic to benthic communities in bays and estuaries of California.” This Water Quality Control Plan became effective in August 2009, supersedes other narrative sediment quality objectives, and establishes new sediment quality objectives and related implementation provisions for specifically defined sediments in most bays and estuaries.

LTMS Guidelines

There is guidance for sediment assessment in the Beneficial Reuse of Dredged Materials: Sediment Screening and Testing Guidelines (RWQCB 2000) consistent with the Long-Term Management Strategy (LTMS) Management Plan (USACE, USEPA, BCDC, and RWQCB 2001). The LTMS Guidelines define statistically determined San Francisco Bay ambient sediment concentrations and ecological thresholds (Table 3.3-5). The ambient concentrations are established through previous sampling efforts around “unimpacted” areas of San Francisco Bay. The ecological thresholds defined in the LTMS Guidelines are the Effects Range–Low (ER-L) and the Effects Range–Median (ER-M) established by the National Oceanic and Atmospheric Administration (NOAA). ER-Ls represent the concentration below which adverse biological effects are unlikely, and ER-Ms represent the concentrations above which adverse biological effects are likely.

The LTMS Guidelines are not a set of regulatory objectives, although project-specific permits from the RWQCB often require that dredge materials placed in areas with direct contact with Bay waters meet the recommended screening guidelines for wetland surface materials. In general, the RWQCB considers sediment with concentrations less than ambient levels to be acceptable for wetland cover material (the upper 3 feet), and sediment with concentrations less than ER-Ms are acceptable for wetland foundation material (greater than 3 feet below current or designed ground surface elevations). (However, for PCBs the ER-L is used as a guideline for cover material.) For some chemical constituents, the ambient value is greater than the respective ER-L. However, the RWQCB acknowledges that it is not practical to regulate to concentrations “cleaner” than ambient conditions.

Table 3.3-5 LTMS Sediment Guidance

CHEMICAL CONSTITUENT	SAN FRANCISCO BAY AMBIENT SEDIMENT CONCENTRATIONS (MG/KG)	EFFECTS RANGE-LOW, ER-L (MG/KG)	EFFECTS RANGE-MEDIAN, ER-M (MG/KG)	SCREENING GUIDELINES FOR WETLAND COVER MATERIAL (MG/KG)
Metals				
Arsenic	15.3	8.2	70	15.3
Cadmium	0.33	1.2	9.60	0.33
Chromium	112	81	370	112
Copper	68.1	34	270	68.1
Lead	43.2	46.7	218	43.2
Mercury	0.43	0.15	0.71	0.43
Nickel	112	20.9	51.6	112
Selenium	0.64	-	-	0.64
Silver	0.58	1	3.7	0.58
Zinc	158	150	410	158
Pesticides				
Aldrin	0.0011	-	-	-
Dieldrin	0.00044	0.000715 [1]	0.0043 [2]	0.00072
p,p’-DDD	-	0.00122 [1]	0.00781 [2]	-

CHEMICAL CONSTITUENT	SAN FRANCISCO BAY AMBIENT SEDIMENT CONCENTRATIONS (MG/KG)	EFFECTS RANGE-LOW, ER-L (MG/KG)	EFFECTS RANGE-MEDIAN, ER-M (MG/KG)	SCREENING GUIDELINES FOR WETLAND COVER MATERIAL (MG/KG)
p,p’-DDE	-	0.00220	0.027	-
p,p’-DDT	-	0.00119 [1]	0.00477 [2]	-
Endrin	0.00078	-	-	-
Hexachlorobenzene	0.000485	-	-	0.000485
Sum of chlordanes (SFEI list)	0.0011	0.00226 [1]	0.00479 [2]	0.0023
Sum of DDTs (SFEI list)	0.007	0.00158	0.0461	0.007
Sum of HCH (SFEI list)	0.00078	-	-	0.00078
Sum of PCBs (SFEI list)	0.0216	0.0227	0.18	0.0227
PAHs				
1-Methylnaphthalene	0.0121	-	-	0.0121
1-Methylphenanthrene	0.0317	-	-	0.0317
2,3,5-Trimethylnaphthalene	0.0098	-	-	0.0098
2,6-Dimethylnaphthalene	0.0121	-	-	0.0121
2-Methylnaphthalene	0.0194	0.07	0.67	0.0194
2-Methylphenanthrene	0.0266	-	-	-
Acenaphthene	0.0317	0.016	0.5	0.026
Acenaphthylene	0.0266	0.044	0.64	0.088
Anthracene	0.088	0.0853	1.1	0.088
Benz(a)anthracene	0.244	0.261	1.6	0.412
Benzo(a)pyrene	0.412	0.43	1.6	0.371
Benzo(b)fluoranthene	0.371	-	-	0.371
Benzo(e)pyrene	0.294	-	-	0.294
Benzo(g,h,i)perylene	0.310	-	-	0.310
Benzo(k)fluoranthene	0.258	-	-	0.258
Biphenyl	0.0129	-	-	0.0129
Chrysene	0.289	0.384	2.8	0.289
Dibenz(a,h)anthracene	0.0327	0.0634	0.26	0.0327
Fluoranthene	0.514	0.6	5.1	0.514
Fluorene	0.0253	0.019	0.54	0.0253
Indeno(1,2,3-c,d)pyrene	0.382	-	-	0.382
Naphthalene	0.0558	0.16	2.1	0.0558
Perylene	0.145	-	-	0.145
Phenanthrene	0.237	0.24	1.5	0.237
Pyrene	0.665	0.665	2.6	0.665
Sum of HPAHs (SFEI list)	3.060	1.7	9.6	3.06
Sum of LPAHs (SFEI list)	0.434	0.552	3.16	0.434
Sum of PAHs (SFEI list)	3.390	4.022	44.792	3.39

Notes:

[1] Threshold Effects Level, as established by the Florida Department of Environmental Protection (FDEP); no ER-L was established.

[2] Probable Effects Level, as established by the FDEP; no ER-M was established.

Waste Discharge Requirements

The RWQCB has issued waste discharge requirements to the USFWS and the CDFW for discharges from the SBSPs and for ongoing maintenance activities. Water Quality Order No. R2-2004-0018 was issued in conjunction with actions taken under the Initial Stewardship Plan and Water Quality Order No. R2-2008-0078, as revised by R2-2012-0014, was issued for Phase 1 actions (RWQCB 2006, 2008, 2012). These requirements permit discharge from certain ponds under an initial release scenario where high salinities discharged from certain ponds may impact beneficial uses in the short term, but impacted areas are expected to fully recover within 1 year. The initial release refers to the time expected to substantially empty salt ponds of their current contents. These requirements also permit subsequent discharge from these ponds as waters from the South Bay are taken into pond systems and then discharged more-or-less continuously (continuous circulation). For the continuous circulation period, the pond systems are required to be managed to ensure beneficial uses remain protected.

The main parameters of concern initially identified by the RWQCB include salinity, metals, dissolved oxygen, pH, and temperature. Subsequent permits also identify mercury, nutrients, and algae. Discharge limitations include numeric criteria for salinity during the initial discharge and during continuous circulation, dissolved oxygen, pH, and temperature. (Salinity is used as an indicator parameter for the concentrations of metals in the salt ponds – concentrations of metals were considered to not impact Bay waters if the salinity of the discharge was limited to 44 ppt.) Water Quality Order No. R2-2008-0078 also specifies receiving water limitations at the contour line for mean lower-low water level (i.e., 0 foot elevation, North American Vertical Datum of 1988 [NAVD88]) for dissolved oxygen, dissolved sulfate, pH, ammonia, nutrients, and turbidity. The order also acknowledges that ponds and sloughs have variable dissolved oxygen levels and often are below the 5.0 mg/L objective due to algal activity.

As indicated in the SBSP waste discharge requirements, the RWQCB expects that the SBSP Restoration Project would create net environmental benefits with respect to water quality and beneficial uses. The RWQCB indicates that restoring tidal wetland functions to former salt ponds would improve water quality in the South Bay estuary on a spatially significant scale with large contiguous habitat to maximize transitional habitat (ecotones) and minimize non-native vegetation, if appropriate management efforts are taken to control non-native species. Marsh systems that are tidally connected to the estuary improve water quality by filtering and fixing pollutants in addition to protecting beneficial uses by providing nursery habitat and protection from predation for native fish species, significant biological productivity to the estuarine system, and habitat for rare and endangered species. Successful restoration would also provide shallow-water habitat for migrating shorebirds and foraging and nesting islands for birds. Operating former salt ponds as managed ponds is considered by the RWQCB to be a transitional phase between salt-making and tidal marsh restoration. This transitional pond management phase for most of the former salt ponds would benefit the environment in the near term by providing shallow open water habitat for shorebirds, thus avoiding the consequences of operating them as seasonal ponds. In addition to habitat and water quality benefits, tidal marsh restoration would also help protect communities from floods, storms, and sea level rise.

Emerging Programs of Water Quality Standards

Emerging programs that may result in new water quality or sediment quality criteria include:

- The RWQCB is working with the SWRCB, the Southern California Coastal Water Research Program, and SFEI to develop nutrient numeric endpoints for the Bay to address nutrient over-enrichment (eutrophication) in state waters. The Draft Scientific Plan for implementing the San Francisco Bay Nutrient Management Strategy was submitted to the SWRCB in March 2016, which describes the studies needed to inform major management decisions.
- Trash could be listed as an impairing pollutant in many urban creeks, including Alameda Creek, during the lifetime of this project. Measures to reduce trash would likely be implemented through the Municipal Regional Permit for stormwater; if these do not succeed, a trash Total Maximum Daily Load (TMDL) is a potential next regulatory step.
- The San Francisco Bay Beaches Bacteria TMDL and Basin Plan amendment has recently been adopted by the RWQCB (April 2016), and is currently being reviewed by the SWRCB for approval. This TMDL establishes a target condition for water contact recreation at San Francisco Bay beaches.

New objectives resulting from these programs are considered in the evaluation of impacts.

3.3.3 Environmental Impacts and Mitigation Measures

Overview

The potential to exceed the thresholds of significance for each impact is evaluated and summarized below. Impact evaluations for the Action Alternatives are assessed based on the existing conditions and the anticipated future conditions that would occur under the No Action Alternative. In this case, the No Action Alternative represents no change from current management direction, practices, or level of management intensity provided in the AMP and CDFW's pond operations plan. Under each potential impact, the likelihood of occurrence and the potential for mitigation are discussed. If there is considerable uncertainty about the likelihood of occurrence, the information needed to reduce the uncertainty is described.

Significance Criteria

For the purposes of this Draft EIS/R, the project is considered to have adverse impacts on water quality or groundwater resources if it would:

- Violate water quality standards or otherwise substantially degrade water quality; or
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge.

None of the SBSP Restoration Project alternatives use groundwater, so the project would not interfere with groundwater recharge or deplete groundwater supplies through groundwater extraction.

For the purpose of this impact assessment, the thresholds of significance are applied to changes from baseline conditions that result from factors within the control of the project proponents. Ambient water quality in the Bay itself, though discussed in the impact sections, is considered outside the control of the project proponents.

Water Quality

Thresholds of significance are used to define indicators of significant environmental impacts. In general, thresholds should be objective and based on existing standards (see Tables 3.3-1 through 3.3-5). Some potential impacts have also been identified as “staircase issues” for the AMP. The “restoration staircase” was a concept developed for the SBSP Restoration Project at its program-level and was included in the 2007 Final EIS/R. Staircase issues are areas of uncertainty for which it is difficult to predict specific outcomes based on the available data and current understandings of the system. The staircase issues are being addressed through the AMP, which includes monitoring to measure and track actual outcomes of management and restoration actions, together with predefined triggers designed to detect adverse outcomes early on, before they reach levels of significance. Corrective actions can thus be developed and implemented before the thresholds of significance are reached. If monitoring indicates that no adverse impacts are occurring, then the planned restoration can continue along the staircase to the next step.

For water quality impacts, the staircase issues are

- Changes in algal composition leading to nuisance algal blooms;
- Algal blooms leading to low dissolved oxygen levels;
- Increased mercury methylation and bioaccumulation; and
- Mobilization and transport of mercury-contaminated sediments and other pollutants.

Triggers for adaptive management actions are typically established well below the thresholds of significance to ensure that the thresholds of significance are not exceeded.

Threshold for Changes in Algal Composition and Abundance

Project activities that lead to unacceptable increases in algal abundance would be deemed to have significant impacts if the RWQCB narrative water quality objective for biostimulatory substances is violated:

> Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses. Changes in chlorophyll-a and associated phytoplankton communities follow complex dynamics that are sometimes associated with a discharge of biostimulatory substances. Irregular and extreme levels of chlorophyll-a or phytoplankton blooms may indicate exceedance of this objective and require investigation.

Concerns over nuisance algal blooms apply to both free-floating phytoplankton and attached macrophytes. In the Bay, where, nutrients are not limiting for algal growth, the biostimulatory substance could be sunlight, in which case the project activity that could potentially promote aquatic growth is localized reduction in suspended load outside a breached levee due to a net loss of suspended load inside the accreting marsh area.

The key indicator that a threshold of significant impact has been exceeded is if algal growth cause nuisance or adversely affect beneficial uses. A key difference between the regional setting (the Bay) and the Eden Landing Phase 2 project setting (managed ponds and restored tidal wetlands) is the baseline with respect to nuisance and protection of beneficial uses. In the regional setting, baseline levels of chlorophyll-a and the expected seasonal variations are well known because of regional monitoring programs. Likewise, dissolved oxygen levels in the open Bay typically meet the Basin Plan water quality objective of 5 mg/L. In contrast, the Bay fringe areas (i.e., former salt ponds, tidal marshes, and sloughs) that make up much of the project setting are known to have higher algal productivity and lower dissolved oxygen levels than in the open Bay. High algal productivity and lower dissolved oxygen levels are common to ponds, wetlands, and sloughs, and do not necessarily indicate degraded or impaired habitat.

Project activities that lead to unacceptable increases in algal composition would be deemed to have significant impacts if the RWQCB narrative water quality objective for population and community ecology is violated:

> All waters shall be maintained free of toxic substances in concentrations that are lethal to or that produce significant alterations in population or community ecology or receiving water biota. In addition, the health and life history characteristics of aquatic organisms in waters affected by controllable water quality factors shall not differ substantially from those for the same waters in areas unaffected by controllable water quality factors.

The narrative objective is helpful because it recognizes the interactive effect of toxicants on changes in community structure. For example, some species of algae (e.g., diatoms) are more resistant to free ionic copper than others (e.g., blue-green algae), and this difference can exert a significant effect on algal community structure. Establishing the narrative objective as a threshold ensures that adaptive management actions would address the interactive effects of biostimulation and other controllable water quality factors that can alter algal composition. The complexity of defining thresholds and baselines for algal abundance and composition is one reason this issue is being handled as a staircase issue. The narrative objectives cited above are sufficient as thresholds for the purposes of this analysis.

Threshold for Localized, Seasonal Low Dissolved Oxygen Levels

The threshold for low dissolved oxygen levels is established by the Basin Plan water quality objective for dissolved oxygen (see Table 3.3-1). Low dissolved oxygen levels can cause mortality in aquatic and benthic organisms (Impact 3.3-2, below), increased mercury methylation rates (Impact 3.3-3, below), and increased rates of disease such as avian botulism. In the Bay, low dissolved oxygen levels correspond to 5 mg/L dissolved oxygen or less for tidal waters, although the objective acknowledges that attaining 80 percent oxygen saturation as a 3-month median is satisfactory for protection of beneficial uses. In the Eden Landing Phase 2 project setting (managed ponds and restored tidal wetlands), the threshold for significance would vary depending on the habitat type. For open, fully tidal waters, the threshold is the same as for the regional setting—dissolved oxygen levels greater than 5 mg/L or at least 80 percent saturation as a 3 month median. But waters that are subject to muted or constrained tidal action (e.g., the managed ponds) function differently because they are managed primarily for wildlife habitat (avian species use). Restricted circulation often results in low dissolved oxygen levels. Therefore, for this analysis, low dissolved oxygen levels alone are not considered a threshold for managed ponds. Rather, the threshold for significant impacts is low dissolved oxygen levels and at least one of the following negative impacts of low dissolved oxygen: mortality of aquatic or benthic organisms, odors that cause nuisance, degraded habitat, or unacceptably high methylmercury production rates (see discussion of methylmercury, below).

This impact is also considered a staircase issue. To avoid exceeding thresholds of significant impact, the AMP defines triggers and associated adaptive management actions to prevent an impact from occurring.

Increased Methylmercury Production, Bioaccumulation, and Mobilization and Transport of Mercury-Contaminated Sediments

The project would have significant impacts to both the regional setting and the project setting if project actions resulted in water quality conditions that exceed the tissue-based mercury water quality objectives in the Basin Plan, as summarized in Table 3.3-4. The Bay Mercury TMDL also discusses a bird egg monitoring target that is also considered during evaluation of impacts. The bird egg monitoring target is a concentration of less than 0.5 mg/kg mercury for bird eggs (wet weight). This concentration is the lowest observable effect level for reproductive impairment in the endangered least tern but is applied to all bird eggs. In addition, the narrative water quality objective for bioaccumulation is considered to be a threshold for significant impacts:

> Many pollutants can accumulate on particles, in sediment, or bioaccumulate in fish and other aquatic organisms. Controllable water quality factors shall not cause a detrimental increase in concentrations of toxic substances found in bottom sediments or aquatic life. Effects on aquatic organisms, wildlife, and human health will be considered.

Establishing this narrative objective as a threshold of significant impacts clarifies that the main concern over mercury is methylmercury, because methylmercury is the primary mercury form that bioaccumulates.

In the regional setting, the threshold for significant impacts for total mercury concentrations in sediments is based, in part, on the suspended sediment mercury target established in the Basin Plan. The Basin Plan includes a target for mercury in suspended sediments of 0.2 mg/kg, computed as an annual median. It is important to recognize that the Bay is currently over this target, which is in part why a TMDL for mercury is being implemented. Project activities that release sediments to the Bay with a median mercury concentration exceeding ambient conditions (and this target value) would be deemed to have significant impacts. The threshold for impacts to managed ponds and restored tidal wetlands for total mercury in sediments is based on the ER-M for mercury (0.7 mg/kg), from the LTMS Guidelines for the beneficial re-use of dredged and sediments (see Table 3.3-5). Project activities that would involve or result in sediments within the SBSP Restoration Project area that exceed this guideline (such as import of dredge material with mercury concentrations about the ER-M thresholds) would be deemed to have significant impacts. Low oxygen conditions are known to increase the risk of methylmercury production. Therefore, more sensitive thresholds for mercury concentrations in sediment could be considered for areas prone to low dissolved oxygen levels to stay below the threshold defined by the narrative objective for bioaccumulation.

Methylmercury bioaccumulation is identified as a staircase issue. The AMP is framed to avoid exceedance of thresholds by developing triggers for adaptive management actions. Triggers are based on methylmercury concentrations in water and sediments, net methylmercury production rates, and mercury concentrations in sentinel species in comparison to levels prior to restoration. Site-specific food web modeling and other tools have also been developed as part of the AMP. Because of the complexity of the biogeochemical processes affecting the conversion of mercury to methylmercury and its accumulation in the food chain, the impacts of mercury mobilization and transport and increased methylmercury production and bioaccumulation are addressed by the AMP.

Mobilization and Transport of Other Contaminants

For all other contaminants, the thresholds for significant impacts are the water quality objectives for the Bay established in the Basin Plan. Project activities that would cause an exceedance of these water quality objectives are deemed to have significant impacts. For pollutants of concern in sediments, the LTMS Sediment Guidance (Table 3.3-5) is also considered. A project activity would be considered to have significant impacts if it causes a detrimental increase in constituent concentrations above ambient conditions or above the ER-M. Some metals, such as nickel, have concentrations that are naturally higher than the ER-M.

Groundwater Quality

The threshold for an impact to groundwater quality is a substantial increase in the potential for salinity intrusion from the Bay into deep potable aquifers. This increase would be indicated by a project-related increase in salinity or total dissolved solids (TDS) at monitoring wells protecting water supplies that exceeds the narrative objective for salinity or the numeric objective for TDS or violates the state's anti-degradation policy by unreasonably degrading the quality of high-quality water. The water quality objective for TDS in municipal water supplies is 500 mg/L.

Program-Level Evaluation Summary

The determination was made in the 2007 Final EIS/R that Programmatic Alternative A (the No Action Alternative) would result in a potentially significant impact and that the Action Alternatives would result in a less-than-significant impact for the following metrics:

- Changes in algal abundance and composition, which could in turn degrade water quality by lowering dissolved oxygen and/or promoting the growth of nuisance species;
- Potential to cause localized, seasonally low dissolved oxygen levels as a result of algal blooms, increased microbial activity, or increased residence time of water;
- Potential to mobilize, transport, and deposit mercury-contaminated sediments, leading to exceedance of numeric water quality objectives, TMDL allocations, and sediment quality guidelines for total mercury; and
- Potential increase in net methylmercury production and bioaccumulation in the food web.

The potential to cause seawater intrusion of regional groundwater sources was also considered potentially significant under No Action conditions, but less than significant in the Action Alternatives, one of which was selected for program-level implementation.

Under Programmatic Alternative A (No Action), it was determined that the lack of monitoring triggers and commitments to take adaptive management actions could lead to potentially significant changes in water quality. Under Programmatic Alternatives B and C, the conceptual designs of the overall alternatives in addition to the implementation of the AMP would reduce uncertainties, adverse water quality conditions, and adverse conditions associated with unintentional levee breaches. At the program level, the decision was made to select Programmatic Alternative C, the Tidal Habitat Emphasis, and implement Phase 1 actions.

Project-Level Evaluation

Phase 2 Impact 3.3-1: Degradation of water quality due to changes in algal abundance or composition.

Eutrophication, the process in which water bodies receive excess nutrients that stimulate excessive plant growth, is a potential concern in both the regional setting (the Bay) and the Phase 2 project settings (managed ponds and restored tidal wetlands). The conceptual model for coastal eutrophication emphasizes both direct and indirect factors that lead to changes in algal abundance and composition. These factors include water transparency, distribution and abundance of larger plants, nutrient ratios and their effect on algal assemblages, chemical transformations in sediment, the life cycle of bottom-dwelling and free-swimming invertebrates, and responses to toxic pollutants and other stressors (Cloern 2001). Changes to algal abundance and composition could cause nuisances and harm in aquatic ecosystems, including the red tides caused by dinoflagellates; paralytic shellfish poisoning caused by diatoms; and mats of blue-green algae that are unsightly, cause odors, and lead to depressed dissolved oxygen levels when they decay.

The potential for changes in algal abundance and composition depends on a number of factors, including:

- Availability of limiting nutrients. The additional input of nutrients that otherwise limit algae production can stimulate algal growth, although there are other attenuating factors. Bay waters typically have high nutrient concentrations. Although the Bay has shown resistance to some of the classic symptoms of nutrient over-enrichment, this is due, in part, to Bay waters generally being light limited.
- Water transparency. Increased water transparency can stimulate plankton growth where light is the limiting factor, rather than nutrients. Bay waters are generally light limited, however, the limiting factor within restored tidal wetlands and managed ponds is not known.
- Hydraulic residence time. Within a managed pond or tidal marsh, the growth of free-floating algae is balanced by removal due to seasonal releases, for ponds, or tidal flushing, for marshes.
- Composition of zooplankton grazers. The amount of grazing organisms present and their food preference exerts a direct effect on algal community structure.
- Concentrations of biologically available metals that are toxic to algae. Different species of algae have different tolerances for metal toxins, such as copper. Metal toxicity is regulated by the amount of metal available for uptake by algae.

Each of these direct factors is dependent on a number of indirect factors. For example, nutrient concentrations are affected by both external sources and internal cycling at the sediment-water interface. Hydraulic residence time can change as water depths decrease because of increased pond bottom elevations due to accretion. Water transparency decreases as suspended sediment concentrations increase, so wind shelter that creates quiescent areas can lead to increased light penetration inside restored tidal wetlands and managed ponds. Accretional areas that trap sediments within the ponds can decrease turbidity in areas adjacent to breached levees. Light penetration can be decreased by algal blooms, especially macrophytic algae. The composition of zooplankton grazer populations responds to changes both in the available food and the intensity of predation from higher organisms. The amount of biologically available metals, such as copper, present in the water column can shift in response to not only changes in metal concentrations but also the amounts of complexing agents present (e.g., dissolved organic matter) that reduce metal availability for uptake by algae. The intricacy of interactive effects between direct and indirect factors makes prediction of the exact response to project alternatives difficult, which is why effects are managed adaptively.

The AMP would address the uncertainties regarding the relationship between project activities and thresholds for significant impacts to algal abundance and composition by monitoring chlorophyll, growth rates, species composition, benthic habitat quality, benthic invertebrate communities, and sediment dissolved oxygen and oxidation-reduction (redox) profiles, as appropriate and when necessary. Should project activities cause adverse changes to water quality, adaptive management measures would be implemented to reduce potential impacts (e.g., manipulating hydraulic residence time or altering the depths of managed ponds and restored tidal marshes).

The baseline conditions are different for the analysis in this Draft EIS/R than in the 2007 Final EIS/R. In the 2007 Final EIS/R, the Programmatic No Action Alternative assumed not doing the program-level project also meant that the AMP would not be implemented. A program-level Action Alternative (Alternative C) was selected and is being implemented; that alternative included the AMP. Therefore, for the purposes of this analysis, the assumption now is that the landowners will continue to implement the AMP measures that maintain water quality. For this reason, some of the Phase 2 project-level significance determinations for the No Action Alternative are different in this Draft EIS/R analysis than in the 2007 Final EIS/R.

Alternative Eden A (No Action). Under Alternative Eden A (No Action), no new activities would be implemented as part of Eden Landing Phase 2. The southern Eden Landing ponds would continue to be managed through the activities described in the AMP, in accordance with current CDFW practices. These ponds are currently operated as seasonal ponds, batch ponds, or for limited directional circulation. Accretion rates in the ponds are minor due to the limited circulation. Residence times in the ponds are relatively long, and risk factors for algal abundance are high. Large algal blooms have been noted in the Eden Landing ponds for several years and subsequent pond management changes require several days to several weeks to result in observable changes in water quality conditions, habitat quality, and use (CDFW 2015).

Managed pond operations would not change, and therefore algal abundance is expected to be similar to existing conditions (a substantial increase in algal abundance beyond what is found under existing conditions is not expected). Monitoring and implementation of adaptive management measures would be used to address harmful changes in algal species composition. Although algal abundance is high, this condition already exists and Alternative Eden A would not worsen this condition. Therefore, impacts would be less than significant.

Alternative Eden A Level of Significance: Less than Significant

Alternative Eden B. Alternative Eden B includes raising pond bottom elevations through the import of dredge material during the construction phase of the project. Dredge material or upland fill material would be used to build habitat transition zones. Upland fill material would also be used for other restoration, flood risk management, and recreational components. The dredge material would be deposited into the ponds in a slurry, and sediments would have the opportunity to settle. Once solids have settled in the ponds, excess water would be decanted and discharged into the Bay. Sediments are generally expected to remain in place when levees are breached and tidal flows are introduced to the ponds – areas near the external levee breaches would likely scour, but sediments deposited within the deep interior of the ponds are expected to remain intact. If sediments are not cohesive or do not have the opportunity to consolidate prior to breaching, additional sediment is expected to scour from the ponds with the initial outgoing tides. This sediment would likely remain in the South Bay, move back and forth through the breached levees and control structures with the tides, and over time, be reworked and redeposited in the ponds or nearby mudflats.

Alternative Eden B would increase tidal flows in the Bay, Inland, and Southern Ponds by breaching levees in the Bay and Inland Ponds and by adding water control structures and improving circulation in the Southern Ponds. Levees along the northern margins of Ponds E1 and E6 would be breached to OAC and the levee on the southern edge of Pond E2 would be breached to the Alameda County marsh, which in turn would be connected to the ACFCC via a water control structure. Portions of the outer levees around the Bay Ponds would be lowered to mean higher high water (MHHW), and internal levees would be breached to increase the hydraulic connectivity between channels and marshes, alter circulation and sedimentation patterns, and increase habitat complexity. Pilot channels would be excavated into and within the Bay, Inland, and Southern Ponds to improve circulation or drainage, and in the case of the Bay Ponds and Inland Ponds, to enhance tidal marsh formation.

Levee breaches would allow tidal inundation to the Bay and Inland Ponds, increase tidal flows and scour in adjacent sloughs, and increase accretion rates within the these ponds. Fully tidal systems (both tidal ponds and adjacent sloughs) have short residence times, are well mixed by tidal flows, and are subject to wind and wave action. Although muted, the Southern Ponds would be operated to simulate tidal flows to the maximum extent possible through the water control structures. The muted tidal flows in the Southern Ponds would increase circulation and decrease residence times in Ponds E1C, E5C, and E4C.

Restoration of tidal marsh habitat would import sediment from tidal waters and raise pond bottom elevations. Tidal flows would bring slough water through the breaches, where suspended sediments would settle out from the water before ebb flows. Accretion in tidal marsh habitat would decrease the suspended sediment supply in the surrounding sloughs and open waters of the Bay, potentially resulting in increased light penetration and algal abundance outside of the ponds.

High-risk factors for excess algal growth within any particular pond are waters that are deep, slow, rich in nutrients and chlorophyll, subject to calm wind exposure, and highly transparent. These types of conditions are more typical of batch ponds managed for deeper water depth with limited inflows and mixing with other ponds. Therefore, the risk factors for managed ponds are relatively high and the potential for excess algal abundance is greater.

Conversely, the lowest-risk waterbodies would likely be shallow, quickly turned over, poor in nutrients and chlorophyll, windy, and opaque. Fully tidal systems (both tidal ponds and adjacent sloughs) have short retentions times, are well mixed by tidal flows, and are often subject to wind and wave action. Therefore, the risk factors for fully tidal systems are relatively low and the potential for increased algal abundance is minimal.

During the construction phase of the project, tidal exchange between the ponds and adjacent sloughs and channels would be limited until external levees are breached. Water levels in the ponds would be lowered prior to placement of dredge materials, slurry material would fill the ponds, and water from the slurry would be decanted once the solids have settled. During most of this time, the ponds are expected to be shallow, turbid (opaque), warm, and have relatively long hydraulic residence times (up to a year). Risk factors during the construction phase of the project are, therefore, high for adverse changes to algal abundance. Although excess algae would be released with the decant water and when tidal flows are first introduced to the ponds, high algal productivity is common to Bay fringe areas, including wetlands and sloughs, and a short-term increase in algal abundance would not necessarily indicate degraded or impaired habitat.

Alternative Eden B would result in long-term changes to hydraulic residence times in the Bay, Inland, and Southern Ponds after tidal or muted tidal flows are introduced. Flow rates in the ponds and adjacent sloughs would increase, and residence times in the ponds would decrease. Treated wastewater from the USD's wastewater treatment plant or brackish water from ARP wells could also be diverted into the Inland Ponds. Treated wastewater from the USD could provide additional nutrients, but volumes would be small compared to the tidal prism. Therefore, risk factors associated with increased algal abundance and adverse changes in species composition would be low to moderate, but compared to existing conditions, risk factors would be reduced over the long-term. After the ponds are restored to tidal and muted tidal flows, adverse changes to algal abundance and composition are not anticipated due to the short hydraulic residence times in the ponds and due to flushing flows from the Bay. Impacts would be less than significant.

Alternative Eden B Level of Significance: Less than Significant

Alternative Eden C. Under Alternative Eden C, pond elevations would be raised in the Bay Ponds, the Bay Ponds would be breached for tidal inundation, and the Inland Ponds and Southern Ponds would remain managed ponds but be enhanced through the addition of water control structures. The northern levee at Pond E1 would be breached to OAC, the southern levee at Pond E4 would be breached to the Alameda County wetlands. Water control structures would be installed in the Inland Ponds and Southern Ponds to manage water quality, depth, salinity, and other aspects of habitat for certain species, including those at the boundaries with OAC, the ACFCC, the J- Ponds, and the Alameda County wetlands. Portions of the outer levees around the Bay Ponds would be lowered and internal levees would be breached during the construction period. Dredge material would be brought in to raise pond bottom elevations in the Bay Ponds and dredge material or upland fill material would be used to build habitat transition zones. Pilot channels would be excavated into and within the Bay Ponds to improve drainage and to enhance tidal marsh formation.

Potential construction-phase impacts from Alternative Eden C (i.e., short-term increases in algal abundance during construction and the initial release of algae from the ponds when tidal flows are first introduced to the Bay Ponds) would be similar to those described under Alternative Eden B.

Under Alternative Eden C, residence times would decrease in the Bay Ponds once external levees are breached, but residence times could remain similar to existing conditions in the Inland Ponds and Southern Ponds, depending on how those ponds were managed. Seasonal/batch ponds can have relatively long residence times with limited inflows and mixing. If not well managed, these ponds could become stagnant and rich in nutrients, and therefore risk factors are moderate to high for adverse changes to algal abundance and composition. However, the addition of new water control structures would allow for improved management control over circulation, water levels, and residence times. These and other management activities would be used to minimize adverse effects. Should these managed ponds cause adverse changes to algal abundance and composition, adaptive management measures would be implemented to reduce potential impacts (e.g., manipulating hydraulic residence time or altering the depths of the managed ponds). Because monitoring and adaptive management would be used to minimize adverse effects from managed ponds, impacts would be less than significant.

Alternative Eden C Level of Significance: Less than Significant

Alternative Eden D. Under Alternative Eden D, tidal flows would be introduced to the Bay Ponds, but the Inland Ponds and the Southern Ponds would remain as managed ponds until tidal or muted tidal flow is introduced at some future time. The northern levee at Pond E1 would be breached to OAC. Water control structures would be constructed in the Inland Ponds and Southern Ponds to improve management control over water quality, depth, salinity, and other aspects of habitat. Portions of the outer levees around the Bay Ponds would be lowered, and internal levees within the Bay Ponds and the Southern Ponds would be breached. Dredge material would be brought in to raise pond bottom elevations in the Bay and Inland Ponds and dredge material or upland fill material would be used to build habitat transition zones. Pilot channels would be excavated into and within the Bay, Inland, and Southern Ponds to improve circulation or drainage, and in the case of the Bay Ponds, to enhance tidal marsh formation.

Potential construction-phase impacts from Alternative Eden D (i.e., short-term increases in algal abundance during construction and the initial release of algae from the ponds when tidal flows are first introduced to the Bay Ponds) would be similar to those described under Alternative Eden B.

Potential operational-phase impacts from Alternative Eden D would be similar to the impacts from Alternative Eden B, with the exception that long-term circulation in the Inland and Southern Ponds would be less improved than in that alternative and would remain limited when operated as managed ponds. Managed ponds could become stagnant and rich in nutrients, and therefore risk factors are moderate to high for changes to algal abundance. However, the addition of new water control structures would allow for improved management control over circulation, water levels, and residence times. These and other management activities would minimize adverse effects. Should these managed ponds cause adverse changes to algal abundance and composition, adaptive management measures would be implemented to reduce potential impacts (e.g., manipulating hydraulic residence time or altering the depths of the managed ponds). Because adaptive management would be used to minimize adverse effects from managed ponds, impacts would be less than significant.

Alternative Eden D Level of Significance: Less than Significant

Phase 2 Impact 3.3-2: Degradation of water quality due to low dissolved oxygen levels.

Dissolved oxygen in the water column is necessary to support respiring organisms. Dissolved oxygen is depleted in pond and marsh environments by respiration and chemical and microbial aerobic processes. Dissolved oxygen is replenished in the system through photosynthesis and reaeration (i.e., oxygen transfer from the atmosphere). Changes in water flow, residence time, and algal abundance productivity (see Impact 3.3-1, above) could change dissolved oxygen levels in managed ponds, tidal marsh habitat, and discharges from project areas into the Bay. Potential impacts of low dissolved oxygen levels include depressed species diversity, fish kills, death of other aquatic organisms, and odor problems. Even short periods of very low dissolved oxygen levels can lead to death of aquatic organisms. Another impact of low dissolved oxygen levels, discussed under Impact 3.3-3, below, is increased net methylmercury production.

Microbial degradation of organic matter in pond and marsh sediments can have significant oxygen demand. The death and decay of algae and aquatic organisms contributes to dissolved oxygen demand. Respiration can also be a significant source of oxygen demand if algae and organism populations are large. Algae are net oxygen consumers at night – wind-driven reaeration is low and the oxygen used by algae is not replaced. Dissolved oxygen is replenished during the day when algae photosynthesis is greater than respiration and when wind-driven reaeration increases. Reaeration rates are largely dependent on wind mixing and flow rates. Mixing brings low dissolved oxygen waters to the surface, driving oxygen transfer, and turbulence increases the exchange rate with the atmosphere. Waters flowing slowly through a pond would not be as well mixed as faster moving waters. Stagnant conditions can lead to anoxic waters if oxygen demands exceed reaeration.

Environments of varying dissolved oxygen ranges can support different aquatic communities. Tidal marshes and ponds designed for shorebird habitat may flourish under lower dissolved oxygen conditions than deeper water communities. For this reason, the water quality standard for dissolved oxygen is thoughtfully applied to areas where the dissolved oxygen level is expected to be naturally low, such as slow moving or standing water over vegetated areas or mudflats. Fringe areas of the Bay, particularly managed ponds, are expected to experience periodic declines and low dissolved oxygen levels.

Alternative Eden A (No Action). Under Alternative Eden A (No Action), the Bay, Inland, and Southern Ponds would continue to be operated as circulation ponds, batch ponds, or seasonal ponds to provide a variety of water depths during summer and winter seasons and for the current water quality management which involves circulating water, as needed, to control pond discharge salinity.

Maintaining adequate dissolved oxygen levels in managed ponds can be a major water quality challenge. The RWQCB has recognized that it may not be feasible for a well-operated lagoon system to meet an instantaneous dissolved oxygen discharge limitation of 5.0 mg/L, and that sloughs in the South Bay unaffected by pond discharges often have dissolved oxygen levels below the Basin Plan objective of 5.0 mg/L. For this reason, adaptive management practices are implemented when dissolved oxygen levels fall below a trigger level (3.3 mg/L dissolved oxygen 10th percentile value, calculated on a weekly basis at the point of discharge.)[3] Even using this trigger value as a threshold, corrective measures such as discharge timing and increased circulation have been routinely implemented to address low dissolved oxygen levels in managed pond discharges (RWQCB 2008).

Adaptive management measures have been used in the Eden Landing ponds to address issues with low dissolved oxygen. For example, CDFW has temporarily ceased discharges and reduced discharge volumes when dissolved oxygen levels were thought to be below the 5.0 mg/L standard and the 3.3 mg/L trigger value. (Water levels and salinity values were used as a proxy for low dissolved oxygen conditions.) [4] After intake levels were sufficient to lower salinity and/or increase water levels, pond

[3] This dissolved oxygen trigger was based on levels found in Artesian Slough near Heron Rookery in July 1997 (RWQCB 2008). The trigger value represents natural dissolved oxygen variations in sloughs or lagoon systems.
[4] A generalized relationship between pond management actions, circulation, and low oxygen conditions has been developed for the Eden landing ponds based on management experience and prior monitoring information.

discharge resumed. Ceasing discharge for prolonged periods of depressed dissolved oxygen levels has been found to degrade water quality, while reducing residence time of water in the ponds appears to improve overall dissolved oxygen levels. Therefore, maintaining discharge, particularly at higher sustained volumes, is generally implemented for increased circulation and mixing in the ponds (CDFW 2015).

Under Alternative Eden A, similar adaptive management measures would be implemented during low dissolved oxygen conditions (e.g., changing residence times and/or increasing pond inflows). Due to the limited tidal flushing with the current system, low dissolved oxygen levels are expected to occur from time to time, a situation similar to existing conditions. Because this condition already exists, and Alternative Eden A would not worsen this condition, there would be a less-than-significant impact.

Alternative Eden A Level of Significance: Less than Significant

Alternative Eden B. Alternative Eden B would increase tidal flows in the Bay, Inland, and Southern Ponds by breaching levees in the Bay and Inland Ponds and by adding water control structures and improving circulation in the Southern Ponds. Dredge material would be brought in as a slurry to raise pond bottom elevations in the Bay and Inland Ponds and dredge material or upland fill material would be used to build habitat transition zones. Pilot channels would be excavated into and within the Bay, Inland, and Southern Ponds to improve circulation or drainage and to enhance tidal marsh formation. Depending on the need for supplemental discharge and/or to establish occasional brackish water conditions, treated wastewater from the USD wastewater treatment plant or brackish water from ARP wells could also be diverted to the Inland Ponds.

During the construction phase of the project, water levels in the ponds would be lowered, slurry material would fill the ponds, and water would be decanted once the solids have settled. Tidal exchange between the ponds and the adjacent sloughs and channels would be limited, particularly when dredge material is imported to the site, levees are lowered, and when pilot channels are excavated in the ponds. Low dissolved oxygen conditions are expected to develop in the ponds and the low dissolved oxygen water would be released when decanted and when levees are breached and tidal flows are first introduced. Initial breaching of the Bay and Inland Ponds and introduction of muted tidal flows in the Southern Ponds could also increase the amount of biological oxygen demand in sloughs and channels during ebb flows because algae and other accumulated biological detritus in the ponds would be flushed out through these channels into the Bay. Although dissolved oxygen concentrations within the ponds would likely be below the 3.3 mg/L trigger value, tidal currents would provide mixing, improve reaeration, and dilute nutrients, and the shallow water environment would allow dissolved oxygen from surface reaeration to rapidly become vertically well mixed. Dissolved oxygen concentrations are not expected to exceed trigger values in areas at a distance from from the point of discharge.

Adaptive management would be used to minimize potential impacts from the water and sediment released from the ponds. Examples of such actions may include breaching levees on the incoming tide and/or introducing dilution flows from the Bay into the ponds prior to the initial release. Management actions would also draw upon prior knowledge based on data collected when levees were breached during Initial Stewardship Plan and Phase 1 actions. Breaching levees on the incoming tide would mix standing water within the ponds with Bay water and with water from adjacent sloughs and channels prior to the initial release. Once the ponds have been shallowly filled with water, dissolved oxygen concentrations are expected to remain at or above trigger values throughout the remainder of the breaching period. Although the initial release of water and sediments from the ponds are expected to create low oxygen conditions and may have short-term adverse effects to aquatic resources, benthic communities in impacted areas are expected to fully recover (RWQCB 2004).

Over the long-term, the introduction of tidal and muted tidal flows to the ponds would reduce the potential for low oxygen conditions developing within the ponds due to tidal mixing, reaeration, and frequent shallow water environments. Treated wastewater from the USD may provide additional nutrients, but volumes would be small compared to the tidal prism, and tidal mixing would be similar. Therefore, the risk of poor dissolved oxygen levels in the ponds would be reduced when compared to existing conditions. Impacts would be less than significant.

Alternative Eden B Level of Significance: Less than Significant

Alternative Eden C. Under Alternative Eden C, the Bay Ponds would be opened to tidal inundation, and the Inland Ponds and Southern Ponds would become enhanced managed ponds. Dredge material would be brought in to raise pond bottom elevations in the Bay Ponds and dredge material or upland fill material would be used to build habitat transition zones. Pilot channels would be excavated into and within the Bay Ponds to improve drainage and to enhance tidal marsh formation. Similar to the effects described for Alternative Eden B, low dissolved oxygen conditions are expected to develop in the ponds during the construction period and this low dissolved oxygen water would be released when decanted and when levees are first breached. Biological oxygen demand in sloughs and channels may temporarily increase after breaching the Bay Ponds, although tidal currents would provide flushing flows and mixing to improve reaeration and dilute nutrients. Potential construction-phase adaptive management measures implemented with Alternative Eden C would be similar to those described under Alternative Eden B.

The introduction of tidal flows to the Bay Ponds would cause tidal mixing, reaeration, and frequent shallow water environments thereby reducing the long-term potential for low oxygen conditions to develop in those ponds. Depending on how the water control structures in the Inland and Southern Ponds are operated (i.e., opened for continuous directional flow or primarily closed to provide maximum water depth), the residence time in the managed ponds could be on the order of days to weeks. If residence times are long, water in the managed ponds would likely be stagnant and rich in nutrients, particularly in summer months, and therefore dissolved oxygen concentrations may be low.

Adaptive management measures (e.g., changing residence times and/or increasing pond inflows in the managed ponds) would be implemented during low dissolved oxygen conditions to reduce the potential for adverse conditions associated with low dissolved oxygen levels, such as mortality of aquatic or benthic organisms, odors that cause nuisance, degraded habitat, or unacceptably high methylmercury production rates. Because of monitoring and implementation of adaptive management measures as need for managed ponds, impacts would be less than significant.

Alternative Eden C Level of Significance: Less than Significant

Alternative Eden D. Under Alternative Eden D, tidal flows would be introduced to the Bay Ponds. The Inland Ponds and Southern Ponds would remain as managed ponds until tidal or muted tidal flow is introduced at some future time. Dredge material would be brought in to raise pond bottom elevations in the Bay and Inland Ponds and dredge material or upland fill material would be used to build habitat transition zones. Pilot channels would be excavated into and within the Bay, Inland, and Southern Ponds to improve circulation or drainage, and in the case of the Bay Ponds, to enhance tidal marsh formation.

Potential construction-phase impacts from Alternative Eden D would be similar to those described under Alternative Eden B. Similar to the effects described for Alternative Eden B, low dissolved oxygen conditions are expected to develop in the ponds and low dissolved oxygen waters would be released when decanted and when levees are first breached. Biological oxygen demand in sloughs and channels may temporarily increase after breaching the Bay Ponds, although tidal currents would provide flushing flows and mixing to improve reaeration and dilute nutrients. Potential construction-phase adaptive management measures implemented with Alternative Eden D would be similar to those described under Alternative Eden B.

The introduction of tidal flows to the Bay Ponds would cause tidal mixing, reaeration, and frequent shallow water environments thereby reducing the long-term potential for low oxygen conditions to develop in those ponds. Depending on how the water control structures in the Inland and Southern Ponds are operated (i.e., opened for continuous directional flow or primarily closed to provide maximum water depth), the residence time in the ponds could be on the order of days to weeks. If residence times are long, water in the managed ponds would likely be stagnant and rich in nutrients, particularly in summer months, and therefore dissolved oxygen concentrations may be low.

Adaptive management measures (e.g., changing residence times and/or increasing pond inflows in the managed ponds) would be implemented during low dissolved oxygen conditions to reduce the potential for adverse conditions associated with low dissolved oxygen levels, such as mortality of aquatic or benthic organisms, odors that cause nuisance, degraded habitat, or unacceptably high methylmercury production rates. Because of monitoring and implementation of adaptive management measures as need for managed ponds, impacts would be less than significant.

Alternative Eden D Level of Significance: Less than Significant

Phase 2 Impact 3.3-3: Degradation of water quality due to increased methylmercury production or mobilization of mercury-contaminated sediments.

A major concern with mercury pollution in the Bay is the accumulation of methylmercury in biota, particularly at the top of aquatic food webs. Mercury occurs in many forms, but methylmercury is the form that poses the highest bioaccumulation risk. Methylmercury is converted from inorganic mercury primarily by the metabolic activity of bacteria, especially sulfate-reducing bacteria. Because microbial activity is generally increased in productive wetlands and marshes, restoration of tidal marshes has the potential to increase net production of methylmercury.

This analysis of methylmercury impacts focuses on methylmercury in the food chain. The analysis recognizes the latest science supporting water quality standards and moves the evaluation closer to the actual beneficial uses of interest: making fish safe for people and wildlife to eat. Net methylation rates are emphasized because the overall release of methylmercury reflects the balance of production and degradation of methylmercury. Dissolved oxygen and sulfide concentrations are water quality factors that affect production of methylmercury. Microbial community composition (which is dependent on redox conditions) affects net methylmercury production by influencing both production and degradation.

Dissolved oxygen is a factor that can affect net methylmercury production. Sulfate-reducing bacteria that produce methylmercury are known to thrive under low-oxygen conditions. Low-oxygen conditions also promote the breakup of oxide surfaces on particles, which can release methylmercury into the water column. The introduction to Section 3.3.3, above, describes dissolved oxygen as a staircase water quality issue. One of the important points of that discussion is that low dissolved oxygen conditions do occur in wetland and marsh habitats. If low dissolved oxygen is found to drive elevated net methylmercury production and bioaccumulation, this would be considered a significant impact.

There are other factors that affect net methylmercury production, including redox conditions, the chemical form of the inorganic mercury, and sulfate concentrations. Some forms of inorganic mercury are more readily available to methylating bacteria than other forms, particularly neutrally charged soluble sulfide complexes. The amount of available sulfide can, in turn, be affected by iron redox chemistry, which is strongly affected by the nature of vegetative root matter and sediment characteristics. These characteristics set up complex spatial variation in the chemical form of inorganic mercury, with unique pockets of localized methylmercury production rates. There also appears to be an optimum window of sulfate concentrations that maximizes net methylmercury production. Too little sulfate prevents sulfate-reducing bacteria from thriving and producing sulfide, and too much produces so much sulfide that the availability of inorganic mercury is diminished (Benoit et al. 1998; Gilmour et al. 1992; Gilmour et al. 1998). Creation of estuarine microzones in a particular window of sulfate concentrations could enhance methylmercury production.

The ecological endpoint evaluated is methylmercury in the food web. This discussion has been focused on net methylmercury production rates, because net methylmercury production is an important factor affecting methylmercury bioaccumulation. However, the structure of the food web also is an important control on methylmercury bioaccumulation. Methylmercury bioaccumulation increases at increasing trophic levels and with increasing food web complexity. These characteristics are driven by the biomagnification of methylmercury. Methylmercury binds strongly to protein residues. Large organisms eat smaller organisms for their protein, and so retain the associated methylmercury. With every step up the food chain, mercury concentrations are found to increase, which is why large predators such as leopard sharks and striped bass have higher mercury concentrations than smaller fish like surf perch. Increasing food web complexity can also increase mercury concentrations at the top of the food web. Adding links to the food web increases the overall biomagnification of methylmercury for top-level predators. Therefore, project activities that alter ecosystem structure can also affect mercury accumulation.

Factors that add to risk of increased net mercury methylation include mercury-contaminated sediments; low dissolved oxygen levels, which promote methylating bacteria and/or the breakup of oxide surfaces; water quality factors that increase mercury bioavailability to methylating bacteria; and factors that reduce the activity of demethylating bacteria and photodemethylation. Factors that increase the risk of bioaccumulation include increased food web complexity, longer-lived prey items, and shifting foraging habits of predators. Effects are complex and difficult to predict, which is why methylmercury bioaccumulation impacts would be adaptively managed.

The impact analysis also focuses on the water quality and sediment quality impacts of inorganic mercury and so considers movement and transport of total mercury along with other water quality factors that affect net methylmercury production and bioaccumulation. The Basin Plan establishes a target concentration for mercury in suspended sediment of 0.2 mg/kg mercury in dry sediment, to help support the human health and wildlife fish tissue criteria (see Table 3.3-4). Mobilization and transport of mercury-contaminated sediments into and out of the project area could cause exceedance of sediment quality guidelines.

The geography and history of the Bay affects the distribution of mercury-contaminated sediments within and surrounding the project area. The lower South Bay has been subjected to discharges of mercury-contaminated sediments originating from the historic New Almaden mining district. The mining activities causing these discharges date back to the late 1800s and early 1900s, although the discharges persist as a legacy source in the Guadalupe River watershed. The Basin Plan's implementation plan for the Guadalupe River watershed is an effort to ensure that land in, around, and downstream of the New Almaden mines will be cleaned up and restored to beneficial use. However, a legacy of mercury contamination persists in the form of a north-south mercury concentration gradient (lower in the north and higher in the south) in sediments in the South Bay (RWQCB 2006).

Activities that result in sediments in managed ponds and restored tidal wetlands having mercury concentrations exceeding the LTMS Guidelines (0.7 mg/kg) have the potential to cause impacts to the Bay. In this case, the potential impact is toxic effects on benthic communities, not bioaccumulation. Re-mobilization of mercury-contaminated sediments into the water column can lead to exceedance of suspended sediment targets for mercury because there is a direct relationship between the concentration of suspended sediments in the water column, the concentration of mercury on those suspended sediments, and the concentration of total mercury in the water column. Project activities could impact attainment of suspended sediment targets for mercury by changing ambient TSS or by changing the mercury concentration on suspended particles.

Alternative Eden A (No Action). Under Alternative Eden A (No Action), the Bay, Inland, and Southern Ponds would continue to be operated as circulation ponds or batch ponds to provide a variety of water depths during summer and winter seasons. Mercury concentrations in pond sediments have been found below average concentrations in the Bay and below the Basin Plan's target concentration of 0.2 mg/kg, while methylmercury concentrations in the pond sediments are typically greater than bay-wide averages. This could be a result of high levels of primary production, low dissolved oxygen conditions, and limited tidal circulation, as mercury-methylating bacteria have higher rates of biological activity in low dissolved oxygen, nutrient-rich, and warm waters.

Managed ponds often have higher rates of net methylmercury production than fully tidal systems. The large pool of easily degraded organic matter in the managed pond (from algal production) could lead to higher methylmercury concentrations in sediment, water, and biota. Organic matter fuels the bacteria that methylate inorganic mercury. Ponds that experience very high rates of primary production would likely benefit (in terms of lowering current methylmercury concentrations) from tidal flushing (Grenier et al. 2010).

Adaptive management is used to monitor effects from the managed ponds. Adaptive management monitoring includes collecting methylmercury concentrations in water and biota; conducting special studies of methylmercury production, degradation, and transport; and monitoring changes in food web indicators and sentinel species. Adaptive management actions would be triggered when mercury concentrations of sentinel species increase substantially compared to nearby reference sites. If these triggers were exceeded, then adaptive management actions would be implemented at managed ponds. Examples of such actions could include changing hydraulic residence times or manipulating other factors depending on the specific case. Because adaptive management would be used to minimize adverse effects, impacts would be less than significant.

Alternative Eden A Level of Significance: Less than Significant

Alternative Eden B. Alternative Eden B would increase tidal flows in the Bay, Inland, and Southern Ponds by breaching levees in the Bay and Inland Ponds and by adding water control structures and improving circulation in the Southern Ponds. Dredge material would be brought in to raise pond bottom elevations in the Bay and Inland Ponds and dredge material or upland fill material would be used to build habitat transition zones. Pilot channels would be excavated into and within the Bay, Inland, and Southern Ponds to improve circulation or drainage and to enhance tidal marsh formation.

The conversion of managed ponds to tidal marsh habitat would lessen the risk of a mercury problem within the pond. The restored tidal marsh would produce less labile organic matter, as compared to existing conditions, providing less fuel for methylating bacteria. Dissolved oxygen concentrations are expected to be higher with tidal flows, leading to a decrease in net methylmercury production. There is, however, a potential risk associated with the remobilization of slough and channel sediments downstream of levee breaches due to scour following reconnection of the ponds to tidal flows. Scour could increase the amount of inorganic mercury that is available for methylmercury production and uptake into the food web, at least in the short term, because Bay and slough sediments are often above target goals for mercury. However, the remobilized sediment would mix with other sediment, be dispersed by the tides, and proceed through various fates of deposition, burial, or further transport (Grenier et al. 2010). In addition, tidal marsh restoration would create accretional areas, eventually resulting in a net loss of mercury from the Bay to the ponds. Because in-pond methylmercury concentrations are likely to decrease because of higher dissolved oxygen concentrations, and because preliminary results from monitoring tidal marsh restoration in the Bay suggest that restoration actions are not causing increases in food web mercury even in areas with higher background concentrations of mercury (SFEI 2015, Robinson et al. 2014), impacts of Alternative Eden B would be less than significant.

Alternative Eden B Level of Significance: Less than Significant

Alternative Eden C. Under Alternative Eden C, the Bay Ponds would be opened to tidal inundation, and the Inland Ponds and Southern Ponds would become enhanced managed ponds through the addition of water control structures. Dredge material would be brought in to raise pond bottom elevations in the Bay Ponds and dredge material or upland fill material would be used to build habitat transition zones. Pilot channels would be excavated into and within the Bay Ponds to improve drainage and to enhance tidal marsh formation.

Tidal marsh restoration in the Bay Ponds is expected to lessen the risk of a mercury problem in those ponds. Although there would likely be short-term increases in transport of mercury-contaminated sediments in nearby sloughs, tidal marsh restoration would create accretional areas, eventually resulting in a net loss of mercury from the Bay to the ponds. The Inland and Southern Ponds would be managed similar to existing conditions, with batch ponds managed for deeper water depth with limited inflows and mixing, but with more ability for managed control over water quality conditions.

Adaptive management would be used to monitor effects from managed ponds. Management actions would be triggered when mercury concentrations of sentinel species increase substantially, regardless of whether they are over or under desirable levels. If triggers were exceeded, then adaptive management actions would be implemented to avoid significant impacts. Examples of such actions could include changing hydraulic residence times or manipulating other factors depending on the specific case. Because adaptive management would be used to minimize adverse effects, impacts would be less than significant.

Alternative Eden C Level of Significance: Less than Significant

Alternative Eden D. Under Alternative Eden D, tidal flows would be introduced to the Bay Ponds. The Inland Ponds and Southern Ponds would remain as managed ponds until muted tidal flow is introduced at some future time. Dredge material would be brought in to raise pond bottom elevations in the Bay and Inland Ponds and dredge material or upland fill material would be used to build habitat transition zones. Pilot channels would be excavated into and within the Bay, Inland, and Southern Ponds to improve circulation or drainage, and in the case of the Bay Ponds, to enhance tidal marsh formation.

Potential effects to methylmercury production would be similar to those effects discussed under Alternative Eden B, with the exception that tidal marsh restoration in the Inland Ponds and Southern Ponds would be delayed. The Inland and Southern Ponds are expected to be managed similar to existing conditions until muted tidal flow is introduced at some future time. The conversion of managed ponds to tidal marsh habitat is expected to lessen the risk of a mercury problem within those ponds. Although there would likely be short-term increases in transport of mercury-contaminated sediments in nearby sloughs, tidal marsh restoration would create accretional areas, eventually resulting in a net loss of mercury from the Bay to the ponds. Adaptive management would be used to monitor effects from tidal marsh restoration and from the managed ponds. Because adaptive management would be used to minimize adverse effects, impacts would be less than significant.

Alternative Eden D Level of Significance: Less than Significant

Phase 2 Impact 3.3-4: Potential impacts to water quality from other contaminants.

The Eden Landing Phase 2 alternatives have the potential to affect water and sediment quality with various constituents other than mercury, methylmercury, and dissolved oxygen. This section describes the primary mechanisms that could impair water and sediment quality by introduction of these other contaminants. Program-wide comprehensive design measures are also incorporated into all of the Action Alternatives.

Alternative Eden A (No Action). Under Alternative Eden A (No Action), the Bay, Inland, and Southern Ponds would continue to be operated as circulation ponds, batch ponds, or seasonal ponds to provide a variety of water depths during summer and winter seasons and for the current water quality management which involves circulating water, as needed, to control pond discharge salinity. Managed pond operations would be similar to existing operations, and therefore effects from the ponds on water and sediment quality in adjacent sloughs and channels is not expected to substantially change compared to existing conditions. Adaptive management measures would be implemented to address adverse water and sediment quality conditions. Impacts would be less than significant.

Alternative Eden A Level of Significance: Less than Significant

Alternative Eden B. Alternative Eden B includes placement of dredge materials in the Bay and Inland Ponds to raise bottom elevations and construct habitat transition zones. An offloading facility would be located in the deep water channel of the Bay approximately 3 miles offshore of Pond E2. Dredge material would be offloaded at this facility, mixed with seawater, and the resulting slurry would be pumped from the offloader via pipelines to the Bay and Inland Ponds. The offloading facility would be comprised of a hydraulic offloader, landing barges, temporary mooring piles, delivery vessels, a feed water system (intake pump and fish screen), and slurry pipeline. The pipeline would be submerged from the offloading facility to shore. Up to two booster pumps would be located along the pipeline route, with potentially one in the Bay, depending on the hydraulic offloader's pumping capacity. Levees would be improved in the Bay and Inlands Ponds and existing water control structures would be used where possible to manage the slurry placed within the ponds; however, up to eight water control structures could be modified or added to maximize the residence time in the ponds and promote settling of solids. After the solids have settled in the ponds, excess water would be decanted and discharged into the Bay. Once complete, the infrastructure used for the import and placement of dredge material would be decommissioned/demolished prior to construction of other restoration, flood risk management, and recreational features.

Alternative Eden B would increase tidal flows in the Bay, Inland, and Southern Ponds by breaching levees in the Bay and Inland Ponds and by adding water control structures and improving circulation in the Southern Ponds. Upland fill materials would be used to improve the backside levees along the eastern edge of the Inland and Southern Ponds for added flood risk management. Along these improved backside levees, habitat transition zones would be constructed, and the Bay Trail spine would be extended on raised levees. Pilot channels would also be excavated into and within the Bay, Inland, and Southern Ponds to improve circulation or drainage and to enhance tidal marsh formation.

Construction Materials. The use of construction materials could lead to transient adverse water quality impacts during or shortly after the period of construction. Construction activities would bring equipment and materials not normally present in the project area onto the site. These activities would increase the possibility of exposure to or release of hazardous materials and waste associated with construction (such as fuels or oils) as a result of accidents or equipment malfunction or maintenance. With proper management and oversight, impacts associated with construction activities should not result in exceedances of any thresholds of significant impact for contaminates. If hazardous materials were spilled, appropriate clean-up procedures would be followed to confine the spill and clean-up the spilled materials. It is unlikely that any residual materials would result in the mobilization and transport of contaminated sediment during the construction period of a sufficient magnitude or extent as to cause exceedances of the thresholds identified after mitigation. Programmatic Mitigation Measure 3.3-4a applies to Alternative Eden B.

Programmatic Mitigation Measure 3.3-4a: Storm Water Pollution Prevention Plan. This measure will mitigate potential impacts due to construction-related activities and maintenance activities. The project sponsors will obtain authorization from the RWQCB before beginning construction. As part of this application, the project sponsors will prepare a Storm Water Pollution Prevention Plan (SWPPP) and require all construction contractors to implement the Best Management Practices (BMPs) identified in the SWPPP for controlling soil erosion and discharges of other construction-related contaminants. Routine monitoring and inspection of BMPs will be conducted to ensure that the quality of stormwater discharges is in compliance with the permit. BMPs that will appear in the SWPPP include:

- Soil stabilization measures, such as preservation of existing vegetation to minimize soil disturbance;
- Sediment control measures to prevent disturbed soils from entering waterways;
- Tracking control measures to reduce sediments that leave the construction site on vehicle or equipment tires; and

- Nonstormwater discharge control measures, such as monitoring hazardous material delivery, storage, and emergency spill response requirements, and measures by the project sponsors to ensure that soil-excavation and movement activities are conducted in accordance with standard BMPs regarding excavation and dredging of bay muds, as outlined in the San Francisco Bay Conservation and Development Commission's (BCDC's) bay dredge guidance documents. These BMPs include excavating slough channels during low tide; using dredge equipment, such as sealing clamshell buckets, designed to minimize escape of the fine-grained materials when excavating pilot channels through OAC; and testing dredge materials for contaminants prior to importing dredge materials for use in the ponds.

The contractor will select specific BMPs from each area, with project sponsor approval, on a site-specific basis. The construction general contractor will ensure that the BMPs are implemented as appropriate throughout the duration of construction and will be responsible for subcontractor compliance with the SWPPP requirements. Other impacts due to construction-related contaminates can be mitigated by appropriate additions to the SWPPP, including a plan for safe refueling of vehicles and spill containment plans. An appropriate hazardous materials management plan will be developed for any activity that involves handling, transport, or removal of hazardous materials.

Mobilization and Transport of Sediments and Contaminates. Project activities could affect the water and sediment quality of sloughs, channels, and the Bay during periods of active construction, when water is decanted from ponds, and when levees are breached and the contents of the ponds are initially released.[5] The main parameters of concern identified by the RWQCB include turbidity, metals, dissolved oxygen, pH, temperature, mercury, nutrients, algae, and salinity (RWQCB 2004, 2008).[6]

Active construction in open Bay waters, in OAC, and the ACFCC is expected to cause localized turbidity. Within the Bay, approximately 30 temporary mooring piles would be driven to secure the offloader, landing barges, delivery vessels, and supporting equipment, and approximately 3 miles of submerged pipeline would be anchored to the bottom of the Bay with precast concrete pipe weights. Within sloughs and channels, excavation would occur in OAC to connect the pilot channel in Pond E1 to the northern channel of the OAC. Water control structures would be newly constructed or modified in ACFCC. All of these activities have the potential to release some turbidity locally.

Dredge material operations could also affect water quality. In situ dredge materials are often anoxic and have higher levels of sulfides and other reduced compounds (such as reduced iron complexes), as compared to surface sediments, because only a thin layer of the in situ dredge materials would be oxygenated by overlaying waters. Dredge materials would be excavated by others and brought to the project offloading facility stationed in the deep-water channel of the South Bay. Only material meeting the RWQCB's wetland cover suitability criteria would be accepted. The imported dredge sediments would be mixed with seawater and pumped to the ponds. Sulfides and other reduced compounds would likely be oxidized by contact with the air and aerobic waters; however it is unlikely that the pH of the slurry would change substantially when the sediments are mixed in the well buffered marine waters.

---

[5] The initial release refers to the time expected to substantially empty salt ponds of their current contents, expected to occur within the first few months.

[6] Because salinity has used as a surrogate for metals concentrations, waste discharge requirements for Initial Stewardship Plan and Phase 1 actions have focused on maintaining salinity levels below required thresholds at the discharge location.

Some metals could become soluble when oxidized; however, the concentration of dissolved metals is not expected to comparable to that expected under acidified conditions.

The dredge material would be deposited into the ponds in a slurry, and sediments would have the opportunity to settle. After the solids have settled in the ponds, excess water would be decanted and discharged into the Bay. Tidal currents in sloughs and channels would provide mixing, dilute dissolved constituents, and allow the water column to become vertically well mixed. The decant water is not expected to cause adverse effects in adjacent sloughs and channels because of the high sediment quality of the dredge materials (sediments would meet the RWQCB's wetland cover suitability criteria) and the relatively low dissolved metal concentrations expected in the decant water.

Because water from the slurry would be decanted, sediments are more likely to become consolidated and remain in place when tidal flows are introduced to the ponds. Breaching on an incoming tide would reduce turbidity effects to the sloughs because the incoming water would move suspended sediments resulting from the breach into the ponds, where they have the opportunity to disperse and settle out. Areas near the levee breaches would likely scour with the outgoing tides, but sediments deposited within the deep interior of the ponds are likely to remain. If the sediments are not cohesive or do not have the opportunity to consolidate prior to breaching, additional sediment would be scoured from the ponds with the initial outgoing tides. This sediment would likely remain in the South Bay, move back and forth through the breached levee with the tides, and over time, be reworked and redeposited in the ponds or nearby mudflats.

Turbidity is expected to be temporarily elevated in OAC, the ACFCC, and the Bay during active construction and during the initial release of sediments from the ponds as they begin to fill and drain. Although turbidity concentrations are expected to be more than 10 percent above typical background concentrations, highly turbid water can occur in the open Bay, in sloughs, and on mudflats and shoals due to sediment transport from local tributaries, wind waves, and/or tidal and wind-driven currents. Episodic sediment loads dominate the sediment supply to the Bay. In the most extreme case, in water year 2003, Alameda Creek transported 76 percent of its annual sediment load in one day and 83 percent in the seven-day period during the storm and on the recession limb of the hydrograph. This one-day and seven-day load constituted 35 percent and 38 percent respectively of the total measured 11-year suspended sediment load for water years 2000 to 2010 (McKee et al. 2013). Turbidity concentrations are expected to be within this upper range in background levels.

Although the initial release of water and sediments from the ponds has the potential to adversely affect aquatic resources, benthic communities in impacted areas are expected to fully recover within 1 year (RWQCB 2004). Adaptive management would be used to minimize potential impacts from the water and sediment released during Eden Landing Phase 2 actions, as levees are breached and water control structures are used to fill and drain prior batch ponds. Examples of such actions could include breaching levees on the incoming tide to allow Bay water and water from adjacent sloughs and channels to mix with the standing water in the ponds, and to allow breach sediments the opportunity to settle deep within the pond interior prior to the outgoing tide, and introducing dilution flows from the Bay into the Southern Ponds prior to discharge through control structures. Management actions would also draw upon the prior knowledge based on data collected when levees were breached during Initial Stewardship Plan and Phase 1 actions.

It is expected that areas of increased tidal action would result in scour of tidal sloughs and channels. Concentrations of particle-associated “legacy” pollutants, such as PCBs and organochlorine pesticides (e.g., DDT and chlordanes), that were deposited during the times of their historic peak use are typically higher in subsurface sediments than surface sediments. Levee breaching, scour of undersized channels, and increased tidal mixing could lead to an increase in the mobilization and transport of contaminated surface and subsurface sediments from sloughs and channels. This could lead to deposition of contaminated sediments in restored areas of biological use.

Because of the spatial gradients for mercury and other sediment-associated contaminants (e.g., PCBs, PAHs), breaching levees would have the effect of either releasing contaminant loads from the restored tidal marshes and managed ponds to the Bay, or from the Bay to the restored tidal marshes and managed ponds, unless sediment contaminant concentrations are identical in the ponds and the Bay. The ponds are expected to have lower concentrations of urban-associated pollutants such as PCBs and copper in their sediments, because they have been largely cut off from Bay sediments during the past 100 years of industrialization and urbanization. Sediment accretion is expected in the restored ponds, which would cause net losses of particle-associated pollutants from the Bay to the ponds.

Sediment monitoring data would be used to evaluate effects from sediment transport. If sediment monitoring data indicate that tidal scour outside a levee breach could remobilize sediments that are significantly more contaminated than ambient conditions in the Bay, the appropriate regulatory agencies would be consulted regarding adaptive management actions.

Urban Runoff Management. Increased exchange of urban runoff with restored tidal marshes and managed ponds (via breaches or tide gates connected to flood control channels) could transport and/or deposit contaminants, including trash, from urban sources into the restored areas. Urban runoff in the South Bay has been shown to have contaminants such as PAHs, metals (copper and zinc), and urban pesticides (diazinon, pyrethroids) (McKee et al. 2006). Restored tidal marshes and managed ponds could sequester urban pollutants, thereby reducing overall pollutant loads from urban runoff to the Bay. However, the sequestering of urban pollutants in the biologically active restored areas could also render the pollutants more available to biological uptake. The project proponents would notify the appropriate urban runoff program of any physical changes (such as breaches) that would introduce urban discharges into the project area and request that the urban runoff program consider those changes when developing annual monitoring plans.

Maintenance-Related Activities. Hazards could result from the routine maintenance activities required for muted tidal or enhanced managed ponds and public access facilities. These activities may include levee repair, dredging, small-scale construction, and general cleaning. Hazardous materials that could lead to water or sediment quality impairments if spilled would primarily include spills and leaks of liquids (fuels and oils) from maintenance vehicles and equipment. The project proponents would implement the control measures specified in the project’s waste discharge permit (Water Quality Order No. R2-2008-0078, as revised by R2-2012-0014, or current version). Provisions include specifications for repair, replacement, and servicing of existing facilities, dredging and placement of dredge and/or imported fill material on existing levees, placement of riprap, and general maintenance activities.

Surface Water Contamination from Groundwater. Because surface water and groundwater are in at least partial hydraulic communication, shallow groundwater could seep into the ponds or restored tidal habitat or the surrounding sloughs and Bay. Fuel and solvent spills affect the shallow aquifers in industrialized areas of the South Bay, and the resulting plumes migrate in the groundwater flow direction.

Project actions are not expected to substantially affect either horizontal or vertical groundwater gradients and the resulting groundwater flows in the area, so project actions would not affect the concentrations, or the migration rates, or directions of plume migration when compared to baseline conditions. In addition, water management agencies (primarily ACWD) and the RWQCB (as well as DTSC and Alameda County) have coordinated programs that together ensure that fuel and solvent spills are identified, contained, and remediated in such a way that neither the ecosystem nor surface water resources are impacted by groundwater contamination.

Although Alternative Eden B has the potential to affect water and sediment quality in adjacent sloughs and channels, Programmatic Mitigation Measure 3.3-4a would be used to reduce potential construction-related effects to less-than-significant levels. Adaptive management measures and control measures would be used to address potential effects that would occur after construction, as described above, and sediment monitoring would be used to inform long-term adaptive management measures. Therefore, impacts would be less than significant.

Alternative Eden B Level of Significance: Less than Significant

Alternative Eden C. Under Alternative Eden C, the Bay Ponds would be opened to tidal inundation, and the Inland Ponds and Southern Ponds would become enhanced managed ponds. Dredge material would be brought in to raise pond bottom elevations in the Bay Ponds and pilot channels would be excavated into and within the Bay Ponds to improve drainage and to enhance tidal marsh formation. Potential effects to water and sediment quality from contaminants would be similar to those discussed under Alternative Eden B. Implementation of Programmatic Mitigation Measure 3.3-4a would reduce impacts to less-than-significant levels.

Alternative Eden C Level of Significance: Less than Significant

Alternative Eden D. Under Alternative Eden D, tidal flow would be introduced to the Bay Ponds, and the Inland Ponds and Southern Ponds would remain as managed ponds until tidal or muted tidal flow is introduced at some future time. Dredge material would be brought in to raise pond bottom elevations in the Bay and Inland Ponds and pilot channels would be excavated into and within the Bay, Inland, and Southern ponds to improve circulation or drainage, and in the case of the Bay Ponds, to enhance tidal marsh formation. Potential effects to water and sediment quality from contaminants would be similar to those discussed under Alternative Eden B. Implementation of Programmatic Mitigation Measure 3.3-4a would reduce impacts to less-than-significant levels.

Alternative Eden D Level of Significance: Less than Significant

Phase 2 Impact 3.3-5: Potential to cause seawater intrusion of regional groundwater sources.

Alternative Eden A (No Action). Factors associated with the risk of future salinity intrusion include improperly abandoned wells and salinity migration into areas with poorly confined aquifers. Artificial pathways can increase the risk of seawater intrusion into regional groundwater supplies. However, as described in Section 3.3.1, water typically flows from the groundwater basin into the Bay. As long as that condition persists, there is no significant risk of salinity intrusion into drinking water aquifers.

Under Alternative Eden A (No Action), the Bay, Inland, and Southern Ponds would continue to be operated as circulation ponds, batch ponds, or seasonal ponds to provide a variety of water depths during summer and winter seasons. Managed ponds with water levels that are near mean sea level would not result in significant changes in groundwater hydrology, as compared to existing conditions. Impacts would be less than significant.

Alternative Eden A Level of Significance: Less than Significant

Alternative Eden B. Alternative Eden B would increase tidal flows in the Bay, Inland, and Southern Ponds by breaching levees in the Bay and Inland Ponds and by enhancing water control structures and improving circulation in the Southern Ponds.

Abandoned Wells. The management of abandoned wells is a program-wide comprehensive design measure incorporated into all Action Alternatives. There are no known wells located within the Eden Landing Ecological Reserve (ELER, or Reserve). As part of Phase Out Agreement with Cargill Inc. (Cargill) and the Initial Stewardship Plan, all known well locations in the Reserve were closed. If new wells are discovered or abandoned wells were found to be improperly destroyed, those wells would be properly destroyed by the project, as per local and state regulations and in coordination with ACWD. Well destruction methods will meet local, county, and state regulations.

Salinity Intrusion. Tidal inundation of prior circulation or batch ponds would not result in a significant change in groundwater hydrology, but could provide beneficial changes in pond salinity. Salinity in tidally inundated ponds would continue to decline to concentrations comparable to the Bay. Although an increased tidal prism would draw Bay waters through the sloughs to the breach locations, OAC and ACFCC likely have similar salinities as Bay waters, because of their close proximity to the Bay, except during storm events. The salinity in upstream creeks is not expected to change substantially, and groundwater currently has positive flow into the Bay. Impacts would be less than significant.

Alternative Eden B Level of Significance: Less than Significant

Alternative Eden C. Under Alternative Eden C, the Bay Ponds would be opened to tidal flow inundation, and the Inland and Southern Ponds would become enhanced managed ponds. Potential effects to salinity intrusion would be similar to those discussed under Alternative Eden B, with the exception that the tidal prism in OAC and ACFCC would be changed less than in that alternative. The salinity in upstream creeks is not expected to change substantially, and groundwater currently has positive flow into the Bay. Impacts would be less than significant.

Alternative Eden C Level of Significance: Less than Significant

Alternative Eden D. Under Alternative Eden D, tidal flow would be introduced to the Bay Ponds, and the Inland Ponds and Southern Ponds would remain as managed ponds until tidal or muted tidal flow is introduced at some future time. Potential effects to salinity intrusion would be similar to those discussed under Alternative Eden B, with the exception that the changes in tidal prism would be phased over a period of decades instead of being implemented at once. The salinity in upstream creeks is not expected to change substantially, and groundwater currently has positive flow into the Bay. Impacts would be less than significant.

Alternative Eden D Level of Significance: Less than Significant

Impact Summary

Impacts, mitigation measures, and the level of significance after mitigation are summarized in Table 3.3-6. With the incorporation of programmatic mitigation and adaptive management measures, all impacts would be less than significant.

Table 3.3-6 Phase 2 Summary of Impacts – Water Quality

IMPACT	ALTERNATIVE EDEN A	ALTERNATIVE EDEN B	ALTERNATIVE EDEN C	ALTERNATIVE EDEN D
Eden Landing Phase 2 Impact 3.3-1: Degradation of water quality due to changes in algal abundance or composition.	LTS	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.3-2: Degradation of water quality due to low dissolved oxygen levels.	LTS	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.3-3: Degradation of water quality due to increased methylmercury production or mobilization of mercury-contaminated sediments.	LTS	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.3-4: Potential impacts to water quality from other contaminants.	LTS	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.3-5: Potential to cause seawater intrusion of regional groundwater sources.	LTS	LTS	LTS	LTS

Notes: Alternative Eden A is the No Action Alternative (No Project Alternative under CEQA).
LTS = Less than Significant

3.4 Geology, Soils, and Seismicity

This section of the Draft Environmental Impact Statement/Report (EIS/R) describes the existing geology and soils resources within the project area for Phase 2 of the South Bay Salt Pond (SBSP) Restoration Project at Eden Landing. The Phase 2 project area incorporates temporary construction-related disturbance areas, as well as the long term operational footprint of the project. It then analyzes whether the project implementation would cause a substantial adverse effect on geology and soils resources and to what extent the existing geologic and soil conditions could affect long term operation of the project. The information presented is based on a review of existing geology and soils resources within the project area and other pertinent federal, state and local regulations. The analysis of the project's potential impacts to geology and soil resources is presented for each alternative described in Chapter 2, Alternatives. The program-level mitigation measures described in Chapter 2, Alternatives, would be implemented as part of this project. Therefore, this section only identifies additional mitigation measures as needed.

3.4.1 Physical Setting

Methodology

The development of the baseline conditions, significance criteria, and impact analysis in this section is commensurate to and reliant on the analysis conducted in the 2007 South Bay Salt Pond (SBSP) Restoration Project Final Environmental Impact Statement/Report (2007 Final EIS/R). The baseline condition specific to the Phase 2 project area at the southern half of Eden Landing is based on an assessment of the current conditions within and surrounding the project site.

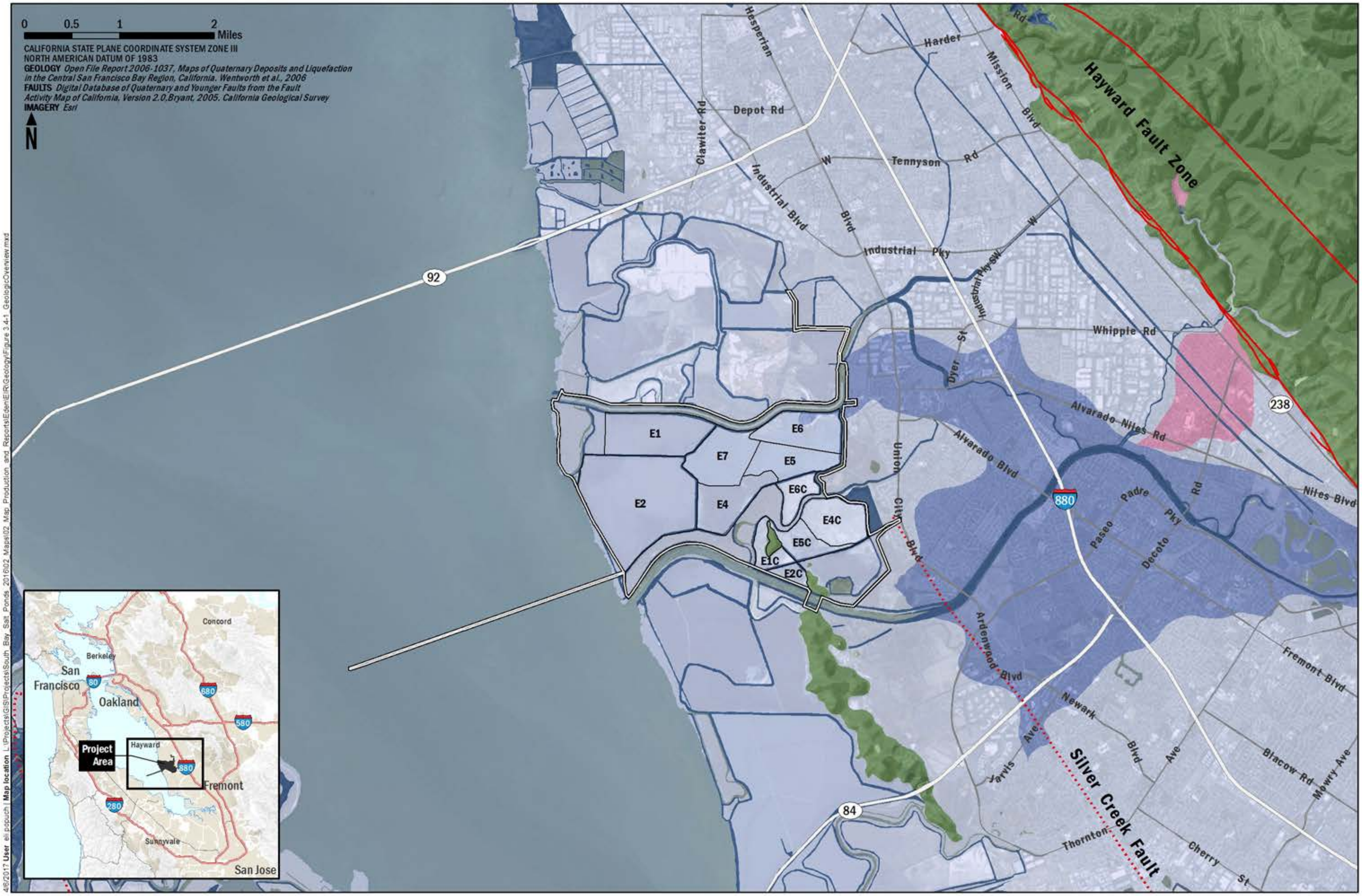
Geologic, seismic, and soil characteristics for the South San Francisco Bay (South Bay) were evaluated using existing published data and other publicly available sources summarized in the 2007 Final EIS/R. The sources and references for that evaluation include maps of general geologic distribution, faults, soils, liquefaction susceptibility, and other characteristics.

Regional and Project Setting

The regional setting for the SBSP Restoration Project as a whole was presented in Chapter 3.5 of the 2007 Final EIS/R. The following excerpts present an overview of key geologic, seismic, soils, and hazards concepts identified as a result of that document in relation to this program. A discussion of these concepts and how they relate to the existing conditions within the Phase 2 project area at the southern half of Eden Landing is provided below.

Geology

The San Francisco Bay (or Bay) Region is located along the boundary between the Pacific and North American plates, two large crustal plates that are separated by the north-northwest-trending San Andreas Fault, within the California Coast Ranges Geomorphic Province. A map showing an overview of geology in the San Francisco Bay Area from the United States Geological Survey (USGS) is shown on Figure 3.4–1 (Wentworth 1997).



LEGEND

Faults
- Well located
- Concealed

Geologic Age
- Modern
- Latest Holocene
- Holocene
- Holocene to Late Pleistocene
- Latest Pleistocene
- Pre-Quaternary

- Eden Landing Phase 2 Project Area
- Southern Eden Landing Ponds

AECOM

South Bay Salt Pond Restoration Project

Figure 3.4-1

General Geological Overview

The geomorphology of the region includes parts of three prominent, northwest-trending geologic/geomorphic features, which include, from west to east, the Santa Cruz Mountains, the Santa Clara Valley, and the Diablo Range. The Santa Clara Valley forms part of an elongated structural block (the San Francisco Bay block) within the central Coast Ranges that contains San Francisco Bay and its surrounding alluvial margins. This structural block is bounded by the San Andreas Fault to the southwest and the Hayward-Calaveras Fault zone to the northeast.

The oldest rocks in the region belong to the Franciscan Complex of Jurassic to Cretaceous age (205 to 65 million years ago [Ma]). These rocks are intensely deformed (i.e., folded, faulted, and fractured) due to ancient tectonic processes and, to a lesser extent, from more recent tectonic processes associated with the San Andreas Fault system. Franciscan rocks generally comprise the “basement” of the Coast Ranges northeast of the San Andreas Fault; Cretaceous granitic rocks, known as the Salinian block, comprise the basement of the ranges located southwest of the San Andreas Fault. A sequence of Tertiary (65 to 1.8 Ma) marine and non-marine sedimentary rocks unconformably overlies the granitic and Franciscan basement rocks in the region.

During the Plio-Pleistocene (5 Ma to 11,000 years ago [ka]) epochs, sediments eroded from the uplifting Diablo Range and the Santa Cruz Mountains formed broad alluvial fan complexes along the margins of the Santa Clara Valley. The 5-Ma to 300,000-year-old (Plio-Pleistocene) Santa Clara Formation, which consists of a sequence of fluvial and lacustrine sediments, was deposited unconformably on the older Tertiary and Franciscan rocks along the margins of the Santa Clara Valley during this time and has subsequently folded, faulted, and eroded. The Santa Clara Formation is unconformably overlain by younger Quaternary and Holocene (11 ka to present) alluvial and fluvial deposits (stream channel, overbank, and flood basin environments), which interfinger to the north with estuarine muds of San Francisco Bay (Helley et al. 1979).

The South Bay and the Phase 2 project area is part of a north-northwest-trending subsiding basin that is filled primarily with Quaternary alluvium (stream) deposits eroded from the surrounding margins and estuarine sources (Bay mud). The Sangamon and Holocene Bay muds are separated by the Quaternary alluvium and eolian (wind-blown) sand deposits. Alluvium deposits consist of sediments eroded from the surrounding Santa Cruz Mountains and Diablo Range uplands. These alluvial sediments were transported and deposited by streams and include a mixture of sands, gravels, silts, and clays with highly variable permeability. In contrast, the fine-grained Bay muds have very low permeability. The youngest Holocene Bay muds underlie almost the entire original Bay (Atwater et al. 1977; Helley et al. 1979). Figure 3.4-2 shows Bay mud thickness in the South Bay area (McDonald et al. 1978). Estuarine (Bay) muds were deposited in San Francisco Bay during high sea level periods of the Sangamon (70,000 to 130,000 years ago) and the Holocene (less than 11,000 years ago) (Atwater et al. 1977).

Due to movement on the San Andreas and related faults including the Hayward and Calaveras Faults, as well as the previous geologic history, a wide variety of igneous, metamorphic, and sedimentary rocks are present. The north-northwest-trending faults and sediment-filled Southern San Francisco Bay are clearly visible.

Soils

According to soil surveys published by the United States Department of Agriculture (USDA) Soil Conservation Service, soils along the Bay on the San Francisco Peninsula generally consist of those typically found on bottom lands, and can vary from very poorly drained to well-drained. Soils along the east side of the South Bay, and specifically in the vicinity of the Phase 2 project area, is primarily comprised of very poorly drained clays (USDA Soil Conservation Service and University of California Agricultural Experiment Station 1981) (Figure 3.4-3).

Soils in the Eden Landing Phase 2 project area are primarily Reyes-Clay soils (USDA Soil Conservation Service and University of California Agricultural Experiment Station 1981). These soils consist of very poorly drained clays located on tidal flats or urban land, and are otherwise known as Bay muds.

Faults

The San Francisco Bay Region is located within a very broad zone of right-lateral transpression (strike-slip faulting and compression) marking a tectonic boundary zone dominated by strike-slip faulting associated with the San Andreas Fault system. The major active components of the San Andreas Fault system that occur in the South Bay Region include the proper or main trace of the San Andreas, Hayward, and Calaveras Faults. The Eden Landing Phase 2 project area is approximately 3.3 miles (5.3 kilometers [km]) from the trace of the Hayward Fault and 11.7 miles (18.7 km) east of the San Andreas Fault. The northern terminus of the potentially active Silver Creek Fault is mapped less than 1 mile from the eastern boundary of the pond complex (Figure 3.4-1).

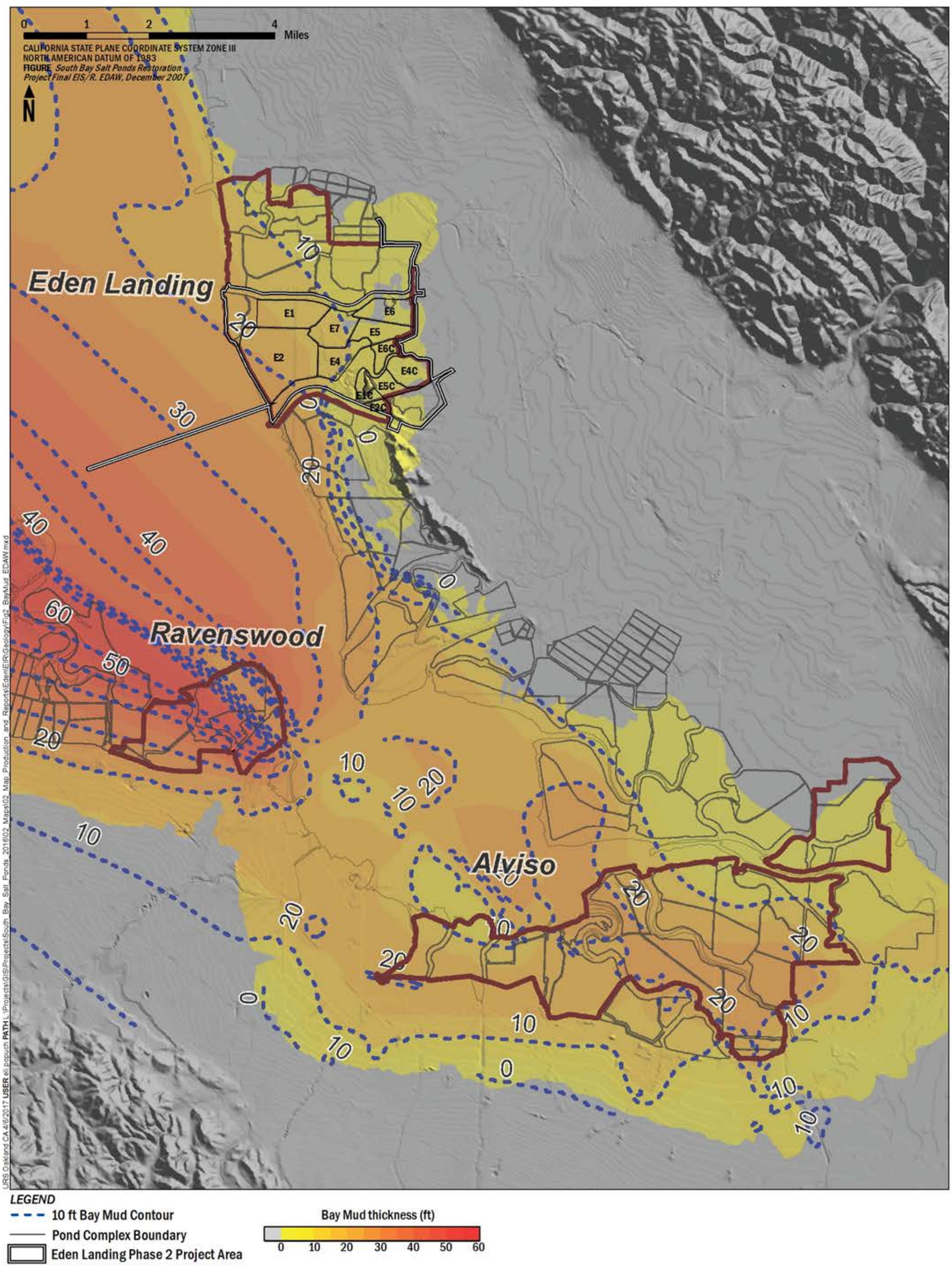
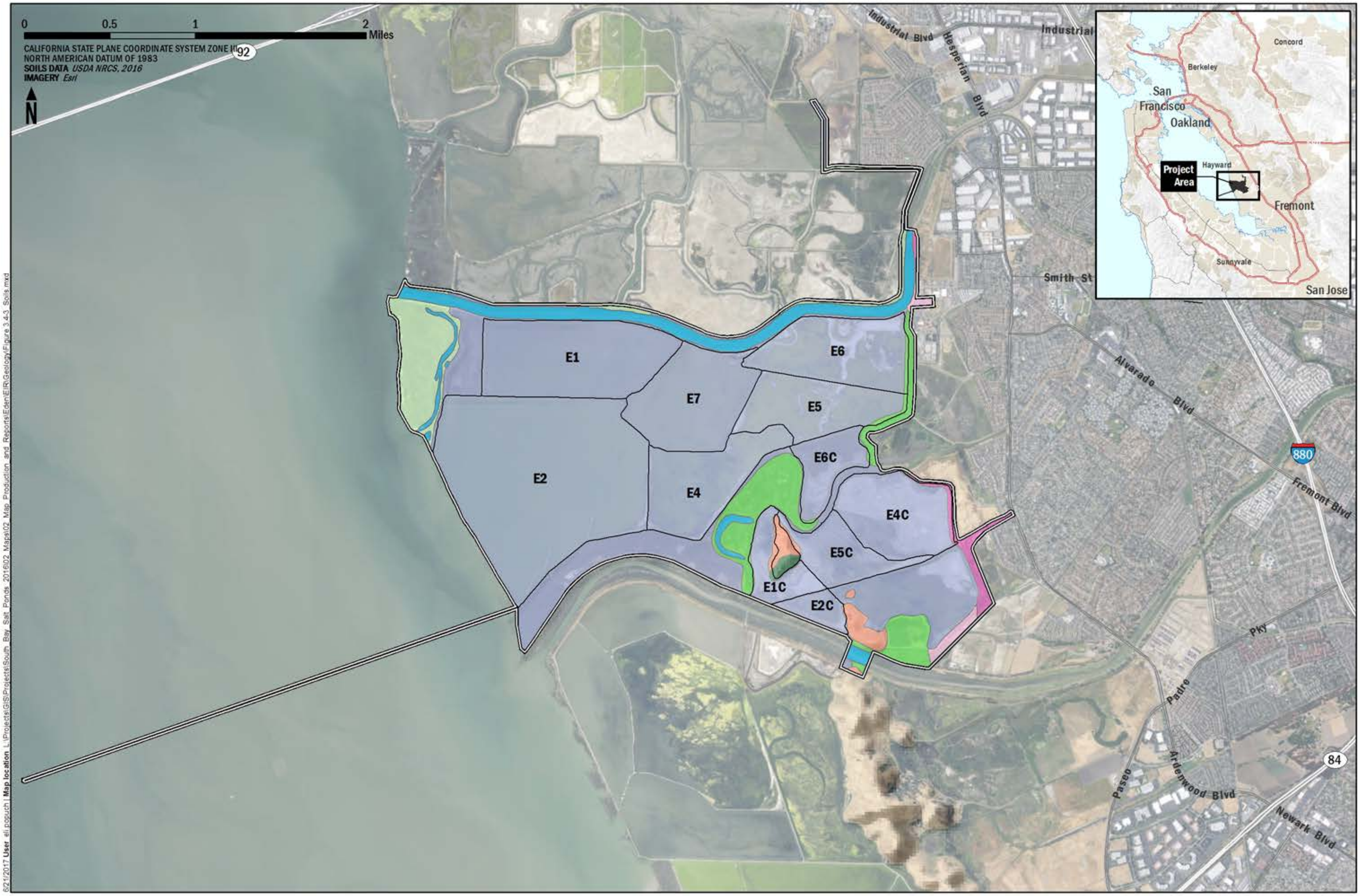


Figure 3.4-2
Bay Mud Thickness, South Bay



LEGEND

NRCS Detailed Soils

- Contra Costa Clay Loam, 30 to 50 Percent Slopes
- Omni silty clay loam, drained
- Reyes clay
- Reyes Clay, Drained
- Reyes Clay, Ponded
- Sycamore Silt Loam, Drained
- Vallecitos-Rock Outcrop Complex, 30 to 50 Percent Slopes
- Water
- Eden Landing Phase 2 Project Area
- Southern Eden Landing Ponds

6/21/2017 User eli.posuch Map location L:\Projects\GIS\Projects\South_Bay_Salt_Ponds_2016\02_Maps\02_Map_Production_and_Reports\EdenEIR\Geology\Figure 3.4-3_Soils.mxd

AECOM

South Bay Salt Pond Restoration Project

Figure 3.4-3

Soils

Seismicity and Seismic Hazards

The San Francisco Bay Region is considered to be one of the more seismically active regions in the world, based on its record of historic earthquakes and its position along the San Andreas Fault system. The San Andreas Fault system consists of several major right-lateral strike-slip faults in the region that define the boundary zone between the Pacific and North American tectonic plates. Numerous damaging earthquakes have occurred along the San Andreas Fault and its associated fault system in historical time.

Seismic or earthquake hazards are generated by the release of underground stress along a fault line and can cause ground shaking, surface fault rupture, tsunami/seiche generation, liquefaction, and earthquake-induced landsliding within the region, and the Phase 2 project area.

Surface Fault Rupture

Surface fault rupture, which is a manifestation of the fault displacement at the ground surface, usually is associated with moderate- to large-magnitude earthquakes (magnitudes of about 6 or larger). Generally, primary surface fault rupture occurs on active faults having mappable traces or zones at the ground surface. Potential surface fault rupture hazards exist along the known active faults in the greater San Francisco Bay Region. Faults that have been identified by the California Geologic Survey as potential surface rupture hazards in proximity to the Phase 2 project area include the San Andreas and Hayward Faults. These faults show historic (last 200 years) displacement associated with mapped surface rupture or surface creep.

Ground Shaking

Ground shaking takes the form of complex vibratory motion in both the horizontal and vertical directions. The amplitude, duration, and frequency content of ground shaking experienced at a specific site in an individual earthquake are highly dependent on several factors, including the magnitude of the earthquake, the fault rupture characteristics, the distance of the fault rupture from the site, and the types and distributions of soils beneath the site. Large-magnitude earthquakes produce stronger ground shaking than small-magnitude events. Sites close to the zone of fault rupture typically experience stronger motion than similar sites located farther away. Site soils can amplify ground motion in certain frequency ranges and can dampen ground motion within other frequency ranges. Soft soils sites, such as the Holocene Bay Mud and Quaternary alluvium, eolian deposits, and older Pleistocene Bay mud could amplify ground motions in the long period range compared to stiff or firm soils sites. This would affect structures having long, natural periods of vibration, such as bridges and tall buildings. Such soft soil substrate is present in the Eden Landing Phase 2 project area.

Liquefaction and Related Ground Failures

Liquefaction is a soil behavior phenomenon in which a soil located below the groundwater surface loses a substantial amount of strength due to high excess pore-water pressure generated and accumulated during strong earthquake ground shaking. During earthquake ground shaking, induced cyclic shear creates a tendency in most soils to change volume by rearrangement of the soil-particle structure. The potential for excess pore-water pressure generation and strength loss associated with this volume change tendency is highly dependent on the density of the soil, with greater potential in looser soils like those surrounding South Bay including the Eden Landing Phase 2 project area.

The severity of the liquefaction hazard depends on: density of the saturated granular soils, depth and thickness of potentially liquefiable layers, magnitude and duration of the ground shaking, and distance to the nearby free face or ground slope. Generally, looser deposits have the potential to densify more as a result of ground shaking and are subject to larger volumetric changes. Generally thicker deposits would accumulate more volumetric change than thinner deposits.

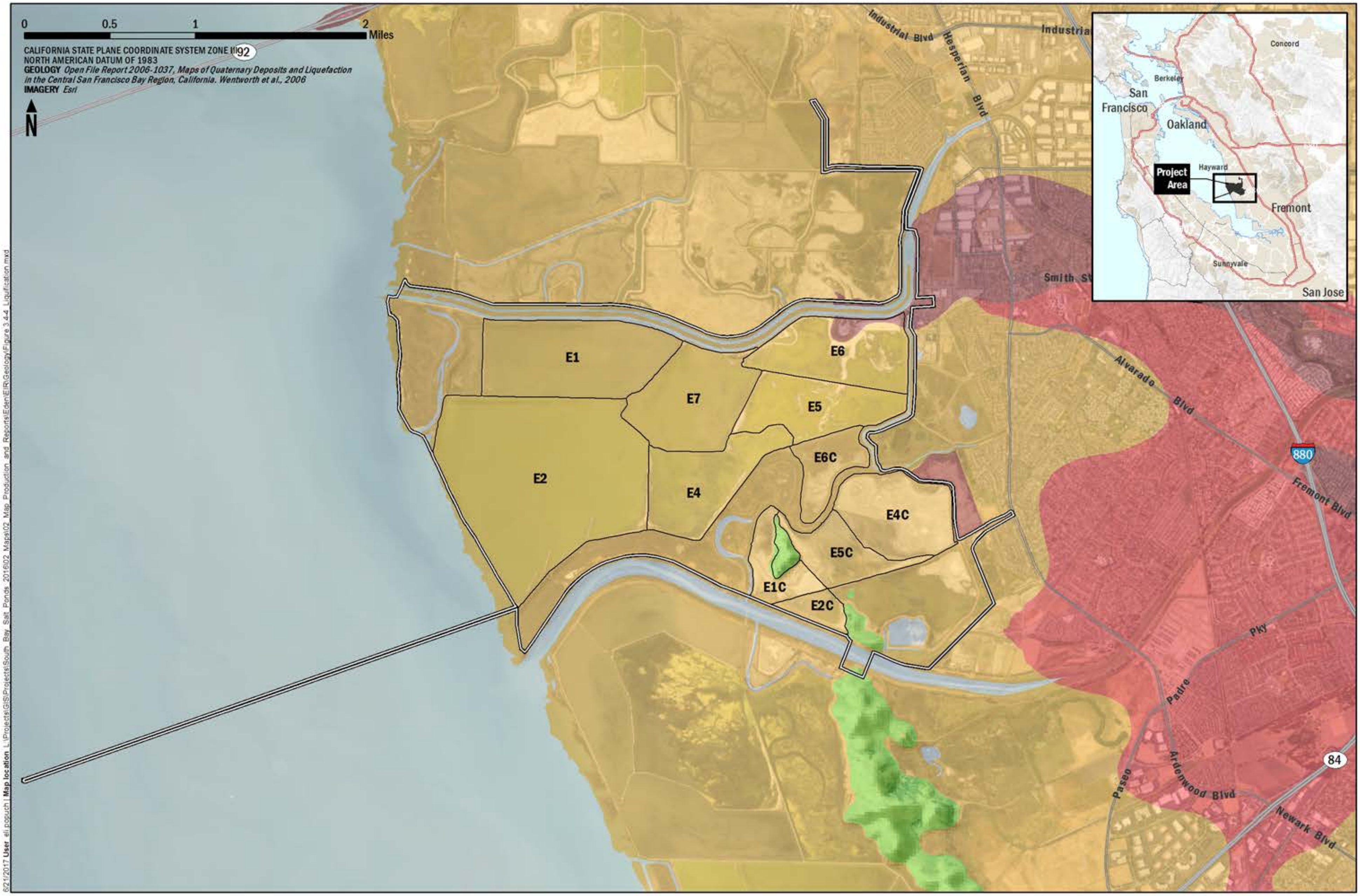
Figure 3.4-4 shows liquefaction susceptibility based on subsurface conditions, including soil type, soil thickness, and depth to groundwater. Locations of observed ground effects (lateral spreading, sand boil, or settlement) from historic earthquakes (1989 Loma Prieta, 1906 San Francisco, and others) are also shown. The majority of the Phase 2 project area has a “Moderate” susceptibility for liquefaction, with a small portion of Pond E6C within the Inland Ponds having a “Very High” susceptibility (Witter et al. 2006). This area of “Very High Susceptibility” traverses the northern levee along Pond E6C where the existing Bay Trail spur runs.

Landslides and Earthquake Triggered Landslides

Landsliding is a general term used to describe the gravity-driven downslope movement of weathered earth materials. Landsliding is frequently used to describe rapid forms of flow, slide, or fall, where a mass of rock or weathered debris moves downhill along discrete shear surfaces. Water generally plays an important role in landsliding by oversteepening slopes through surface erosion, by generating seepage pressures through groundwater flow, and by adding weight to a soil mass when it is saturated. Other factors that influence landsliding are: (1) strength of the rock/soil material; (2) degree/depth of weathering; (3) slope angle; (4) the orientation and density of rock structures, such as bedding, joint, and fault planes; and (5) grading activities. Inertial forces from earthquake ground shaking can also reduce the stability of a slope and cause sliding or falling of soil or rock. Landslides may also be triggered by earthquakes and ground shaking.

Subsidence

Within the Eden Landing Phase 2 project area, Bay mud is a very soft, highly compressible material that can cause settlement and ground subsidence. The potential for settlement is correlated to the thickness of the material that underlies a given location. Within southern Eden Landing, the thickness of Bay mud varies from about zero to 25 feet. Therefore, a new earthen or structural load constructed in an area that contains a significant thickness of Bay mud can cause consolidation of Bay mud, which would cause ground settlement that would result in lower ground surface elevations over time.



6/21/2017 User eli.popuch | Map location L:\Projects\GIS\Projects\South Bay Salt Ponds 2016\02 Maps\02 Map Production and Reports\Eden\EIR\Geology\Figure 3.4-4 Liquification.mxd

LEGEND

Liquefaction Susceptibility

- Very High
- High
- Moderate
- Very Low
- Water
- Eden Landing Phase 2 Project Area
- Southern Eden Landing Ponds

AECOM

South Bay Salt Pond Restoration Project

Figure 3.4-4

Liquefaction

3.4.2 Regulatory Setting

Federal

Flood risk assessments and some flood-protection projects are conducted by federal agencies, including Federal Emergency Management Agency (FEMA) and United States Army Corps of Engineers (USACE). Flood risk management actions and levee integrity will be influenced by geology, soils, and seismicity in the Eden Landing Phase 2 area. Applicable regulations and potential impacts to flood risk management are discussed in Section 3.2, Hydrology, Flood Management, and Infrastructure.

State

State regulations that govern geotechnical and geological aspects of Eden Landing Phase 2 project area include the Alquist-Priolo Earthquake Fault Zoning Act and Seismic Hazards Mapping Act. The California Building Code (CBC) would apply if a significant, permanent structure is constructed; however, none is proposed. The two primary regulations governing soils and geology are discussed below.

Alquist-Priolo Earthquake Fault Zone Act

Alquist-Priolo Earthquake Fault Zones are regulatory zones that encompass surface traces of active faults that have a potential for future surface fault rupture. To be located within an Earthquake Fault Zone means that an active fault is present within the zone, and the fault may pose a risk of surface fault rupture to existing or future structures. If property is not developed, a fault study may be required before the parcel can be subdivided or before most structures can be permitted. If a property within a Fault Zone is developed, the Alquist-Priolo Earthquake Fault Zone Act requires that all real estate transactions within the zone be disclosed by the seller to prospective buyers.

The law requires the State Geologist to establish regulatory zones (known as Earthquake Fault Zones) around the surface traces of active faults and to issue appropriate maps. (“Earthquake Fault Zones” were called “Special Studies Zones” prior to January 1, 1994.) The maps are distributed to all affected state agencies, counties, and cities for their use in planning and controlling new or renewed construction. Local agencies must regulate most type of development within Earthquake Fault Zones. For purposes of the Act, a project is defined as all land divisions and includes most structures for human occupancy. Single-family wood-frame and steel-frame dwellings up to two stories that are not part of a development of four units or more are exempt from the provisions of the Act. However, local agencies can be more restrictive than state law requires.

Before a project can be permitted, counties and cities must require a geologic investigation to demonstrate whether a proposed project will be constructed across active faults. An evaluation and written report of a specific site must be prepared by a licensed geologist. If an active fault is found, a structure for human occupancy cannot be placed over the trace of the fault and must be set back from the fault (generally 50 feet).

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act addresses seismic hazards such as strong ground shaking, soil liquefaction, and earthquake-related landslides. This act requires the State of California to identify and map areas that are at risk for these and other related hazards. Counties and cities are also required to regulate development in the mapped seismic hazard zones.

Permit review is the primary method of regulating local development under the Seismic Hazards Mapping Act. Counties and cities cannot issue development permits in these hazard zones until site-specific soils and/or geology investigations are carried out and measures to reduce potential damage are incorporated in the development plans.

The design of all structures (i.e., building and non-building structures) is required to comply with the Uniform Building Code (UBC)[1] and the CBC, which are the applicable building codes. Construction activities are overseen by the immediate local jurisdiction and regulated through a multi-stage permitting process. Projects within city limits typically require permit review by the city, while projects in unincorporated areas require a county permit. Grading and building permits require a site-specific geotechnical evaluation by a state-certified engineering geologist and/or geotechnical engineer. The geotechnical evaluation provides a geological basis from which to develop appropriate construction designs. A typical geotechnical evaluation usually includes an assessment of bedrock and quaternary geology, geologic structure, and soils, and a history of excavation and fill placement. The evaluation may also address the requirements of the Alquist-Priolo Act and the Seismic Hazards Mapping Act when appropriate.

3.4.3 Environmental Impacts and Mitigation Measures

Overview

This section describes environmental impacts and mitigation measures related to geology, soils, and seismicity. It includes a discussion of the criteria used to determine the significance of impacts. Potential impacts are characterized by evaluating direct, indirect, short-term (temporary), and long-term effects. Impact evaluations for the Action Alternatives are assessed based on the existing conditions described in Section 3.4.1, not the conditions that would occur under the No Action Alternative. This approach follows the requirements of CEQA, and what was done for the 2007 Final EIS/R. In this case, the No Action Alternative represents no change from current management direction or level of management intensity, as provided in the Adaptive Management Plan (AMP), the California Department of Fish and Wildlife’s (CDFW’s) Eden Landing Ecological Reserve (ELER, or Reserve) Restoration and Management Plan and the *Eden Landing Ecological Reserve System E2 and E2C Operation Plan* (Operations Plan), is consistent with the National Environmental Policy Act (NEPA) impact discussion. Mitigation measures are recommended, as necessary, to reduce significant impacts.

Significance Criteria

For the purposes of this Draft EIS/R, implementation of project alternatives at the Phase 2 project area within the Eden Landing pond complex would have a significant effect if it would:

- Be located on a site with geologic features that pose a substantial hazard to property and/or human life (e.g., an active fault, an active landslide); or
- Expose people or property to major geologic hazards that cannot be avoided or reduced through the use of standard engineering design and seismic safety techniques; or
- Cause substantial erosion or siltation.

[1] Published by the International Conference of Building Officials, the UBC is a widely adopted model building code in the United States. The CBC incorporates by reference the UBC, with necessary California amendments.

The first two of these significance criteria are addressed in the impacts discussed below, which are a function of the geographic location of the Phase 2 ponds and underlying geologic features (e.g., faults, Bay muds). The third bulleted significance criterion above is addressed partly herein and partly in Section 3.2, Hydrology, Flood Management, and Infrastructure. The Phase 2 Alternatives proposed at southern Eden Landing would not cause substantial erosion or siltation of top soils, so no further discussion of that topic is necessary here. The potential erosion caused by altering existing drainage patterns in the mudflats and sloughs is discussed in Section 3.2, Hydrology, Flood Management, and Infrastructure, and the biological and ecological effects of mudflat or marsh erosion are discussed in Section 3.5, Biological Resources.

As explained in Section 3.1.2, while both Council on Environmental Quality Regulations for Implementing NEPA and the CEQA Guidelines were considered during the impact analysis, impacts identified in this EIS/R are characterized using CEQA terminology.

Program-level Evaluation Summary

The 2007 Final EIS/R evaluated the potential geologic, soils, and seismic hazards that could affect the three long-term restoration alternatives. At the program level, the decision was made to select Programmatic Alternative C and implement Phase 1 actions. Therefore, a summary of the impacts for Alternative C from the 2007 Final EIS/R is provided below.

Potential effects from settlement and subsidence (including effects on levees and subsurface utility and surface rail crossings), liquefaction, lateral spreading, and ground and levee faults from fault rupture were found to be less than significant under Alternative C. This is because new and/or improved flood risk management levees would be designed, constructed, and maintained to address settlement, liquefaction, lateral spreading, and ground failure from a fault rupture. These facilities would be designed to account for the location of existing underground utilities and surface rail lines.

Risk from tsunami and/or seiche were found to be less than significant because Alternative C would not include habitable structures, and warning systems would allow for evacuation of the shoreline in such an event so inundation by tsunamis would not be expected to expose people to potential injury or death. Because impacts from Alternative C were found to be less than significant, no mitigation measures specific to geology and soils conditions are carried forward to Eden Landing Phase 2 from the 2007 Final EIS/R.

Project-Level Evaluation

Phase 2 Impact 3.4-1: Potential effects from settlement due to consolidation of Bay mud.

Alternative Eden A (No Action). Under Alternative Eden A (the No Action Alternative), no new activities would be implemented as part of the Phase 2 project. The CDFW would continue maintaining and operating the ponds as part of the ELER and according to the Operations Plan and the activities described in the AMP and in accordance with current CDFW practices.

The Eden Landing Phase 2 project area is underlain by Bay mud of varying thickness. Implementation of Alternative Eden A would allow existing features within the Phase 2 project area, including levees, pond bottoms, and recreational trail alignments to continue to settle at their current rate. Under this No Action

Alternative, no new structures or weight would be added that would expedite settlement caused by underlying Bay mud.

Under Alternative Eden A, CDFW would commit minimal effort to maintaining the majority of existing salt pond levees within the Phase 2 project area. Per CDFW's Restoration and Management Plan (California Department of Fish and Game [CDFG] 1999), existing levees along Ponds E4C, E5, E6C and E6 would be maintained for flood risk management, and maintenance of other levees and access roads coordinated with Alameda County Flood Control and Water Conservation District (ACFCWCD) and utilities such as Pacific Gas and Electric (PG&E) to ensure access to, and maintenance of existing assets is retained. Other periodic maintenance by CDFW would involve cleaning tide gates and weirs, and operating the water control system to maintain salinity levels, and control invasive species (CDFG 1999) through managed connections to Old Alameda Creek (OAC) and Alameda Creek Flood Control Channel (ACFCC). Beyond these efforts, all non-priority levees within the Phase 2 project area would settle over time, and due to wave action, unintentional breeching, and levee overtopping become increasingly prone to complete failure. However, because high priority flood risk management levees would be maintained, the potential effects from settlement due to consolidation of Bay mud would not increase overall hazards associated with dissolution and settlement of levees internal to the Phase 2 project area. As such, potential impacts associated with implementation of Alternative Eden A would overall, be less than significant and pose no new risks.

Alternative Eden A Level of Significance: Less than Significant

Alternative Eden B. Alternative Eden B includes a mix of project components that are intended to increase hydrologic connectivity of the project area via OAC and ACFCC. This increased connectivity, particularly through the northern portion of the Bay and Inland Ponds is intended to facilitate transition of the project area to tidal marsh over time. There would also be additional trails placed on improved levees. Project components such as breaching levees and the excavation of pilot channels would not increase settlement rates because they would not add additional weight to areas underlain by Bay mud. However, the construction and operation of footbridges and water control structures, along with the construction of dredge material infrastructure and the import of dredge material to raise pond bottom elevations and construct habitat transition zones, and the import of upland fill material to create islands, construct habitat transition zones, and improve levees for habitat separation and flood risk management, could increase localized background settlement rates over time.

Levees intended for habitat separation, flood risk management, and public access would be designed and constructed to account for settlement and consolidation caused by underlying Bay mud. The improved backside levee at the Inland and Southern Ponds, along with the associated habitat transition zone, would be designed to withstand seismic events to the extent practicable. Also, levees and other features would be initially overbuilt to account for localized settlement. The long-term settlement resulting from the increased weight associated with these levees and other features would be offset by required maintenance to ensure that minimum levee elevations for flood risk management are retained. Due to design considerations and ongoing maintenance of proposed flood risk management infrastructure associated with the project, the potential effects from settlement due to consolidation of Bay mud would not increase hazards associated with settlement. Therefore, implementation of Alternative Eden B would be less than significant, and pose no new risks.

Alternative Eden B Level of Significance: Less than Significant

Alternative Eden C. Alternative Eden C includes a mix of project features that would transition the Bay Ponds to tidal marsh and convert the Inland and Southern Ponds to enhanced managed ponds. The tidal marsh vs. managed pond areas would be separated by a proposed improved mid-complex levee between the Bay and Inland Ponds, which extends south through the J-Ponds to the ACFCC. Similar features described in Alternative Eden B would be constructed as part of Alternative Eden C including footbridges, viewing platforms, water control structures, habitat transition zones, islands, improved levees for habitat separation and flood risk management, and improved pond bottom elevations in the Bay Ponds. There would also be additional trails placed on improved levees above and beyond those in Alternative Eden B. New structures and import of dredge material and upland fill material could increase background settlement rates in these localized areas over time. While the components described are similar, the major difference between Alternative Eden B and C would occur in the proposed location of improved levees, the habitat transition zone, and the number and location of proposed water control structures, and the placement location for dredge materials. As with Alternative Eden B, these improvements – particularly the imported dredge material, the habitat transition zone, and the improved mid-complex levee – would add additional fill material to areas underlain by Bay mud. This could potentially increase the rate of settlement. However, the dredge material, habitat transition zones, and levee improvements are intended to function in coordination with the many other aspects of the Phase 2 project improvements, and as a whole, the Phase 2 project improvements are intended raise the elevation of the deeply subsided pond bottoms. Also, the levees and other features would be initially overbuilt to account for localized settlement. The long-term settlement resulting from the increased weight associated with these levees and other features would be offset by required maintenance to ensure that minimum levee elevations for flood risk management are retained. Therefore, on balance, the proposed actions associated with Alternative Eden C would work to offset the long term impacts of settlement and consolidation, and would not create impacts to people or property. Impacts resulting from potential settlement due to consolidation of Bay mud are therefore less than significant.

Alternative Eden C Level of Significance: Less than Significant

Alternative Eden D. Under Alternative Eden D, dredge materials would be placed in the Bay and Inland Ponds, the Bay Ponds would be restored to tidal marsh, and the Inland Ponds and Southern Ponds would be temporarily retained as managed ponds and enhanced with water intakes, water control structures, and habitat features intended to add complexity and ecological value. Coastal flood risk management would primarily be provided by a combination of an enhanced mid-complex levee and improvements to the backside levee along the eastern edge of the Inland and Southern Ponds. Once tidal marsh habitat forms in the Bay Ponds, fully tidal flows could be restored to the Inland and Southern Ponds as the backside levee at the Inland and Southern Ponds would provide the flood risk management. A significant habitat transition zone would be constructed behind the bay-facing levee, and a temporary (rather than permanent) mid-complex levee would separate the Bay and Inland Ponds. There would be similar trails and public access feature options as in Alternative Eden B.

Imported dredge materials and associated infrastructure, levee improvements for habitat separation and flood risk management purposes, construction of water control structures and habitat transition zones, and adding recreational facilities under Alternative Eden D would impose added weight on the underlying Bay mud, thereby potentially accelerating existing background rates of settlement. However, improved flood risk management and habitat separation levees (and related improvements) would be designed and constructed to compensate for settlement and consolidation over time. The long-term settlement resulting from the increased weight associated with these levees and other features would be offset by required maintenance to ensure minimum levee elevations for flood risk management are retained. Also, the levees and other features would be initially overbuilt to account for localized settlement.

Construction of the habitat transition zone along the western edge of the Bay Ponds would prevent scouring of lands within the Bay Ponds and assist in facilitating its transition to tidal marsh. The potential accelerated settlement and consolidation caused by the addition of material along the bay-facing levee, and improved levees at the backside of the project area would be offset by required maintenance to ensure minimum levee elevations for flood risk management are retained. Further, construction of the habitat transition zones, temporary, and improved flood risk management levees would not create impacts to people or structures. This would prevent potential effects on people and property resulting from potentially accelerated rates of subsidence. Impacts resulting from potential settlement due to consolidation of Bay mud under Alternative Eden D are therefore less than significant.

Alternative Eden D Level of Significance: Less than Significant

Phase 2 Impact 3.4-2: Potential effects from liquefaction of soils and lateral spreading.

Alternative Eden A (No Action). Based on existing data, the project area is within an area of moderate liquefaction susceptibility. Under Alternative Eden A, CDFW would commit minimal effort to maintaining the majority of existing salt pond levees within the Phase 2 project area. Per CDFW's Restoration and Management Plan (CDFG 1999), existing levees along Ponds E4C, E5, E6C and E6 would be maintained for flood risk management, and maintenance of other levees and access roads (such as those to utilities) would be coordinated with ACFCWCD and PG&E, as applicable, to ensure that access to, and maintenance of existing assets is retained.

Liquefaction may cause portions of existing levees to settle below minimum elevations, allowing them to be overtopped. In areas where liquefaction causes failure and deformation of levee slopes, levees may be breached. Corresponding ponds and adjacent areas may be flooded as a result, but these conditions exist now. Alternative Eden A would not create a new opportunity to expose people to damage resulting from liquefaction or lateral spreading. As such, impacts resulting from the selection of Alternative Eden A would be less than significant.

Alternative Eden A Level of Significance: Less than Significant

Alternative Eden B. Alternative Eden B is intended to restore the entirety of southern Eden Landing to tidal marsh in a single project implementation stage. The eastern, backside levees would be improved to provide the necessary degree of flood risk management. Following this, habitat enhancements including habitat transition zones, islands made from remnant levees, channel excavation, and levee lowering would be implemented. Two sections of internal levee improvements would also be made along the J-ponds and other ACFCWCD-owned channels. Public access trails and a viewing platform would be placed on improved levees.

Project components such as breaching levees and excavation of pilot channels, construction and operation of proposed features such as water control structures, islands, mounds, and improved levees for habitat separation, may be impacted by liquefaction due to the presence of underlying Bay mud and soft compressible soils. However, if these features were impacted by liquefaction or lateral spreading caused by ground shaking, they would be repaired, as needed.

The addition of proposed walking trails, viewing platforms and footbridges would enable greater public access to portions of the project area but are not considered components that would place the general public a significant risk should they be impacted by liquefaction or lateral spreading during a ground shaking event. It would not expose people or property to major geologic hazards. Alternative Eden B does not include construction of any buildings or habitable structures that could be subject to liquefaction from seismic-related ground failure.

Based on the above, liquefaction of soils, and therefore lateral spreading within the project area, could cause deformation of levee slopes, affect habitat transition zones, and cause failure of trail routes, footbridges and viewpoints. However, the project would not expose people to unnecessary flood hazards resulting from liquefaction or lateral spreading and therefore potential effects from lateral spreading and liquefaction are considered less than significant.

Alternative Eden B Level of Significance: Less than Significant

Alternative Eden C. Alternative Eden C includes a mix of project features that would transition the Bay Ponds to tidal marsh, and the Inland and Southern Ponds to managed ponds. The tidal marsh habitat vs. managed pond areas would be separated by a proposed improved mid-complex levee between the Bay and Inland Ponds, which would extend south through the J-Ponds to the ACFCC. Similar project features described in Alternative Eden B would be constructed as part of Alternative Eden C with differences in location. Most notably, the proposed improved mid-complex levee, habitat transition zone, and the number and location of proposed water control structures would be different, but would also be designed with liquefaction and lateral spread potential, and would be repaired if destroyed as a result of lateral spread or liquefaction.

Additional public access trails beyond those in Alternative Eden B, larger pedestrian and bicycle bridges over the ACFCC and OAC to connect these trails, and two viewing platforms would be placed on improved levees. The pedestrian bridges notwithstanding, Alternative Eden C does not include construction of any buildings or habitable structures that could be subject to liquefaction from seismic-related ground failure. The addition of proposed walking trails, viewing platforms and footbridges would enable greater public access to portions of the project area but are not considered components that would place the general public a significant risk should they be impacted by liquefaction or lateral spreading during a ground shaking event. It would not expose people or property to major geologic hazards

Based on the above, Alternative Eden C would not introduce unnecessary exposure of people and property to flood hazards resulting from liquefaction or lateral spreading. As such, impacts resulting from the selection of Alternative Eden C would be less than significant.

Alternative Eden C Level of Significance: Less than Significant

Alternative Eden D. Under Alternative Eden D, the Bay Ponds would be restored to tidal marsh, and the Inland and Southern Ponds would be temporarily retained as managed ponds and enhanced with water intakes, water control structures, and other habitat improvement features intended to add complexity and ecological value to these managed ponds. Coastal flood risk management would primarily be provided by a combination of an enhanced mid-complex levee and improvements to the backside levee along the eastern edge of the Inland and Southern Ponds. Once the tidal marsh habitat forms in the Bay Ponds, fully tidal flows could be restored to the Inland and Southern Ponds as the backside levee at the Inland and Southern Ponds would provide the flood risk management. A significant habitat transition zone would be constructed behind the bay-facing levee, and a temporary mid-complex levee would separate the Bay and Inland Ponds.

Public access to features such as trails and view platforms could increase public exposure to liquefaction and impacts resulting from lateral spreading. As with Alternatives B and C, the addition of proposed walking trails, viewing platforms and footbridges would enable greater public access to portions of the project area. However, these are not considered components that would significantly place the general public at risk should they be impacted by liquefaction or lateral spreading during a ground shaking event. It would not expose people or property to major geologic hazards. Alternative Eden D does not include construction of any buildings or habitable structures that could be subject to liquefaction from seismic-related ground failure.

Based on the above, Alternative Eden D would not introduce features that would cause unnecessary exposure of people and property to flood hazards resulting from liquefaction or lateral spreading. As such, impacts resulting from the selection of Alternative Eden D would be less than significant.

Alternative Eden D Level of Significance: Less than Significant

Phase 2 Impact 3.4-3: Potential for ground and levee failure from fault rupture.

Alternative Eden A (No Action). Under Alternative Eden A, CDFW would commit minimal effort to maintaining the majority of existing salt pond levees within the Phase 2 project area. Per CDFW's Restoration and Management Plan (CDFG 1999), existing levees along Ponds E4C, E5, E6C and E6 would be maintained for flood risk management.

No active or potentially active faults are mapped within the Eden Landing Phase 2 project area; however the concealed quaternary Silver Creek Fault is located less than 1 mile east of the Southern Ponds. Ground shaking during an earthquake caused by rupture of this fault or others in the region could cause existing and proposed levees within the project area to fail and collapse. Because flood risk management levees would be repaired and maintained, potential impacts to people and property due to an earthquake induced rupture of the Silver Creek Fault would be less than significant.

Alternative Eden A Level of Significance: Less than Significant

Alternative Eden B. Alternative Eden B would restore the entirety of southern Eden Landing to tidal marsh in a single project implementation stage. The eastern, backside levees would be improved to provide the necessary degree of flood risk management. Following this, habitat enhancements including habitat transition zones, islands made from remnant levees, channel excavation, and levee lowering would be implemented.

No active or potentially active faults are mapped within the Eden Landing Phase 2 project area; however the concealed quaternary Silver Creek Fault is located less than 1 mile east of the project area. Proposed flood risk management levees and other structures constructed as part of Alternative Eden B would be designed to account for ground shaking during an earthquake to prevent failure from fault rupture. Should failure or fault rupture occur, however, flood risk management levees and other features associated with Alternative Eden B would be repaired, as needed. As such, potential impacts to people and property due to an earthquake induced rupture of the Silver Creek Fault would be less than significant under Alternative Eden B.

Alternative Eden B Level of Significance: Less than Significant

Alternative Eden C. Alternative Eden C would retain the Inland and Southern Ponds as managed ponds and add a number of water control structures to allow the depth and salinity of these ponds to be actively managed for a range of different pond-dependent wildlife. The Bay Ponds would be restored to tidal marsh, as in Alternative Eden B, and a mid-complex levee would largely be built on top of existing internal levees. This alternative would feature a similar range of habitat enhancements as Alternative Eden B but in different locations. The Bay Trail is planned for the same routes as Alternative Eden B, but Alternative Eden C would add an additional set of trails on either side of the OAC and a bridge over the OAC to connect them. These trails would form a spur trail to the site of the Alvarado Salt Works, and a viewing platform there. Another large bridge would be built over the ACFCC to extend the Bay Trail spine further and beyond the ELER boundary itself.

No active or potentially active faults are mapped within the Eden Landing Phase 2 project area; however the concealed quaternary Silver Creek Fault is located less than one mile east of the Southern Ponds. Proposed levees and recreational trails constructed as part of Alternative Eden C would be designed to account for ground shaking during an earthquake to prevent failure from fault rupture. While the general public is anticipated to use public trails and occupy viewing areas, these resources would not put the general public at risk of life or property to major geologic hazards. Additionally, should failure or fault rupture occur, flood risk management levees and other features associated with Alternative Eden C would be repaired, as needed. As such, potential impacts to people and property due to an earthquake induced rupture of the Silver Creek Fault or other faults in the region would be less than significant under Alternative Eden C.

Alternative Eden C Level of Significance: Less than Significant

Alternative Eden D. Alternative Eden D is a staged implementation of the tidal marsh restoration outlined in Alternative Eden B. It would make use of a mid-complex levee, as in Alternative Eden C, but that levee would be temporary. This separation of the Bay Ponds from the others would allow those large outer ponds to first be restored to tidal marsh, after which, the mid-complex levee would be removed, and the Inland and Southern Ponds then restored to tidal marsh. Water control structures would be added to the Inland and Southern Ponds for use during the years in which they would be operated as managed ponds and then removed to allow tidal flows. The trail and associated viewing platform would be similar to those in Alternative Eden B.

No active or potentially active faults are mapped within the Eden Landing Phase 2 project area; however, the concealed quaternary Silver Creek Fault is located less than 1 mile east of the Southern Ponds. Proposed flood risk management levees and recreational trails constructed as part of Alternative Eden D would be designed to account for ground shaking during an earthquake to prevent failure from fault rupture. While the general public is anticipated to use public trails and occupy viewing areas, these resources would not put the general public at risk. Additionally, should failure or fault rupture occur, flood risk management levees and other features associated with Alternative Eden D would be repaired, as needed. As such, potential impacts to people and property due to an earthquake induced rupture of the Silver Creek Fault or other faults in the region would be less than significant under Alternative Eden D.

Alternative Eden D Level of Significance: Less than Significant

Phase 2 Impact 3.4-4: Potential effects from consolidation of Bay mud on existing subsurface utility crossings and surface rail crossings.

Alternative Eden A (No Action). Under Alternative Eden A (the No Action Alternative), no new activities would be implemented as part of the Phase 2 project. The CDFW would continue maintaining and operating the ponds as part of the ELER and according to the Operations Plan and the activities described in the AMP and in accordance with current CDFW practices.

The Phase 2 project area contains no surface rail crossings or subsurface utility crossings. The existing above ground PG&E distribution line running along the north side of Ponds E1, E7 and E6, along with the distribution line bisecting Pond E2C and running along the south side of E5C and E4C would remain active and be unaffected by long-term operation because these levees would be maintained.

Because there are no rail lines or subsurface utilities within the project area, impacts to subsurface utility crossings and surface rail crossings as a result of continued consolidation and the ensuing impacts of consolidating Bay mud would be less than significant under Alternative Eden A.

Alternative Eden A Level of Significance: Less than Significant

Alternative Eden B. Alternative Eden B would restore the entirety of southern Eden Landing to tidal marsh in a single project implementation stage. Dredge materials would be placed in the Bay and Inland Ponds to raise pond bottom elevations. The eastern, backside levees would be improved to provide the necessary degree of flood risk management. Following this, habitat enhancements including habitat transition zones, islands made from remnant levees, channel excavation, and levee lowering would be implemented. Two sections of internal levee improvements would also be made along the J-ponds and other ACFCWCD-owned channels.

The Phase 2 project area contains no surface rail crossings or subsurface utility crossings within the southern Eden Landing ponds or in the portion of the Bay between the offloading facility and Pond E2. The existing above ground PG&E distribution line running along the north side of Ponds E1, E7 and E6 would be removed, but the above ground distribution line bisecting Pond E2C and running along the south side of E5C and E4C would remain active and be unaffected by long-term operation because these levees would be maintained.

Because there are no rail lines or subsurface utilities within the project area, impacts to subsurface utility crossings and surface rail crossings as a result of continued consolidation and the ensuing impacts of consolidating Bay mud would be less than significant under Alternative Eden B.

Alternative Eden B Level of Significance: Less than Significant

Alternative Eden C. Implementation of Alternative Eden C would retain the Inland Ponds and the Southern Ponds as managed ponds and add a number of water control structures to allow the depth and salinity of these ponds to be actively managed for a range of different pond-dependent wildlife. Dredge materials would be placed in the Bay Ponds to raise pond bottom elevations and the Bay Ponds would be restored to tidal marsh, as in Alternative Eden B, through the use of a mid-complex levee that would largely be built on top of the existing internal levees.

The Phase 2 project area contains no surface rail crossings or subsurface utility crossings within the southern Eden Landing ponds or in the portion of the Bay between the offloading facility and Pond E2. The existing above ground PG&E distribution line running along the north side of Ponds E1, E7 and E6 would be removed, but the above ground distribution line bisecting Pond E2C and running along the south side of E5C and E4C would remain active and be unaffected by long-term operation because these levees would be maintained.

Because there are no rail lines or subsurface utilities within the project area, impacts to subsurface utility crossings and surface rail crossings as a result of continued consolidation and the ensuing impacts of consolidating Bay mud would be less than significant under Alternative Eden C.

Alternative Eden C Level of Significance: Less than Significant

Alternative Eden D. Alternative Eden D is a staged implementation of the tidal marsh restoration outlined in Alternative Eden B. It would make use of a mid-complex levee, as in Alternative Eden C, but that levee would be temporary. This separation of the Bay Ponds from the others would allow those large outer ponds to first be restored to tidal marsh, after which, the mid-complex levee would be removed, and the Inland and Southern Ponds then restored to tidal marsh. Water control structures would be added to the Inland and Southern Ponds for use during the years in which they would be operated as managed ponds and then removed to allow tidal flows. The trail and associated viewing platform would be similar to those in Alternative Eden B.

The Phase 2 project area contains no surface rail crossings or subsurface utility crossings within the southern Eden Landing ponds or in the portion of the Bay between the offloading facility and Pond E2. The existing above ground PG&E distribution line running along the north side of Ponds E1, E7 and E6 would be removed, but the above ground distribution line bisecting Pond E2C and running along the south side of E5C and E4C would remain active and be unaffected by long-term operation because these levees would be maintained.

Because there are no rail lines or subsurface utilities within the project area, impacts to subsurface utility crossings and surface rail crossings as a result of continued consolidation and the ensuing impacts of consolidating Bay mud would be less than significant under Alternative Eden D.

Alternative Eden D Level of Significance: Less than Significant

Impact Summary

Phase 2 impacts and levels of significance are summarized in Table 3.4-1. The levels of significance are those remaining after implementation of program-level mitigation measures, project-level design features, and the AMP and other Refuge management documents and practices. The geology and soils analysis required no project-level mitigation measures in order to reduce the impacts to a level that was less than significant.

Table 3.4-1 Phase 2 Summary of Impacts – Geology and Soils

IMPACT	ALTERNATIVE EDEN A	ALTERNATIVE EDEN B	ALTERNATIVE EDEN C	ALTERNATIVE EDEN D
Phase 2 Impact 3.4-1: Potential effects from settlement due to consolidation of Bay mud.	LTS	LTS	LTS	LTS
Phase 2 Impact 3.4-2: Potential effects from liquefaction of soils and lateral spreading.	LTS	LTS	LTS	LTS
Phase 2 Impact 3.4-3: Potential for ground and levee failure from fault rupture.	LTS	LTS	LTS	LTS
Phase 2 Impact 3.4-4: Potential effects from consolidation of Bay mud on existing subsurface utility crossings and surface rail crossings.	LTS	LTS	LTS	LTS

Notes:
Alternative Eden A is the No Action Alternative (No Project Alternative under CEQA).
LTS = Less than Significant

This page intentionally left blank

3.5 Biological Resources

This section of the Draft Environmental Impact Statement/Report (EIS/R) characterizes the existing biological resources and natural environment in the Phase 2 project area and analyzes whether implementation of the project would cause a substantial adverse effect on biological resources. The information presented is based on review of existing conditions within the area and other pertinent federal, state and local regulations, which are presented in Section 3.5.2, Regulatory Setting. Using this information as context, an analysis of the biological environmental impacts of the project is presented for each alternative in Section 3.5.3, Environmental Impacts and Mitigation Measures. Program-level mitigation measures described in Chapter 2, Alternatives, would be implemented as part of the project. Therefore, this section only includes additional, project-level mitigation measures, as needed.

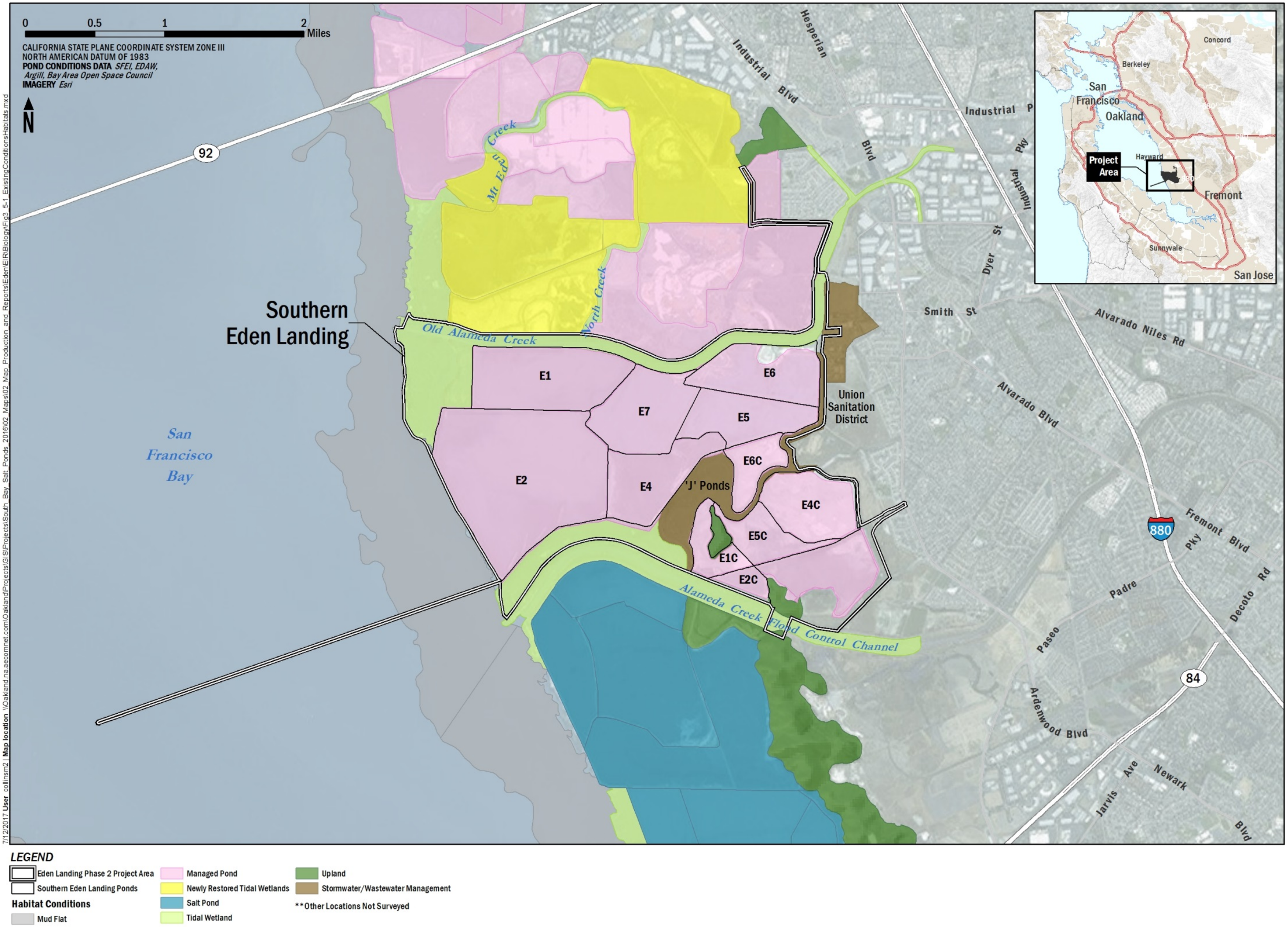
3.5.1 Physical Setting

Methodology

Following the methodology in the 2007 South Bay Salt Pond (SBSP) Restoration Project Final EIS/R (2007 Final EIS/R), this section characterizes the existing biological conditions related to Phase 2 of the SBSP Restoration Project. The principal biological components of concern are the vegetation and habitats, the wildlife, and the area of habitat subject to United States Army Corps of Engineers (USACE) jurisdiction. Phase 2 of the SBSP Restoration Project focuses on the southern half of the Eden Landing Ecological Reserve (ELER, or Reserve) which includes 11 ponds that are described in three groups: the Bay Ponds (E1, E2, E4 and E7); the Inland Ponds (E5, E6, and E6C); and the Southern Ponds or C-Ponds (E1C, E2C, E4C, and E5C) (Figure 2-2). Existing conditions in the Eden Landing pond area are provided here to provide a regional context for the proposed project. The ELER, and the southern Eden Landing ponds within it, are owned and operated by the California Department of Fish and Wildlife (CDFW). Existing conditions within each of the three pond groups are also provided (see Figure 3.5-1 for general habitat conditions). Much of the data on wildlife use of the Eden Landing Ponds has been collected by its owner and operator, CDFW. Additional information has been provided by the United States Fish and Wildlife Service (USFWS), the United States Geological Survey (USGS); non-profit organizations and research groups such as Point Blue Conservation Science (Point Blue), formerly the Point Reyes Bird Observatory Conservation Science and the San Francisco Bay Bird Observatory (SFBBO); local government entities; consultants; researchers; and private individuals.

Regional Setting

As discussed in the 2007 Final EIS/R, the San Francisco Bay Estuary is the largest estuary on the west coast of North America and is an extremely productive and diverse ecosystem (Trulio et al. 2004). The South San Francisco Bay (South Bay) includes some of the most important habitat remaining in the Bay Area for a number of wildlife species (Goals Project 1999). The term “South Bay” refers to the portion of San Francisco Bay (or Bay) south of Coyote Point on the western shore and San Leandro Marina on the eastern shore (Goals Project 1999). This region differs in several physical and ecological aspects from the other portions of San Francisco Bay Estuary. The habitats included in the South Bay are open waters and subtidal and intertidal habitats (largely mudflats) that extend to the upper reaches of tidal action, tidal and nontidal wetlands, and former salt evaporation ponds adjacent to the Bay, and the upland areas immediately adjacent to these features.



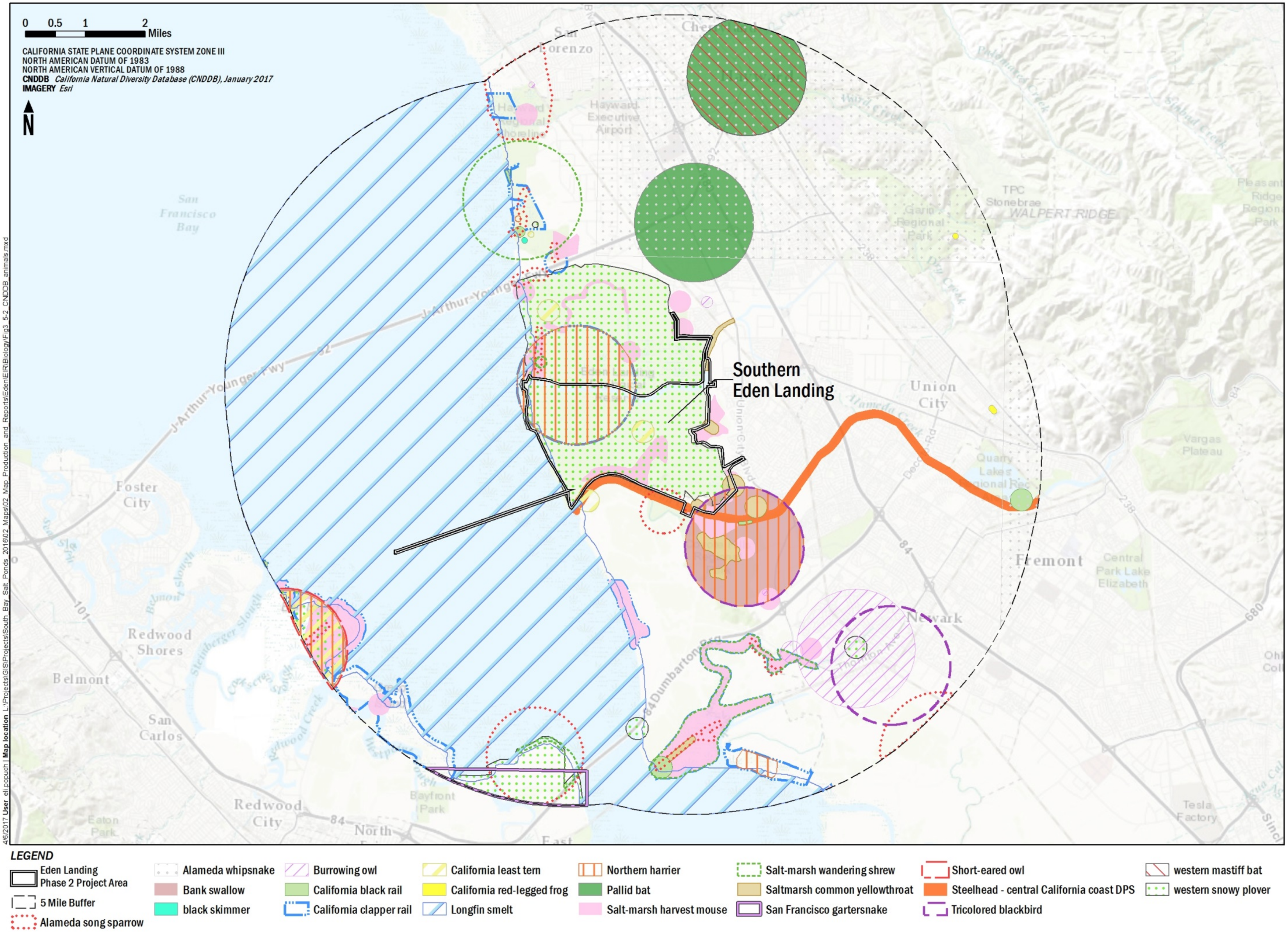
7/12/2017 User collinsm2 | Map location \\Oakland.na.aecomnet.com\Oakland\Projects\GIS\Projects\South_Bay_Salt_Ponds_2016\02_Maps\02_Map_Production_and_Reports\Eden\EIR\Biology\Fig3_5-1_ExistingConditionsHabitats.mxd

AECOM
South Bay Salt Pond Restoration Project

Figure 3.5-1
Existing Condition Study Area Habitats

The diversity of habitat types, particularly within the South Bay, is largely responsible for the diversity of wildlife species that occur. Although the high productivity of these habitats allows those species that are not habitat-limited to achieve substantial numbers, the tidal salt marshes and open waters that sustain aquatic plants and phytoplankton and the salt ponds that sustain high biomass of invertebrates are the basis of the estuary's complex and productive food web. The San Francisco Estuary supports more than 250 species of birds, 120 species of fish, 81 species of mammals, 30 species of reptiles, and 14 species of amphibians (Siegel and Bachand 2002). Equally important, the San Francisco Estuary supports populations of species that are of regional, hemispheric, or even global importance. A number of special-status wildlife species—including endemic, endangered, threatened, and rare wildlife species or subspecies—reside in the San Francisco Bay Area. Figure 3.5-2 illustrates occurrences of these special-status species with data from the California Natural Diversity Database (CNDDB). These rare San Francisco Bay area include the California Ridgway's rail (*Rallus obsoletus obsoletus*; formerly California clapper rail), salt marsh harvest mouse (*Reithrodontomys raviventris raviventris*), salt marsh wandering shrew (*Sorex vagrans halicoetes*), and Alameda song sparrow (*Melospize melodia pusillula*) in remnant tidal marsh habitat and other species such as California least terns (*Sterna antillarum browni*), western snowy plovers (*Charadrius nivosus* ssp. *nivosus*), longfin smelt (*Spirinchus thaleichthys*) and steelhead (*Oncorhynchus mykiss*; Central California Coast Distinct Population Segment).

The southern San Francisco Bay Area, including the former salt-production ponds and managed ponds, provides habitat for more than one million waterbirds each year, including large percentages of the Pacific Flyway populations of some shorebird, duck, and tern species (Page et al. 1999; Stenzel and Page 1988; Takekawa et al. 2001; Trivedi and Gross 2005). With its extensive mudflats, remnant salt marshes, and salt ponds, the South Bay in particular supports very high diversity and abundance of waterbirds (Harvey et al. 1992; Takekawa et al. 2001; Warnock 2004). Some species, such as the Wilson's phalarope (*Phalaropus tricolor*), red-necked phalarope (*Phalaropus lobatus*), eared grebe (*Podiceps nigricollis*), and the federally threatened western snowy plover, forage in the South Bay most abundantly in shallow ponds; western snowy plover also nest in the dry salt pannes or salt flats in some ponds. In contrast, a number of bird species use other habitats extensively as well, and most shorebirds occur in ponds primarily during high tide, when their preferred intertidal foraging habitats are inundated (Warnock 2004). Use of individual ponds by foraging birds is influenced primarily by water depth and salinity, which mediate food availability. Salinity mediates the availability or abundance of prey in these ponds—fish for piscivorous species occur in low-salinity ponds, while species that forage on brine flies (especially *Ephydra millbrae* and *Lipochaeta slossonae*), reticulated water boatmen (*Trichocorixa reticulata*), and brine shrimp (*Artemia franciscana*) in the higher-salinity ponds can benefit from the considerable biomass of these invertebrates in areas where water depths are suitable for foraging. At any given time, only a relatively small portion of the pond complexes provide suitable conditions (e.g., moist soil or shallow water) for foraging by shorebirds. Numerous waterbirds use the ponds and their associated islands and levees primarily for roosting, either at night or during high tide, when their preferred foraging habitats are submerged. Large mixed species flocks of shorebirds, gulls, terns, cormorants, pelicans, herons, and other birds are often seen roosting or loafing on levees, in shallow water, or on exposed mud in the ponds, and several species are known to use isolated or undisturbed pieces of upland habitat for nesting, including levees and islands.



AECOM
South Bay Salt Pond Restoration Project

Figure 3.5-2
CNDDB Special-Status Wildlife Species

There are two commercial airports in the South Bay (San Francisco International Airport and Norman Y. Mineta San Jose International Airport), and Oakland International Airport is just north of San Leandro Marina, which is the dividing line between the South Bay and the Central Bay. There are smaller private airstrips in San Carlos and Hayward, and the Moffett Federal Airfield, which is also used by the California Air National Guard, is in Sunnyvale. These airfields do present some potential for bird strikes by planes flying into or out of them. Such bird strikes are rare enough as to present very little potential for affecting the various populations of special-status birds. The 2007 Final EIS/R did not include bird strikes as a potential impact on biological resources. In fact, the potential impact of concern is more about the possibility of reductions in aviation safety from aircraft hitting birds in the air. An analysis of these impacts was conducted for the Bair Island EIS/R (USFWS and CDFG 2006), which identified the greatest risks to aviation safety from bird strikes as being from larger and higher-flying waterfowl that are attracted more to open-water ponds than they are to tidal marshes. Tidal marsh tends to attract smaller and lower-flying or ground-based shorebirds. This point was mirrored in the Federal Aviation Administration's 2007 Circular on hazardous wildlife attractants on or near airports, which found that cormorants, cranes, pelicans, and ducks presented much greater hazards to aviation than do small shorebirds (Federal Aviation Administration 2007).

The Eden Landing ponds included in the Phase 2 alternatives are all further away than the recommended 10,000-foot distance a project should be from an airport. For this reason, bird strikes are not exhaustively assessed in this Draft EIS/R.

The details of the habitats in and adjacent to the former salt ponds proposed for restoration under Phase 2 and the species that utilize these habitats are discussed in greater detail in the following section.

Eden Landing Phase 2 Project Setting

The Phase 2 activities assessed in this document are in the southern Eden Landing Ponds. The following subsections present a summary of the major habitat categories that were mapped in the SBSP Restoration Project Biology and Habitats Existing Condition Report (H.T. Harvey and Associates 2005). In addition, information presented in the *Eden Landing Ecological Reserve System E2 and E2C Operation Plan* (Operations Plan, CDFW 2016a) was used to update the baseline conditions of the Eden Landing Phase 2.

The following discussion first generally describes the habitat types within the southern Eden Landing Ponds. The subsequent section then describes more specifically which of these habitats occur within each pond group.

Habitats Identified within the Eden Landing Ponds

Tidal Salt Marsh

Tidal salt marsh vegetation consists of halophytic (salt-tolerant) species adapted to occasional to regular (tidal) saltwater inundation. Tidal salt marsh occurs on the outboard (San Francisco Bay) portions of salt pond levees, where salinities are higher.

In tidal salt marsh, cordgrass (*Spartina* sp. – OBL[1]) dominates low marsh areas. Pacific cordgrass (*Spartina foliosa*) has hybridized extensively with smooth cordgrass (*Spartina alterniflora*), a non-native species from the east and gulf coasts of North America. One or both of these species and/or their hybrids may be present at any one location.

The pickleweed and cordgrass salt marsh habitats are generally separated by elevation; cordgrass typically occurs below the Mean High Water mark and pickleweed occurs above this mark and often extends into higher elevations. However, the hybridized cordgrass can extend into the pickleweed elevation in some marshes. Pickleweed (*Sarcocornia depressa* and *S. pacifica* – OBL) dominates middle marsh areas, and high marsh areas feature a mixture of pickleweed and other moderately halophytic species, including alkali heath (*Frankenia salina* – FACW), saltgrass (*Distichlis spicata* – FAC), saltmarsh dodder (*Cuscuta salina* – NL), small flowered iceplant (*Mesembryanthemum nodiflorum* – FAC), fleshy jaumea (*Jaumea carnosa* – OBL), spearscale (*Atriplex prostrate* – FACW), perennial pepperweed (*Lepidium latifolium* – FAC), New Zealand spinach (*Tetragonia tetragonioides* – NL), and marsh gumplant (*Grindelia stricta* var. *angustifolia* – NL). High marsh is considered an ecotone, also known as an upland transitional zone, because the high marsh species frequently occur above the high tide line, which is indicated by wrack material (water-transported organic and synthetic detritus). The outboard sides of pond levees and channels associated with Old Alameda Creek (OAC) and Alameda Creek Flood Control Channel (ACFCC) and Whales Tail Marsh and Cargill Marsh typify tidal salt marsh in the project area. There are also small patches of salt marsh on portions of the internal sides of the pond levees, and these receive muted and controlled tidal flows thru water control structures.

In addition to the endangered salt marsh harvest mouse and the California Ridgway's rail, the Alameda song sparrow (*Melospiza melodia pusillula*), endemic to the Central and South San Francisco Bay, nests in dense herbaceous vegetation in salt and brackish marshes. The savannah sparrow (*Passerculus sandwichensis*) nests in pickleweed and peripheral halophytes in the upper marsh and upland transitional zones. The saltmarsh common yellowthroat (*Geothlypis trichas sinuosa*) nests in tidal and nontidal brackish and freshwater marshes and possibly also in low densities in salt marsh habitat (Shuford and Gardali 2008) in the South Bay. A wide variety of birds nest in the tidal marshes of the South Bay, including several species of ducks, Virginia rails (*Rallus limicola*), soras (*Porzana carolina*), black-necked stilts (*Himantopus mexicanus*), northern harriers (*Circus cyaneus*), and in a few locations herons and egrets (Gill 1977). Also, California black rails (*Laterallus jamaicensis coturniculus*) winter and possibly breed in small numbers in these marshes (Liu et al. 2005). In addition, non-breeding birds, including larger shorebirds, swallows, blackbirds, and other species, roost, occasionally in large numbers,

---

[1] Plant indicator status categories include (Environmental Laboratory 1987):

- OBL - Plants that almost always occur in wetlands under natural conditions (estimated probability greater than 99 percent), but which rarely occur in non-wetlands
- FACW - Plants that occur usually (estimated probability 67 to 99 percent) in wetlands, but also occur in non-wetlands
- FAC - Plants with a similar likelihood (estimated probability 33 to 67 percent) of occurring in both wetlands and non-wetlands
- FACU - Plants that occur sometimes (estimated probability 1 to 33 percent) in wetlands, but occur more often in non-wetlands
- UPL - Plants that occur rarely (estimated probability less than 1 percent) in wetlands, but occur almost always in non-wetlands
- NL – Not listed or evaluated for this region

in the tidal marsh. Tidal marshes (and mudflats) in several South Bay locations are also used as haul-out and pupping sites by harbor seals (*Phoca vitulina richardsi*), though none of these are close to southern Eden Landing.

Brackish Marsh

Brackish marsh occurs along the intertidal reaches of the creeks and sloughs that drain to the Bay, where salinities are lower due to freshwater input. Brackish marsh is found where intermediate interstitial soil salinities occur along creeks and sloughs; where freshwater channels experience periodic tidal inundation, and where groundwater emerges into tidal marshlands. Vegetative diversity and richness increase with greater freshwater influence. Where sediment deposits form terraced floodplains along low-flow channels, short bulrushes such as seacoast bulrush (*Bolboschoenus robustus* – OBL) and saltmarsh bulrush (*Bolboschoenus maritimus* ssp. *paludosus* – OBL) dominate the brackish habitat. These terraced areas may also support dense populations of the invasive perennial pepperweed, which can quickly develop into monotypic stands with increasing levels of disturbance. Other moderately halophytic plants such as brass buttons (*Cotula coronopifolia* – OBL) and taller bulrushes, including California bulrush (*Schoenoplectus californicus* – OBL) and hard stemmed tule (*Schoenoplectus acutus* var. *occidentalis* – OBL), occur in areas of lower soil salinity (e.g., toward the upland edges of brackish marsh). Tidal salt marsh species, including pickleweed, alkali heath, saltgrass, and spearscale, may also colonize brackish habitat. The two major streams outside of southern Eden Landing (OAC and the ACFCC) have brackish marsh along their banks in the uppermost areas of tidal influence. There are also areas of brackish marsh along the Alameda County Flood Control and Water Conservation District’s (ACFCWCD) channels and in the channels between the CDFW-owned levees and the County-owned levees outside the eastern edge of Eden Landing.

Brackish marshes support many of the wildlife species that use salt marsh and freshwater marsh habitats. Species composition and the relative abundance of different species may vary spatially within brackish marshes depending on water salinity, vegetation type, and habitat structure. Variability in salinity within brackish marshes is likely most important for aquatic species, which are directly subject to variation in salinity. Brackish marshes are particularly important for anadromous fish (migrating from saline to fresh water to spawn), catadromous fish (migrating from fresh to saline water to spawn), and invertebrates such as shrimp, which use brackish marshes while physiologically acclimating to changing salinity on their migrations between saline and freshwater habitats.

The often taller and denser vegetation in brackish marshes supports large densities of breeding song sparrows, saltmarsh common yellowthroats, and marsh wrens (*Cistothorus palustris*) and large numbers of Virginia rails and soras during migration and winter.

Freshwater Marsh

Freshwater marsh vegetation in and around the project area exists along the upper reaches of sloughs and creeks and primarily consists of emergent vegetation adapted to freshwater wetland conditions. Though some freshwater marshes may experience tidal influence and periodic saltwater inundation, soil salinity remains relatively low due to freshwater flowing through these areas on a regular basis. The upper reaches of OAC (along the northern boundary of the Bay and Inland Ponds) demonstrate the vegetation transition that occurs as freshwater influence increases. Dense stands of California bulrush and hard-stemmed tule interspersed with perennial pepperweed (*Lepidium latifolium*) or curly dock (*Rumex crispus*) compose the majority of emergent vegetation in freshwater marsh habitat. Areas less frequently exposed to freshwater flow but still exposed to occasional saltwater inundation may also host halophytic species such as marsh gumplant and pickleweed. Upstream in the OAC and ACFCC drainages, there are areas of freshwater marsh, and there are also narrower strips of freshwater marsh along the ACFCWCD's channels within the stormwater management areas east of the Ponds E5 and E6.

Because of the relatively limited areas of freshwater marsh occur in the South Bay, the wildlife communities of these marshes (versus those of brackish and salt marshes) in the South Bay have been little studied. Where freshwater occurs along the inland margins of the project area, the Pacific treefrog (*Pseudacris regilla*), bullfrog (*Rana catesbeiana*), and western toad (*Bufo boreas*) are present. California tiger salamanders (*Ambystoma californiense*) occur in vernal pool habitats in the Warm Springs Unit area, primarily on lands of the Don Edwards San Francisco Bay National Wildlife Refuge (or Refuge), adjacent to the SBSP Restoration Project area and the Newark salt ponds managed by Cargill Inc. (Cargill).

Most wetland-associated birds respond more to food availability and habitat structure than to salinity and therefore may occur in abundance in freshwater, brackish, or salt marsh habitats with suitable habitat structure. Some birds that are typically associated with fresh (versus more saline) marshes during the breeding season, such as bitterns, Virginia rails, and soras, breed sparingly in the South Bay, likely due to the limited extent of freshwater marshes. In contrast, red-winged blackbirds (*Agelaius phoeniceus*), American coots (*Fulica americana*), common moorhens (*Gallinula chloropus*), pied-billed grebes (*Podilymbus podiceps*), song sparrows, saltmarsh common yellowthroats, and marsh wrens breed commonly in freshwater marsh habitats in the South Bay. A variety of mammals occur in these freshwater habitats as well, although with the exception of the muskrat (*Ondatra zibethica*), none are associated primarily with this habitat type. Rather, mammals associated more with adjacent upland habitats use freshwater marsh for cover or foraging habitat.

Upland/Levees

The primary upland habitat existing in the Phase 2 project area at Eden Landing exists along the tops of levees and along the landward sides of the project area. There are also two natural hills in southern Eden Landing: Turk Island and Cal Hill (shown on Figure 2-2 and others). Across the ACFCC, the Coyote Hills form must of the land in the Coyote Hills Regional Park.

The salt pond levees were constructed from native tidal salt marsh soils (silty clay) in the immediate vicinity and may occasionally be reinforced with rock or concrete debris. Due to the high-salinity of these soils and their inherent disturbed nature, many levees feature areas of bare soil or are otherwise populated by non-native halophytic species, including small flowered iceplant, New Zealand spinach, sea fig (*Carpobrotus chilensis* – FACU), Russian thistle (*Salsola soda* – FACW), and Australian saltbush (*Atriplex semibaccata* – FAC).

On levees and portions of levees where freshwater (groundwater or rain) has reduced soil salinity over time, other common ruderal species (non-native species that thrive in areas of disturbance) of forbs and grasses dominate; including black mustard (*Brassica nigra* – NL), Italian thistle (*Carduus pycnocephalus* – NL), yellow star thistle (*Centaurea solstitialis* – NL), sweet fennel (*Foeniculum vulgare* – NL), perennial pepperweed, common mallow (*Malva neglecta* – NL), bird's foot trefoil (*Lotus corniculatus* – FAC), wild oats (*Avena fatua* – NL), ripgut brome (*Bromus diandrus* – NL), crabgrass (*Digitaria sanguinalis* – FACU), Italian rye grass (*Lolium multiflorum* – NL), tall wheat grass (*Elymus ponticus* – NL), and Mediterranean barley (*Hordeum marinum* ssp. *gussoneanum* – FAC). Native shrubs may colonize more substantial levees.

Due to the intense disturbance of much of uplands areas adjacent to the ponds, with most areas lacking an obvious transitional zone between the aquatic bayland habitats and adjacent habitats, most of the wildlife species found in these peripheral areas are common species adapted to urban or ruderal habitats. Reptiles such as the western fence lizard (*Sceloporus occidentalis*), gopher snake (*Pituophis melanoleucus*), and southern alligator lizard (*Elgaria multicaranata*) and mammals such as the house mouse (*Mus musculus*), California vole (*Microtus californicus*), western harvest mouse (*Reithrodontomys megalotis*), California ground squirrel (*Spermophilus beecheyi*), black-tailed jack rabbit (*Lepus californicus*), cottontail (*Sylvilagus audubonii*), brush rabbit *(S. bachmani*), valley pocket gopher (*Thomomys bottae*), and striped skunk (*Mephitis mephitis*) all occur in the upland transitional areas along the edge of the Bay.

In most areas, the bird species that occur in the peripheral upland habitats are also common, widespread species. These include permanent residents such as the Anna's hummingbird (*Calypte anna*), mourning dove (*Zenaida macroura*), black phoebe (*Sayornis nigricans*), northern mockingbird (*Mimus polyglottos*), bushtit (*Psaltriparus minimus*), California towhee (*Pipilo crissalis*), red-winged blackbird (*Agelaius phoeniceus*), Brewer's blackbird (*Euphagus cyanocephalus*), house finch (*Carpodacus mexicanus*), lesser goldfinch (*Carduelis psaltria*); summer residents such as the barn swallow (*Hirundo rustica*) and cliff swallow (*Petrochelidon pyrrhonota*); transients (some of which breed at higher elevations in the Bay Area), including the Swainson's thrush (*Catharus ustulatus*); and winter residents such as the hermit thrush (*Catharus guttatus*), white-crowned sparrow (*Zonotrichia leucophrys*), golden-crowned sparrow (*Zonotrichia atricapilla*), yellow-rumped warbler (*Dendroica coronata*), and American pipit (*Anthus rubescens*).

In remote areas (e.g., levees between salt ponds far from the upland edge such as those along the Bay Ponds), South Bay levees are heavily used for roosting and some nesting by birds such as double-crested cormorants (*Phalacrocorax auritus*), California gulls (*Larus californicus*), American white pelicans (*Pelecanus erythrorhynchos*), Forster's terns (*Sterna forsteri*), black-necked stilts, and American avocets (*Recurvirostra Americana*). Western snowy plovers have been identified nesting in relatively large numbers on some South Bay levees relatively recently, in the years since their construction. Before the development of the levees, western snowy plover primarily nested in natural dunes, many of which have been lost to development. Large numbers of shorebirds use salt pond levees for roosting, particularly when intertidal foraging habitats are inundated during high tide (Warnock 2004). Some species, including western snowy plovers, black-necked stilts, and least sandpipers (*Calidris minutilla*), also forage frequently along the margins of levees. Gulls, Forster's terns, Caspian terns (*Hydroprogne caspia*), cormorants, pelicans, and other waterbirds also frequently roost on levees. The California least tern uses levees in the South Bay as post-breeding roosting sites. After breeding (primarily at Central Bay sites), adult California least terns bring their juvenile offspring to the South Bay to forage before migration. Mammals use levees for dispersal and to obtain access to foraging areas. Red foxes (*Vulpes vulpes*) and California ground squirrels often excavate dens within levees (usually near the upland edge). Levees with riprap or concrete debris provide some cover for other small mammals, including predators or nuisance species such as the Norway rat (*Rattus norvegicus*), roof rat (*Rattus rattus*), and feral cat (*Felis catus*), and peripheral halophytes along the lower edges of the levee provide high-tide refugia for species such as the salt marsh harvest mouse, California Ridgway's rail, and California black rail. These high-tide refugia may be quite important to the survival of individual rails and mice during extreme high-tide events. However, levees also provide corridors for mammalian predators to access marsh areas, which can lead to high levels of predation on marsh wildlife.

Mudflats

Naturally occurring mudflats on the outboard sides of many ponds begin at low tidal salt marsh areas and extend into the Bay. They form the overwhelming majority of intertidal habitat in the South Bay, with exceptions being only a narrow and deep channel near the center of the Bay and the fringing marshes and former salt ponds around the edges. Covered by shallow water during high tide, these mudflats are exposed during low tide. These intertidal habitats are inhospitable to most vascular emergent vegetation; typically supporting 0 to 10 percent cover of cordgrass or pickleweed. Narrow stretches of mudflat occur within slough and creek channels and at the mouths of major sloughs. Mudflats occur during low tides in OAC, and ACFCC. Eventually, as sediment accretes in former salt ponds restored to full tidal action, tidal marsh habitat is expected to replace open water and mudflats.

These mudflats are a key reason for the importance of the San Francisco Bay Area to west coast shorebird populations, with an average of 67 percent of all the shorebirds on the west coast of the United States using San Francisco Bay wetlands (Page et al. 1999). Gulls and some dabbling ducks forage on the exposed mudflats as well. Because benthic invertebrates often recede deeper into the mud as the tidal elevation drops, especially large concentrations of foraging birds usually occur along the edge of the receding or rising tideline. Although the largest numbers of shorebirds forage on the broad flats along the edge of the Bay at low tide, some shorebirds, gulls, and large waders (e.g., herons and egrets) feed on the exposed flats along sloughs and channels, and the smaller channels in the brackish and salt marshes are the favored foraging areas for the state and federally endangered California Ridgway's rail.

Shorebirds, gulls, terns, American white pelicans, and ducks often use exposed mudflats as roosting or loafing areas when available, as do harbor seals. When the tides rise, most of these birds return to roosting areas in ponds or other alternate habitats, and the seals move to open waters.

Former Salt Production Ponds

Former salt ponds were previously managed for the purpose of commercial salt production. At southern Eden Landing, almost all of the interior of these ponds are now managed ponds that are either year-round open water or seasonally dry ponds. The total acreage of these ponds is approximately 2,250 acres. A formal delineation of jurisdictional wetlands and other waters within the Phase 2 ponds has not yet taken place. But based on the various program-level surveys and the similar surveys done for Phase 1 and for Phase 2 at the Don Edwards San Francisco Bay National Wildlife Refuge, the expectation is that all of these ponds will be considered jurisdictional and that most of that total area will be other waters.

The margins and basins of some former salt ponds are ponded during the fall, winter and spring seasons, but some are actively drained by CDFW or allowed to dry during the summer (e.g., Ponds E6C, E5C, E4C, and E1C). When dry, these ponds consist of bare ground and salt flat or salt panne (non-mudflat soils) areas. Historically, these basins were subject to regular tidal inundation, but following installation of levees and their use as salt ponds, they instead experience near-constant inundation and increased salinity. These conditions are beyond the tolerance of most halophytic vegetation, and only a few vascular plant species can survive in this environment. Vascular plant species that have adapted to these harsh environmental conditions include pickleweed, alkali heath, and the non-native small flowered iceplant (*Carpobrotus* spp.) which are typically only found along the margins of the basins and on top of the soil terrace of the salt flats. Due to the paucity of vegetation, these ponds provide little to no cover for small mammals or reptiles and provide nesting habitat only for species such as the western snowy plover that ground-nest on the dry salt pannes, levees, and the occasional islands that have been created (by deposition of dredged material) within the ponds.

Many of the ponds provide valuable roosting and foraging habitat for shorebirds, waterfowl. Higher-salinity ponds support high densities of brine shrimp and brine flies (especially *Ephydra millbrae*), which in turn serve as prey for waterfowl and shorebirds.

The larger ponds in the project area are, collectively, productive systems supporting large quantities of vertebrate and invertebrate biomass. However, much of the biomass produced by these ponds is unavailable to some types of birds or fish due to water depths (for shorebirds) and salinities (for fish) that preclude these vertebrates' use of much of the invertebrates as food in the deeper, higher-salinity ponds.

Open Water and Subtidal Habitats

The open water category includes a variety of habitat types, including subtidal Bay waters, tidal sloughs and channels, and areas of standing or flowing waters within the salt ponds and tidal marshes. Deep water does not support emergent vegetation. Deep bays and channels are important for aquatic invertebrates, fishes, waterbirds, and harbor seals. The open waters of South Bay support a high diversity of benthic and pelagic macroinvertebrates. Though most of the dominant invertebrates are non-native species, they nonetheless support native oyster populations, large fish populations representing several different trophic levels, including Pacific herring (*Clupea pallasi*), northern anchovy (*Engraulis mordax*), Pacific sardine (*Sardinops sagax caeruleus*), staghorn sculpin (*Leptocottus armatus*), several species of perch (Embiotocidae family), English sole (*Parophrys vetulus*), and California halibut (*Paralichthys californicus*). Many of these fish species in turn support harbor seals and piscivorous (fish-eating) birds such as the Forster's tern, California least tern, American white pelican, brown pelican (*Pelecanus occidentalis*), and double-crested cormorant. Waterfowl such as greater scaup (*Aythya marila*), lesser scaup (*Aythya affinis*), canvasbacks (*Aythya valisineria*), and surf scoters (*Melanitta perspicillata*) dive for bivalves, crustaceans, and other invertebrates in shallower subtidal areas. Bird diversity in the open Bay waters is fairly low, as the species of birds that can exploit the subtidal areas are limited to those that can forage from the air (e.g., terns) or under water (e.g., scoters) and those that can swim. However, large densities (i.e., rafts) of diving ducks (e.g., ruddy ducks [*Oxyura jamaicensis]*, bufflehead [*Bucephala albeola*], greater scaup) occur in some areas where appropriate depths and concentrations of benthic invertebrates, particularly bivalves, provide a rich food source. Some species, such as gulls, also roost on the open waters of the Bay, especially at night.

The tidal sloughs and channels that circulate water around and between salt ponds and marsh remnants and through the marshes provide important habitat for large numbers of benthic and pelagic invertebrates and fish. These detritus-rich channels serve as important nurseries and feeding areas for estuarine fish, including leopard sharks (*Triakis semisasciata*). California bay shrimp (*Crangon franciscorum*) spawn in the open ocean but spend much of their lives feeding in the brackish waters of South Bay sloughs (Baxter et al. 1999). Diving ducks generally avoid the smaller tidal channels but can be found in abundance, particularly during their nonbreeding season, near the mouths of the larger tidal sloughs, in open waters, and in deeper ponds. During the winter, thousands of diving ducks roost and forage in the artificial lagoons around San Francisco Bay (e.g., in Foster City and Redwood Shores on the Peninsula) and in the Sunnyvale water treatment plant in the far South Bay. At Eden Landing, the Bay Ponds are relatively deep open water ponds that provide large areas of habitat for diving and dabbling ducks. Dabbling ducks such as the gadwall (*Anas strepera*), green winged teal (*Anas crecca*), northern shoveler (*Anas clypeata*), and mallard (*Anas platyrhynchos*) reach high densities in the shallower ponds and in smaller and shallower channels, where they feed on aquatic plants (including algae, submerged aquatic vegetation, and plankton) and invertebrates. Terns often forage in the larger and mid-sized channels and ponds, and several species of herons and egrets forage in the shallows for fish. Many shorebirds feed along the exposed flats along tidal channels at low tide, as do rails and other tidal marsh birds.

Eden Landing Phase 2 Restoration Project Ponds

All of the ponds in southern Eden Landing, including the Bay Ponds, Inland Ponds and Southern Ponds, are being considered for Phase 2 restoration actions and are included in this Draft EIS/R.

Aquatic Habitats. Large areas of mudflats and open water Bay habitats are found west of Eden Landing. Smaller and more channelized open water also exists along the OAC and ACFCC. Large expanses of mudflat and cordgrass habitats exist outside of Eden Landing, along the levee borders, and at the mouth of the OAC and ACFCC. There is a variety of Initial Stewardship Plan management regimes, including System Ponds (E1, E2, and E2C) and Seasonal Ponds (E5, E6, E4 E7, E1C, E4C, E5C, and E6C). System Ponds are managed to circulate water through a series of ponds linked by water control structures that are controlled to reduce or maintain ambient salinities. Seasonal Ponds have less bay-water inputs, particularly in summer; water levels will rise and recede depending on precipitation and limited bay/slough or pond-to-pond hydrology. Ponds are managed differently throughout the year, primarily either as part of “summer” or “winter” operations, with seasonal transitional periods to either draw down or begin flooding to provide habitat for spring and fall migration periods, respectively.

Vegetation. The Phase 2 Eden Landing Ponds are predominately-open water ponds that are either permanently (e.g., Bay Ponds) or seasonally inundated (e.g., some Inland and Southern Ponds) and therefore have little vegetation within the ponds. The pond bottoms are a mix of mudflats or salt pannes depending on the extent to which they are exposed or become dry. The Phase 2 Eden Landing ponds include circulating, open water or “system ponds,” other ponds which are allowed to dry or “seasonal ponds,” and a few ponds (e.g., E6, E5 and E6C) which are provided “make up” water during the summer and result in high-salinity ponds called “batch” ponds. The concentration of salinity in these batch pond increases as the water evaporates. Vegetated areas in and around the Phase 2 Eden Landing area include pickleweed-dominated salt marsh, cordgrass-dominated marsh, smaller areas of brackish and freshwater marsh, upland vegetation, and small developed areas. Pickleweed salt marsh dominates the lower reach of the ACFCC along the southern boundary of the pond complex. Pickleweed-dominated tidal marsh is present in a strip of high marsh between the Bay Ponds and the ACFCC. Also, the J-Ponds primarily contain pickleweed and limited amounts of other salt marsh vegetation, even though they do not receive tidal flows. Brackish marsh exists upstream in OAC. Levees, in various states of function and condition, are found around the perimeter and in some instances internal to the Ponds. Upland vegetation is most often associated with the levees and adjacent areas.

There are tidal salt marshes with small marsh ponds or “pannes” at the Whale’s Tail marsh and Cargill Marsh, located at the mouths of the Old Alameda and Mt. Eden Creeks along the western edge of Eden Landing. The Whale’s Tail marsh is bordered by the restored and developing salt marsh in the Cargill Marsh (also known as New Marsh). In addition, small areas of coarse grain or oyster shell beach ridges are found along the bayfront edges of the Whale’s Tail marsh, and the strip marshes on the outboard levee of Pond E2.

Wildlife. Physical, biological and chemical characteristics of ponds such as extent of open water or exposed pond bottom, islands or other isolated berms or mounds, vegetation, salinity and depth influence wildlife use. Changes in salinity and depth that may vary seasonally or between years may affect the abundance and species composition of invertebrates, fish, and feeding and roosting assemblages of birds, in ponds. Results of bird surveys at ponds managed for salt production by Cargill also suggests the response to physical characteristics varies between guilds. For example, small and medium shorebirds, gulls, and eared grebes showed an increase in abundance with increases in salinity while piscivorous birds, egrets and herons, and diving ducks showed marked decreases in abundance in areas of higher salinity. These different responses are likely related to the interactions between water depth, salinity, and dissolved oxygen and with their prey base. Some guilds, including dabbling ducks and terns showed little change in abundance with changes in salinity, potentially due to more varied foraging preferences with regard to water quality parameters. These differences support the assumption that a range of ponds with differing physical characteristics is necessary to support a diverse and robust avian community.

Monitoring conducted by USGS; SFBBO; University of California, Davis; and others indicated that the most prominent wildlife resources and patterns of wildlife distribution at Eden Landing and vicinity in recent years are as follows:

- Great blue herons nest on old wooden structures such as duck hunting blinds. Nesting great blue herons occur in the “Heron House” and occasionally some electrical transmission towers in the Eden Landing Ponds (Donehower and Tokatlian 2012).
- Breeding black-necked stilts and American avocets occur in and around many Eden Landing ponds in low densities.
- California Ridgway’s rails occur in low (less than 0.2 rails per hectare) to medium (0.2 to 0.5 rails per hectare) densities within the OAC, and the ACFCC and along the strip marshes north of the ACFCC and just outside of the E2 levee. Ridgway’s rails are known to occur in moderate density in Whale’s Tail Marsh, and the Cargill Marsh.
- California black rails are known to occur in low to medium densities in the upstream reaches with more brackish tidal marsh within OAC and ACFCC.
- Ponds E1 and E2 and the shallow bay outboard of the ponds are regularly used as foraging areas by California least terns during the post-breeding period in late summer.
- Forster’s terns nest primarily on islands or isolated levee segments within a number of ponds in the Eden Landing pond complex. Caspian terns have also nested on a small island in Pond E10.
- Large numbers of shorebirds forage on mudflats west of the Eden Landing pond complex at low tide.
- Large numbers of shorebirds roost, and forage to varying degrees, in most Eden Landing ponds, particularly at high tide.
- Ponds E1, E2, E4, and E7 support large numbers of piscivorous birds.
- Ponds in the Eden Landing complex supporting large numbers of dabblers include Ponds E4C, E5C, E6A, E6B, and E9,whereas Ponds E1, E2, E6A, E6C, and E10support the greatest abundance of diving ducks (Washburn et al. 2015).

- Red-tailed hawks, peregrine falcons, crows and common ravens nest on electrical transmission towers and old wooden structures in and among the pond levees and ponds.
- Salt marsh harvest mouse habitat in the Eden Landing pond complex is most extensive along Whale's Tail Marsh, OAC, and the ACFCC. Smaller habitat units are present within the restored tidal marsh that are developing in North Creek and Mt. Eden Creek marshes, diked marsh areas along the eastern perimeter and in several areas outside and on the landward side of this pond complex.
- Salmonids, such as steelhead (*Oncorhynchus mykiss*), occur in the ACFCC. The ability for salmonids to reach upstream spawning habitat is limited due to the presence of extensive barriers that restrict migration. Fish passage is the subject of other restoration efforts, which may, in the near-term future, restore a viable salmonid run.
- The largest concentration of breeding and wintering western snowy plovers in the San Francisco Bay Area is located in the salt ponds north of OAC in the northern (Phase 1) portion of the Eden Landing pond complex. Recent work by Tokatlian et al (2014) documented that the Eden Landing complex hosted 66 percent of all the nests found in Recovery Unit 3 (RU3). Pond E14 had the most nests (54 nests), followed by Pond E8 (32 nests) and Pond E13 (19 nests). Most nests were on dry pond bottoms, with some nests on internal graveled levees and berms. In 2014, a habitat enhancement project was completed in Pond E14, which spread oyster shells over two large (approximately 25-acre) plots.

Habitat Related Operations. The operational characteristics of the individual ponds that are being assessed in terms of their effect upon biological resource for the Eden Landing Phase 2 portion of the SBSP Restoration Project are discussed below.

Bay Ponds. The Bay Ponds are relatively large at a combined 1,394 acres in size. They include Ponds E1 (337 acres), E2 (673 acres), E4 (175 acres) and E7 (209 acres). The average bottom elevation of these ponds is 2.3-feet (NGVD). As part of the Initial Stewardship Plan, circulation of tidal water, particularly intake to and discharge from the pond systems, was established through use of existing as well as newly installed water control structures from the bay and sloughs, and between the existing levees (pond-to-pond). Intake occurs primarily at Pond E1, and discharge occurs primarily out of Pond E2. Pond depth is managed to be approximately 1 foot in Ponds E1 and E2 during the summer, at which time Ponds E4 and E7 are partially drawn down. Winter average depths of approximately 1 to 2 feet occur in all ponds.

The interior of these ponds are primarily open water with little to no vegetation. Suitable nesting bird habitat (for Forster's terns, American avocets, black-necked stilts, and the occasional black skimmer) exists on a few small, isolated islands or berms found within the interior of the ponds.

Inland Ponds. The Inland Ponds (413 acres) includes Ponds E6 (176 acres), E5 (159 acres), and E6C (78 acres). Ponds E6C, E6 and E5 are typically managed as "batch" ponds (salinity to approximately 120 parts per thousand [ppt]) with year-round water. The ponds have low salinity in the spring, and are allowed to concentrate and increase salinity during the summer with "make-up" water flow from Ponds E7 and E4 to maintain target water and salinity levels. The high-salinity water in Ponds E6C, E6 and E5 is diluted and circulated during the winter in the subsequent ponds with circulation through the system and discharge via Pond E2. The system-wide circulation normally reduces the salinity for the next summer season. For 2016 operations, Pond E6C was drawn down to provide additional dry seasonal pond area for western snowy plover breeding habitat.

Southern Ponds (C-Ponds). The Southern Ponds totals 376 acres in size. It includes E4C (175 acres), E1C (66 acres), E5C (111 acres), and E2C (24 acres). Cargill Pond (CP) 3C (153 acres) was not acquired by CDFW in 2003 and is not included in the Phase 2 project plans; however, CP3C remains hydraulically linked to and is operated as part of ELER's Pond E2C system. CP3C may be acquired from Cargill and incorporated into ELER in the future. The Southern Ponds are located along the southeastern boundary of the ELER adjacent to the ACFCWCD lands and are comprised of diked marshes and a detention basin. Pond bottom elevations range from 2.4 to 3.6 NGVD.

The Southern Ponds are mostly seasonally dry, with periodic, managed intake and discharge via Pond E2C. Ponds E4C, E5C and E1C are essentially seasonal ponds with winter open water and shallow water conditions in the fall and spring and dry conditions during the summer. Pond E1C was a supplemental intake pond under pump driven salt making operations. Ponds E4C, E5C and E1C could also be shallow open water during the summer with pumped intake from ACFCC, but pump-driven intake operations are not anticipated. Constraints on pumping include high-energy costs, as well as elevated salinity resulting from high summer evaporation which may preclude adequate circulation and mixing prior to discharge. Ponds E1C, E5C and E4C are generally filled from E2C in late October with the onset of rainfall and open circulation with increased gravity inflow.

Other Notable Wildlife Resources outside the Project Area

The most prominent wildlife resources and patterns of wildlife distribution within the general South Bay area are as follows:

- Steelhead use estuarine habitats as rearing habitat for juveniles. They move through the South Bay on their migrations to and from upstream spawning areas in the designated critical habitat in Stevens Creek, Coyote Creek, and Guadalupe River.
- Green sturgeon have been found throughout San Francisco Bay (the designated critical habitat for this species), although its population and its freshwater spawning tend to be concentrated in the northern portions of the Bay and the Sacramento-San Joaquin River Delta.
- Large numbers of shorebirds forage on the intertidal mudflats ringing the South Bay during low tide. Shorebirds roost (and, variably, forage) in salt ponds and other habitats at high tide.
- Large numbers of waterfowl forage and roost on open Bay and pond waters and other available habitats.
- The largest harbor seal haul-out site in the South Bay occurs along lower Mowry Slough. Other areas frequently used as haul-out sites are near Calaveras Point, at Dumbarton Point, on Greco and Bair Islands, and along Corkscrew Slough.
- California Ridgway's rail and salt marsh harvest mouse habitat in many areas is limited in extent and connectivity. For example, many of the tidal marshes are very narrow and have little to no escape cover or transitional habitat. Relatively large marshes occur on Dumbarton Point, between Newark and Mowry Sloughs, at the Palo Alto Baylands Park and Nature Preserve, and on Greco and Bair Islands. The highest population densities for rails continue to be in the South Bay. The

largest populations occur in Arrowhead Marsh, Dumbarton Point, Mowry Slough, the Faber/Laumeister Marshes, Bair Island, and Greco Island (USFWS 2013).

Special-Status Plant Species

The special-status plant species that occur in the South Bay in the vicinity of the SBSP Restoration Project are discussed in this section. The most current and historic pertinent information was reviewed to compile a list of species considered for occurrence within the Phase 2 project area. The CNDDB was queried to determine the potential for occurrence in the area based on known populations and habitat requirements. This database represents the most current data available regarding special-status plant distribution within California. A map of the results is presented as Figure 3.5-3.

The SBSP Restoration Project pond complexes themselves are not expected to support many special-status plants: vascular plants are almost entirely absent from artificial, hypersaline ponds, and levees and remnant marshes provide peripheral halophytic habitat bearing little resemblance to the broad, relatively heterogeneous habitat of an intact upper marsh. However, pickleweed and native cordgrass, while not themselves listed under the Federal Endangered Species Act (ESA), are key components of marsh vegetation. Also, special-status plants may once have occurred in the natural salt pannes, sandy deposits, and slough channels of the former marsh, and habitat still exists in Eden Landing and its surroundings. The legal status and likelihood of occurrence of these species are listed in Table 3.5-1.

No ESA-listed plant species have been documented within the boundaries of the Eden Landing pond complex (CDFW 2016b). In fact, there is only one known ESA-listed plant occurrence within 5 miles of the project areas (Figure 3.5-3). This record is a historical occurrence (from 1959), of Contra Costa goldfields (*Lasthenia conjugens*) and is believed to be extant. This species usually occurs within saline/alkaline and freshwater wetlands such as vernal pools or wetland-riparian areas within valley grassland habitats. The habitat types are not present in the project area, and the species is not expected to occur. Although not found in southern Eden Landing, several species-status plant species (i.e., California Native Plant Society (CNPS)-ranked and track species) have been documented near southern Eden Landing that have potential to occur in the Phase 2 project area; including Congdon’s tarplant (*Centromadia parryi* ssp. *congdonii*), Hoover’s button-celery (*Eryngium aristulatum* var. *hooveri*), and saline clover (*Trifolium hydrophilum*).

Special-Status Wildlife Species

Special-status animal species that occur in or near the Eden Landing Phase 2 project area are shown on Figure 3.5-2. The legal status and likelihood of occurrence of these species are listed in Table 3.5-2. There are three threatened or endangered species that are a focus of particular management efforts by the CDFW at ELER, including: salt marsh harvest mouse, California Ridgway’s rail, and western snowy plover.

Other special-status wildlife species are known to use or may use the Phase 2 project area for breeding and rearing of young. These include Alameda song sparrow (*Melospiza melodia pusillula*), double-crested cormorant (*Phalacrocorax auritus*), fox sparrow (*Passerella iliaca*), northern harrier (*Circus cyaneus*), salt marsh wandering shrew (*Sorex vagrans halicoetes*), saltmarsh common yellowthroat (*Geothlypis trichas sinuosa*), and short-eared owl (*Asio flammeus*). California black rails (*Laterallus jamaicensis coturniculus*) breed in the brackish marshes of the OAC that are upstream of the Phase 2 project area and below the 20-tide gate structure.

A number of other special-status species occur in the Phase 2 project area as visitors, migrants, or foragers but are not known or expected to breed in the immediate project area. Animals that occasionally occur within the project area and breed in adjacent habitats or in the greater South Bay area, but occur only in the Phase 2 project area as uncommon to rare foragers, include the California black rail (*Laterallus jamaicensis coturniculus*), California least tern, California brown pelican (*Pelecanus occidentalis californicus*), California Central Coast steelhead DPS, green sturgeon Southern DPS (*Acipenser medirostris*), longfin smelt (*Spirinchus thaleichthys*), fall-run chinook salmon (*Oncorhynchus tshawytscha*), golden eagle (*Aquila chrysaetos*), tricolored blackbird (*Agelaius tricolor*), Vaux's swift (*Chaetura vauxi*), and white-tailed kite (*Elanus caeruleus*).

Species that occur in the project area regularly as foragers but have "special status" only at nesting sites elsewhere in California include the American peregrine falcon (*Falco peregrinus anatum*), American white pelican (*Pelecanus erythrorhnchos*), black oystercatcher (*Haematopus bachmani*), common loon (*Gavia immer*), Cooper's hawk (*Accipiter cooperii*), lesser yellowlegs (*Tringa flavipes*), loggerhead shrike (*Lanius ludovicianus*), long-billed curlew (*Numenius americanus*), marbled godwit (*Limosa fedoa*), merlin (*Falco columbarius*), osprey (*Pandion haliaetus*), red knot (*Calidris canutus* ssp. *roselaari*), sharp-shinned hawk (*Accipiter striatus*), short-billed dowitcher (*Limnodromus griseus*), Western grebe (*Aechmophorus occidentalis*), and whimbrel (*Numenius phaeopus*).

Table 3.5-1 Special-Status Plant Species and Their Potential to Occur in the Phase 2 Eden Landing Ponds

NAME	STATUS*	HABITAT/DESCRIPTION	POTENTIAL TO OCCUR
Threatened or Endangered Species			
California seablite (*Suaeda californica*)	FE, CRPR 1B.1	Sandy, high-energy shorelines within salt marsh. Relict populations in South Bay had been considered extirpated; known from the San Francisco Bay and Morro Bay, San Luis Obispo county. Elev. 0 – 525 ft.	**Low potential to occur.** Suitable habitat occurs within Eden Landing and Ravenswood pond complexes and the species has been documented in salt marsh habitat at multiple locations in central San Francisco Bay.
Contra Costa goldfields (*Lasthenia conjugens)*	FE, CRPR 1B.1	Saline/alkaline vernal pools, mesic areas within grassland. Known from Alameda, Solano, Monterey, Contra Costa, and Napa Counties. Annual; blooms March through June. Elev. 13 – 590 ft.	**No potential to occur.** Historically known from edges of salt ponds at the Bay shore near Mt. Eden and Newark. No suitable habitat is present in the southern Eden Landing Phase 2 project area. Otherwise occurs in disjunct populations in Monterey and North Bay areas.
Fountain thistle (*Cirsium fontinale* var. *fontinale*)	FE, SE, CRPR 1B.1	Valley and foothill grassland, chaparral, growing in serpentine seeps and grassland. Elev. 295 – 590 ft.	**No potential to occur.** No serpentine seeps are present in the Phase 2 Eden Landing project area.
Marin western flax (*Hesperolinon congestum*)	FT, ST, CRPR 1B.1	Chaparral, valley and foothill grassland, growing in serpentine barrens and in serpentine grassland and chaparral. Elev. 100 – 1.200 ft.	**No potential to occur.** No serpentine habitats are present in the Phase 2 Eden Landing project area.
Robust spineflower (*Chorizanthe robusta* var. *robusta*)	FE, CRPR 1B.1	Cismontane woodland, coastal dunes, coastal scrub, growing on sandy terraces and bluffs or in loose sand. Elev. 10 – 390 ft.	**No potential to occur.** No CNDDB occurrences within 5 miles of the Phase 2 Eden Landing project area. Eden Landing does not include appropriate coastal habitat with sandy substrate.
San Mateo thorn-mint (*Acanthomintha duttonii*)	FE, SE, CRPR 1B.1	Chaparral, valley and foothill grassland, coastal scrub in relatively open areas. Only known to occur on very uncommon serpentinite vertisol clays. Elev. 165 – 655 ft.	**No potential to occur.** No CNDDB occurrences within 5 miles of the Phase 2 Eden Landing project area. No appropriate habitat or suitable serpentinite substrate is present at Eden Landing.
Santa Cruz tarplant (*Holocarpha macradenia*)	FT, SE, SRPR 1B.1	Coastal prairie, coastal scrub, and valley and foothill grassland. Often found in clay, sandy areas. Elev. 30 – 720 ft.	**No potential to occur.** Appropriate habitat, substrate and the elevation range are absent from the project area. One historic (from 1915) CNDDB occurrence within 5 miles of the Phase 2 Eden Landing project area.

NAME	STATUS*	HABITAT/DESCRIPTION	POTENTIAL TO OCCUR
Species of Concern and CRPR Species			
Alkali milk-vetch (*Astragalus tener* var. *tener*)	CRPR 1B.2	Alkaline soils in playas, vernal pools, and adobe clay areas within grassland. Alameda, Merced, Solano, and Yolo Counties. Annual; blooms March to June. Elev. 0 – 200 ft.	**Low potential to occur.** A recently rediscovered population in seasonal wetlands at Warm Springs in Fremont. Considered extirpated from Hayward, Newark and San Leandro Quads. Currently no high-quality habitat in Phase 2 Eden Landing project area.
Arcuate bush-mallow (*Malacothamnus arcuatus*)	CRPR 1B.2	Chaparral on gravelly alluvium substrates. Elev. 260 – 1,166 ft.	**No potential to occur.** No suitable habitat present in Phase 2 Eden Landing project area.
Brittlescale (*Atriplex depressa*)	CRPR 1B.2	Chenopod scrub, meadows, playas, valley and foothill grassland, vernal pools. Usually occurs in alkali scalds or clay in meadows or annual grassland. Elev. 3 – 1,050 ft.	**No potential to occur.** No suitable habitat present in Phase 2 Eden Landing project area.
California androsace (*Androsace elongate* ssp. *acuta*)	CRPR 4.2	Annual herb in chaparral, cismontane woodland, coastal scrub, meadows and seeps, pinyon and juniper woodland and valley and foothill grasslands. Elev. 345 – 4,280 ft.	**No potential to occur.** No suitable habitat present in Phase 2 Eden Landing project area.
Chaparral ragwort (*Senecio aphanactis*)	CRPR 2B.2	Chaparral, cismontane woodland, coastal scrub. drying alkaline flats. Elev. 505 – 2,625 ft.	**No potential to occur.** There is one historic (from 1892) CNDDB occurrence within 5 miles of the Phase 2 Eden Landing project area. However, there is no suitable habitat present at Eden Landing.
Congdon’s tarplant (*Centromadia parryi* ssp. *congdonii*)	CRPR 1B.2	Moist, alkaline soils within grassland. Tolerates disturbance. Annual; blooms June through November. Known from Alameda, Monterey, San Luis Obispo, and Santa Clara Counties. Elev. 0 – 850 ft.	**Low potential to occur.** Known from several locations in Newark, Fremont, Alviso, and Sunnyvale, including three CNDDB occurrences within 5 miles of Eden Landing. Slight potential for occurrence in peripheral halophyte or disturbed upland zones in Phase 2 Eden Landing project area, but not currently associated with salt marsh.
Davidson's bush-mallow (*Malacothamnus davidsonii*)	CRPR 1B.2	Coastal scrub, riparian woodland, chaparral, cismontane woodland, in sandy washes. Elev. 605 – 2,805 ft.	**No potential to occur.** No suitable habitat present in Phase 2 Eden Landing project area.

NAME	STATUS*	HABITAT/DESCRIPTION	POTENTIAL TO OCCUR
Diablo helianthella (*Helianthella castanea*)	CRPR 1B.2	Usually rocky, axonal soils. Often in partial shade. Broadleaf upland forest, chaparral, cismontane woodland, coastal scrub, riparian woodland, and valley and foothill grassland. Elev. 200 – 4,260 ft.	**No potential to occur.** No suitable habitat present in Phase 2 Eden Landing, and the known elevation range is well above the elevations found within the project area. There is one CNDDB occurrence within 5 miles of Eden Landing.
Fragrant fritillary (*Fritillaria liliacea*)	CRPR 1B.2	Coastal scrub, valley and foothill grassland, coastal prairie. Often on serpentine; various soils reported, though usually clay, in grassland. Elev. 10 – 1,340 ft.	**No potential to occur.** No suitable habitat present in Phase 2 Eden Landing project area.
Franciscan onion (*Allium peninsulare* var. *franciscanum*)	CRPR 1B.2	Cismontane woodland, valley and foothill grassland, growing on clay soils or serpentine on dry hillsides. Elev. 325 – 985 ft.	**No potential to occur.** No suitable habitat present in Phase 2 Eden Landing project area.
Hairless popcorn-flower (*Plagiobothrys glaber*)	CRPR 1A	Formerly known from alkali meadows and coastal salt marshes and swamps. Extirpated throughout its range; last documented occurrence in 1954, though possibly relocated near Antioch. Elev. 50 – 590 ft.	**No potential to occur.** Presumed extinct. There are two historic occurrences within 5 miles of the Phase 2 Eden Landing project area (1890, and 1896)
Hall's bush-mallow (*Malacothamnus hallii*)	CRPR 1B.2	Chaparral. Populations may occur on serpentine. Elev. 30 – 1,800 ft.	**No potential to occur.** No suitable habitat present in Phase 2 Eden Landing project area.
Hoover's button-celery (*Eryngium aristulatum* var. *hooveri*)	CRPR 1B.1	Vernal pools, alkaline depressions, roadside ditches, and other wet places near the coast. Elev. 15 – 150 ft.	**Low potential to occur.** One CNDDB occurrences is located within 5 miles of Eden Landing. Suitable habitat may be present in Phase 2 Eden Landing project area.
Johnny-nip (*Castilleia ambigua* var. *ambigua*)	CRPR 4.2	Annual herb of coastal bluff scrub, coastal prairie, coastal scrub, marshes and swamps, valley and foothill grasslands, and vernal pool margins. Elev. 0 – 1,425 ft.	**No potential to occur.** No suitable habitat present in Phase 2 Eden Landing project area.
Kings Mountain manzanita (*Arctostaphylos regismontana*)	CRPR 1B.2	Broadleaved upland forest, chaparral, north coast coniferous forest, growing on granitic or sandstone outcrops. Elev. 1,060 – 2,400 ft.	**No potential to occur.** No suitable habitat present in Phase 2 Eden Landing project area.
Lesser saltscale (*Atriplex minuscula*)	CRPR 1B.1	Chenopod scrub, playas, valley and foothill grassland, in alkali sink and grassland in sandy, alkaline soils. Elev. 65 – 330 ft.	**No potential to occur.** No suitable habitat present in Phase 2 Eden Landing project area.

NAME	STATUS*	HABITAT/DESCRIPTION	POTENTIAL TO OCCUR
Lost thistle (*Cirsium praeteriens*)	CRPR 1A	Little information is available about the habitat preferences of the species. Bloom period is June through July. Elev. 0 – 330 ft.	**No potential to occur.** The species is known from only two collections made near Palo Alto (last in 1901) and is presumed extirpated in California.
Most beautiful jewel-flower (*Streptanthus albidus* ssp. *peramoenus*)	CRPR 1B.2	Chaparral, valley and foothill grassland, cismontane woodland, growing on serpentine outcrops, on ridges and slopes. Elev. 390 – 2,400 ft.	**No potential to occur.** No suitable habitat present in Phase 2 Eden Landing project area. Serpentine substrates are absent. However, there are two CNDDB documented occurrences within 5 miles of the Eden Landing.
Patterson's navarretia (*Navarretia paradoxiclara*)	CRPR 1B.3	Serpentinite, openings, vernally mesic, often drainage of meadows and seeps. Elev. 490 – 1,410 ft.	**No potential to occur.** There are no CNDDB occurrences within 5 miles of Eden Landing. No suitable habitat present in Phase 2 Eden Landing project area.
Pincushion navarretia (*Navarretia myersii* ssp. m*yersii*)	CRPR 1B.1	Acidic vernal pools. Elev. 65 – 985 ft.	**No potential to occur.** There are no CNDDB documented occurrences within Alameda County or CNDDB occurrences within 5 miles of the Phase 2 project area at Eden Landing. No suitable habitat present in Phase 2 Eden Landing project area.
Point Reyes bird's-beak (*Chloropyron maritimum* ssp. *palustre*)	CRPR 1B.2	Coastal salt marsh habitats, growing with pickleweed and saltgrass, etc. Elev. 0 – 50 ft.	**Potential to occur.** Found in LaRiviere Marsh, Don Edward's Refuge, Fremont in 2010 and 2015. Currently, appropriate habitat is present in the fully tidal marshes adjacent to and outside of the Phase 2 Eden Landing project areas. There is one documented occurrence within 5 miles of the Phase 2 Eden Landing project area; near the mouth of Redwood Creek on the west side of the Bay.
Prostrate navarretia (*Navarretia prostrata*)	CRPR 1B.1	Seasonal wetlands and vernal pools within grassland and coastal scrub. Ranges from Monterey County south to San Diego. Annual; blooms April through July. Elev. 10 – 3,970 ft.	**No potential to occur.** There are no CNDDB occurrences within 5 miles of the Phase 2 project area at Eden Landing. In South Bay area, known only from Warm Springs in Fremont. No suitable habitat present in Phase 2 Eden Landing project area.
Saline clover (*Trifolium hydrophilum*)	CRPR 1B.2	Edges of salt marshes, alkali meadows, and vernal pools along the coast from Sonoma County south to San Luis Obispo as well as in the inland counties of Solano and Colusa. Annual; blooms April through June. Elev. 0 – 985 ft.	**Low potential to occur.** There is one CNDDB occurrence within 5 miles of the Phase 2 project area at Eden Landing. Historic collection (type locality) from Belmont and documented in Fremont salt flats in 2004. Currently, no high-quality habitat present in the immediate Phase 2 Eden Landing project area.

NAME	STATUS*	HABITAT/DESCRIPTION	POTENTIAL TO OCCUR
San Francisco collinsia (*Collinsia multicolor*)	CRPR 1B.2	Closed-cone coniferous forest and coastal scrub, growing on decomposed shale (mudstone) mixed with humus. Elev. 100 – 820 ft.	**No potential to occur.** No suitable forest or scrub habitats present in Phase 2 Eden Landing project area.
San Joaquin spearscale (*Extriplex* [=*Atriplex]* *joaquiniana*)	CRPR 1B.1	Alkaline soils within chenopod scrub, meadows, playas, and grasslands in 14 Central California counties. Annual; blooms April through October. Elev. 0 – 2,460 ft.	**No potential to occur.** There is one documented occurrences within 5 miles of the Phase 2 project area at Eden Landing. Currently, no suitable habitat present in Phase 2 Eden Landing project area.
Santa Clara red ribbons (*Clarkia concinna* ssp. *automixa*)	CRPR 4.3	Annual herb of chaparral and cismontane woodlands. Elev. 295 – 4,920 ft.	**No potential to occur.** There are no CNDDB occurrences within 5 miles of the Phase 2 project area at Eden Landing. Suitable habitats are not present in the Phase 2 Eden Landing project area.
Slender-leaved pondweed (*Stuckenia filiformis* ssp. *alpina*)	CRPR 2B.2	Marshes and swamps (assorted shallow freshwater habitats). Elev. 985 – 7,050 ft.	**Potential to occur.** There is one historic (from 1977) CNDDB occurrence within 5 miles of the Phase 2 project area at Eden Landing. Suitable freshwater habitat is absent from the Phase 2 Eden Landing project areas, and area well outside the known elevation range of the species.
Small spikerush (dwarf spikerush) (*Eleocharis parvula*)	CRPR 4.3	Coastal and riparian marshes, swamps, and wetlands; blooms July and August. Elev. 3 – 9,840 ft.	**Low potential to occur.** There are no known occurrences within 5 miles of the Phase 2 project area at Eden Landing. However, a population of has been documented on the levee shoreline of one of the Island Ponds. Suitable habitat for this species is found within the Phase 2 Eden Landing project area.
Western leatherwood (*Dirca occidentalis*)	CRPR 1B.2	Broad-leafed upland and riparian forest and woodlands, and chaparral, growing on brushy slopes, in mesic areas; mostly in mixed evergreen & foothill woodland communities. Elev. 100 – 1,800 ft.	**No potential to occur.** No suitable habitat present in Phase 2 Eden Landing project area.

* Definitions:

CRPR – California Rare Plant Rank

CRPR 1A – Plants considered extinct.

CRPR 1B – Plants rare, threatened, or endangered in California and elsewhere.

CRPR 2B – Plants rare, threatened, or endangered in California, but more common elsewhere.

CRPR 3 – Plants about which more information is needed; a review list.

CRPR 4 – Plants of limited distribution; a watch list.

0.1-Seriously threatened in California (over 80 percent of occurrences threatened / high degree and immediacy of threat)

0.2-Moderately threatened in California (20 to 80 percent occurrences threatened / moderate degree and immediacy of threat)

FE – Federally Endangered

FT – Federally Threatened

SE – State Endangered (California)

ST – State Threatened (California)

Sources:

CDFW 2016b. California Natural Diversity Database, Biogeographic Data Branch, Sacramento, CA. August. Available online at https://www.wildlife.ca.gov/Data/CNDDB

Nomenclature from CNPS 2016 and CDFW 2016b.

Table 3.5-2 Special-Status Animal Species and Their Potential to Occur in the Phase 2 Eden Landing Ponds

NAME	STATUS	HABITAT/DESCRIPTION	POTENTIAL TO OCCUR
Threatened or Endangered	**Species**		
Alameda whipsnake (*Masticophis lateralis euryxanthus*)	FT, ST	Chaparral foothills, shrublands with scattered grassy patches, rocky canyons and watercourses, and adjacent habitat. Underground or under cover when inactive.	**No potential to occur.** Suitable habitats are not present in the Phase 2 project area at Eden Landing.
American peregrine falcon (*Falco peregrinus anatum*)	SFP, BCC	Forages in many habitats; nests on cliffs and similar human-made structures.	**Known to occur.** Regular forager (on other birds) in the vicinity of project area, primarily during migration and winter. In the Phase 2 project area, individuals have successfully nested in former duck hunting blinds.
Bald eagle (*Haliaeetus leucocephalus*)	SE, SFP, BCC	Occurs mainly along seacoasts, rivers, and lakes; nests in tall trees or in cliffs. Feeds mostly on fish.	**Low potential to occur.** Rare visitor, primarily during winter, to the Phase 2 project area. May occasionally forage, but does not nest, in the project area at Eden Landing.
Bank swallow (*Riparia riparia*)	ST	Colonial nester on vertical banks or cliffs with fine-textured soils near water.	**Low potential to occur.** There is one CNDDB occurrence within 5 miles of the Phase 2 project area, but it is from 1983. Species has not been observed in the project area, but may be a rare transient. No suitable breeding habitat in the project area.

NAME	STATUS	HABITAT/DESCRIPTION	POTENTIAL TO OCCUR
California black rail (*Laterallus jamaicensis coturniculus*)	ST, SFP, BCC	Breeds in fresh, brackish, and tidal salt marsh.	**Known to occur.** Non-breeding individuals winter in small numbers in ACFCC and freshwater marsh upstream from the Phase 2 project area. Have been observed in small numbers during breeding seasons in Old Alameda Creek (OAC) and breed in small numbers. Suitable habitat is largely absent from the Phase 2 Eden Landing project area, aside from OAC.
California brown pelican (*Pelecanus occidentalis californicus*)	SFP (*Delisted from Federal ESA*)	Occurs in near-shore marine habitats and coastal bays. Nests on islands in Mexico and Southern California.	**Known to occur.** Regular in project area during nonbreeding season (summer and fall). Roosts on levees in the interiors of pond complexes; forage in ponds and Bay.
California least tern (*Sterna antillarum browni*)	FE, SE, SFP	Nests along the coast on bare or sparsely vegetated flat substrates.	**Known to occur.** The South Bay is an important post-breeding staging area for California least terns. Current Bay Area nesting sites include Alameda Point and Hayward Regional Shoreline. Has attempted to nest in small numbers at northern Eden Landing Pond E8A prior to full tidal restoration (completed in 2011), but all nests were depredated. A small colony is established north of Eden Landing, at Hayward Regional Shoreline.
California red-legged frog (*Rana draytonii*)	FT, CSSC	Permanent waters of streams, marshes, lakes and other quiet bodies of water. Estivate in the summer underground. Disperse along riparian corridors.	**No potential to occur.** Suitable habitat does not occur within the Phase 2 project area at Eden Landing. Species does not occur in saline habitats.
California Ridgway's rail (*Rallus obsoletus obsoletus*)	FE, SE, SFP	Salt and brackish marsh habitat usually dominated by pickleweed and cordgrass.	**Known to occur.** Resident in tidal marshes and sloughs within and immediately adjacent to the Phase 2 project area at Eden Landing, including Whale's Tail and Cargill Marsh, the OAC and ACFCC tidal marshes. Suitable habitat within the Bay, Inland and Southern Ponds is largely absent.
California tiger salamander (*Ambystoma californiense*)	FT, ST, WL	Vernal or temporary pools in annual grasslands, or open stages of woodlands.	**No potential to occur.** Suitable habitat for this species is not present in the Phase 2 project area at Eden Landing. A population is present on Refuge lands in the Fremont/Warm Springs area, though not in the immediate SBSP pond complexes.
Delta smelt (*Hypomesus transpacificus*)	FT, FE	Inhabits open waters of bays, tidal rivers, channels, and sloughs; when not spawning, it tends to concentrate where salt water and freshwater mix and zooplankton populations are dense. Populations occur in the lower Delta and upper Suisun Bay after breeding.	**No potential to occur.** Phase 2 project area is outside the geographic range of the species.

NAME	STATUS	HABITAT/DESCRIPTION	POTENTIAL TO OCCUR
Green sturgeon, Southern Distinct Population Segment (DPS) (*Acipenser medirostris*)	FT, CSSC	Spends majority of life in near-shore oceanic waters, bays, and estuaries; spawns in freshwater rivers.	**Known to occur.** Spawns in Sacramento River, but not known to spawn in South Bay. Juveniles and adults forage in San Francisco Bay. Present in the South Bay; may be in adjacent channels; unlikely to be inside ponds.
Longfin smelt (*Spirinchus thaleichthys)*	FC, ST, CSSC	Spends the majority of life in San Francisco Bay, moving upstream to spawn in low-salinity waters in winter/spring.	**Known to occur**. Occurs year-round in San Francisco Bay and known to occur in the South Bay.
Salt marsh harvest mouse (*Reithrodontomys raviventris raviventris*)	FE, SE, SFP	Salt marsh habitat dominated by pickleweed.	**Known to occur.** Limited habitat within the southern Eden Landing Ponds; however, species is known to occur in pickleweed marshes within and immediately adjacent to the Phase 2 project area at Eden Landing (Mt. Eden Creek, Baumberg Tract marshes, Whale's Tail Marsh, OAC, and the ACFCC, and in several areas on the landward side of this pond complex).
San Francisco garter snake (*Thamnophis sirtalis tetrataenia*)	FE, SE, SFP	Near freshwater marshes, ponds, and slow-moving streams; upland areas near pond/marsh habitat are important in fall and winter. Occur along the San Francisco peninsula.	**No potential to occur.** The Phase 2 project area is outside the known geographic range of the species.
Steelhead – California Central Coast DPS (*Oncorhynchus mykiss irideus*)	FT	Cool streams with suitable spawning habitat and conditions allowing migration and marine habitats.	**Known to occur.** Known to be present in several South Bay creeks (including ACFCC). Suitable spawning habitat is not present in the project area, but this species moves through the area to spawn upstream, though several barriers to upstream migration occur and are the subject of separate restoration efforts.
Tricolored blackbird (*Agelaius tricolor*)	SE, BCC	Cattail or tule marshes; forages in fields, farms. Breeds in large freshwater marshes, in dense stands of cattails or bulrushes. Breeds in	**Potential to occur.** Suitable nesting habitats are not present in the Phase 2 project area, but may occur in nearby freshwater habitats (upstream) in the OAC and ACFCC. Species has not been documented within southern Eden Landing, but has been documented in Coyote Hills Regional Park. May occur in the Phase 2 project area at Eden Landing as a nonbreeding forager.
Vernal pool fairy shrimp (*Branchinecta lynchi*)	FT	Freshwater, vernal pool and similar ephemeral wetlands with grass or mud bottoms in grasslands	**No potential to occur.** Suitable habitats for the species are not present in the Phase 2 project area. Species does not occur in estuarine habitats.
Vernal pool tadpole shrimp (*Lepidurus packardi*)	FE	Freshwater. Natural or artificial, seasonally ponded habitat types, including vernal pools, swales, ephemeral drainages, stock ponds, reservoirs, ditches and tire ruts.	**No potential to occur.** Suitable habitats for the species are not present in the Phase 2 project area. Species does not occur in estuarine habitats.

NAME	STATUS	HABITAT/DESCRIPTION	POTENTIAL TO OCCUR
Western snowy plover (*Charadrius nivosus nivosus*)	FT, CSSC, BCC	Nests on sandy beaches and salt panne habitats, including dry ponds.	**Known to occur.** Occurs in the Phase 2 project area, and successful breeding occurred in Pond E6C in 2016. High numbers of breeding birds occur in northern Eden Landing. Additional birds occur in the project area during winter.
State Species of Concern and Fully Protected Species			
Alameda song sparrow (*Melospiza melodia pusillula*)	CSSC, BCC	Breeds in salt marsh, primarily in marsh gumplant and cordgrass along channels.	**Known to occur.** Common resident, breeding and foraging in tidal salt marsh. Suitable habitat is available within and adjacent to the Phase 2 project area (along the OAC, ACFCC, Whale’s Tail, Cargill marsh, and Alameda County Wetlands).
Allen's Hummingbird (*Selasphorus sasin*)	BCC	Habitat includes chaparral, thickets, forested areas, riparian woodland, ravines and canyons, planted stands of eucalyptus or cypress, residential areas; in migration and winter, also in montane woodland and in open situations with flowering shrubs.	**No potential to occur.** There are no documented occurrences within 5 miles of the Phase 2 project area. Suitable habitat is not present within southern Eden Landing.
American white pelican (*Pelecanus erythrorhnchos*)	CSSC (nesting)	Forages in freshwater lakes and rivers; nests on islands in lakes.	**Known to occur.** Common non-breeder, foraging primarily on ponds in the project area. Regular visitor from late summer to spring. Not known to breed on-site.
Barrow’s goldeneye (*Bucephala islandica*)	CSSC (nesting)	Nests in freshwater marshes; winters in coastal marine habitats.	**Low potential to occur.** Uncommon winter visitor; does not breed in the project area.
Bell’s sparrow (*Amphispiza belli*)	BCC	Desert, shrublands, and chaparral, most commonly associated with sagebrush for breeding. Also found in chaparral.	**No potential to occur.** Suitable habitat is not present in the Phase 2 project area at Eden Landing.
Black oystercatcher (*Haematopus bachmani*)	BCC	Breeds in high tide margin of intertidal zone, and includes mixed sand and gravel beaches.	**Known to occur.** Species has been observed within southern Eden Landing. Suitable intertidal habitats are limited within the southern Eden Landing ponds, but present in marshes associated with the OAC, ACFCC, Whale’s Tail and Cargill marshes.
Black skimmer (*Rynchops niger*)	CSSC, BCC (nesting)	Nests on abandoned levees and islands in salt ponds and marshes on Refuge lands.	**Low potential to occur.** There is only one sighting in eBird in the Eden Landing project area, and it was in 1978; the only CNDDB occurrence was north of Eden Landing in 1994. Known to nest on the Refuge in small numbers south of Eden Landing. There are few islands present in the in the Phase 2 project area. May forage in low numbers in some years. Breeding has not been confirmed within the Phase 2 project area.

NAME	STATUS	HABITAT/DESCRIPTION	POTENTIAL TO OCCUR
Black-vented shearwater (*Puffinus opisthomelas*)	BCC	Pelagic, but coastal; most frequently observed in close proximity to the shore. Nests on sparsely-vegetated islands in areas of permanent upwelling	**No potential to occur.** Suitable pelagic and coastal habitats are not present in the Phase 2 project area. There are no documented occurrences or sightings in the vicinity of the project area.
California gull (*Larus californicus*)	WL (nesting)	Nests on inland lakes and around San Francisco Bay, in ponds.	**Known to occur.** Nesting colonies are on the watch list; individuals are not. Common resident, breeding on several Bay Ponds and associated small islands in the Phase 2 project area at Eden Landing. Forages throughout project area. Nuisance concern for this species addressed through Adaptive Management Plan and other Reserve practices.
California horned lark (*Eremophila alpestris actia*)	WL	Short-grass prairie, annual grasslands, coastal plains, and open fields.	**Low potential to occur.** Given the few records in eBird, this species is probably not common in the project area at Eden Landing during nonbreeding season. Not known to nest on salt pond levees, salt flats, or ruderal habitats within Phase 2 project area, but have been present during spring forging on levees.
California yellow warbler (*Dendroica petechia brewsteri*)	CSSC, BCC (nesting)	Breeds in riparian woodlands, particularly those dominated by willows and cottonwoods.	**Low potential to occur.** May occur on-site as a migrant. No nesting habitat within or adjacent to southern Eden Landing, but nests in riparian habitat upstream from the Bay, including areas within the South Bay.
Common loon (*Gavia immer*)	CSSC (nesting)	Nests in freshwater marshes; winters in coastal marine habitats.	**Potential to occur.** Occasional winter visitor; does not breed in the Phase 2 Eden Landing project area.
Cooper's hawk (*Accipiter cooperii*)	WL (nesting)	Nests in woodlands; forages in many habitats in winter and migration.	**Potential to occur.** Observed on-site as a migrant and winter resident. Breeds in limited numbers in upland habitats adjacent to the project area in the South Bay, but not within the immediate Phase 2 project area.
Costa's hummingbird (*Calypte costae*)	BCC	Desert and semi-desert, and arid brushy foothills and chaparral.	**Low potential to occur.** Suitable breeding habitat is not present in the Phase 2 project area. Species has limited potential to occur in winter as a migrant, but there is only one eBird occurrence nearby (at Coyote Hills Regional Park).

NAME	STATUS	HABITAT/DESCRIPTION	POTENTIAL TO OCCUR
Double-crested cormorant (*Phalacrocorax auritus*)	WL (nesting)	Colonial nester on coastal cliffs, offshore islands, electrical transmission towers, and along interior lake margins. Feeds on fish.	**Known to occur.** Breeds on electrical transmission towers and nearby bridges and structures within the Phase 2 project area and forages in ponds and other open water habitats in the Phase 2 project area.
Fall-run chinook salmon Central Valley Evolutionarily Significant Unit (ESU) (*Oncorhynchus tshawytscha*)	CSSC	Cool rivers and large streams that reach the ocean and that have shallow, partly shaded pools, riffles, and runs.	**Known to occur.** Known to be present in several South Bay creeks (including ACFCC,) and associated slough channels within the project area. Suitable spawning habitat is not present in the project area, but this species moves through the area to spawn upstream along some of these creeks.
Fox sparrow (*Passerella iliaca*)	BCC	Dense thickets in coniferous or mixed woodlands, chaparral, p arks, and gardens, wooded bottomlands along rivers and creeks.	**Known to occur.** Suitable breeding habitat for this species is not present in the Phase 2 project area. Species has been observed in southern Eden Landing during the non-breeding season (winter).
Golden eagle (*Aquila chrysaetos*)	SFP, WL, BCC	Breeds on cliffs or in large trees or electrical towers; forages in open areas.	**Potential to occur.** Occasional forager, primarily during the nonbreeding season. Known to nest in the Fremont/Milpitas area. No nesting records within the Phase 2 project area at Eden Landing.
Lawrence's goldfinch (*Carduelis lawrencei*)	~~BCC~~	Oak-pine woods, chaparral. Breeds in variety of habitats including streamside trees, oak woodlands, open pine woods, pinyon-juniper woods, chaparral. Often found close to water.	**Low potential to occur.** Suitable breeding habitat does not occur in the Phase 2 project area at Eden Landing. However, the species may forage or migrate through the project area.
Least bittern (*Ixobrychus exilis*)	BCC	Marshes, reedy ponds. Mostly freshwater marsh but also in brackish marsh, in areas with tall, dense vegetation standing in water.	**Low potential to occur.** Suitable freshwater habitat does not occur in the Phase 2 project area. Suitable brackish marsh and associated vegetation occurs upstream along the OAC and ACFCC and outside of the Phase 2 project area at Eden Landing; however, this species has not been observed or recorded there.
Lesser yellowlegs (*Tringa flavipes*)	BCC	Marshes, mudflats, shores, ponds; in summer, open boreal woods. Occurs widely in migration, including coastal estuaries, salt and fresh marshes	**Known to occur**. Species has been observed foraging and migrating within southern Eden Landing ponds. Breeding habitat is not present in the project area.
Loggerhead shrike (*Lanius ludovicianus*)	CSSC (nesting)	Nests in dense shrubs and trees; forages in grasslands, marshes, and ruderal habitats.	**Potential to occur.** Resident in low numbers within the Phase 2 project area at Eden Landing.
Long-billed curlew (*Numenius americanus*)	WL, BCC (nesting)	Nests on prairies and short-grass fields; forages on mudflats, marshes, pastures, and agricultural fields.	**Potential to occur.** Forages on mudflats and marshes and roosts on levees, diked marshes, and ponds in the project area as a migrant and winter resident. Does not nest in the Phase 2 project area at Eden Landing.

NAME	STATUS	HABITAT/DESCRIPTION	POTENTIAL TO OCCUR
Marbled godwit (*Limosa fedoa*)	BCC	Prairies, pools, shores, tideflats. Breeds mostly on northern Great Plains, in areas of native prairie with marshes or ponds nearby. In migration and winter around tidal mudflats, marshes, ponds, mainly in coastal regions.	**Known to occur.** Forages in the South Bay, including southern Eden Landing in ponds, marshes and mudflats as a migrant and winter resident. Does not nest in the Phase 2 project area.
Merlin (*Falco columbarius*)	WL	Uses many habitats in winter and migration.	**Potential to occur.** Regular in low numbers during migration and winter. Does not nest in California.
Northern harrier (*Circus cyaneus*)	CSSC (nesting)	Nests and forages in marshes, grasslands, and ruderal habitats.	**Known to occur.** Common year-round in and in the vicinity of the southern Eden Landing ponds. Breeds in small numbers in marsh in the vicinity of the Phase 2 project area; forages in a variety of habitats.
Osprey (*Pandion haliaetus*)	WL (nesting)	Nests in tall trees or cliffs on freshwater lakes and rivers and along seacoast; feeds on fish.	**Potential to occur.** Occasional forager, primarily during the nonbreeding season. Has nested in power line towers in the Fremont area, adjacent to the project area; could make similar use of remaining towers in southern Eden Landing.
Pallid bat (*Antrozous pallidus*)	CSSC	Grasslands, shrublands, woodlands, and forest from sea level up through mixed conifer forest. Most common in open, dry habitat, with rocky areas.	**Low potential to occur.** Habitat in Phase 2 project area is limited for the species. Species may forage in the project area. However, nesting habitat is absent. There are no known occurrences in the Phase 2 project area at Eden Landing.
Pink-footed shearwater (*Puffinus creatopus*)	BCC	Open ocean. Mainly found well offshore over relatively shallow waters of continental shelf. Rarely seen from shore, and rarely over deep mid-ocean waters. Nests on islands with soil suitable for nesting burrows.	**No potential to occur.** Suitable habitats for this species are not present in the Phase 2 project area and the species has been reported in the South Bay.
Red knot (*Calidris canutus* ssp. *roselaari*)	BCC	Tidal flats, shores; tundra (summer). In migration and winter on coastal mudflats and tidal zones, sometimes on open sandy beaches of the sort favored by Sanderlings. Nests on Arctic tundra, usually on rather high and barren areas inland from coast, but typically near a pond or stream.	**Known to occur.** Forages in the South Bay, including southern Eden Landing in ponds, marshes and mudflats as a migrant and winter resident. Does not nest in the Phase 2 project area at Eden Landing.
Rufous-crowned sparrow (*Aimophila ruficeps*)	BCC	Grassy or rocky slopes with sparse low bushes; open pine-oak woods. In Southwest, usually in rocky areas of foothills and lower canyons, in understory of pine-oak woods, or in chaparral or coastal scrub.	**Low potential to occur.** Uncommon in South Bay pond habitats.

NAME	STATUS	HABITAT/DESCRIPTION	POTENTIAL TO OCCUR
Salt marsh wandering shrew (*Sorex vagrans halicoetes*)	CSSC	Occurs in middle and high marsh zones with abundant driftwood and pickleweed.	**Potential to occur.** Known from northern Eden Landing. May occur in the salt marshes located around and adjacent to the Phase 2 project area at Eden Landing, though numbers have declined and current status is unknown.
Saltmarsh common yellowthroat (*Geothlypis trichas sinuosa*)	CSSC, BCC	Breeds primarily in fresh and brackish marshes in tall grass, tules, willows; low-density resident in salt marshes, which are used more in winter.	**Known to occur.** Common resident, breeding in freshwater and brackish marshes and, to a lesser extent, in salt marshes; forages in all three marsh types during the nonbreeding season.
Sharp-shinned hawk (*Accipiter striatus*)	WL (nesting)	Nests in woodlands; forages in many habitats in winter and migration.	**Known to occur.** Uncommon but has been observed on-site as a migrant and winter resident. No breeding habitat in the Phase 2 project area at Eden Landing.
Short-billed dowitcher (*Limnodromus griseus*)	BCC	Mudflats, tidal marshes, pond edges. Migrants and wintering birds favor coastal habitats, especially tidal flats on protected estuaries and bays, also lagoons, salt marshes, sometimes sandy beaches.	**Known to occur.** Common within southern Eden Landing and adjacent areas during wintering and migration period. Does not nest within the South Bay.
Short-eared owl (*Asio flammeus*)	CSSC (nesting)	Nests on ground in tall emergent vegetation or grasses; forages over a variety of open habitats.	**Known to occur.** Uncommon. Has bred in small numbers within the Phase 2 project area at Eden Landing, although current breeding status unknown. Most numerous in project area in migration and winter.
Vaux's swift (*Chaetura vauxi*)	CSSC (nesting)	Nests in snags in coastal coniferous forests or, occasionally, in chimneys; forages aerially.	**Potential to occur.** May forage over project area during spring. No nesting habitat within area. The closest known occurrences are from Coyote Hills Regional Park.
Western burrowing owl (*Athene cunicularia hypogea*)	CSSC, BCC	Flat grasslands and ruderal habitats.	**Low potential to occur.** Nests have been found at several upland sites immediately adjacent to the Phase 2 project area pond complexes (notably in Coyote Hills Regional Park). Observations have been reported, primarily of wintering birds, though the species may forage within moist grasslands along the northeastern perimeter of northern Eden Landing to some extent.
Western grebe (*Aechmophorus occidentalis*)	BCC	Rushy lakes, sloughs; in winter, bays, ocean. Summers mainly on fresh water lakes with large areas of both open water and marsh vegetation; rarely on tidal marshes.	**Known to occur.** Common winter resident. Species winters and forages within and adjacent to the Phase 2 project area at Eden Landing. No nesting habitat occurs in the project area.
Western mastiff bat (*Eumops perotis californicus*)	CSSC	Occurs in many open, semi-arid to arid habitats, including conifer and deciduous woodlands, coastal scrub, annual and perennial grasslands, palm oases, chaparral, desert scrub, and urban.	**Low potential to occur.** Habitat in Phase 2 project area is limited for the species. Species may forage in the project area. However, nesting habitat is absent. There are no known occurrences in the Phase 2 project area at Eden Landing.

NAME	STATUS	HABITAT/DESCRIPTION	POTENTIAL TO OCCUR
Western pond turtle (*Actinemys marmorata*)	CSSC	Permanent or nearly permanent fresh or brackish water in a variety of habitats.	**Low potential to occur.** Uncommon and unlikely to occur within southern Eden Landing. May occasionally found in freshwater and brackish creeks and sloughs in and adjacent to the Phase 2 project area at Eden Landing.
Whimbrel (*Numenius phaeopus*)	BCC	Shores, mudflats, marshes, tundra. Found on a wide variety of habitats on migration.	**Known to occur.** Common winter resident. Species has been observed foraging in southern Eden Landing. Does not nest in the Phase 2 project area at Eden Landing.
White-faced ibis (*Plegadis chihi*)	WL (nesting)	Forages in freshwater marshes and, to a lesser extent, brackish areas.	**Low potential to occur.** Rare visitor in fall and winter. Has bred in heron rookery on Mallard Slough, but no current nesting within southern Eden Landing Ponds is known.
White-tailed kite (*Elanus caeruleus*)	SFP (nesting)	Nests in tall shrubs and trees; forages in grasslands, marshes, and ruderal habitats.	**Known to occur.** Common resident; breeds at inland margins of the estuarine areas. Little breeding habitat occurs within the Phase 2 project area in upland vegetation along OAC and ACFCC. Some foraging habitat present.

Definitions:

FE – Federally Endangered

FT – Federally Threatened

FC – Candidate for Federal Listing

BCC – USFWS Bird of Conservation Concern

SE – State Endangered

ST – State Threatened

SFP – Fully Protected (California)

CSSC – California Species of Special Concern

WL – CDFW Watch List

Sources:

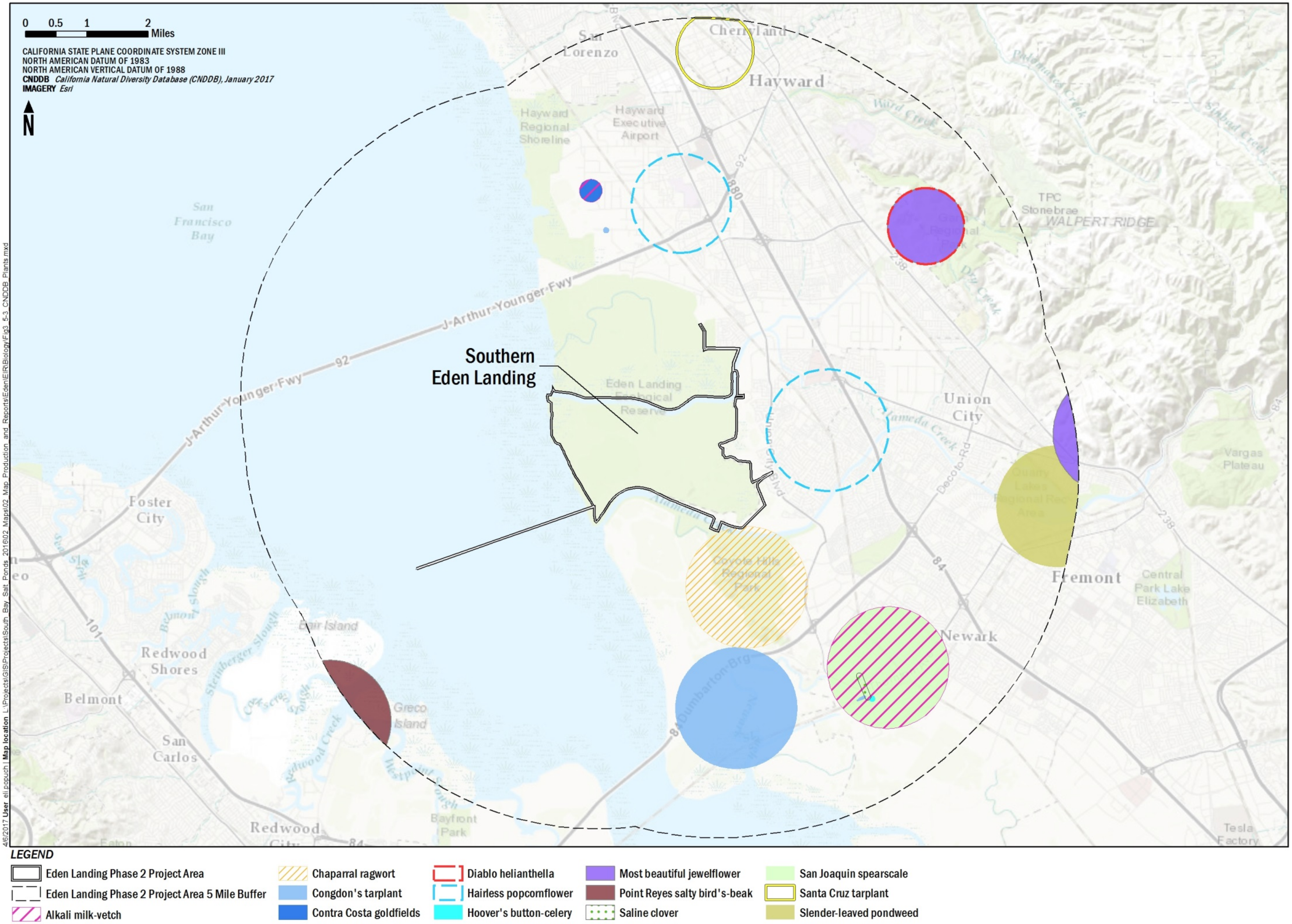
Audubon. 2016. Guide to North American Birds. Available online at: http://www.audubon.org/bird-guide

Audubon and Cornell Lab of Ornithology. 2016. eBird. Online Observations and Species Maps. Available at: http://ebird.org/

CDFW 2016b. California Natural Diversity Database, Biogeographic Data Branch, Sacramento, CA. August. Available online at https://www.wildlife.ca.gov/Data/CNDDB

USFWS 2016a. List of Threatened and Endangered Species that May Occur in Your Proposed Project Location, and/or May be Affected by Your Proposed Project. Consultation Code: 08FBDT00-2016-SLI-0239. September 21. San Francisco Bay-Delta Fish and Wildlife. http://ecos.fws.gove/ipac

USFWS 2016b. Information for Planning and Conservation (IPaC) Trust Resource Report. San Francisco Bay-Delta Fish and Wildlife. September 21. IPaC v3.0.9. https://ecos.fws.gov/ipac/.



AECOM
South Bay Salt Pond Restoration Project

Figure 3.5-3
CNDDB Special-Status Plant Species

3.5.2 Regulatory Setting

This section discusses the regulations that are relevant to the biological resources of the southern Eden Landing Phase 2 project area.

Federal Regulations

Waters of the United States Regulations Overview

Jurisdictional wetlands and other waters meet the regulatory definition of “Waters of the U.S.” are subject to the jurisdiction of the USACE under provisions of Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act. Jurisdictional wetlands and other waters may include all waters used, or potentially used, for interstate commerce, including all waters subject to the ebb and flow of the tide, all interstate waters, all other waters (intrastate lakes, rivers, streams, mudflats, sandflats, playa lakes, natural ponds, etc.), all impoundments of waters otherwise defined as Waters of the U.S., tributaries of waters otherwise defined as Waters of the U.S., the territorial seas, and wetlands (termed Special Aquatic Sites) adjacent to Waters of the U.S. (33 Code of Federal Regulations [CFR] Section 328.3[2]). Wetlands on non-agricultural lands are identified using the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987).

Federal Endangered Species Act

The Federal Endangered Species Act (FESA) protects listed fish and wildlife species from harm or “take,” which is broadly defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct. Take can also include habitat modification or degradation that directly results in death or injury to a listed wildlife species. An activity can be defined as take even if it is unintentional or accidental. Listed plant species are provided less protection than listed wildlife species. Listed plant species are legally protected from take under FESA if they occur on federal lands or if the project requires a federal action, such as a Section 404 fill permit.

USFWS has jurisdiction over federally listed threatened and endangered wildlife species under the FESA, and the National Marine Fisheries Service (NMFS; also referred to as National Oceanic and Atmospheric Administration [NOAA] Fisheries) has jurisdiction over federally listed, threatened, and endangered marine and anadromous fish. Coordination with NOAA Fisheries and USFWS is required for maintenance dredging and disposal projects, particularly if dredging activities would be conducted outside of environmental work windows. These agencies also maintain lists of species proposed for listing. Species on these lists are not legally protected under the Federal ESA, but may become listed in the near future, and these agencies often include them in their review of a project.

Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act governs all fishery management activities that occur in federal waters within the United States 200-nautical-mile limit. The act establishes eight Regional Fishery Management Councils responsible for the preparation of fishery management plans to achieve the optimum yield from United States fisheries in their regions. These councils, with

[2] 33 CFR 328.3, “Definition of Waters of the United States.” 51 Federal Register 41250 (13 November 1986), as amended at 58 Federal Register 45036 (25 August 1993).

assistance from NOAA Fisheries, establish Essential Fish Habitat (EFH) in fishery management plans for all managed species. Federal agencies that fund, permit, or implement activities that may adversely affect EFH are required to consult with NOAA Fisheries regarding potential adverse effects of their actions on EFH, and respond in writing to the recommendations of the NOAA Fisheries.

Migratory Bird Treaty Act

The federal Migratory Bird Treaty Act (16 United States Code [USC] § 703) prohibits killing, possessing, or trading in migratory birds except in accordance with regulations prescribed by the Secretary of the Interior. This act encompasses whole birds, parts of birds, and bird nests and eggs.

Marine Mammal Protection Act

The 1972 Marine Mammal Protection Act (16 USC §§ 1361–1407) was enacted to conserve marine mammals, including cetaceans, pinnipeds, and other marine mammal species. With certain exceptions, the act prohibits the taking and importation of marine mammals and products taken from them. Relevant to the Phase 2 project, this act prohibits harassment of marine mammals, including the harbor seal.

Coastal Zone Management Act

The 1972 Coastal Zone Management Act (16 USC §§ 1451–1464, Chapter 33) was passed to encourage coastal states to develop and implement coastal zone management plans. This act was established as a United States national policy to preserve, protect, develop, and where possible, restore or enhance, the resources of the Nation's coastal zone for this and succeeding generations. See “San Francisco Bay Conservation and Development Commission” below for a discussion of how the act is implemented within San Francisco Bay.

Long-Term Management Strategy

The San Francisco Bay Long-Term Management Strategy (LTMS) is a multi-agency effort to establish a long-term plan for the beneficial reuse of dredge material for habitat restoration, levee maintenance, and construction fill. Its members are the San Francisco Bay Conservation and Development Commission (BCDC), USACE, the United States Environmental Protection Agency (EPA), and the San Francisco Bay Regional Water Quality Control Board (RWQCB). The major goals of the LTMS are to (1) maintain in an economically and environmentally sound manner those channels necessary for navigation in San Francisco Bay and Estuary and eliminate unnecessary dredging activities in the Bay and Estuary; (2) conduct dredged material disposal in the most environmentally sound manner; (3) maximize the use of dredged material as a resource; and to (4) establish a cooperative permitting framework for dredging and dredged material disposal applications. .

State Regulations/Agencies

California Department of Fish and Wildlife

The mission of CDFW is to manage California’s diverse fish, wildlife, and plant resources, and the habitats upon which they depend, for their ecological values and for their use and enjoyment by the public. This includes habitat protection and maintenance in a sufficient amount and quality to ensure the survival of all species and natural communities.

California Endangered Species Act

The California Endangered Species Act (CESA) prohibits the take of any plant or animal listed or proposed for listing as rare (plants only), threatened, or endangered. In accordance with the CESA, CDFW has jurisdiction over state-listed species (California Fish and Game Code § 2070). CDFW also maintains lists of "species of special concern" that are defined as species that appear to be vulnerable to extinction because of declining populations, limited ranges, and/or continuing threats.

Fish and Game Code, Section 1600 et. Seq.

Habitats potentially under the regulatory jurisdiction of CDFW are described under Division 2, Chapter 6, Sections 1600–1616 of the Fish and Game Code of California. Under Sections 1600–1607 of the Fish and Game Code of California, CDFW does not claim jurisdiction over saltwater habitats, including diked, muted, and tidal salt marsh similar to that found within the Eden Landing Phase 2 project area. Other sections of the Fish and Game Code of California protect various groups of wildlife species, including fish, crustaceans, mollusks, birds, mammals, reptiles, and amphibians.

Fully Protected Species

CDFW also regulates "Fully Protected Animals", a classification which was the State's initial effort to identify and provide additional protection to those animals that were rare or faced possible extinction. Under Fish and Game Code 3511 (birds), 4700 (mammals), 5050 (reptiles and amphibians), and 5515 (fish), fully protected species may not be taken or possessed at any time and no permits may be issued for their take except for collection of these species for scientific research and relocation of bird species for the protection of livestock. Most (but not all) Fully Protected Animals have also been listed as threatened or endangered species under the more recent state and federal endangered species laws and regulations.

San Francisco Bay Conservation and Development Commission

BCDC is a California state agency. BCDC jurisdiction in the project area extends over the Bay, up to mean high tide and to 5 feet above mean sea level in marshes, and over a 100-foot shoreline band inland from the line of mean high tide or the line 5 feet above mean sea level adjacent to marshes. BCDC also has certain waterway jurisdiction in the project area, along the ACFCC and OAC. BCDC does not have 100-foot shoreline band jurisdiction adjacent to its certain waterway jurisdiction. BCDC also has salt pond jurisdiction, consisting of all areas that have been diked off from the Bay and have been used during the 3 years from August 1966 to August 1969 for the solar evaporation of Bay water in the course of salt production. The SBSP Restoration Project would require a BCDC permit or consistency determination for dredging and filling, shoreline improvements, or substantial changes in use. BCDC is responsible for enforcing the McAteer-Petris Act, which requires that "maximum feasible public access, consistent with a project be included as part of each project to be approved by the BCDC." BCDC is also responsible for determining consistency with the federal Coastal Zone Management Act.

The federal Coastal Zone Management Act and the California Coastal Act require the BCDC to review federal projects, projects that require federal approval or projects that are supported by federal funds. BCDC's San Francisco Bay Plan (Bay Plan) promotes Bay conservation along with shoreline development and public access. BCDC has adopted policies that specifically address public access and wildlife compatibility, where in some "cases public access would be clearly inconsistent with the project because of public safety considerations or significant use conflicts, including unavoidable, significant adverse effects on Bay natural resources."

The SBSP Restoration Project would require a BCDC permit for dredging and filling and shoreline improvements.

California State Lands Commission

The California State Lands Commission (CSLC) manages lands and resources under their jurisdiction to ensure public access to these lands and waters for current and future generations. Public lands under the jurisdiction of the CSLC include fee lands owned by the State and easement interests in lands which are held in public trust. The CSLC has jurisdiction and management authority over all ungranted tidelands (*e.g.*, tidal sloughs), submerged lands, and the beds of navigable lakes and waterways. On tidal waterways, the State's sovereign fee ownership extends landward to the high tide line, except where there has been fill or artificial accretions or the boundary has been fixed by agreement or court decision. Use of public trust lands is generally limited to water dependent or related uses, including commerce, fisheries, and navigation, environmental preservation, and recreation. Public trust lands may also be kept in their natural state for habitat, wildlife refuges, scientific study, or use as open space.

The SBSP Restoration Project would obtain a construction easement (a surface and submerged lands lease) for the dredge material infrastructure placed in the Bay and for pilot channel dredging through OAC.

San Francisco Bay Regional Water Quality Control Board

The RWQCB has been delegated authority to implement provisions of the federal Clean Water Act and California's Porter-Cologne Water Quality Control Act. These statutes establish the process for developing and implementing planning, permitting, and enforcement authority for waste discharges to land and water. The *San Francisco Bay Basin (Region 2), Water Quality Control Plan (Basin Plan)* establishes beneficial uses for surface and groundwater resources and sets regulatory water quality objectives that are designed to protect those beneficial uses (RWQCB 2017). Under the current Basin Plan, designated beneficial uses of the San Francisco Bay Area's surface waters include municipal and domestic supply; agricultural supply; industrial service supply; groundwater recharge; contact and noncontact recreation; warm freshwater fish habitat; cold freshwater fish habitat; wildlife habitat; preservation of rare and endangered species; migration of aquatic organisms; and spawning, reproduction, and/or early development of fish.

The Basin Plan provides a program of actions designed to preserve and enhance water quality and to protect beneficial uses. It meets EPA requirements and establishes conditions related to discharges that must be met at all times.

The implementation portion of the Basin Plan includes descriptions of specific actions to be taken by local public entities and industries to comply with the Basin Plan's policies and objectives. These actions include measures for urban runoff management and wetland protection.

The SBSP Restoration Project would be designed to comply with RWQCB permitting requirements. USFWS and CDFW would prepare and conform to a Storm Water Pollution Prevention Plan (SWPPP), as required under the State Water Resources Control Board–implemented National Pollutant Discharge Elimination System permit program for construction activities and conform to an SWPPP, as required by the State Water Resources Control Board. The SWPPP would identify specific measures for reducing construction impacts such as erosion and sediment control measures.

The SBSP Restoration Project would involve construction activities that could adversely affect water quality, and therefore the Action Alternatives would require acquisition of a Clean Water Act Section 401 water quality certification from the RWQCB.

The San Francisco Bay RWQCB also has established sediment screening criteria and testing requirements for the beneficial reuse of dredged material (e.g., wetlands creation, upland disposal). All sediment used for creation of upland habitat would be screened to meet wetland cover standards set by the RWQCB.

California Native Plant Society / California Rare Plant Rank

The California Native Plant Society (CNPS), a statewide, non-governmental conservation organization, working with CDFW and other organizations, has developed a ranking of plant species of concern in California. Vascular plants included on the California Rare Plant Rank (CRPR) are defined as follows:

CRPR 1A: Plants considered extinct.

CRPR 1B: Plants rare, threatened, or endangered in California and elsewhere.

CRPR 2: Plants rare, threatened, or endangered in California but more common elsewhere.

CRPR 3: Plants about which more information is needed; these are on the CNPS “review list.”

CRPR 4: Plants of limited distribution; these are on the CNPS “watch list.”

Although the CNPS is not a regulatory agency, and plants on the ranking have no regulatory protection under the federal or state Endangered Species Acts, plants appearing as CRPR 1B or CRPR 2 are, in general, considered to meet the California Environmental Quality Act (CEQA) Section 15380 criteria and adverse effects to these species are considered significant. Although most CRPR 3 and CRPR 4 plants are not eligible for state listing, some CRPR 4 plants may be considered significant locally and could be considered to meet the CEQA Section 18380 criteria if the populations are at the periphery of the specie range, the taxon is uncommon, has sustained significant losses, exhibits unusual morphology, or occur on unusual substrates.

Regional/Local Regulations and Related Programs

Alameda County and Hayward General Plans

Section 3.8 (Land Use) contains the regional/local plans, regulations, and related programs associated with the CDFW Eden Landing Ecological Reserve, Alameda County, and the City of Hayward[3]. The Project is owned and operated by the State of California are part of CDFW’s Eden Landing Ecological Reserve, managed for resident and migratory waterbirds and tidal marsh habitats and species.

The Alameda County General Plan designates the Eden Landing Phase 2 area as Shoreline and Bay Open Space. The principals for this designation identified in the General Plan are consistent with the Project including providing for an “orderly transition of phased out salt extraction area to uses compatible with

[3] The Eden Landing pond complex, while primarily located on State-owned lands, is still within the incorporated boundaries of the City of Hayward. Access to the ponds is through the City of Union City, but the border of that city is at the gated entrance to the State-owned pond complex.

the open space plan." Similarly, the Project is consistent with the natural resource goals identified in Chapter 3.5 of the Hayward General Plan including "enhancing natural baylands, wetlands, marshes, hillsides, and unique ecosystems…to protect their natural ecology, establish the physical setting in the city, provide recreation opportunities…." (City of Hayward 2014).

Eden Landing Land Management and Pond System Operations Plans

Section 1019 of the California Fish and Game Code requires the Department to draft and adopt Land Management Plans for any property wholly under its jurisdiction and that was purchased after January 1, 2002. Land Management Plans document management goals and objectives, and other necessary information for consistent and effective management of CDFW Wildlife Areas and Ecological Reserves. Land Management Plans describe future conditions and contain long-range guidance to accomplish the purposes for which a Refuge or Reserve was established. The CDFW manages the ELER according to the ELER (Baumberg Tract) Restoration and Management Plan (1999) and the Operations Plan (CDFW 2016a). Additionally, the CDFW, and implemented the Initial Stewardship Plan. Together these documents describe pond management activities that are carried out to meet the goals and objectives for managed ponds within the ELER, which includes the ponds in the Phase 2 project area.

The broad objectives of the Operations Plan include the following:

- Maintain year-round open water habitat of various depths in Ponds E1, E2, E7, E4 and E5 and E2C and deeper open water habitat in winter in all ponds. Muted tidal circulation via Ponds E2 and E2C.
- Maintain discharge salinity into San Francisco Bay (Pond E2) and ACFCC (Pond E2C) at less than 44 ppt via muted tidal circulation in Ponds E2 and E2C.
- Operate Cargill Pond 3C (CP3C) as part of E2C system as year-round open water, though it is not owned by CDFW.
- Manage for different waterbird guilds in summer vs. winter by varying depth and salinity of the ponds.
- Maintain prey base for overwintering ducks, migratory shorebirds and resident waterbirds.

The CDFW meets these overarching objectives through the control of tidal flow into and out of the ponds. Tidal flows into and out of the ponds are primarily influenced by (1) pond bottom elevations and (2) existing water control structures' access to tidal flux. These basic parameters are further influenced by seasonal changes in weather, and diurnal and annual fluctuations in the tides. As per the Operations Plan, the management of tidal flux and its effect on species and water quality ensures the CDFW meets management objectives described above at the pond system and at a pond specific level.

Finally, while it may not be a formal part of the Operations Plan, CDFW does operate portions of Eden Landing to include public access for recreational use of hiking trails, kayak launches, and in-season waterfowl hunting areas. Implementation of the Phase 2 actions may necessitate changes to the goals and management of each pond.

San Francisco Estuary Invasive Spartina Project

The Invasive Spartina Project is in the process of implementing a coordinated, region-wide eradication program, comprising a number of on-the-ground treatment techniques to stave off a San Francisco Bay invasion of non-native cordgrass (*Spartina alterniflora* and its hybrids as well as *S. densiflora*, *S. patens*, and *S. anglica*) (California State Coastal Conservancy [SCC] and USFWS 2003). The Invasive Spartina Project is focused on the nearly 40,000 acres of tidal marsh and 29,000 acres of tidal flats that constitute the shoreline areas of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, Sonoma, and Sacramento Counties. The purpose of the Invasive Spartina Project is to arrest and reverse the spread of invasive non-native cordgrass species in the estuary to preserve and restore the ecological integrity of the estuary's intertidal habitats and estuarine ecosystem.

Association of Bay Area Governments San Francisco Bay Trail Plan

The plan for the Bay Trail proposes development of a regional hiking and bicycling trail around the perimeter of San Francisco and San Pablo Bays. The Bay Trail Plan was prepared by the Association of Bay Area Governments pursuant to Senate Bill 100 (1989), which mandated that the Bay Trail provide connections to existing park and recreation facilities; create links to existing and proposed transportation facilities; and be planned in such a way as to avoid adverse effects on environmentally sensitive areas. The Bay Trail Plan proposes an alignment for what is planned to become a 500-mile recreational "ring around the Bay."

Alameda County Flood Control and Water Conservation District

The Alameda County Public Works Agency is responsible for maintaining the infrastructure of Alameda County—from its roads and bridges to flood channels and natural creeks. Within the Public Works Agency, the ACFCWCD works specifically to protect county citizens from flooding while preserving the natural environment. The Grading and Permits Division enforces a number of ordinances that may require a permit, such as the Watercourse Protection and Flood Plain Management ordinances. The SBSP Restoration Project would be designed to comply with local ordinances, and the project is working collaboratively with Alameda County and the ACFCWCD to determine if any permits will be required.

Permits Required

The following permits/approvals may be required from the agencies indicated:

- Section 404 Permit (USACE);
- Section 401 Water Quality Certification (RWQCB);
- BCDC Permit (BCDC);
- Biological Opinion (BO) (USFWS);
- BO, Essential Fish Habitat consultation and Marine Mammal Protection Act Incidental Harassment Authorization (NOAA Fisheries);
- Incidental Take Permit or Consistency Determination (CDFW);
- CSLC lease or letter of non-objection; and

- Access and construction easements and/or permits from external landowners (e.g., Cargill and the ACFCWCD) and possibly from Alameda County and/or the cities of Hayward and Union City.

3.5.3 Environmental Impacts and Mitigation Measures

Overview

This section includes an analysis of potential short-term (construction) and long-term (operation) impacts of the SBSP Restoration Project's Phase 2 actions at Eden Landing. Impact evaluations for the Action Alternatives are assessed based on the existing conditions described in Section 3.5.2, not the conditions that would occur under the No Action Alternative.[4] This approach follows the requirements of the National Environmental Policy Act (NEPA), CEQA, and what was done for the 2007 Final EIS/R. In this case, the No Action Alternative represents no change from current management direction or level of management intensity provided in the *Final Eden Landing Ecological Reserve (Baumberg Tract) Restoration and Management Plan* (CDFG 1999) or the Operations Plan (CDFW 2016a). Mitigation measures are recommended, as necessary, to reduce significant impacts.

Significance Criteria

Significance criteria were developed and approved as part of the programmatic portion of the 2007 Final EIS/R. Those are unchanged for Phase 2. Therefore, for the purposes of this Draft EIS/R, a significant biological impact would occur if the project would result in any of the following:

- Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations or by CDFW or USFWS;
- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by CDFW or USFWS;
- Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (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 a tree preservation policy or ordinance; or
- Conflict with the provisions of an adopted Habitat Conservation Plan (HCP), Natural Community Conservation Plan (NCCP), or other approved local, regional, or state HCP.

These bullet points are general descriptors of what types of changes would constitute a significant impact. Below, the first four points in this general list are developed into specific impacts to particular habitats,

---

[4] "No Action Alternative" is the NEPA term. It corresponds to the CEQA term "No Project Alternative." This Draft EIS/R generally uses No Action throughout.

taxa, guilds, or species that were identified and chosen for individual analysis as part of the 2007 Final EIS/R.

The last two points are not directly considered as itemized impacts. However, this Draft EIS/R considers those criteria implicitly as part of the overall impact assessment. Specifically, with regard to conflicting with local policies or ordinances, the SBSP Restoration Project has committed to comply with applicable local policies and regulations. Some of the Eden Landing Phase 2 project areas are subject to local policies and regulations, for example the project activities within the ACFCC (under the jurisdiction of the ACFCWCD), and activities that occurs on adjacent property (e.g., Alameda County-owned levees and lands). In these areas, the relevant jurisdictional agencies are project partners that have made their policies known and with whose input and participation the alternatives have been developed. These local agencies will also have permitting authority over those aspects of the project that would ensure that their policies and ordinances would be followed. There is no need for a numbered impact specifically assessing these regulations. Further, the Phase 2 project alternatives do not conflict with provisions of an adopted HCP; NCCP; or other relevant local, regional, or state regulations.

The CEQA Guidelines indicate that an action would be significant if it had a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in a local or regional plan, policy, or regulation or by the USFWS or CDFW (AEP 2016). For species that use a single habitat type (e.g., only deep salt-pond habitat or cordgrass-dominated tidal salt marsh), determining whether Phase 2 would result in a substantial reduction in habitat is fairly straightforward. However, many species use a variety of habitats, including salt ponds, bay waters, intertidal areas, water treatment plants, and other habitats. Also, Phase 2 activities would not just result in a loss or gain of general habitat types such as “former salt pond,” but also a change in the conditions of those habitat types through species-targeted management (in the case of managed ponds) or carefully planned breaches and other measures to restore more extensive and more complex tidal marsh than currently exists in the South Bay. Although the extent of what is currently managed pond habitat would be reduced as a result of conversion to tidal habitats, the remaining managed ponds would be enhanced as part of various project phases and then actively managed for wildlife. As a result, making significance determinations simply on the basis of acreages of habitat loss or gain is not generally straightforward. Instead, in addition to assessing potential effects on individuals, this analysis considers habitat type, loss, or conversion in combination with species life histories, habitat needs, and overall population size and abundance in the South Bay to determine significance of impacts.

The 2007 Final EIS/R modeled habitat evolution in the South Bay under the three programmatic alternatives, and Point Reyes Bird Observatory (now called Point Blue) (Stralberg et al. 2006) performed modeling to predict bird population responses to changing habitat conditions under the three programmatic alternatives. The 2007 Final EIS/R predicted the acreage of various habitats important to wildlife species in the South Bay, including shallow and deep subtidal, intertidal, and low and high tidal marsh as well as the extent and size of tidal channels and marsh pannes within restored tidal marshes. The extent of these habitats was predicted at Year 0 (2008) and Year 50 (2058) for each of the alternatives. Using data gathered for the 2007 Final EIS/R tidal habitat predictions, predictions of the conditions within managed ponds provided by H.T. Harvey & Associates, and bird-habitat relationship data from 6 years (1999 to 2004) of Point Blue’s avian surveys in tidal marsh and salt pond habitats, Stralberg et al. (2006) developed models to predict numbers of key bird species in the SBSP Restoration Project area, and in the South Bay as a whole at Year 50 under each of the three alternatives.

The baseline for determining the significance of potential impacts under NEPA and CEQA for the purposes of this Draft EIS/R is the existing condition of the project area. However, South Bay populations of many plants and animals may vary considerably from one year to the next, and thus a longer-term average (e.g., in numbers of individuals of a particular species) is used where appropriate to establish baseline conditions and determine whether deviations from that condition would result in a significant impact. Triggers for action that are addressed in the Adaptive Management Plan (AMP) are designed to ensure, to the greatest extent possible, that the project not have significant adverse impacts and will be effective in achieving the project objectives. The discussion of impacts herein focuses on whether impacts would reach a level of significance under NEPA and CEQA.

Establishing thresholds of significance, determining the significance of impacts, and establishing adaptive management triggers for biological resources for the SBSP Restoration Project are complicated by several factors, as described in the 2007 Final EIS/R. These factors are summarized below.

- The lack of a clear, quantifiable baseline (i.e., status/abundance originally in 2006 or during preparation of this document between 2013 and 2015) for many potential species impacts makes it difficult to identify a quantitative threshold of significance. For example, interannual variability in shorebird numbers requires many years of bird surveys to establish a baseline quantitatively, yet the available data on South Bay birds may not accurately describe existing conditions for NEPA/CEQA baseline purposes.
- The most intensive, standardized surveys were conducted either before Initial Stewardship Plan implementation (Point Blue) or while conditions in the ponds were changing due to Cargill’s preparation for the sale of the ponds and due to Initial Stewardship Plan implementation (USGS).
- Most such surveys covered the ponds and did not include the associated bay habitats such as mudflats and subtidal areas, which may be affected by the project.
- The inherent variability in South Bay plant and wildlife communities makes it difficult to determine whether a quantitative threshold of significance has been exceeded. For example, if the threshold of significance for project impacts to small migratory shorebirds was set at 20 percent below baseline conditions, the interannual variability in shorebird numbers in the South Bay would result in numbers that, in some years, would drop below the threshold, even if the project was not involved.
- A number of factors external to the SBSP Restoration Project will affect the biological resources using the South Bay. For example, global climate change and sea-level rise may have much greater effects on numbers of migratory shorebirds present in the South Bay than would changes resulting directly from the project. As restoration proceeds and key biological parameters (e.g., shorebird numbers) are monitored, it will be challenging to distinguish trends (e.g., declines in abundance of small migratory shorebirds) that actually result from project activities from trends resulting from external factors, yet such a distinction will be important to avoid significant project impacts.
- Some biological resources are expected to decline even in the absence of the project, which may exaggerate impacts actually attributable to the SBSP Restoration Project. For example, the loss of outboard mudflats due to existing processes of sediment dynamics in the Bay and sea-level rise is expected to occur regardless of the alternative selected; this loss would cause a number of species to be affected (negatively and positively) even under the No Action Alternative. Separating the

changes that are not related to the SBSP Restoration Project from those changes caused by the various alternatives is a considerable challenge.

- The SBSP Restoration Project sets forth restoration targets and thresholds of significance that in some instances are related to each other but are not identical. For example, the restoration target for small migratory shorebirds is "Maintain small shorebird numbers at pre-Initial Stewardship Plan levels," yet these population levels differ from the NEPA/CEQA baseline used in the 2007 Final EIS/R (which is a percentage change in the small shorebird population relative to fall 2006 numbers). These similar but not identical targets lead to a complication wherein maintaining populations at 90 percent of pre-Initial Stewardship Plan levels could occur, which would be a failure to achieve a restoration target but not severe enough to trigger a significance determination. Although these differences do not necessarily affect the determination of the NEPA/CEQA threshold of significance for small migratory shorebirds, they complicate the link between the adaptive management triggers and the threshold of significance in the monitoring and adaptive management process that would be used to avoid significant impacts.

In the summaries of thresholds of significance for specific biological resources impacts discussed below, the term "substantial" is frequently used to indicate the level of impact (e.g., a decline in numbers of a particular species or group) that would be considered significant under NEPA and CEQA. Neither NEPA nor CEQA guidelines provide a clear definition of the term "substantial" as it applies to the magnitude of an impact (e.g., to a species' populations, habitat, or range) that would be considered significant. Therefore, in determining the threshold of significance for a particular species or group of species for the SBSP Restoration Project, both the magnitude of impacts to South Bay populations and the contribution of South Bay populations to larger-scale (i.e., regional, flyway-level, continental, and range-wide) populations were considered. As a result, thresholds of significance may vary among different taxa (e.g., percent declines in numbers that would be considered significant may vary among some impacts discussed below). Except where a specific percent decline is noted in a particular significance threshold, a decline of 10 to 20 percent in South Bay numbers or 5 to 10 percent in flyway-level numbers (for birds) would generally be considered "substantial."

Thresholds of significance for potential project impacts to specific biological resources are discussed below. If at any point during the 50-year SBSP Restoration Project, a numerical threshold is exceeded or a qualitative threshold is reached for a given impact and that change has resulted from the SBSP Restoration Project, a significant impact would have occurred. However, monitoring and Adaptive Management are integral components of the SBSP Restoration Project and would be critical in preventing adverse effects from reaching a level of significance. The Adaptive Management triggers would be set to warn of potential impacts and allow Adaptive Management to be undertaken to reverse or forestall such impacts before such a point will have been reached. The rationale for each impact includes a description of how the threshold of significance was selected, indicates how the threshold of significance is related to the restoration target and the triggers, and illustrates how monitoring and Adaptive Management would be used to avoid a significant impact.

Although both the Council on Environmental Quality (CEQ) Regulations for Implementing NEPA and the CEQA Guidelines were considered during the impact analysis, impacts identified in this Draft EIS/R are characterized using CEQA terminology. Please refer to Section 3.1.1, Chapter Organization, for a description of the terminology used to explain the severity of the impacts.

In Table 3.5-3, the threshold of significance is briefly described for each potential biological resources impact. Except where otherwise noted, the impacts and the thresholds of significance are the same as those presented in the 2007 Final EIS/R. Next, potential impacts and related adaptive management information are discussed.

Table 3.5-3 Biological Impact Significance Threshold

IMPACT	THRESHOLD OF SIGNIFICANCE
3.5-1: Potential construction-related loss of or disturbance to special-status, marsh-associated wildlife.	The SBSP Restoration Project would have a significant impact on marsh-associated species if it resulted in the mortality of, or the loss of active nests of, substantial numbers of state- or federally listed marsh-associated species or abandonment of a primary harbor seal haul-out or pupping area as a result of the SBSP Restoration Project.
3.5-2: Potential construction-related loss of or disturbance to nesting pond-associated birds.	Loss of any individuals or nests of the federally listed western snowy plover would be significant given the low west coast populations of this species. The loss of a substantial number of active nests and/or chicks of other pond-associated species, such as Forster's and Caspian terns, American avocets, and black-necked stilts, due to breaching of ponds and other construction-related activities during the nesting season would also be a significant impact.
3.5-3: Potential reduction in numbers of small shorebirds using San Francisco Bay, resulting in substantial declines in flyway-level populations.	The SBSP Restoration Project would have a significant impact on small shorebirds if it resulted in a substantial reduction in numbers (i.e., a decline of 20 percent below baseline levels as a result of the SBSP Restoration Project) of the most abundant species (i.e., semipalmated plover (*Charadrius semipalmatus*), western sandpiper (*Calidris mauri*), least sandpiper, dunlin (*Calidris alpina*), short-billed dowitcher [*Limnodromus griseus*], and long-billed dowitcher [*Limnodromus scolopaceus*]) in the South Bay, resulting in a substantial decline in flyway-level populations.
3.5-4: Loss of intertidal mudflats and reduction of habitat for mudflat-associated wildlife species.	The threshold of significance for this impact is defined as measurable, long-term loss of intertidal mudflat area not compensated for by equivalent increases in benthic invertebrate productivity, as a result of SBSP Restoration Project activities.
3.5-5: Potential habitat conversion impacts to western snowy plovers.	The SBSP Restoration Project would have a significant impact on western snowy plovers if it resulted in a decline in the adult breeding-season population within San Francisco Bay (relative to the NEPA/CEQA baseline).
3.5-6: Potential reduction in the population size of breeding, pond-associated waterbirds (avocets, stilts, and terns) using the South Bay due to reduction in habitat, concentration effects, displacement by nesting California gulls, and other project-related effects.	The SBSP Restoration Project would have a significant impact if it resulted in a decline of 10 percent or greater (relative to the NEPA/CEQA baseline) in the number of breeding black-necked stilts, American avocets, Caspian terns, or Forster's terns breeding in the San Francisco Bay Area.
3.5-7: Potential reduction in the population size of non-breeding, salt-pond-associated birds (e.g., phalaropes, eared grebes, and Bonaparte's gulls as a result of habitat loss.	The SBSP Restoration Project would have a significant impact on salt-pond-specialist waterbirds (i.e., eared grebes, Bonaparte's gulls [*Chroicocephalus philadelphia*]), Wilson's phalaropes, and red-necked phalaropes) if it resulted in the loss of a substantial number of individuals (i.e., a decline of 50 percent below baseline levels as a result of the SBSP Restoration Project) of these species from the South Bay, resulting in a substantial decline in flyway-level populations, due to a reduction in the extent of higher-salinity ponds and the conversion of managed ponds to tidal habitats.
3.5-8: Potential reduction in foraging habitat for diving ducks, resulting in a substantial decline in flyway-level populations.	The SBSP Restoration Project would have a significant impact on diving ducks foraging in the South Bay if it resulted in a substantial reduction in numbers (i.e., a decline of 20 percent below baseline levels as a result of the SBSP Restoration Project) of diving ducks using the South Bay, resulting in a substantial decline in flyway-level populations, due to the conversion of managed ponds to tidal habitats.

IMPACT	THRESHOLD OF SIGNIFICANCE
3.5-9: Potential reduction in foraging habitat for ruddy ducks, resulting in a substantial decline in flyway-level populations.	The SBSP Restoration Project would have a significant impact on ruddy ducks foraging in the South Bay if it resulted in a substantial reduction in numbers of individuals (i.e., a real decline of 15 percent below baseline levels as a result of the SBSP Restoration Project) using the South Bay, resulting in a substantial decline in flyway-level populations, due to the conversion of managed ponds to tidal habitats.
3.5-10: Potential habitat conversion impacts on California least terns.	The SBSP Restoration Project would have a significant impact on California least terns if it resulted in a decrease in foraging habitat or prey availability for post-breeding dispersants in the South Bay, leading to a decline in the Bay Area breeding population relative to baseline levels.
3.5-11: Potential loss of pickleweed-dominated tidal salt marsh habitat for the salt marsh harvest mouse and salt marsh wandering shrew and further isolation of these species' populations due to breaching activities and scour.	The threshold of significance for this impact is defined as measurable, sustained loss of pickleweed-dominated tidal salt marsh resulting in substantial isolation of salt marsh harvest mouse and salt marsh wandering shrew populations due to the SBSP Restoration Project, without development of a commensurate amount of new contiguous marsh once the appropriate elevations are achieved within the restored ponds.
3.5-12: Potential disturbance to or loss of sensitive wildlife species due to ongoing monitoring, maintenance, and management activities.	The SBSP Restoration Project would have a significant impact on biological resources as a result of ongoing monitoring, management, and maintenance activities if these activities resulted, directly or indirectly (e.g., by facilitating predation), in: ▪ The mortality of, or loss of active nests of, any western snowy plovers or California least terns; ▪ The mortality of, or the loss of active nests of, substantial numbers of state- or federally listed, marsh-associated species; ▪ Abandonment of a primary harbor seal haul-out or pupping area; ▪ The loss of substantial numbers of nests of non-listed pond-associated birds such as terns, avocets, and stilts; or ▪ Disturbance or harm to plant species of concern.
3.5-13: Potential effects of habitat conversion and pond management on steelhead.	The SBSP Restoration Project would have a significant impact on steelhead if it resulted in a decline in steelhead populations associated with South Bay spawning streams.
3.5-14: Potential impacts to estuarine fish.	The SBSP Restoration Project would result in a significant impact to estuarine fish if it resulted in a substantial decline in South Bay populations of estuarine fish.
3.5-15: Potential impacts to piscivorous birds.	The SBSP Restoration Project would result in a significant impact to piscivorous birds if it resulted in a substantial decline (relative to baseline levels) in South Bay populations of mergansers, pelicans, fish-eating grebes, herons, and egrets, resulting in a substantial decline in Pacific Flyway populations.
3.5-16: Potential impacts to dabbling ducks.	The SBSP Restoration Project would have a significant impact to dabbling ducks if it resulted in a substantial decline (relative to baseline levels) in South Bay populations of dabbling ducks, resulting in a substantial decline in Pacific Flyway populations.
3.5-17: Potential impacts to harbor seals.	The SBSP Restoration Project would result in a significant impact to harbor seals if it resulted in a substantial decline (relative to baseline levels) in South Bay populations.

IMPACT	THRESHOLD OF SIGNIFICANCE
3.5-18: Potential recreation-oriented impacts to sensitive species and their habitats.	Recreation associated with the SBSP Restoration Project would have a significant impact if it resulted, directly or indirectly (e.g., by facilitating predation), in: ▪ The abandonment of a primary harbor seal haul-out or pupping area; ▪ The mortality of, or loss of active nests of, western snowy plovers or California least terns; ▪ A reduction in California Ridgway's rail populations; ▪ The loss of substantial numbers of nests of non-listed pond-associated birds (specifically, terns, avocets, and stilts); ▪ Substantial, long-term declines in numbers of waterbirds in the South Bay due to recreational disturbance; or ▪ Losses of California Ridgway's rail or salt marsh harvest mouse individuals by impeding the use of high-tide refugia under or near public access features.
3.5-19: Potential impacts to special-status plants.	The threshold of significance for this impact is defined as the loss of individuals of a state- or federally listed plant species, or loss of a substantial portion of the population of other special-status plants (e.g., species considered rare under the CRPR), as a result of SBSP Restoration Project activities without commensurate increases in numbers as a result of restoration of tidal and transitional habitats.
3.5-20: Colonization of mudflats and marsh plain by non-native *Spartina* and its hybrids.	The threshold of significance is defined as colonization of restored tidal habitats by non-native *Spartina* at a level (measured by percentage of the vegetated marsh dominated by non-native *Spartina*) that exceeds recently colonized marshes elsewhere in the South Bay.
3.5-21: Colonization by non-native *Lepidium*.	The threshold of significance is defined as colonization of restored brackish marsh habitats by *Lepidium latifolium* at a level (measured by percentage of the vegetated marsh dominated by *Lepidium latifolium*) that exceeds recently colonized reference brackish marshes elsewhere in the South Bay.
3.5-22: Increase in exposure of wildlife to avian botulism and other diseases.	The threshold of significance is defined as a substantial increase in the incidence of avian botulism or other wildlife diseases in the South Bay, or an increase in the number of individuals exposed to such diseases, relative to baseline conditions as a result of the SBSP Restoration Project.
3.5-23: Potential impacts to bay shrimp populations.	The threshold of significance is defined as a substantial decrease in numbers of California bay shrimp within the South Bay as a result of the SBSP Restoration Project.
3.5-24: Potential impacts to jurisdictional wetlands or waters.	The threshold of significance for this impact is defined as measurable, long-term loss of jurisdictional wetlands or waters not compensated for by equivalent increases in jurisdictional wetlands or waters as a result of SBSP Restoration Project activities.
3.5-25: Potential construction-related loss of, or disturbance to, nesting raptors (including burrowing owls [*Athene cunicularia*]).	The SBSP Restoration Project would have a significant impact on raptors if it resulted in the mortality of, or the loss of active nests of, substantial numbers of raptors (including burrowing owls), as a result of the SBSP Restoration Project.

This page intentionally left blank

Program-Level Evaluation Summary

In the 2007 Final EIS/R, the analysis determined that Programmatic Alternative C was beneficial or would have less-than-significant impacts to almost all species and habitats when evaluated at the full program scale. The only potentially significant adverse biological impacts identified for Programmatic Alternative C was to ruddy ducks. Construction-related impacts (that would generally be temporary and localized) would also occur under Programmatic Alternatives B and C; no construction-related impacts would occur under Programmatic Alternative A.

Programmatic Alternative C was chosen, and implementation of Phase 1 actions began. The actions proposed under completed Phase 1 actions in combination with Phase 2 actions will continue to move the overall mix of habitats toward 50 percent restored tidal marsh, after which future phases can continue progressing toward the mix of habitats described for Programmatic Alternative C.

Project-Level Evaluation

Project-level evaluation is described below for each of the 25 identified potential biological resource impacts. Of these 25 impacts, 23 are the same ones used in the 2007 Final EIS/R. However, two new impacts were added for consideration here. Impact 3.5-24 covers the potential impacts to jurisdictional wetlands or waters. This impact was added to more specifically call out and assess the changes to jurisdictional wetlands that would occur as part of connecting former salt ponds with tidal flows. Many of the ponds are surrounded by fringing marsh that would necessarily have channels excavated through them, and the Project Management Team (PMT) wanted to explicitly account for and analyze those channels. Impact 3.5-25 covers potential construction-related loss of, or disturbance to, nesting raptors (including burrowing owls). This impact was added at the request of project partners that own and manage public lands or infrastructure adjacent to the SBSP Restoration Project that are known to be raptor habitat. It was appropriate to make an explicit assessment of the construction-related impacts to those birds.

Phase 2 Impact 3.5-1: Potential construction-related loss of or disturbance to special-status, marsh-associated wildlife.

Potential program-level impacts are addressed in Chapter 3.6 of the program-level evaluation found in the 2007 Final EIS/R. Here, the project-level impacts of the implementation of Eden Landing Phase 2 actions are assessed.

Construction related to the implementation of the SBSP Restoration Project could potentially disturb some special-status wildlife species, and in some cases could lead to the loss of individuals. Wildlife species that occur in tidal marsh habitats on the outboard side of the perimeter levees include special-status species such as the salt marsh harvest mouse, salt marsh wandering shrew, California Ridgway's rail, saltmarsh common yellowthroat, Alameda song sparrow, and northern harrier (2007 Final EIS/R). The first two of these are considered in the broader impacts on loss of pickleweed-dominated marshes (see Impact 3.5-11); this discussion focuses more specifically on construction impacts on a range of marsh-associated wildlife species.

Tidal restoration would require direct alteration of existing habitats (e.g., placement of dredged material, levee breaching, channel excavation, and installation of water control structures) that would affect levees and small amounts of tidal marsh. Such activities could potentially result in direct injury or mortality to marsh-associated species and their nests, eggs, and young, though such direct effects are expected to be avoided due to program-level mitigation measures, project-level design features, the AMP, and other Reserve management documents and practices designed to limit direct impacts, and no impacts on fully protected species would occur. Restoration activities associated with both tidal restoration and enhancement of managed ponds (e.g., placement of dredged material, operation of booster pumps, grading, island and berm construction, water-control structure installation and maintenance) would require use of heavy equipment, create loud noise, and increase human presence in and adjacent to existing marsh habitats. These activities may result in the disturbance of wildlife within those habitats, such as disrupting foraging or breeding behaviors, and possibly causing individuals to flee areas adjacent to construction activities or abandon their nests or territories in these areas. Such occurrences would be short-term adverse effects. It is anticipated that a number of measures to avoid direct impacts to federally listed species, such as seasonal work windows, vegetation clearing and biological monitoring as described below, would be required by the BO for this project (2007 Final EIS/R).

Seasonal work windows and biological monitoring may be used to avoid construction-related impacts to special-status, marsh-associated wildlife, and fully protected species. Work in areas that could cause disturbance or direct take of nesting birds (e.g., accidental crushing of individuals or nests) would be limited to the period September 1 through February 1, to the extent practicable. At any time of year, work within tidal salt marsh could impact California Ridgway's rails or salt marsh harvest mice, both of which are fully protected. The precautions outlined in the 2007 Final EIS/R for special-status, marsh associated wildlife would be taken during construction to avoid impacts on this species, and a number of measures to avoid and minimize impacts would be required by the BO from the USFWS for this project. If seasonal avoidance is not possible, using data from annual or periodic monitoring and/or pre-construction surveys conducted for California Ridgway's rails and salt marsh harvest mice, the project could be redesigned to avoid potential impacts, or habitats may be removed or modified by hand trimming prior to ground disturbance to avoid direct take of the species (2007 Final EIS/R).

Alternative Eden A (No Action). Under Alternative Eden A (the No Action Alternative), there would be no new construction, and thus no construction-related impacts would occur.

Alternative Eden A Level of Significance: No Impact

Alternative Eden B. Alternative Eden B includes placement of dredge materials in the Bay and Inland Ponds to raise pond bottom elevations and construct habitat transition zones. An offloading facility would be located in the deep water channel of the Bay approximately 3 miles offshore of Pond E2. Dredge material would be offloaded at this facility, mixed with seawater, and the resulting slurry would be pumped from the offloader via pipelines to the Bay and Inland Ponds. The offloading facility would be comprised of a hydraulic offloader, landing barges, temporary mooring piles, delivery vessels, a feed water system, and slurry pipeline. The feed water system would be comprised of an intake pump and fish screen. The pipeline would be submerged from the offloading facility to shore. Up to two booster pumps would be located along the pipeline route, with potentially one in the Bay, depending on the hydraulic offloader's pumping capacity. Levees would be improved in the Bay and Inlands Ponds and existing water control structures would be used where possible to manage the slurry placed within the ponds; however, up to eight water control structures could be modified or added to maximize the residence time in the ponds and promote settling of solids. After the solids have settled in the ponds, excess water would be decanted and discharged into the Bay. Once complete, the infrastructure used for the import and placement of dredge material would be decommissioned/demolished prior to construction of other restoration, flood risk management, and recreational features.

Other restoration actions include improving some levees while breaching and lowering others, forming habitat islands, installing water control structures, excavating channels through pond interiors and existing fringing marsh, and constructing a recreational trail, footbridge, and viewing platform. Logs would be installed along the outboard levee for increasing local sedimentation to support strip marsh enhancement and to provide additional levee protection. Pilot channels would be excavated in the Bay, Inland, and Southern Ponds in areas that are largely devoid of vegetation. In addition, a connection from the Union Sanitation District (USD) treated wastewater pipeline and the Alameda County Water District's (ACWD) Aquifer Reclamation Program (ARP) wells would be provided to the Inland Ponds through the landward levee to deliver treated wastewater or brackish groundwater to the habitat transition zones and the adjacent marshes.

The construction impacts associated with many of these activities could include visual/noise disturbance associated with equipment operation and habitat loss. Areas of marsh habitat exist along intermittent strips of the perimeter levees of the southern Eden Landing Ponds including those adjacent to Ponds E1 and E2 (Whale's Tail Marsh, Cargill Marsh, the J-Ponds, the Alameda County-owned high marsh wetland south of E2, and narrow strips along the OAC and ACFCC), and in the Alameda County owned high marsh (between the ACFCC and the Bay Ponds) and the J-Ponds. In most places, potential impacts could occur to marsh habitat during construction, but impacts would be minor and limited to small areas. These impacts would be from noise, human presence, and the possibility of increased turbidity and other changes to water quality. The exception to that is where dredge material infrastructure (i.e., pumps and secondary pipelines, or substations) may temporary result in fill in marshes. In addition, channels would be excavated through existing marshes outside of the ponds to connect decant discharge structures, breaches or water control structures to the nearest channels. This temporary fill and permanent excavation of channels are a necessary component of implementing tidal marsh restoration and would result in loss of a small amount of marsh habitat.

These construction-related impacts to marsh-associated wildlife due to construction activities would be greatly offset by the creation of over 2,000 acres of vegetated tidal marsh in the Bay, Inland and Southern Ponds. Habitat transition zones and habitat islands would be included to increase marsh habitat diversity. Such habitat restoration would increase the extent of habitat for all special-status, marsh-associated wildlife species substantially.

Seasonal work windows and biological monitoring may be used to avoid construction-related impacts to special-status, marsh-associated wildlife. Work in areas that could cause disturbance or direct take of nesting birds (e.g., accidental crushing of individuals or nests) would be avoided by establishment of seasonal work windows, or by prior removal of vegetation prior to the nesting season for migratory birds. At any time of year, work within tidal salt marsh could impact California Ridgway's rails or salt marsh harvest mice, both of which are fully protected. The precautions outlined in the 2007 Final EIS/R for special-status, marsh associated wildlife would be taken during construction to avoid impacts on this species, and a number of measures to avoid and minimize impacts would be required by the BO from the USFWS for this project. If seasonal avoidance is not possible, using data from annual or periodic monitoring and/or pre-construction surveys conducted for California Ridgway's rails and salt marsh harvest mice, the project could be redesigned to avoid potential impacts, or habitats may be removed or modified by hand trimming prior to ground disturbance to avoid direct take of the species (2007 Final EIS/R).

With the implementation of the measures discussed above, the overall effect of Alternative Eden B would be less than significant.

Alternative Eden B Level of Significance: Less than Significant

Alternative Eden C. Alternative Eden C involves similar construction process as those outlined in Alternative Eden B with dredge material placement, levee breaches, improved and lowered levees, pilot channels, habitat islands, and habitat transition zones. Dredged material would only be placed within the Bay Ponds. There would also be many more water control structures required in the Southern Ponds and the Inland Ponds to enhance management of these ponds. In addition to the recreation facilities described in Alternative Eden B, Eden C provides two additional trail spurs with footbridges over the OAC and ACFCC and an additional viewing platform at the Alvarado Salt Works. Logs would not be placed on the outboard levee, as the levee would be otherwise improved. External pilot channels would be constructed at two locations: from OAC and from the ACFCC through the J-Ponds into the Bay Ponds.

The construction impacts would be similar to those listed for Alternative Eden B, except the footprint in and around marsh habitat would increase as a result of footbridges over the OAC and ACFCC, and excavation of a relatively long pilot channel through marsh habitat in the J-Ponds. The areas along the OAC, the ACFCC, in the County-owned high marsh south of the Bay Ponds, and in the J-Ponds contain suitable marsh habitat for special-status wildlife. The salt marsh harvest mouse has been observed in this area (CDFW 2016b), and the combined footprint of the pilot channel and the adjacent levee improvements would be substantially wider than the current footprint. The precautions outlined in the Programmatic BO for special-status, marsh-associated wildlife would be taken during construction to avoid impacts. The measures proposed for Alternative Eden B would be implemented to avoid impact as a result of construction activities. Over the long term, new marsh habitat creation in the Bay Ponds would offset any temporary construction impacts, and the overall effect would be less than significant.

Alternative Eden C Level of Significance: Less than Significant

Alternative Eden D. Under Alternative Eden D, bottom elevations would be raised in the Bay and Inland Ponds through the import of dredge materials, the Bay Ponds would be converted to tidal marsh, and the Inland and Southern Ponds would become enhanced managed ponds initially, and may later be converted to tidal marsh. Alternative Eden D would include similar construction features as described in Alternative Eden B and Eden C. Like Alternative B and C, dredged material would be placed in the Bay and Inland Ponds, and there would be two breaches on levees on the OAC. On the ACFCC, the same breach of Pond E2C would occur under all Action Alternatives (e.g., at an existing water control structure); however, a second breach would not be constructed under Alternative Eden D. When the Inland and Southern Ponds are converted to tidal marsh the water control structures would be removed, thereby connecting the pilot channels excavated in the first construction stage with the tidal flows in the OAC and ACFCC.

Construction impacts to habitat for marsh-associated wildlife for Alternative Eden D would be similar in type and extent to those listed for Alternatives Eden B and Eden C. Construction impacts would occur at the onset of the project, and again if and when the Inland and Southern Ponds are converted to tidal marsh, which would occur a decade or so later. Small fringe areas of marsh habitat exist along the perimeter levees in the OAC. Impacts would occur to marsh habitat during construction, but impacts would be minor and limited to small areas of marsh habitat. The impacts to marsh-associated wildlife due to construction activities would be greatly offset by the restoration of the Bay Ponds to tidal marsh habitat over the long term, and potentially later through the restoration of Inland and Southern Ponds to tidal marsh habitat (a decade or more later).

Construction-related impacts would be avoided through the implementation of the measures described in Alternative Eden B, and the overall effect of Alternative Eden D would be less than significant.

Alternative Eden D Level of Significance: Less than Significant

Phase 2 Impact 3.5-2: Potential construction-related loss of or disturbance to nesting pond-associated birds.

Potential program-level impacts are addressed in Chapter 3.6 of the program-level evaluation found in the 2007 Final EIS/R. Here, the project-level impacts of the implementation of Eden Landing Phase 2 actions are assessed.

Construction related to the implementation of the SBSP Restoration Project could potentially disturb some wildlife species and in some cases could lead to the loss of individuals. Birds that nest in managed pond habitats may be adversely affected by construction activities. Such species include the double-crested cormorant, Caspian tern, Forster's tern, California least tern, American avocet, black-necked stilt, and western snowy plover (2007 Final EIS/R).

Because these species occasionally nest on levees or their side-slopes or fringing marshes, tidal restoration activities such as levee breaching or lowering and pond enhancement activities such as berm construction, island construction, or installation of water-control structures could result in the direct alteration of levees and islands on which these birds nest. Levee breaching would also result in the flooding of some ponds that are seasonally dry, which could destroy nests placed on dried pond bottoms or islands or internal berms and levees. Construction activities would also involve the movement of heavy equipment, loud noise, and human presence in and adjacent to existing nesting habitat. These activities may result in the disturbance of birds nesting within ponds, such as disrupting foraging or breeding behaviors, and potentially resulting in the abandonment of nests, eggs, or young, or may facilitate predation on eggs or young by causing adults to flee (2007 Final EIS/R).

To minimize such impacts, several measures are incorporated into the project. Work in and adjacent to potential bird-nesting habitat would be conducted outside of the avian nesting season to the extent practicable. Work in these areas that could cause disturbance or direct take (e.g., accidental crushing of individuals or nests) would be limited to the period September 1 through January 31, to the extent practicable. This condition would minimize potential impacts to nesting birds. If seasonal avoidance is not possible, pre-construction surveys would be conducted for nesting birds. If any nesting pond-associated waterbirds are detected in areas that could be disturbed by construction activities, the implementation would be delayed, redesigned, a biological monitor would be present to minimize potential impacts to actively nesting birds, or other measures could be taken to avoid impacts in consultation with USFWS and CDFW (2007 Final EIS/R).

Alternative Eden A (No Action). Under Alternative Eden A (the No Action Alternative), there would be no construction, and thus no construction-related impacts would occur.

Alternative Eden A Level of Significance: No Impact

Alternative Eden B. Alternative Eden B includes placement of dredge materials in the Bay and Inland Ponds to raise pond bottom elevations and construct habitat transition zones. An offloading facility would be located in the deep water channel of the Bay approximately 3 miles offshore of Pond E2. Dredge material would mixed with seawater, and the resulting slurry would be pumped via pipelines to the Bay and Inland Ponds. Up to two booster pumps would be located along the pipeline route, with potentially one in the Bay, depending on the hydraulic offloader's pumping capacity. Levees would be improved in the Bay and Inlands Ponds and would support the secondary pipelines. Existing water control structures would be used where possible to manage the slurry placed within the ponds; however, up to eight water control structures could be modified or added to maximize the residence time in the ponds and promote settling of solids. After the solids have settled in the ponds, excess water would be decanted and discharged into the Bay. Once complete, the infrastructure used for the import and placement of dredge material would be decommissioned/demolished prior to construction of other restoration, flood risk management, and recreational features.

Other restoration actions include improving some levees while breaching and lowering others, enhancing habitat islands, and constructing a recreational trail, footbridge, and viewing platform. In doing so, Alternative Eden B would convert the Bay, Inland and Southern Ponds to tidal marsh. Logs would be installed along the outboard levee for marsh enhancement and to provide additional levee protection. Pilot channels would be excavated in the Bay, Inland, and Southern Ponds in areas that are largely devoid of vegetation.

The southern Eden Landing ponds currently contain suitable habitat for nesting pond-associated birds. Various gull Forster's tern, avocet, black-necked stilts, and cormorant colonies, are located here, as are other nesting birds. Construction activities could directly impact these nesting pond-associated birds (the effects on these types of birds from the actual habitat conversion is discussed in other impacts). Visual and noise impacts from construction equipment could temporarily disturb nesting birds, and placement of the pipeline on levees, operation of booster pumps, and construction and breaching could directly impact nesting birds through nest noise disturbance, flooding or crushing.

The deposition of slurry material in the ponds would also create adverse conditions for wildlife during the construction period. The slurry placed within the ponds would be managed to maximize residence time and promote settling of solids. Conditions in the Bay and Inland Ponds may include warm water temperature, low dissolved oxygen, and poor water circulation. These conditions would be limited to the Bay and Inlands Ponds until settlement and consolidation is complete, and would not be expected to affect the Bay or nearby managed ponds. Because the habitat value for the fish and other invertebrates would be eliminated in these areas, there would be minimal habitat value for wildlife, and avian use is expected to be minimal.

Once dredge material phase of the construction is complete, other restoration features would be constructed and levees would be breached to tidal flows. The long-term creation of nesting islands and improved invertebrate habitat and fisheries are expected to offset the short-term construction impacts and provide an overall benefit to nesting pond-associated birds. With implementation of the minimization measures (e.g., seasonal avoidance of nesting birds to the extent practicable, pre-construction surveys, and biological monitoring) described above, impacts to nesting birds as a result of construction-related disturbance would be less than significant.

Alternative Eden B Level of Significance: Less than Significant

Alternative Eden C. Alternative Eden C involves a similar construction process as that outlined in Alternative Eden B with dredge material placement, levee breaches, improved or lowered levees, habitat islands, channel excavation, and habitat transition zones and islands. However, Alternative Eden C would raise bottom elevations in the Bay Ponds, convert the Bay Ponds to tidal marsh, and the Inland and Southern Ponds would become enhanced managed ponds. In addition to the recreation facilities described in Alternative Eden B, Eden C provides two additional trail spurs with footbridges over the OAC and ACFCC and an additional viewing platform at the Alvarado Salt Works. Pilot channels would be constructed at two locations to restore tidal flux to the Bay Ponds: from OAC and from the ACFCC through the J-Ponds.

Construction impacts would be similar to those listed for Alternative Eden B, except the wildlife in the Inland and Southern Ponds would not subject to dredged material or construction of associate infrastructure, breaches, or flooding. They could still be directly affected by the construction work itself, as these ponds would be have channels excavated and water control structures placed within them. Also, Alternative Eden C would result in additional recreation trail construction that may impact pond-dependent species that are roosting or nesting in these areas, especially as these added trails would pass near what are currently managed ponds (see Impact 3.5-18 for full discussion on recreation and public access impacts). Like Alternative Eden B, the removal, lowering and improvement of levees may result in construction disturbance and reduce the long-term benefit of levee habitat for nesting; this area contains levees and islands with suitable habitat for nesting pond-associated birds. Also, the long-term creation of nesting islands, enhanced management of the Inland and Southern Ponds, and improved fisheries are expected to offset the short-term construction impacts and provide an overall benefit to nesting birds.

With implementation of the minimization measures (e.g., seasonal avoidance of nesting birds, pre-construction surveys, and biological monitoring) described above, impacts to nesting birds as a result of construction-related disturbance would be less than significant.

Alternative Eden C Level of Significance: Less than Significant

Alternative Eden D. Under Alternative Eden D, bottom elevations would be raised in the Bay and Inland Ponds through the import of dredge materials, the Bay Ponds would be converted to tidal marsh, and the Inland and Southern Ponds would become enhanced managed ponds initially, and may later be converted to tidal marsh through the removal of water control structures. Alternative Eden D would include similar construction features as those described in Alternative Eden B and Eden C. The timing and location of these different components varies somewhat, but the overall effect on pond-dependent species would be similar.

Construction impacts to suitable habitat for nesting pond-associated birds for Alternative Eden D would be similar in extent to those listed for Alternatives Eden B in the long term and Eden C in the short and medium term. With implementation of the minimization measures (e.g., seasonal avoidance of nesting birds and pre-construction surveys) described above, impacts to nesting birds as a result of construction-related disturbance would be less than significant.

Alternative Eden D Level of Significance: Less than Significant

Phase 2 Impact 3.5-3: Potential reduction in numbers of small shorebirds using San Francisco Bay, resulting in substantial declines in flyway-level populations.

Potential program-level impacts on small shorebirds are addressed in Chapter 3.6 of the program-level evaluation found in the 2007 Final EIS/R. Here, the project-level impacts of the implementation of Eden Landing Phase 2 actions are assessed.

Several species of small shorebirds (examples of common species include semipalmated plover, western sandpiper, least sandpiper, dunlin, short-billed dowitcher, and long-billed dowitcher) occur in the San Francisco Bay Area, primarily during migration and in winter (roughly July through April). Fall and winter populations of shorebirds have increased between 2008 and 2014, after sustaining decreases in population during implementation of the Initial Stewardship Plan. Spring populations of small shorebirds have remained relatively steady with some variability since 2002 (De La Cruz et al., in press). Populations of medium shorebirds (e.g., marbled godwit, willet) increased from 2002 to 2007 and have remained steady since then (De La Cruz et al., in press).

San Francisco Bay is one of the most important stopover and wintering areas on the west coast for these species. Within San Francisco Bay, the majority of these birds are typically found in the South Bay. In the South Bay, these small shorebirds forage primarily on intertidal mudflats at low tide and to a lesser extent along the margins of ponds or in shallow ponds. These birds roost and nest on sandy or gravel islands, salt flats, and levees.

Conversion of former salt ponds to tidal habitats is expected to increase the availability of intertidal mudflat foraging area at low tide in the short term, as some of the breached ponds would provide intertidal mudflat and shallow water habitats for some time before accreting enough sediment to become vegetated. However, in the long term, sedimentation patterns of the South Bay are expected to result in a loss of intertidal mudflat, both due to conversion to emerging fringe marsh and conversion to subtidal habitat due to scour as a result of increased tidal flux and eventually because of sea-level rise. The latter of these is expected to occur even in the absence of the SBSP Restoration Project, but mudflat loss is expected to be greater if ponds are breached and tidal habitats restored (2007 Final EIS/R) as part of the SBSP Restoration Project. However, intertidal mudflats are the dominant habitat of the South Bay, and only a small percentage of the total area of mudflats is within or adjacent to the Phase 2 areas and even a small portion of those are expected to be adversely affected by Phase 2 actions at southern Eden Landing.

In addition to causing changes in the extent of mudflats, tidal restoration of what are currently managed or seasonal ponds could reduce the availability of high-tide roosting habitat for small shorebirds. The extent of shallow-water habitat that may be used by foraging small shorebirds (estimated as the extent of managed ponds containing water less than 6 inches deep) would vary considerably among the alternatives. High-tide roosting habitat is unlikely to limit populations, as pond levees, islands, habitat transition zones, and other alternative habitats can support high densities of roosting birds. However, conversion of managed ponds to tidal habitats would reduce the numbers of sites where shorebirds can congregate at high tide, potentially resulting in increased predation, possibly increased susceptibility to disease, and increased disturbance (and associated increases in energy expenditure) by predators and humans.

Alternative Eden A (No Action). Under Alternative Eden A (the No Action Alternative), no new action would be taken. The CDFW would continue to operate and maintain the ponds in accordance with ongoing management practices and operation plans that are in place and described in Chapter 2. All southern Eden Landing ponds would remain as managed ponds. OAC would remain a tidal creek channel with mudflat on its margins. Levees would be maintained, as needed, and the ponds would continue to provide the same habitat functions as they do now. Existing trails along the ACFCC would continue to be maintained and used for recreational access. Currently the ponds and levees in southern Eden Landing provide habitat for small shorebirds (around the edges of the deeper, open water ponds and within shallowly inundated ponds, particularly during spring and fall migratory periods). Northern Eden Landing would continue to provide a wide range of effective habitats as enhanced in Phase 1. The existing marsh between the Bay Ponds and the ACFCC provides foraging habitat for them at low tides, as do parts of the OAC channel.

Because the habitat would not change relative to baseline and the ponds and surrounding levees and mudflats currently provide habitat, Alternative Eden A would have no impact on small shorebirds.

Alternative Eden A Level of Significance: No Impact

Alternative Eden B. Under Alternative Eden B, bottom elevations would be raised in the Bay and Inland Ponds through the import of dredge materials, levees would be breached and water control structures would be added to restore tidal flows to all Bay, Inland, and Southern Ponds, and pilot tidal channels would be constructed. This would result in a large extent of tidal marsh that would be restored. These conditions would be an improvement in shorebird habitat over the moderately deep water conditions that currently exist in the Bay Ponds in the short term as the ponds transition from mudflat to vegetated marsh. The easternmost levees would be raised and would continue to provide “de facto” flood protection and maintain flood risk management conditions and would also support a trail. Habitat transition zones would extend into the Inland and Southern Ponds. (Construction impacts within the ponds and in the tidal marsh habitats adjacent to the ponds are described in more detail in Impacts 3.5-1 and 3.5-2.) Because bottom sediments in the Bay and Inland Ponds would be raised to marsh plain elevations, these ponds are expected to recruit salt marsh vegetation when breached.

In the short term, the Southern Ponds would remain aquatic habitat, but would become tidal. With time, sedimentation would raise the pond bottom, providing some mudflat habitat for foraging at low tide. (This would also occur in the Bay and Inland Ponds if dredge materials were not used to raise the bottom elevations.) Once sediment accretion has reached a level that supports tidal marsh vegetation, small shorebird foraging habitat would be locally reduced; however, due to the abundance of mudflat habitat at low tide and managed ponds throughout the South Bay, this change would not be significant. Managed ponds in the South Bay are particularly important habitats for small shorebirds during high tides. Managed ponds would be removed from the Bay, Inland and Southern Ponds, and small shorebirds would have to rely on managed ponds located elsewhere in the South Bay to provide stable environmental conditions that allow longer foraging and roosting periods. To a smaller degree, narrow intertidal mudflats along marsh channels and sloughs of the Southern Ponds would continue to provide small amounts of foraging habitat for small shorebirds.

A footbridge would be added between the southern tip of E6C and E5C, and eastern edge of Pond E6C and E4C, would have a very small impact on existing mudflat habitat that could be used for foraging shorebirds. The trail systems improvements would be constructed on existing levees, some portions of which may be improved. These levees would also be located in or adjacent to areas subject to ongoing flood risk management studies, habitat transition zones, or habitat improvements. Small shorebirds that roost on the limited habitat on the existing easternmost levees may be disturbed by the construction and by the ongoing trail use. However, the placement of the trails and other recreation amenities would be grouped in the eastern portion of the pond complex, leaving the rest of it available for sensitive wildlife species.

Also, large areas of levees inside the pond complex are being retained and raised and improved as habitat islands for bird use, and the physical separation caused by the breaches would reduce access to mammalian predators and other disturbance. This roosting habitat for shorebirds would be created in the Bay, Inland and Southern Ponds. These islands would eventually transition to marsh mounds but in each case would provide high-tide refuge for small shorebirds and better protection from mammalian predators compared to the levees. Habitat transition zones would also be constructed to increase habitat complexity. A habitat transition zone would provide a gradual slope that would increase the area available for intertidal habitat transition over time. This area would provide some foraging habitat for small shorebirds.

Outside of the immediate project area, intertidal mudflat areas within OAC, to lesser degree in ACFCC, and along the eastern edge of the San Francisco Bay adjacent to the project area are could be impacted by the changes in tidal flow volumes and velocities. These changes may include scour and erosion of the existing mudflats that provide habitat for small shorebirds. These changes are expected to result in localized changes in the extent and depth of the mudflat habitat; however, at a regional scale, the scoured or eroded material is expected to deposit elsewhere and could expand or reduce the depth of mudflat in those areas. These impacts are not expected to result in significant changes in small shorebird populations.

Overall, Alternative Eden B would have a net increase in foraging habitat quantity for shorebirds in the short and medium term, but a decrease in the longer term as marsh establishes in the Bay, Inland, and Southern Ponds. The lost habitat from levee breaching, scouring/erosion forces, and disturbance associated with recreational use would occur, but the additions and improvements of islands and transition zones for roosting or other habitat benefits would offset that. Though the long-term net effect of Alternative Eden B could lead to a net decrease in small shorebird use, these changes are not expected to produce substantial declines in flyway-level populations or reduce the populations 20 percent below baseline levels. Therefore, the impacts of Alternative Eden B are considered less than significant.

Alternative Eden B Level of Significance: Less than Significant

Alternative Eden C. Under Alternative Eden C, pond bottom elevations would be raised through the import of dredge materials and tidal action would be restored to the Bay Ponds, and water control structures would be constructed in the Inland and Southern Ponds to create enhanced managed ponds. In addition, pilot channels, habitat islands, habitat transition zones, and trails would all be constructed as described in Chapter 2, Alternatives. Habitat transition zones would also be constructed along the mid-complex levee border of Ponds E7 and E6/E5 and E4 and the J-Ponds. Habitat islands would be created and the corresponding benefits would be as described in Alternative Eden B.

Because pond bottom elevations would be raised prior to breaching, the Bay Ponds and habitat transition zones would be at elevations higher than those that support mudflat habitat. Once tidal, the Bay Ponds are expected to recruit high salt marsh vegetation. Upland habitat areas on levees, islands, and habitat transition zones would provide additional roosting habitat. Bay Ponds E1, E2 and E7 do not currently provide foraging habitat for small shorebirds as they are moderately deep water ponds. However, Bay Pond E4 is drawn down sufficiently in summer and fall to provide areas suitable as small shorebird foraging habitat.

Scour and erosion impacts may occur adjacent to the levee breaches and in the San Francisco Bay mudflats, however, any mobile sediments would also be deposited, resulting in small changes in the location and extent of the mudflat. Because the amount of tidal marsh created under Alternative Eden B is greater than Alternative Eden C, the tidal flux and associated erosion and scour impacts are expected to be reduced in Alternative Eden C when compared with Alternative Eden B.

For the Inland and Southern Ponds, the existing ponds would be improved through enhanced management via additional water control structures to provide intake and discharge, as well as pond-to-pond flow, which would improve circulation and management of inundation depth, and adequate water quality in these ponds. These enhancements would provide a diverse range of management and operations to support target habitats and conditions for a variety of wildlife species, including shorebirds. The management of these ponds would be determined based on previous operations plans, and informed through the AMP's ongoing monitoring results to determine optimum management and habitat conditions. The impacts associated with the enhanced managed ponds may include the reduction in amount of suitable habitat or an increase, depending on particular species prioritization and management needs. Habitat suitable for roosting and nesting are expected to continue in Inland and Southern Ponds that provide dry conditions during the breeding season. In addition, the Inland and Southern Ponds would continue to provide foraging habitat for shorebirds along levee margins and in those ponds managed to have shallow water. The changes to pond management are not expected to result in significant alteration in small shorebird population numbers and may increase them by increasing shallow water foraging and roosting habitat.

The same recreational infrastructure improvements and impacts described for Alternative Eden B would also occur under Alternative Eden C. In addition, though, Alternative Eden C includes a loop trail to the Alvarado Salt Works site and a pedestrian bridge over ACFCC. Comparatively, Alternative Eden C would result in more disturbances to existing levees associated with construction and recreation that has the potential to impact small shorebirds nesting or roosting on levees. The new trails proposed would be located on existing levees that are already used for CDFW access, but it is expected that the recreational access would increase potential for disturbance to roosting due to the increased use of the levee by bicyclists and people on foot. Again, however, the recreation would be clustered on the edge of the pond complex and leave large areas of ponds, islands, and other habitat areas free from human disturbance. The construction of nesting islands, which would be located away from levee-top trails to minimize disturbance from recreation, would provide roosting habitat and would mitigate for the roosting habitat lost where the new trail/infrastructure would potentially be located.

Overall, the enhanced managed ponds at the Inland Ponds and Southern Ponds would be improvements for these species. The other habitat features, including the temporary intertidal mudflat, as it transitions to marsh, and the ongoing upland habitat areas on levees, islands, and habitat transition zones would provide roosting and foraging habitat for small shorebirds. These features are expected to benefit small shorebirds, while suitable habitat for small shorebirds in other locations around the Bay is expected to remain and provide significant mudflats throughout the South Bay. Because the amount of fully tidal area is reduced when compared with Alternative B, the extent of impacts associated with scour and erosion is expected to be less than under Alternative B. The changes to small shorebird habitat are not expected to produce substantial declines in flyway-level populations or reduce the populations 20 percent below baseline levels and may help increase populations. For these reasons, the impacts of Alternative Eden C would be less than significant under CEQA and beneficial under NEPA.

Alternative Eden C Level of Significance: Less than Significant (CEQA); Beneficial (NEPA)

Alternative Eden D. Alternative Eden D has elements of both Alternatives Eden B and Eden C. Under Alternative Eden D, bottom elevations would be raised in the Bay and Inland Ponds through the import of dredge materials and the Bay Ponds would be restored to tidal marsh. The restoration of the Inland and Southern Ponds, first as enhanced managed ponds and potentially later to fully tidal ponds at southern Eden Landing Ponds, would be staged over a long period of time (potentially a decade or more). The operation of enhanced managed ponds in the Inland and Southern Pond areas would, in the early years, be as described in Alternative Eden C. Later, the restoration of tidal action to the ponds would be similar to those described in Alternative Eden B. Habitat enhancements, such as islands and habitat transition zones would be constructed. Similar long term habitat conversions and related losses relative to the existing conditions would occur. The habitat transition zones, and islands/mounds would provide high water shelter and foraging opportunities along the margins and nesting and roosting habitat (at least until they are vegetated). The short-term disturbances from construction would be similar. The long-term disturbances from recreational trail use would be similar to those in Alternative Eden B.

The main differences in the impacts associated with this alternative are with the locations of the habitat transition zone, which would be on the interior of the outer, western levees instead of on the eastern boundary. The mid-complex levee would provide temporary habitat for nesting and roosting, but it would be regraded to provide habitat transition zones, high tide refugia and/or lowered levees or islands in the long-term with restoration of the ponds behind it to tidal marsh. In addition, the increase in tidal flows may initially result in a small amount of erosion and scour of sloughs and outboard mudflats (similar to those described under Alternative Eden C), would stabilize, and then may be subject to addition erosion and scour impacts that in total would be most similar to those described under Alternative Eden B.

Overall, the staged and sequential transition of all of southern Eden Landing's ponds to tidal marsh over a decade or more, with opportunities under the AMP to retain some of those ponds as enhanced managed ponds to provide suitable habitat for small shorebirds would provide maximum flexibility in providing shorebird habitat (as well as habitat for other guilds of birds) while still moving toward full tidal restoration here. While some adverse effects on small shorebird population are expected, the implementation of Alternative Eden D is unlikely to reduce flyway-level populations 20 percent below baseline levels and would thus have a less-than-significant impact on small shorebirds.

Alternative Eden D Level of Significance: Less than Significant

Phase 2 Impact 3.5-4: Loss of intertidal mudflats and reduction of habitat for mudflat-associated wildlife species.

Potential program-level impacts are addressed in Section 3.6 of the program-level evaluation found in the 2007 Final EIS/R. Here, the project-level impacts of the implementation of Eden Landing Phase 2 actions are assessed.

Shorebirds are a primary user of intertidal mudflats, and the habitat- and population-related effects on small shorebirds from Phase 2 actions were covered extensively in Impact 3.5-3. This impact (Impact 3.5-4) focuses more generally on effects on other birds and other wildlife species. Resident and migratory (midsize and larger) shorebirds forage on invertebrates found in mudflats during low tide. Gulls and some dabbling ducks forage on exposed mudflats as well. During high tides, fish move over these mudflats to feed on invertebrates.

Restoration of former salt ponds to tidal habitats is expected to increase the availability of intertidal mudflat foraging area at low tide within the ponds in the short term in areas unaffected by the import and deposition of dredge materials. Some of the breached ponds would provide large areas of intertidal mudflat habitat for some time before accreting enough sediment for vegetation to colonize. Eventually, this mudflat habitat within the ponds would be converted to tidal marsh. In areas where pond bottom elevations are raised prior to breaching, these elevations are expected to be higher than those that readily support mudflat habitat. Once tidal, these ponds are expected to recruit high salt marsh vegetation.

Mudflats outside of the ponds could be directly affected by the construction and operation of dredge material infrastructure and indirectly affected by scour and changes in sediment transport. As the ponds are breached, increased tidal flux is expected to cause short-term scouring and loss of some of the mudflat area outside of the ponds alongside stream outflows, sloughs, and channels until an equilibrium has been reached. Mudflat loss is also expected as ponds are breached because sediments from existing mudflats could be transported into the breached subsided ponds and the ponds would then be colonized with vegetation (2007 Final EIS/R). However, intertidal mudflats are one of the most dominant habitats of the South Bay (the other being former salt-ponds), and only a minimal percentage of the total area of mudflats would be affected by the Eden Landing Phase 2 actions.

Numerous species of invertebrates, birds, and fish use intertidal mudflats. As a result, direct effects to mudflats outside of the ponds and a decline in mudflat availability due to scour and changes in sediment transport could result in declines in abundance of these species; however, because the Eden Landing Phase 2 project area represent a small fraction of the total South Bay mudflat area, these declines would be minimal. Also, productivity within the former salt ponds is expected to increase with tidal restoration, as tidal water brings nutrients and organisms into the former salt ponds. This would form marshes, which are likely to result in increased productivity in the benthic invertebrate food chain, potentially increasing the density of the invertebrate prey base available to the various bird and fish species that forage on intertidal mudflats. Such increases in productivity may offset, at least to some extent, the adverse effects of mudflat loss outside of the ponds on South Bay animals such as invertebrates, fish, and birds. In addition, minimal amounts of foraging habitat for some mudflat foragers would be created along the margins of the sloughs and channels that would form in restored marshes, as discussed in the 2007 Final EIS/R.

Alternative A (No Action). Under Alternative A (the No Action Alternative), no new action would be taken. The Bay, Inland and Southern Ponds would continue as managed ponds. Levees would be maintained, as needed, and the ponds would continue to provide the same habitat function. Currently, the only intertidal mudflat habitat within southern Eden Landing is within the OAC and the along the ACFCC. Mudflats may exist temporarily during the summer months within managed ponds that dry out. Intertidal mudflats also exist outside the Bay Ponds and at the mouth of the OAC and ACFCC on the bayward sides of southern Eden Landing. Northern Eden Landing would continue to provide the range of effective habitats that were provided and enhanced in Phase 1. None of these mudflats would be disturbed with the No Action Alternative; therefore, Alternative A would have no impact on intertidal mudflat habitat for wildlife species in the South Bay.

Alternative Eden A Level of Significance: No Impact

Alternative Eden B. Under Alternative Eden B, an offloading facility and pipelines would be placed in the Bay during the construction period to transport dredge materials to Pond E2. Pond bottom elevations would be raised in the Bay and Inland Ponds and levees would be breached to restore tidal action to the Bay, Inland, and Southern Ponds. All of southern Eden Landing would transition to tidal marsh habitat. Internal levees would be breached and lowered, and habitat transition zones and islands/ marsh mounds would be created to provide high-tide refugia, nesting and foraging habitat. Because bottom sediments in the Bay and Inland Ponds would be raised to marsh plain elevations, these ponds are expected to recruit salt marsh vegetation when breached.

An offloading facility would be located in the deep water channel of the Bay approximately 3 miles offshore of Pond E2. Dredge material would be offloaded at this facility, mixed with seawater, and the resulting slurry would be pumped from the offloader via pipelines to the Bay and Inland Ponds. Up to two booster pumps would be located along the pipeline route, with potentially one in the Bay, depending on the hydraulic offloader's pumping capacity. The submerged pipeline would be anchored on the Bay bottom with precast concrete pipe weights to reduce vulnerability to wind and wave action.

The infrastructure placed in the Bay between the offloading facility and Pond E2 would have direct effects on benthic species on the mudflats along the pipeline route (those living at the sediment surface and in upper subsurface layer) and indirect effects on those species living at and just above the bottom sediments that cannot rise more than an few feet in the water column during high tide. To minimize potential effects to north-south movement across the mudflats, portions of the submerged pipeline could be floated above the shallow mudflats, where needed, to allow for species to pass below the pipe. Although effects to benthic species would occur during construction and operation of the dredge material placement infrastructure, as described above, intertidal mudflats are one of the most dominant habitats of the South Bay, and only a minimal percentage of the total area of mudflats would be affected by the Eden Landing Phase 2 actions. In addition, effects from pipelines and booster pumps would only occur during a portion of the construction period, as the dredge material infrastructure would be removed prior to construction of the other restoration, flood risk management, and recreational components.

Levee breaches and associated increases in tidal flux would increase erosion and scour and thus slightly reduce the total availability of mudflat habitat present along the edges of the OAC and the ACFCC as well as along the mudflat bayward of Eden Landing. However, this amount is also minimal relative to the amount of mudflat in the Bay. Sediment accretion in the Southern Ponds during the transition to tidal marsh would result in some temporary intertidal mudflat habitat. This mudflat habitat would in turn become vegetated as a tidal marsh in the long term. The existing mudflats along and outside of southern Eden Landing (OAC and ACFCC) would likely experience some scour and reduced area. The existing mudflats in San Francisco Bay may experience similar small amounts scour and localized reduction in the extent, but would likely be replaced by deposition in other areas. The impacts associated with scour and erosion are expected to stabilize and reach equilibrium quickly.

Overall, the planned full tidal restoration in Alternative Eden B would likely eventually result in more extensive channel networks, higher-order sloughs, and overall greater habitat diversity. Intertidal mudflat habitat is expected to develop along the channels and sloughs in the restored tidal marsh and along the shallow sloping features of the habitat transition zones and islands. There would also be some loss of mudflat due to scour from the increased tidal flux outside of the ponds and in adjacent sloughs. The net of these areas of change to existing mudflats is expected to be relatively small and would thus constitute a less-than-significant impact on mudflat habitats for wildlife species in the South Bay.

Alternative Eden B Level of Significance: Less than Significant

Alternative Eden C. Alternative Eden C would use an offloading facility, booster pumps, and pipelines to import dredge materials and raise pond bottom elevations, restore tidal action to the Bay Ponds as described for Alternative Eden B, and convert the Inland Ponds and Southern Ponds to enhanced managed ponds. In addition, the internal levees within the Bay Ponds would be breached, and the material would be used to create islands. A mid-complex levee and associated habitat transition zone would be created.

Due to the similarity of the activities proposed, the impacts on mudflats associated with the Bay Ponds are similar to those described under Alternative B. For the Inland Ponds and the Southern Ponds, the addition water control structures will provide ELER managers with a greater ability to manage and operate the ponds for a wide variety of wildlife. However, these enhancements would provide only limited ability to provide intertidal mudflat habitat. The operation of water control structures is not expected to result in significant changes in existing mudflat conditions in the mudflats present in or along the OAC, ACFCC or in the San Francisco Bay outside of Eden Landing. Furthermore, due to the presence of large amounts of mudflat habitat throughout the South Bay these changes are not expected to be limiting for populations of mudflat-associate species.

Overall, with Alternative Eden C, the effects associated with the tidal flux would be less severe than those described from Alternative Eden B, because of the reduced area that will be exposed to full tidal action, and smaller tidal volumes and corresponding velocities. Like Alternative Eden B, there would be affects during construction from pipelines and booster pumps, and there may also be some loss of mudflat due to scour from the increased tidal flux outside of the ponds and in adjacent sloughs under Alternative Eden C.

Alternative Eden C Level of Significance: Less than Significant

Alternative Eden D. Alternative Eden D is similar Alternative Eden B in the long term and similar to Alternative Eden C in the short term. In the short term, an offloading facility and pipelines would be used to import dredge materials and raise bottom elevations in the Bay and Inland Ponds, the Inland Ponds and Southern Ponds would become enhanced managed ponds, and the Bay Ponds (as with both Alternatives Eden B and Eden C) would become tidal marsh. Over time, the Inland Ponds and Southern Ponds enhanced managed ponds may also be converted to tidal marsh (similar to Alternative Eden B) through removal of the temporary mid-complex levee and the additions of more levee breaches. Like Alternative Eden C, Alternative Eden D would also provide water control structures in the Inland Ponds and Southern Ponds, but these could ultimately be removed to provide full tidal action. The staged transition of the Inland and Southern Ponds to tidal flows would occur when observations made elsewhere in South Bay and in the greater SBSP Restoration Project demonstrated pond-dependent wildlife species were not suffering adverse impacts as defined in the AMP and in the significance criteria established in the 2007 Final EIS/R such that managed ponds needed to be retained.

Overall, the potential impacts from pipelines and booster pumps on mudflats and from localized erosion and scour would, in the short term, be similar to those described under Alternative Eden C and more closely resemble those described under Alternative Eden B in the long term. Under Alternative Eden D, the impacts associated with localized erosion and scour will be spread out over time, giving biota more time to adjust to potential changes in mudflats.

Alternative Eden D Level of Significance: Less than Significant

Phase 2 Impact 3.5-5: Potential habitat conversion impacts to western snowy plovers.

Potential program-level impacts are addressed in Chapter 3.6 of the program-level evaluation found in the SBSP Restoration Project's 2007 Final EIS/R. The project-level impacts of the implementation of Eden Landing Phase 2 actions are assessed in this Draft EIS/R.

The Pacific coast population of western snowy plover is federally listed as threatened and substantial losses in the San Francisco Bay population could be significant in the context of the Pacific Coast population (2007 Final EIS/R). The majority of the San Francisco Bay population of western snowy plovers currently breeds in Eden Landing, where this species nests in and adjacent to a number of ponds. Recovery goals for the entire San Francisco Bay are to support 250 breeding pairs. Recovery goals for the

SBSP Restoration Project area are to support 125 breeding pairs. Western snowy plovers have found suitable breeding and nesting conditions in some former salt ponds that are now seasonally wet ponds. Plovers prefer open spaces with no vegetation, away from trails and predator perches. Although western snowy plovers in San Francisco Bay occasionally nest on levees and islands, the majority of nests are currently found on flats within dry or partially dry ponds (2007 Final EIS/R). Individuals also forage in adjacent shallow ponds or tidal sloughs. Some of these ponds would be converted to tidal marsh during pond restoration efforts, potentially impacting western snowy plover habitat. The enhancements and subsequent management of ponds that were included in Phase 1 at northern Eden Landing have seen net increases in numbers of nests, even as the total area of available habitats has decreased (De La Cruz et al., in press; Tokatlian et al. 2014).

Alternative Eden A (No Action). Under Alternative Eden A (the No Action Alternative), no new action would be taken. Some of the Inland Ponds and Southern Ponds currently provide nesting and foraging habitat for western snowy plover, and that usage would continue. No changes would be made to the configuration or operation of these ponds that would either increase or decrease this habitat and the expected population numbers. Northern Eden Landing would continue to provide the range of effective habitats that were provided and enhanced in Phase 1. Alternative Eden A would have no impact on western snowy plover.

Alternative Eden A Level of Significance: No Impact

Alternative Eden B. The Bay Ponds are currently moderately deep pools, and the Inland Ponds and Southern Ponds are shallower and are frequently managed so as to be seasonally dry for use by this species. Under Alternative Eden B, bottom elevations would be raised in the Bay and Inland Ponds through the import of dredge materials and all of the ponds in southern Eden Landing would be converted to tidal marsh by being opened to tidal flows. There would also be habitat transition zones, islands, levee raising and lowering, and other habitat enhancements. The Bay Trail spine would be completed along the eastern side of the project area. (Construction impacts within the ponds and in the tidal marsh habitats adjacent to the ponds are described in more detail in Impacts 3.5-1 and 3.5-2.) Because bottom sediments in the Bay and Inland Ponds would be raised to marsh plain elevations, these ponds are expected to recruit salt marsh vegetation when breached.

Tidal marsh habitats are not well-suited for western snowy plover, but the transitional mudflat habitat in the Southern Ponds could provide temporary foraging opportunities until the marshes form. The islands that would be built on residual levees in the ponds could provide some western snowy plover roosting habitat. The populations that use the managed ponds in northern Eden Landing could benefit from these enhancements which would partially offset the losses of existing nesting or roosting habitat in the Inland and Southern Ponds. However, there would still be a net negative effect on habitat. Also, the proposed Bay Trail spine and its optional routes through southern Eden Landing have the potential to bring increased numbers of trail users closer than preferred to nesting plovers in northern Eden Landing, where ponds managed for this species exist.

Overall, because the net habitat change would be the loss of large areas of seasonally dry nesting habitat for western snowy plover and because recreational use of proposed trails may disturb individual plovers, the impacts under Alternative Eden B would be potentially significant.

Alternative Eden B Level of Significance: Potentially Significant

Alternative Eden C. Alternative Eden C is similar to Alternative Eden B at the Bay Ponds, which would have bottom elevations raised and be converted to tidal marsh. But those ponds are not heavily used by western snowy plover because of their depth. Under Alternative Eden C, however, instead of being converted to tidal marsh, the Inland Ponds and Southern Ponds, including Pond E6C, which was drawn down in 2016 to provide additional habitat, would be fitted with water control structures to allow those ponds to be managed for a variety of wildlife. Seasonally, management of some Inland and Southern Ponds would focus on the western snowy plover. Activities that may directly benefit the western snowy plover, such as drying earlier in the year, may enhance nesting density and success.

The other habitat enhancements would also be implemented, though in different locations, and these would benefit individuals present in the ELER. The management of the enhanced ponds would focus on and improve nesting habitat quality that would benefit the western snowy plover.

However, Alternative Eden C would also feature additional public access and recreation features, beyond those described in Alternative Eden B, including the loop trail off of the Bay Trail spine. These trails and other recreational features would increase the risk of recreational disturbance on nesting, foraging, or roosting western snowy plover, which would be expected to offset some of the benefits of the enhanced managed ponds, and reduce the amount of suitable habitat available for nesting individuals. The full effect of disturbance of recreation and public access on sensitive wildlife species is discussed at length in Impact 3.5-18.

Overall, even with the increased recreational disturbance the improved ability to manage the Inland Ponds and Southern Ponds for western snowy plover habitat and the retention of those ponds as enhanced managed ponds would cause Alternative Eden C to have a less-than-significant impact on western snowy plover.

Alternative Eden C Level of Significance: Less than Significant

Alternative Eden D. Under Alternative Eden D, bottom elevations would be raised in the Bay and Inland Ponds through the import of dredge materials, the Bay Ponds would be converted to tidal marsh as in the other alternatives, but the Inland Ponds and Southern Ponds would be retained as managed ponds and enhanced to provide similar, though slightly less flexible control over water depth, salinity, and other characteristics. The benefits would be similar to those described under Alternative Eden C. The addition of dredged material to the Inland Ponds during construction may result in temporary alteration of suitable nesting habitat, particularly to Pond E6C. However, once the material settles and dries, nesting habitat within the Inland Ponds may be improved through increased elevation and enhanced management. The retention of the Inland Ponds and Southern Ponds, which are used by western snowy plover, as managed ponds would persist until ongoing research and monitoring indicated that some or all of those ponds could be converted to tidal flows without significantly reducing populations of western snowy plover in San Francisco Bay relative to the baseline. If instead the need for these ponds to remain as breeding areas for western snowy plover is indicated, Alternative Eden D would thus retain them. Also, the public access trails would be the same as Alternative Eden B (i.e., less extensive than those in Alternative Eden C), and are expected to increase the risk of recreational disturbance on nesting, foraging, or roosting western snowy plover. These impacts would offset some of the benefits of the enhanced managed ponds, and reduce the amount of suitable habitat available for nesting individuals. The full effect of disturbance of recreation and public access on sensitive wildlife species is discussed at length in Impact 3.5-18.

Overall, the retention and improvement of the Inland Ponds and Southern Pond as breeding habitat for western snowy plover until it can be demonstrated that further tidal marsh restoration can proceed without triggering a significant impact would mean that Alternative Eden D would have a less-than-significant impact.

Alternative Eden D Level of Significance: Less than Significant

Phase 2 Impact 3.5-6: Potential reduction in the numbers of breeding, pond-associated waterbirds (avocets, stilts, and terns) using the South Bay due to reduction in habitat, concentration effects, displacement by nesting California gulls, and other project-related effects.

Potential program-level impacts are addressed in Chapter 3.6 of the program-level evaluation found in the 2007 Final EIS/R. The project-level impacts of the implementation of Eden Landing Phase 2 actions are assessed in this Draft EIS/R.

American avocets, black-necked stilts, Forster's terns, and Caspian terns are colonial waterbirds that nest and forage within portions of the SBSP Restoration Project. These birds nest on islands within ponds, on pond levees; in dry salt panne habitat; in marshes on higher ground around marsh ponds; and in other bayside habitats such as water treatment plant settling ponds. Avocets and stilts forage in ponds, marshes, and alternative habitats such as water treatment plants. Avocets also forage on intertidal mudflats when they are not inundated. The terns forage on fish, which they catch in the Bay; along slough channels; in lower-salinity ponds within the SBSP Restoration Project area; and in artificial ponds, lagoons, and reservoirs throughout the South Bay (2007 Final EIS/R).

Based on recent long-term monitoring data, the highest number of American avocets occurred in SBSP Restoration Project ponds during fall and winters months, with an increase from 2002 to 2006 and from 2010 to 2014 (De La Cruz et al., in press). Spring tern populations have increased in SBSP Restoration Project ponds between 2001 and 2014 (*Ibid*). The same study found that gull abundance peaking from 2004 to 2006, after which the population declines; and numbers have recently increased (2011 to 2014), but remained below peak numbers.

Restoration of managed ponds to tidal marsh could result in a loss of nesting and foraging habitat for some of these species. Large areas of unoccupied nesting habitat are available and could offset habitat loss due to conversion to tidal marsh. If available habitat is concentrated, it could make populations more vulnerable to predation. California gulls use the same habitat type as avocets, stilts, and terns. Gulls displaced by loss of nesting habitat due to tidal marsh restoration could disrupt avocet, stilt, and tern colonies (2007 Final EIS/R).

Overall, the loss of habitat in ponds that would be converted to tidal habitats in Phase 2 is expected to impact relatively small numbers of breeding avocets, stilts, and terns through loss of nesting and foraging habitat. These adverse impacts may be offset by the creation of islands for these species and the improvements to other ponds that are designated to become enhanced managed ponds as part of Phase 2 or a future project phase. Recent and ongoing monitoring of converted ponds indicates that populations of avocets and stilts are in decline, potentially as a result of loss of historic nesting islands. In general these species are not moving as ponds are restored. Terns appear to be more mobile and more resilient to these changes, and are moving to new sites as pond are restored to tidal flows, however, they are not moving to newly created pond habitat with islands (*Ibid*). Habitat islands or other enhancements in managed ponds are believed to be the key to maintaining breeding habitat. Recommendations for effective island breeding habitat (from Ackerman et al. 2014a) have been incorporated into this project to the extent practicable.

Alternative Eden A (No Action). Under Alternative Eden A (the No Action Alternative), no new action would be taken. Southern Eden Landing would continue to function as managed ponds similar to current conditions and northern Eden Landing would continue to provide the range of effective habitats that were provided and enhanced in Phase 1. The levees would continue to provide de facto flood protection and would be maintained for habitat purposes and for CDFW access and operations and maintenance (O&M). There would be no change to the operation and maintenance of southern Eden Landing.

Under the No Action Alternative, there would be no change in impacts to pond-associated waterbirds.

Alternative Eden A Level of Significance: No Impact

Alternative Eden B. Under Eden B, bottom elevations would be raised in the Bay and Inland Ponds through the import of dredge materials, and the Bay Ponds, Inland Ponds and Southern Ponds would be breached to support the development of tidal marshes and promote the recovery of several threatened and endangered marsh dependent species. Levee modifications, including breaching and lowering or removal of large sections of internal and external Bay Pond levees, and improvements to the landward (easternmost) levee of the Inland Ponds and Southern Ponds for flood risk management would occur. Habitat transition zones and nesting islands would also be constructed. Recreational trails would be constructed along the landward levee of the Inland Ponds and with several options along the perimeter levees of the Southern Ponds. (Construction impacts within the ponds and in the tidal marsh habitats adjacent to the ponds are described in more detail in Impacts 3.5-1 and 3.5-2.) Because bottom sediments in the Bay and Inland Ponds would be raised to marsh plain elevations, these ponds are expected to recruit salt marsh vegetation when breached.

Existing pond habitat – useful for nesting and foraging for these species – in the Island Ponds would be converted to marsh habitat, and in the Southern Ponds it would be converted to open water and mudflats (in the short term) and tidal marsh in the long term. Both nesting and roosting habitat for pond-associated waterbirds would be increased through the construction of islands. Island features would be designed to provide breeding habitat for avocets, stilts, and terns, at least in the short term, and would be isolated from terrestrial predators. As these constructed habitat features transition to tidal marsh, the usefulness of these islands for nesting birds may decrease. These islands have some potential to create concentration effects, where the large numbers of birds would become targets for predators such as gulls or disease. Gull management would be a part of ongoing CDFW and SBSP Restoration Project management and should help avoid displacement.

During the transition to the tidal marsh habitat, the Southern Ponds would provide some foraging habitat in the form of mudflats and would enhance the local fisheries. Tidal slough channels could also be used for foraging. Other than the islands, the long-term restored tidal marsh would offer minimal habitat for avocets, stilts, and terns, but some nesting opportunities may still be available on the surrounding levees. Levees that could provide nesting habitat would be lowered or removed and remaining portions that are regraded would become isolated from terrestrial predators, as well as foot and vehicle traffic.

The recreational features may reduce current nesting or roosting activities on the Inland Ponds and Southern Ponds levees and disrupt foraging activities that occur there. These effects are discussed more fully in Impact 3.5-18. In general, however, research (e.g., Trulio et al. 2013) indicates that buffer distances of several hundred feet from trails or observation platforms (the exact distance varies by species) appears to minimize disturbance.

Small amounts of mudflat foraging habitat outside of the ponds would be lost due to scour from the levee breaches, but improved foraging, in the short term, would be created inside the Southern Ponds as they transition to tidal marsh. These changes are small compared to the amount of habitat available for pond-associated waterbirds in the South Bay and are not expected to reduce populations 10 percent or greater relative to the baseline. As such, these impacts are considered less than significant.

Alternative Eden B Level of Significance: Less than Significant

Alternative Eden C. Alternative Eden C would provide avocet, stilt, and tern nesting habitat benefits as the Inland and Southern Ponds become enhanced managed ponds. The Inland and Southern Ponds would be enhanced with the addition of 11 water control structures that will provide CDFW with greater management flexibility and seasonal control over water quality and depths for a variety of wildlife. Alternative Eden C would add the same long section of recreation trail and a viewing platform provided in Alternative Eden B as well as a loop trail to the Alvarado Salt Works site and bridges over the OAC and ACFCC. The Bay Ponds are moderately deep and do not provide nesting habitat, except on levees and limited pond margins. Shallow areas provide foraging habitat. Pond bottom elevations would be raised through the import of dredge materials and the Bay Ponds would be breached to provide full tidal action to facilitate its transition to tidal marsh habitat. The mid-complex levee would be would be raised to create separation between the Bay Ponds and the other ponds; this raised levee could be used for roosting and nesting pond-associated birds.

The installation of the water control structures would have temporary and minor effects to waterbirds that use adjacent Inland Ponds and Southern Ponds. In the long term, the ability CDFW to better manage water quality and quantity will provide better habitat conditions, including nesting and foraging conditions, for a wide variety of bird species, including pond dependent wildlife. Islands and habitat transition zones would be constructed within the Bay Ponds and along the mid-complex levee, which may support nesting waterbirds. Like Alternative Eden B, the islands created from the remnant levees in the Bay Ponds and internal levees on the Inland Ponds have potential to increase concentration effects somewhat relative to the existing conditions; gull control would be a part of ongoing CDFW management and should help avoid displacement.

As in Alternative Eden B, the proposed recreational trails may remove or otherwise disturb waterbirds that nest along the landward levees of the Inland or Southern Ponds, and the various trail routes through the Southern Ponds. The additional recreational features along either or both sides of the OAC may further disrupt nesting, roosting, or forage activities on the Inland Ponds or at northern Eden Landing. These effects are discussed more fully in Impact 3.5-18.

Overall, the foraging habitat for avocets, stilts, and terns, would be improved with the conversion of the Inland and Southern Ponds to enhanced managed ponds. Foraging habitat would be much reduced in the Bay Ponds and limited to the tidal slough channels. Nesting habitat would be removed or disturbed to some extent through the removal and lowering of levee and addition recreational trails. New nesting and roosting habitat would be available on the constructed islands and habitat transition zones. The habitat changes are small compared to the amount of habitat available for pond-associated waterbirds in the South Bay and are not expected to reduce populations 10 percent or greater relative to baseline conditions. As such, these impacts are considered less than significant.

Alternative Eden C Level of Significance: Less than Significant

Alternative Eden D. Alternative Eden D would provide features similar to those in Alternative Eden B in the long term (full tidal restoration at southern Eden Landing Ponds), and Alternative C in the short term (mix of tidal marsh and enhanced managed ponds). The primary difference being that under Alternative Eden D, bottom elevations would be raised in both the Bay and Inland Ponds through the import of dredge materials, but the Inland and Southern Ponds would initially be enhanced managed ponds and ultimately (based on the AMP and ongoing monitoring) converted to tidal marsh.

The Inland and Southern ponds, when managed as enhanced pond habitat, could provide foraging and nesting habitat for shorebirds or other waterbirds. Like Alternative Eden C, water control structures on the Inland and Southern Ponds would increase the ability for CDFW to provide improved foraging and roosting habitat for waterbirds. However, in the long term, these benefits would be diminished once the control structures are removed to create breaches to provide full tidal flows to these ponds and vegetated salt marsh develops. The Bay Ponds would be breached and become vegetated as a tidal marsh.

In the short term, these actions could be beneficial; however, in the long term they are expected to reduce the amount of habitat available for nesting, foraging and roosting shorebirds. These actions are not expected to result in a decline in populations of pond-associated waterbirds by 10 percent or greater relative to the baseline and would therefore have a less-than-significant impact.

Alternative Eden D Level of Significance: Less than Significant

Phase 2 Impact 3.5-7: Potential reduction in the numbers of non-breeding, salt-pond-associated birds (e.g., phalaropes, eared grebes, and Bonaparte's gulls) as a result of habitat loss.

Potential program-level impacts are addressed in Chapter 3.6 of the program-level evaluation found in the 2007 Final EIS/R. The project-level impacts of the implementation of Eden Landing Phase 2 actions are assessed in this Draft EIS/R.

Several species of waterbirds that may not otherwise occur in high numbers in the South Bay use the former salt ponds in considerable numbers. These salt pond specialists, which include the eared grebe, Wilson's phalarope, red-necked phalarope, and Bonaparte's gull, are closely associated, at least on the scale of San Francisco Bay, with high-salinity ponds. High-salinity ponds generally support high invertebrate biomass, but low species diversity. Eared grebes, phalaropes, and Bonaparte's gulls use primarily moderate- to high-salinity ponds, where they forage on brine shrimp and brine flies (Harvey et al. 1992). Most individuals of all four of these species breed primarily outside of the SBSP Restoration Project area and occur in the project area only during winter or during spring and fall migration (2007 Final EIS/R).

Eared grebes prefer ponds that are deep enough for them to forage in the underwater column. Phalaropes and Bonaparte's gulls are dabblers preferring shallow ponds. These migratory birds are present during spring, fall and winter months and forage on the available prey in high-salinity ponds. The restoration of high-salinity ponds into lower-salinity managed ponds and tidal marsh would affect these salt-pond-associated birds. Based on long-term monitoring of eared grebes, SPSP project ponds have seen decreased population numbers from 2002 to 2006 under the Initial Stewardship Plan, but since 2011 (during Phase 1) have been increasing (De La Cruz et al., in press).

Within southern Eden Landing, high-salinity ponds are limited to the Inland Ponds (E6C, E6, and E5) and some of the Southern Ponds (E1C, E4C, and E5C). The Inland and Southern Ponds may be inundated year-round or may be managed as "batch" ponds. Water levels at the Inland Ponds are supplemented in the winter by rains, and in the summer through circulation of water from Bay Ponds E4 and E7 or E2C in the case of the Southern Ponds. The salinity is variable depending on rainfall (i.e., higher salinity in the summer when ponds are shallower) with limited exchange with Bay water. In the summer, these ponds may reach the high-salinity levels that typically produce abundant invertebrate prey. The Inland Ponds are generally recirculated in the winter, and are drawn down in the summer depending on management objectives. They currently provide dry salt flats or high salinity ponds. All of the ponds provide potential nesting and roosting on levees and/or islands, but most of the salt pond-associated species do not nest in the area.

Alternative Eden A (No Action). Under Alternative Eden A (the No Action Alternative), no new action would be taken. The southern Eden Landing Ponds would continue to function as unenhanced managed ponds similar to the Initial Stewardship Plan and Phase 1 enhancements provided at northern Eden Landing would continue to provide a range of effective habitats. Under the No Action Alternative, there would not be an impact on salt-pond-associated, high-salinity specialist birds.

Alternative Eden A Level of Significance: No Impact

Alternative Eden B. Under Alternative Eden B, bottom elevations would be raised in the Bay and Inland Ponds through the import of dredge materials, and the Bay Ponds, Inland Ponds, and Southern Ponds would be breached to support the development of tidal marshes. (Construction impacts within the ponds and in the tidal marsh habitats adjacent to the ponds are described in more detail in Impacts 3.5-1 and 3.5-2.) Habitat for non-breeding salt-pond-associated waterbirds would decrease, as tidal marshes are established and restored. Currently, there is only moderate use of the southern Eden Landing ponds by phalaropes and somewhat higher use by eared grebes.

The conversion of the Inland Ponds to tidal marsh would reduce the amount of habitat for high-salinity dependent species, particularly in the fall when these species use the area for migration. These species are typically not found in the South Bay during the summer months, as they typically breed outside the area. Foraging habitat, in the form of moderate- and low-salinity ponds at southern Eden Landing would be lost because the area of ponds, overall salinity, and the water depth would gradually decrease over time with the formation of the tidal marsh. There would be reduction in available forage habitat of these species. However, few of these birds use southern Eden Landing. More significant use of ongoing salt production ponds occurs in the areas south of Eden Landing. Overall, these habitat changes are small and not expected to reduce populations of non-breeding, salt-pond-associated birds by 50 percent. As such, the impacts of Alternative Eden B would be less than significant.

Alternative Eden B Level of Significance: Less than Significant

Alternative Eden C. Alternative Eden C would involve raising pond bottom elevations and breaching and lowering levees in the Bay Ponds, as described in Alternative Eden B, to increase the transition to tidal marsh habitat in the Bay Ponds, but installation of water control structures in the Inland and Southern Ponds to enhance management. Under Alternative Eden C, the Inland Ponds and Southern Ponds would remain managed ponds, with greater ability for CDFW to manage water quality, including salinity, water depth and circulation. Islands and habitat transition zones would be constructed as in Alternative Eden B, but the habitat transition zone would be located along the mid-complex levee. Also, under Alternative

Eden C, the mid-complex levee would be raised to provide hydraulic and habitat separation as well as flood risk management

Currently, there is moderate use of the southern Eden Landing Ponds by phalaropes and somewhat higher use by eared grebes. There would be some reduction in foraging habitat of these species with the conversion to tidal marsh, although this reduction would be less than under Alternative Eden B because of the retention and improvement of management control of the Inland Ponds and Southern Ponds. At the Inland Ponds, enhanced management may improve conditions for salt pond dependent bird species, through increased ability to manage for salinity. However, high salinity foraging habitat is only present in the fall months in the Inland Ponds, and available for these birds generally after breeding, which occurs outside of the Project area. Overall the habitat changes would be small, and populations are unlikely to decline by 50 percent below baseline levels as a result of this action. For these reasons, the impacts of Alternative Eden C would be less than significant.

Alternative Eden C Level of Significance: Less than Significant

Alternative Eden D. Under Alternative Eden D, bottom elevations would be raised in the Bay and Inland Ponds through the import of dredge materials, the Bay Ponds would be opened to tidal action and transition to tidal marsh habitat, and Inland Ponds and Southern Ponds would initially become enhanced managed ponds, as described for Alternative Eden C. Later these ponds would also be opened to become tidal marsh. In the short term Alternative Eden D is similar to Alternative Eden C (Bay Ponds as tidal marsh and Inland Ponds and Southern Ponds as enhanced managed ponds), and in the long term is similar to Alternative Eden B (all ponds would be tidal marsh).

In the long term, the Inland Ponds that provide moderate salinity foraging habitat in the non-breeding season that would be lost with the conversion of southern Eden Landing ponds to tidal marsh. The Inland Ponds currently only provide high-salinity foraging habitat in the fall months and available for these birds generally after breeding, which occurs outside of the Project area. Moderate salinity may support salt pond associated birds in the non-breeding season. In the short term, the Inland Ponds would continue to be managed as salt ponds, with increased ability for CDFW to manage water quality, levels of inundation, and circulation as discussed under Alternative C, which may benefit non-breeding salt pond dependent birds. Due to the abundance of higher-salinity ponds in other areas of the South Bay, it is expected that the small reduction in salt pond habitat resulting from Alternative Eden D would not reduce populations by 50 percent below baseline levels and therefore would have a less-than-significant impact for salt-pond-associated, high-salinity specialist birds.

Alternative Eden D Level of Significance: Less than Significant

Phase 2 Impact 3.5-8: Potential reduction in foraging habitat for diving ducks, resulting in a substantial decline in flyway-level populations.

Potential program-level impacts are addressed in Chapter 3.6 of the program-level evaluation found in the 2007 Final EIS/R. Here, the project-level impacts of the implementation of Eden Landing Phase 2 actions are assessed. Diving ducks, such as lesser and greater scaup, bufflehead, canvasbacks, and other species, occur in the South Bay primarily during the nonbreeding season (note that ruddy ducks are addressed specifically in Impact 3.5-9). These species forage in relatively shallow aquatic habitats in the South Bay, including shallow subtidal habitats, intertidal habitats (when flooded at high tide), and low-salinity managed ponds. These species have been shown to be negatively affected by decreases in water depth, low dissolved oxygen, and increased salinity. Based on long-term monitoring data, diving duck counts have doubled in fall and winter census of the SBSP Restoration Project ponds since 2002, and spring population number have remained constant (De La Cruz et al., in press). Some species, such as lesser and greater scaup have declined significantly.

The SBSP Restoration Project could potentially affect the numbers of diving ducks in the South Bay in several ways. By converting managed ponds that currently provide foraging habitat for diving ducks to tidal habitats or enhanced managed ponds with a different hydrological regime (e.g., shallowly flooded intertidal mudflats), the project would result in an overall loss of managed pond habitat. This conversion would be expected to adversely affect habitat for bufflehead, which occur in the South Bay primarily in managed ponds and make relatively little use of tidal waters. However, subtidal habitat in sloughs and larger channels within restored ponds would provide foraging habitat for species such as canvasbacks and scaup, potentially offsetting the effects of the loss of managed pond habitat (2007 Final EIS/R).

Alternative Eden A (No Action). Under Alternative Eden A (No Action Alternative), no new action would be taken. The Bay Ponds currently function as year-round ponds with moderately deep water (1 to 3 feet) suitable for diving duck foraging and roosting habitat during the non-breeding season (winter). The Inland Ponds and Southern Ponds are seasonal “batch” ponds that are shallower, with higher salinity (from being drawn down), and allow more dry areas during the summer and fall, which provides little habitat for diving ducks. All of these ponds would be maintained in their current condition and would continue to provide the same habitat functions. In addition, northern Eden Landing would continue to provide the range of effective habitats that were provided and enhanced in Phase 1. There would be no impacts to diving duck foraging habitat.

Alternative Eden A Level of Significance: No Impact

Alternative Eden B. Alternative Eden B would use an offloading facility, booster pumps, and pipelines to import dredge materials and raise bottom elevations in the Bay and Inland Ponds and restore all of southern Eden Landing Ponds to tidal marsh. (Construction impacts within the ponds and in the tidal marsh habitats adjacent to the ponds are described in more detail in Impacts 3.5-1 and 3.5-2.) This conversion would result in a long-term loss of the existing pond habitat, which currently provides shallow and moderately deep water foraging and roosting habitat for diving ducks. The sheltered, still-water habitat the ponds now provide to diving ducks in winter would be changed to tidal flows. Foraging habitat would remain at high tide in the short term while sediment accretes in the Southern Ponds. Some foraging habitat would permanently remain in the open water areas of OAC and ACFCC and slough channels created within the existing ponds. Foraging habitat in open waters of the Bay could be temporarily affected by the construction and operation of the dredge material placement infrastructure. Disturbance to diving duck foraging would also occur from new recreational facilities along and through the Inland and Southern Ponds. Although some open water foraging habitat would be lost, substantial amounts of foraging habitat would still be available in other open waters of the Bay and in other managed ponds.

Abundant foraging habitat for diving ducks is available in other ponds nearby, such as a few of the salt ponds still in production, as well as in the Alviso pond complex or Ravenswood pond complex located in the South Bay. Diving ducks would redistribute to nearby habitats as the southern Eden Landing ponds are converted to tidal marsh.

The implementation of ongoing monitoring and management actions would continue under the AMP and would record bird counts to verify that these changes do not result in substantial declines in flyway-level populations, such as a reduction in the counts of diving ducks 20 percent below baseline levels. The results of the monitoring actions would inform adaptive management actions and the design of future phases of restoration. Examples of management changes that may be implemented in response to reductions in bird use of the ponds include changing management of other ponds in northern ELER or in other pond complexes in the SBSP Restoration Project area to provide additional deep water habitat suitable for diving ducks in the winter.

Due to the current population trends of diving ducks in the South Bay (doubling in fall and winter since 2002), availability of additional foraging habitat nearby, implementation of monitoring and adaptive management actions, these changes are not expected to result in substantial declines in flyway-level populations or reduce the population of diving ducks 20 percent below baseline levels. The impacts of Alternative Eden B on diving ducks would be less than significant.

Alternative Eden B Level of Significance: Less than Significant

Alternative Eden C. Under Alternative Eden C, pond bottom elevations would be raised through the import of dredge materials and the Bay Ponds would be restored to tidal marsh, as in Alternative Eden B, but the Inland Ponds and Southern Ponds would become enhanced managed ponds with the addition of water control structures. Under Alternative Eden C, the Inland Ponds and Southern Ponds would remain managed ponds, with greater ability for CDFW to manage water quality, including salinity, water depth and circulation. Islands and habitat transition zones would be constructed as in Alternative Eden B, but the habitat transition zone would be located along the mid-complex levee. Also, under Alternative Eden C, the mid-complex levee would be raised to maintain adequate flood risk management. Similar recreation infrastructure noted for Alternative Eden B would also apply to Alternative Eden C. In addition, Alternative Eden C, also includes two additional trails may result in additional disturbance on diving ducks.

The habitat changes in the Bay Ponds would generally be similar to those discussed above for Alternative Eden B. However, the increased ability to manage water quality, quantity and circulation in the Inland and Southern Ponds would not result in substantial deviation from existing conditions and may enhance shallow foraging habitat for diving ducks during the non-breading season. Water levels in the Inland and Southern Ponds are generally higher in the winter, but currently do not provide as much moderate or deep water foraging habitat, as ponds the Bay Ponds. Substantial amounts of moderate and deep open water habitat for diving ducks is maintained elsewhere in northern ELER and farther in the South Bay, as noted above.

Implementation of ongoing monitoring and management actions would continue using the AMP. Additional foraging habitat is available in other ponds nearby, such as ponds in northern Eden Landing, in salt ponds still used for production, as well as farther in the South Bay in the Alviso Complex. Implementation of monitoring and adaptive management actions would continue to verify these changes do not result in substantial declines.

Due to the availability of additional foraging habitat nearby and the implementation of monitoring and adaptive management actions, these changes are not expected to produce substantial declines in flyway-level populations or reduce the population of diving ducks 20 percent below baseline levels. The impact of Alternative Eden C on diving ducks would thus be less than significant.

Alternative Eden C Level of Significance: Less than Significant

Alternative Eden D. Alternative Eden D offers similar components and resultant impacts on shallow diving duck habitat in the short term as described in Alternative Eden C. In the long term the alternative activities would be similar to those as described in Alternative Eden B. Bottom elevations would be raised in the Bay and Inland Ponds through the import of dredge materials and the Bay Ponds would transition to tidal marsh habitat, and the Inland and Southern Ponds would initially become enhanced managed ponds and, depending on ongoing monitoring, may later become tidal marsh.

None of the Action Alternatives would provide deep water habitat for foraging diving ducks. Alternative Eden D would continue to provide shallow foraging habitat for diving ducks in enhanced managed ponds of Inland and Southern Ponds in the short term similar to Alternative Eden C. In the long term, Alternative Eden D would reduce shallow water foraging opportunities as the Inland and Southern Ponds become tidal marsh. Diving ducks may be able to forage in the OAC, ACFCC, and internal tidal channels, if the sloughs are sufficiently deep. Additional foraging habitat is available in other ponds nearby, such as ponds in northern Eden Landing, in salt ponds still used for production, as well as farther in the South Bay in the Alviso Complex. Implementation of monitoring and adaptive management actions would continue to verify these changes do not result in substantial declines.

The combined effect of these actions would be net loss of moderately shallow to deep water foraging habitat for diving ducks in southern Eden Landing. The continued restoration of some or all of the Inland and Southern Ponds would proceed only if ongoing monitoring (such as bird counts using managed ponds) indicates that diving ducks use has increased, such that the total counts in the ELER and/or other complexes such as Alviso or Ravenswood within the SBSP Restoration Project are similar to previous counts. These changes are not expected to produce substantial declines in flyway-level populations or reduce the population of diving ducks 20 percent below baseline levels. Impacts associated Alternative Eden D would thus be less than significant.

Alternative Eden D Level of Significance: Less than Significant

Phase 2 Impact 3.5-9: Potential reduction in foraging habitat for ruddy ducks, resulting in a substantial decline in flyway-level populations.

Potential program-level impacts are addressed in Chapter 3.6 of the program-level evaluation found in the 2007 Final EIS/R. Here, the project-level impacts of the implementation of Eden Landing Phase 2 actions are assessed.

Although small numbers of ruddy ducks breed in the South Bay, this species occurs in the project area primarily during their winter migration. In contrast with most of the diving ducks addressed in Impact 3.5-8, ruddy ducks are ducks that, in the South Bay, forage primarily in ponds, with relatively few individuals using tidal habitats or open water in the South Bay. Ruddy ducks account for about 65 percent of the diving ducks in 46 South Bay ponds; diving ducks generally are associated with low- to medium-salinity ponds (Brand et al. 2014, De La Cruz et al., in press). Other studies (Takekawa et al. 2001) have reported that the salt ponds in the South Bay supported up to 27 percent of the Bay's total waterfowl population, including 67 percent of the ruddy ducks. Ongoing and recent monitoring of diving ducks, including ruddy ducks, suggest that the mid-winter populations have increased significantly in the South Bay (De La Cruz et al., in press), and are maintaining pre-Initial Stewardship Plan baseline numbers. While the target has not been met, the overall trend is increasing toward success.These findings reinforce the information presented in the 2007 Final EIS/R, which stated that the majority of the ruddy ducks in the entire San Francisco Bay Area were in the ponds in the South Bay, with only 2 percent in open water tidal habitats in the South Bay.

Results of the 2012 midwinter waterfowl survey indicate that an even higher proportion of waterbirds, including coots, are supported by the ponds in the South Bay than is reported by Takekawa et al (2001). Over 40 percent of the waterfowl observed were seen in the ponds in the South Bay, a total of 153,196 birds. Ruddy duck numbers were reported as 38,818, representing 10 percent of all waterbirds in the San Francisco Bay estuary and 36 percent of the Lower Pacific Flyway population. Of the total ruddy ducks counted, 77 percent (29,892) were observed in the South Bay Ponds (Richmond et al. 2014). As such, substantial effects on the populations in the South Bay are likely to have a significant impact on the status of the flyway as a whole. The abundance of this species in the South Bay relative to the total flyway population increases the importance of potential effects from project activities.

Because ruddy ducks in the South Bay make little use of tidal waters, the SBSP Restoration Project could result in declines in ruddy duck numbers within the South Bay due to conversion of managed ponds to tidal habitats. Changes to existing pond habitat may affect ruddy duck populations by reducing available foraging habitat during a period of increased energetic stress following reproduction and molt (Tome 1984). Reductions in available forage may also increase density-dependent effects on fitness and increase the daily energy expenditure required to meet metabolic demand (Brand et al. 2014). As suitable pond habitat gradually decreases, some additional energy expenditure would be required for ruddy ducks to move to additional areas. Disease, prey availability, and competitive interactions may increase as a result of reduced wintering habitat. However, there are high levels of primary productivity in the SBSP Restoration Project area, and food sources may not be the limiting factor on ruddy duck populations.

Some ruddy ducks displaced from ponds in the South Bay that are restored to tidal habitats would likely simply shift to other areas, including other managed ponds in the area of the SBSP Restoration Project, salt ponds, or ponds and lakes elsewhere in the South Bay. This phenomenon was documented in bird counts of ruddy ducks in other ponds in northern Eden Landing following the tidal restoration of Pond E9. While use of Pond E9 substantially decreased, other ponds in northern Eden Landing, such as Pond E6A and E6B showed increased use by ruddy ducks. Pond E9 was breached in September or 2009, converting what had been deep-water pond habitat to tidal lagoons and mudflats. Winter bird counts in that area before and after the levee breach indicate that a spatial redistribution of the ruddy duck population occurred but that a large overall decline did not. Ruddy duck numbers in Pond E9 declined over 95 percent between 2011 and 2014. However, the adjacent ponds, E2, E4, E6A E6E, E7, E8, E8X, and E10 all saw large increases in ruddy duck numbers. In total, ruddy duck numbers decreased approximately 16 percent after the breach of Pond E9. This may be a reflection of other construction actions undertaken at ELER to increase long-term suitable habitat in Ponds E6A and E6B.

This decrease in ruddy duck counts is not necessarily evidence of a negative trend in ruddy duck populations in the San Francisco Bay or the Pacific Flyway. Trend analysis of midwinter waterfowl survey results between 1981 and 2012 suggests that ruddy duck numbers in the San Francisco Estuary have been stable over that period even while demonstrating large interannual variability. The scale of the displacement caused by the loss of suitable habitat in Pond E9 is significantly less than the annual variation around the San Francisco Bay. These populations, numbering 38,818 in 2012, shift by many thousands of individuals counted on an annual basis compared to a change of approximately 100 fewer individuals counted within the Eden Landing pond complex (Richmond et al. 2014). However, given the importance of San Francisco Bay to Pacific Flyway numbers of ruddy ducks and the relatively high percentage of Bay Area ruddy ducks that occur in ponds in the South Bay, a decline in the extent of ponds in the South Bay may result in flyway-level declines in ruddy duck numbers (2007 Final EIS/R).

Alternative Eden A (No Action). Under Alternative Eden A (the No Action Alternative), no new action would be taken. Large portions of the southern Eden Landing ponds currently function as year-round ponds with suitable ruddy duck foraging habitat. These ponds and the northern Eden Landing Ponds would be maintained in their current condition and would continue to provide the same habitat functions. There would be no impacts to ruddy duck foraging habitat.

Alternative Eden A Level of Significance: No Impact

Alternative Eden B. Alternative Eden B would raise bottom elevations in the Bay and Inland Ponds and restore the southern Eden Landing Ponds to tidal marsh by restoring tidal flows through the outer levees. Habitat islands and habitat transitions zones would be constructed, and a new trail infrastructure would be constructed along and within the Inland and Southern Ponds. (Construction impacts within the ponds and in the tidal marsh habitats adjacent to the ponds are described in more detail in Impacts 3.5-1 and 3.5-2.) Because bottom sediments in the Bay and Inland Ponds would be raised to marsh plain elevations, these ponds are expected to recruit salt marsh vegetation when breached.

The conversion to tidal marsh would result in a loss of existing pond habitat that currently provides foraging and roosting ruddy duck habitat. Permitted hunting in adjacent ponds in the Eden Landing ponds may make the availability of these ponds to ruddy ducks more important. Construction of the recreational trails could increase the visual disturbance to ruddy ducks, although much of the Inland Ponds would be at a distance from the trail and also buffered by a habitat transition zone (see Impact 3.5-18 for full discussion of recreation and public access impacts). After restoration, some marginal tidal foraging habitat would remain in the open water areas of OAC, ACFCC, and the created internal pilot tidal channels. Foraging habitat for ruddy ducks would be available in nearby managed ponds in northern Eden Landing and elsewhere in the South Bay. The project would not impact breeding habitat.

The ruddy duck is a stable species in the South Bay (Richmond et al. 2014). The threshold for a significant impact to ruddy ducks is a 15 percent decline in population. Given the wide availability of other ponds in the South Bay and northern Eden Landing, and the potential for spatial redistribution of the ruddy duck population to other suitable ponds, the conversion of these ponds to marsh would not be expected to cause a 15 percent population decline. With the availability of foraging habitat nearby and the implementation of ongoing monitoring and adaptive management actions to support adequate deep water habitat used by ruddy ducks, Alternative Eden B would have a less-than-significant impact on the ruddy duck population.

Alternative Eden B Level of Significance: Less than Significant

Alternative Eden C. Under Alternative Eden C, pond bottom elevations would be raised through the import of dredge materials and the Bay Ponds would be restored to tidal marsh, and the Inland and Southern Ponds would become enhanced managed ponds. A mid-complex levee would be improved to support a habitat transition zone on the Bay Ponds and to provide appropriate levee conditions for moderately deep conditions in the managed Inland Ponds and to maintain adequate flood risk management. Habitat islands would also be created. The same trail infrastructure noted for Alternative Eden B would also be established for Alternative Eden C, but it would also include two additional trails to cross the OAC and ACFCC and connect with other regional trails.

Alternative Eden C would result in some similar habitat losses and temporary construction disturbances as those described for Alternative Eden B because open water foraging habitat would be lost in the Bay Ponds as tidal marsh is created. However, Alternative Eden C would not result in substantial changes in the existing open water habitat at the Inland Ponds or the Southern Ponds. Instead, the ability to manage water quality, quantity, and circulation would be enhanced and foraging habitat for ruddy duck is expected to be maintained to provide moderately deep open water similar to or improved relative to the existing conditions. Overall, the amount of ruddy duck foraging habitat lost would be reduced in comparison with the Alternative Eden B but still greater than the amount lost compared to the No Action Alternative due to conversion of the Bay Ponds. The OAC, ACFCC, and internal pilot tidal channels may provide marginal foraging habitat for ruddy ducks. Foraging habitat for ruddy ducks is also available in nearby managed ponds, including those associated with northern Eden Landing, and salt production ponds.

These changes are not expected to produce substantial declines in flyway-level populations or reduce the population of ruddy ducks 15 percent below baseline levels. With the availability of foraging habitat nearby and no impacts to breeding or nesting habitat (since ruddy ducks do not nest in San Francisco Bay), Alternative Eden C is expected to have a less-than-significant impact on the ruddy duck population.

Alternative Eden C Level of Significance: Less than Significant

Alternative Eden D. Alternative Eden D results in impacts to ruddy duck habitat similar to those described under Alternative Eden B and Alternative Eden C. Alternative Eden D would raise bottom elevations in the Bay and Inland Ponds and restore tidal marsh to the Bay Ponds. Alternative Eden D, in the short term would create enhanced managed ponds within the Inland and Southern Ponds similar to those described in Alternative Eden C, but with higher bottom elevations in the Inland Ponds. The difference is that under Alternative Eden D, and with input from AMP and ongoing monitoring, the Inland and Southern Ponds may ultimately be converted to tidal marsh. The ongoing monitoring ensures ruddy duck use continues to maintain similar counts in Eden Landing and/or in other locations around the South Bay, such as the salt production ponds and managed ponds in the Alviso and Ravenswood complexes. Water quality and water depth would remain similar to the existing conditions at the Inland and Southern Ponds in the short and medium term, and foraging habitat for non-breeding ruddy ducks would remain for a decade or more. If and when tidal flows are restored to the Inland and Southern Ponds, foraging habitat would be gradually reduced and then lost as sediments accrete and tidal marsh vegetation becomes established as is expected with the Bay Ponds.

Although Alternative Eden D would not provide as much long-term foraging habitat for ruddy ducks in the Inland or Southern Ponds as Alternative Eden C would, Alternative Eden D would provide more than Alternative Eden B, at least in the short- to medium- term. Alternative Eden D allows for transition to tidal marsh if ongoing monitoring shows that the use by ruddy ducks in other ponds in Eden Landing or other South Bay locations increases or could successfully be accommodated by those changes. The Inland and Southern Ponds would continue to function as managed ponds for many years to a decade or more, providing valuable foraging habitat as tidal marshes are created in the Bay Ponds, potentially reducing the net impact on ruddy ducks. Also, ruddy ducks may be able to forage in other adjacent managed ponds, including the northern Eden Landing. The combined effect of these actions would be a gradual net decrease in the area of foraging habitat for ruddy ducks in this portion of southern Eden Landing. Because southern Eden Landing is 13 percent of the entire SBSP Restoration Project area, changes to foraging habitat are not expected to cause a significant reduction in ruddy duck populations. Given the documented dispersal to other suitable habitats, and large areas of remaining salt ponds available to ruddy ducks for foraging habitat, Alternative Eden D would not be expected to cause substantial declines in flyway-level populations or cause a 15 percent reduction in population and would therefore be a less-than-significant impact.

Alternative Eden D Level of Significance: Less than Significant

Phase 2 Impact 3.5-10: Potential habitat conversion impacts on California least terns.

Potential program-level impacts are addressed in Chapter 3.6 of the program-level evaluation found in the 2007 Final EIS/R. Here, the project-level impacts of the implementation of Eden Landing Phase 2 actions are assessed.

California least terns are classified as both a federal and a state endangered species. No critical habitat has been proposed or designated for California least terns; therefore, none would be adversely modified by the project. California least terns have bred in the vicinity of the SBSP Restoration Project area in the past, but they now occur in the South Bay primarily as post-breeding dispersants. Most California least terns nest in the San Francisco Bay Area at the Alameda National Wildlife Refuge (NWR) and may forage during the breeding season (e.g., to feed chicks) within the Eden Landing Phase 2 project area. California least terns have occasionally attempted to nest in the Eden Landing Phase 2 project area, but have been unsuccessful due to predation (Marschalek 2012). The closest known nesting colony occurs at Hayward Regional Shoreline Park, approximately 5 miles from southern Eden Landing. In a study of the Alameda NWR colony, foraging occurred in marine and estuarine habitats within 3.5 miles of the colony site (Ackerman et al. 2015). However, foraging by post-breeding dispersants is observed annually within Ponds E1 and E2 at the Bay Ponds and in the adjacent San Francisco Bay. Roosting occurs on the bayward levees of the Bay Ponds and likely also on some of the other internal and external levees around them. This species currently uses the South Bay primarily as a post-breeding staging area in late summer. Former salt ponds are used for both foraging (in lower-salinity ponds supporting fish) and roosting (on levees, islands, and artificial structures such as boardwalks). Although large foraging concentrations are noted in ponds, this species frequently forages on the Bay and in channels as well (2007 Final EIS/R).

Foraging habitat for California least terns in deep managed ponds is expected to decline under alternatives where those deep managed ponds are converted to tidal or seasonal habitats. However, tidal restoration is expected to benefit prey fish populations for the California least tern, and miles of sloughs and channels that would provide foraging habitat for this species are proposed to be restored by the project. California least terns "displaced" from current South Bay foraging locations would likely find alternative foraging areas, either within the project area, the larger South Bay, or elsewhere in the Bay Area. The degree to which a reduction in foraging habitat in ponds would be offset by increases in habitat and prey abundance in the Bay and in restored sloughs and whether the SBSP Restoration Project would have considerable impacts on the species at all are unknown (2007 Final EIS/R).

Alternative Eden A (No Action). Under Alternative Eden A (the No Action Alternative), no new action would be taken. Levees would be maintained, as needed, the Bay Ponds would continue to function as moderately deep managed ponds, and the Inland and Southern Ponds would continue to be shallow to moderately deep managed ponds that may be seasonally "batched" and/or drawn down and allowed to dry. The currently moderately deep water in Ponds E1 and E2 would continue to provide foraging habitat. The levees within and around the Bay Ponds at southern Eden Landing Ponds would continue to provide roosting habitat. Northern Eden Landing would continue to provide the range of effective habitats that were provided and enhanced in Phase 1. The No Action Alternative would have no impact on the California least tern.

Alternative Eden A Level of Significance: No Impact

Alternative Eden B. In Alternative Eden B, an offloading facility and pipelines would be used to import of dredge materials and raise bottom elevations in the Bay and Inland Ponds, and the Bay Ponds, Inland Ponds and Southern Ponds (including the known foraging Ponds E1 and E2) would be restored to tidal marsh. Levee lowering and other modifications would occur along the perimeter levees of the Bay Ponds that are available roosting areas, and habitat islands would be created in the Bay Ponds. Pilot channels would be excavated within the Bay Ponds. Constructed islands and habitat transition zones would be included in the restoration on the landward levee of the Inland Ponds and Southern Ponds. (Construction impacts within the ponds and in the tidal marsh habitats adjacent to the ponds are described in more detail in Impacts 3.5-1 and 3.5-2.) Because bottom sediments in the Bay and Inland Ponds would be raised to marsh plain elevations, these ponds are expected to recruit salt marsh vegetation when breached.

Currently, California least terns forage in Ponds E1 and E2 and roost on the adjacent levees. During construction, a small portion of the adjacent forging habitat in the Bay would be affected by the construction and operation of the dredge material placement infrastructure. After breaching, terns would most likely continue to use adjacent open water for foraging.

There could be temporary disturbance to California least tern roosting habitat during levee modifications, but the construction of habitat islands would result in a small net change in the amount of roosting habitat while increasing the quality of that habitat. These modifications would also reduce the amount of available roosting habitat. Although deep-water foraging within Ponds E1 and E2 would be lost, tidal marsh habitat would support nursery habitat for estuarine fish that could improve deep-water foraging in the pilot tidal channels within the ponds and the adjacent OAC, ACFCC and San Francisco Bay. Impacts to the California least tern associated with the loss of foraging habitat in Ponds E1 and E2 would be partially offset through improved foraging in internal tidal channels and adjacent open water areas and the creation of roosting islands in the ponds. The activities that occur on the Inland and Southern Ponds are not expected to impact or convert suitable habitat for the California least tern because these ponds are relatively shallow and higher salinity that do not support fish populations and as such are not as suitable for California least terns. Therefore, Alternative Eden B, while likely to have some effect on foraging and roosting habitat for this species, would not be expected to contribute to a population decline, since successful breeding occurs only in other areas. Due to the adjacent habitat improvements and the availability of adjacent open bay foraging habitat, impacts to the California least tern would be less than significant.

Alternative Eden B Level of Significance: Less than Significant

Alternative Eden C. Under Alternative Eden C, an offloading facility and pipelines would be used to import dredge materials and raise pond bottom elevations and the Bay Ponds would be breached to create tidal marsh, pilot tidal channels would be excavated, and portions of the perimeter levees around Ponds E1 and E2 would be lowered. In addition, the internal levees of the Bay Ponds would be breached, and habitat islands would be created. The bayward levee of Pond E2 would be improved to provide habitat for a variety of species including the California least tern.

In the Bay Ponds, Alternative Eden C would provide similar California least tern habitat features as described in Alternative Eden B. In addition, the habitat improvements to the western levee of Pond E2 would benefit roosting California least terns in close proximity to existing foraging habitat in the San Francisco Bay and in close proximity to the OAC and ACFCC. The Southern Ponds and Inland Ponds would be enhanced managed ponds, which could also provide some forage habitat for California least terns, because at least some enhanced managed ponds would provide lower salinity, and deeper water habitats. Many of the impacts described under Alternative Eden B would also occur under Alternative Eden C, including those due to construction.

Overall, while there would be some potential long-term California least tern habitat loss, due to the benefits provided by improved fisheries, creation of nesting islands, and presence of nearby deep-water habitat that would provide improved foraging, impacts to California least tern would be less than significant under Alternative Eden C.

Alternative Eden C Level of Significance: Less than Significant

Alternative Eden D. Under Alternative Eden D, project activities in Bay Ponds E1 and E2 would be similar to the actions described for Action Alternatives Eden B and Eden C. However, under Alternative Eden D, the entire bayward levee of Pond E1 and E2 would be improved to provide habitat for wide range of species, including California least terns, and a habitat transition zone would be constructed internal to the bayward levee. These would enhance roosting habitat for this species. Activities associated with the Inland and Southern Ponds would not be expected to impact suitable habitats for the California least tern, since under current conditions, little use of the Inland Ponds and Southern Ponds occurs. The project's benefits to fisheries and thus to improved foraging conditions outside of southern Eden Landing would be similar to those described for Alternative Eden B.

Alternative Eden D results in similar habitat area losses and habitat enhancements and benefits as described for Alternative Eden B and Alternative Eden C, with increased benefit of roosting habitat along a greater distance immediately adjacent to known foraging habitats in the San Francisco Bay. There would likely be some effect on this species, particularly during construction, but as described under Alternatives Eden B and Eden C, benefits would be provided by improved fisheries, creation of nesting islands, and presence of nearby deep-water habitat that would provide improved foraging. Impacts to California least terns would be less than significant under Alternative Eden D.

Alternative Eden D Level of Significance: Less than Significant

Phase 2 Impact 3.5-11: Potential loss of pickleweed-dominated tidal salt marsh habitat for the salt marsh harvest mouse and salt marsh wandering shrew and further isolation of these species' populations due to breaching activities and scour.

Potential program-level impacts are addressed in Chapter 3.6 of the program-level evaluation found in the 2007 Final EIS/R. Here, the project-level impacts of the implementation of Eden Landing Phase 2 actions are assessed.

Tidal restoration actions would require direct alteration of habitats (e.g., levee breaching, levee lowering, and installation of water-control structures) that would affect levees and small amounts of tidal marsh, generally on the outboard side of the ponds. Tidal marsh restoration would however, restore larger tidal prisms within existing channels, which would be expected to result in an increased level of local erosion of existing tidal marshes and local scour of the existing channels. However, in the long term, there would be an overwhelmingly positive benefit to tidal marsh-associated species from tidal restoration, as thousands of acres of new marsh would be restored, albeit over an extended period. There is very little remaining undiked pickleweed-dominated tidal salt marsh in the area of the SBSP Restoration Project, and the existing narrow corridors of habitat between larger blocks of habitat are necessary for dispersal of mice and shrews among core habitat areas. Therefore, even the limited habitat present in these corridors has high value as dispersal habitat (2007 Final EIS/R). Based on recent monitoring, Phase 1 and other Phase 2 projects have demonstrated an upward trend in pickleweed dependent species (e.g., salt marsh harvest mouse), however, some uncertainty remains as the rate of increase in population deviates from the projected goal.

Because tidal restoration efforts are being phased, new pickleweed-dominated habitat is expected to form within 10-20 years from early phases of restoration before later breaching actions and associated scour occur elsewhere in the South Bay. In the long term, tidal restoration is expected to result in substantial increases in habitat connectivity through marsh development and evolution. The 2007 Final EIS/R concluded that these sorts of project benefits would occur before short-term reductions in dispersal capability have substantial effects on populations in core habitat areas (2007 Final EIS/R). The early results of Phase 1 and Initial Stewardship Plan activities support this general assertion.

For pickleweed marsh-associated species such as the salt marsh harvest mouse and salt marsh wandering shrew, the SBSP Restoration Project is expected to result in considerable increases in tidal marsh habitat in the long term, thereby augmenting populations far beyond the minor, local impacts that would occur during some construction activities. Monitoring of salt marsh harvest mouse habitat and determination of presence would occur as part of the AMP to monitor the success of the SBSP Restoration Project with respect to these species (2007 Final EIS/R).

Alternative Eden A (No Action). Under Alternative Eden A (the No Action Alternative), no new action would be taken. The southern Eden Landing Ponds would continue to function as managed ponds and a range of effective habitats provided and enhanced in Phase 1 would continue to be provided at northern Eden Landing. The tidal marshes located on the bayward side of the outboard levees (west of Pond E1 and E2), and marshes associated with OAC and ACFCC, and landward of the complex would remain.

Under the No Action Alternative, the southern Eden Landing Ponds would be maintained in their current condition; therefore, this alternative would have no impact on pickleweed-dominated tidal salt marsh habitat or dependent species.

Alternative Eden A Level of Significance: No Impact

Alternative Eden B. Under Alternative Eden B, bottom elevations would be raised in the Bay and Inland Ponds through the import of dredge materials, levees would be breached in the Bay and Inland Ponds, and all southern Eden Landing ponds would transition from pond to tidal marsh habitat. Existing levees would be lowered and/or breached, or improved as habitat islands and habitat transition zones would also be created. In addition, a connection from the USD treated wastewater pipeline and the ACWD ARP wells would be provided to the Inland Ponds through the landward levee to deliver treated wastewater or brackish groundwater to the habitat transition zones and the adjacent marshes. (Construction impacts within the ponds and in the tidal marsh habitats adjacent to the ponds are described in more detail in Impacts 3.5-1 and 3.5-2.) Because bottom sediments in the Bay and Inland Ponds would be raised to marsh plain elevations, these ponds are expected to recruit salt marsh vegetation when breached.

The breaches and water control structures located around the edge of the ponds, including the connection to USD and the ARP wells, may result in the loss of a small amount of existing pickleweed-dominated and other marsh habitat. The levee lowering adjacent to Cargill Marsh is not expected to negatively impact pickleweed habitat, but may instead enhance ability for pickleweed to establish in the newly created tidal marsh habitat. Pickleweed habitat located alongside of the OAC and ACFCC, and adjacent to the landward levee, may be impacted by increased tidal flows or during construction. These impacts may include erosion and scour, and loss of small amount of pickleweed habitat. Narrow corridors of pickleweed habitat would be lost when levees are breached and channels are excavated through existing marsh to connect to the channels outside the ponds. The habitat losses at breaching points would be a short-term impact to pickleweed habitat. In the long-term, the breaches are expected to result in the restoration of large extents of diverse tidal marsh habitat.

The combined area of all of these known and potential effects would be in the low tens of acres of existing marsh. But the expected outcome of Alternative Eden B is the establishment of over 2,000 acres of newly restored tidal marsh habitat. This diverse tidal marsh habitat would be dominated by pickleweed in the main marsh plain, with corridors of low marsh dominated by Pacific cordgrass and high tide refugia in higher marsh, dominated by marsh gumplant, which would provide increased breeding and foraging habitat and dispersal corridors for the salt marsh harvest mouse and the salt marsh wandering shrew. These habitats would be interspersed with habitat islands and habitat transition zones that will provide substantial amounts of high-tide refugia for these species.

Overall, Alternative Eden B would increase the total area, and provide a wide range of elevations for pickleweed-dominated tidal marsh habitat in the long term. Any losses would be temporary and would be more than offset by the restoration of tidal marsh habitat in the Bay, Inland and Southern Ponds. The impact to the salt marsh harvest mouse and salt marsh wandering shrew would be less than significant under CEQA and beneficial under NEPA.

Alternative Eden B Level of Significance: Less than Significant (CEQA); Beneficial (NEPA)

Alternative Eden C. Under Alternative Eden C, pond bottom elevations would be raised through the import of dredge materials and the Bay Ponds would be converted to tidal marsh (as in Alternative Eden B), and the Inland and Southern Ponds would be enhanced managed ponds. The Inland Ponds and Southern Ponds would be enhanced through the improvement, partial removal or lowering of existing levees and installation of additional water control structures. The mid-complex levee would be improved and habitat transition zone would be constructed bayward of it.

Alternative Eden C includes restoration of tidal marsh habitat in the Bay Ponds and proposes the same number (in similar location) of breaches along the outer levee as proposed under Alternative Eden B. However, under Alterative Eden C, pipelines and discharge structures would not connect the Inland Ponds to the USD treated wastewater pipeline or to the ARP wells (Alternative B includes these connections), and no impacts to the pickleweed marsh would occur at this location. Internal pond to pond water control structures and breaches may impact existing narrow and isolated pickleweed habitat present along the pond margins. Similar to Alternative Eden B, the peripheral levee breaches and channels would remove a small amount (several acres) of pickleweed habitat. Restoration of tidal marsh habitat in the Bay Ponds would result in more pickleweed-dominated marsh habitat than offered in the No Action Alternative (Alternative Eden A), but significantly less than in Alternative Eden B. Like Alternative Eden B, the proximity of the Bay Ponds to existing salt marsh harvest mouse and salt marsh wandering shrew occupied habitat (in Whale’s Tail and Cargill Marsh, OAC and ACFCC) would provide additional habitat and dispersal for these special-status species. Habitat in the Inland Ponds and Southern Ponds would not be expected to support pickleweed vegetation and would remain open water managed ponds unsuitable for these species.

Therefore, Alternative Eden C would bring a net increase in the total area of pickleweed-dominated tidal marsh habitat. The losses would be temporary and would be more than offset by the restoration of over 1,200 acres of tidal marsh habitat in the Bay Ponds. The impact to the salt marsh harvest mouse and salt marsh wandering shrew would be less than significant under CEQA and beneficial under NEPA.

Alternative Eden C Level of Significance: Less than Significant (CEQA); Beneficial (NEPA)

Alternative Eden D. Under Alternative Eden D, similar components of both Alternative Eden B and Eden C would be implemented. Bottom elevations would be raised in the Bay and Inland Ponds through the import of dredge materials, the Bay Ponds would be restored to tidal marsh, and, in the short term, the Inland Ponds and Southern Ponds would become enhanced managed ponds. In the long term, depending on the results of monitoring and the decision processes described in the AMP, the Inland Ponds and Southern Ponds could be left as managed ponds or converted to tidal marsh, as in Alternative Eden B.

Like Alternative Eden B and Eden C, a small amount of loss of pickleweed-dominated habitat would occur as a result of the breaches, water control structures on the OAC and ACFCC. The increase in tidal flux may also result in areas of local erosion, scour and removal of pickleweed-dominated habitat, at first associated with the connection of Bay Ponds to the OAC, and then later with the Southern and Inland Ponds along the OAC and ACFCC. These small losses would be offset by the restoration of a large amount of tidal marsh, habitat islands and habitat transition zones that are likely to support pickleweed-dominated vegetation. The proximity of the pickleweed habitat in OAC, ACFCC, Whale’s Tail and Cargill Marshes to the Bay Ponds and improved habitat on the outboard levee and the habitat transition zones, may help facilitate recruitment of the pickleweed habitat and support dispersal of and habitat for special-status species including the salt marsh harvest mouse and salt marsh wandering shrew. If and when the Inland and Southern Ponds are converted to tidal marsh habitat, they too would likely support pickleweed-dominated vegetation and may provide suitable habitat for special-status species that may disperse from the surrounding areas.

Therefore, Alternative Eden C would bring a net increase in the total area of pickleweed-dominated tidal marsh habitat. The losses would be temporary and would be more than offset by the restoration of over 1,200 acres of tidal marsh habitat in the Bay Ponds in the initial stage and up to 800 more acres or more in the Inland Ponds and/or the Southern Ponds in the second stage. The impact to the salt marsh harvest mouse and salt marsh wandering shrew would be less than significant under CEQA and beneficial under NEPA.

Alternative Eden D Level of Significance: Less than Significant (CEQA); Beneficial (NEPA)

Phase 2 Impact 3.5-12: Potential disturbance to or loss of sensitive wildlife species due to ongoing monitoring, maintenance, and management activities.

Potential program-level impacts are addressed in Chapter 3.6 of the program-level evaluation found in the 2007 Final EIS/R. Here, the project-level impacts of the implementation of Eden Landing Phase 2 actions are assessed.

Management, O&M, and monitoring are expected to occur over the life of the SBSP Restoration Project in all parts of the program-level Project area, not just those included in the Phase 2 actions. Many of these activities would be directed toward the monitoring of, or management for, particular resources of concern, and thus the net effect of these activities would be beneficial. However, these activities also have the potential to adversely affect biological resources, at least in the short term. Specifically, monitoring and management activities have the potential to cause disturbance to breeding species and even site, nest, or colony abandonment. These activities may inadvertently contribute to low population numbers (2007 Final EIS/R).

Monitoring activities would include surveys of managed ponds and restored marshes. Monitoring would entail surveys for vegetation, birds, and harbor seals conducted on foot, by car, and possibly by boat and airplane. Monitoring for nesting success at bird colonies would entail approaching or entering the colonies to count and measure. Monitoring of harvest mouse populations would entail trapping within restored marshes and marsh areas that are not part of a Project action. Vegetation mapping would be conducted using aerial photos and ground-truthing. Monitoring of fish would be conducted through counts (e.g., of salmonids) and sampling with nets or other methods (for estuarine fish). Impacts would primarily be minor and short term (e.g., flushing individual birds or seals along the survey route) (2007 Final EIS/R).

Following the breaching of levees around a pond restored to tidal action, the main management activities that may occur within restored tidal habitats are habitat and species monitoring, predator management and invasive plant management. Vector control activities—including monitoring and mosquito abatement—would also occur periodically, particularly along habitat transition zones. Management and maintenance activities associated with the SBSP Restoration Project would occur primarily in managed ponds and in recreational access areas such as trails. Examples of such activities include:

- Raising or lowering water levels within ponds via inlet and outlet structures;
- Controlling vegetation on islands, in areas designed as open water habitat and along trails using mechanical control, spraying with saltwater, spraying with approved herbicides, or other means;
- Predator management, including trapping and removal of mammals and nuisance birds;
- Periodic augmentation of sediment or other ground cover on islands; and
- Maintenance of levees, berms, trails, boat launches, viewing platforms, gates, and water-control structures.

As part of CDFW's current practices under the AMP, the SBSP Restoration Project incorporates measures to minimize impacts from monitoring, maintenance, and management, and it is anticipated that a number of measures, including pre-construction surveys and biological monitoring, to avoid and minimize such impacts to federally listed species, would be required by the BO for this project. Activities that are sufficiently loud or obtrusive enough to cause disturbance of nesting birds or pupping harbor seals (although pupping harbor seals are not known to use ELER and the closest known occurrence is more than 6 miles away),would be limited to the period September 15 through February 1, to the extent practicable, to minimize potential impacts. (Effects to harbor seals are also addressed in Impact 3.5-17.) If seasonal avoidance is not possible, habitat assessments and/or pre-construction surveys would be conducted for nesting birds and other sensitive species. If any nesting pond-associated waterbirds are detected in areas that could be disturbed by project-related construction activities, project implementation would be delayed or redesigned to minimize potential impacts to actively nesting birds (2007 Final EIS/R).

Alternative Eden A (No Action). Under Alternative Eden A (the No Action Alternative), no new action would be taken. Southern Eden Landing would continue to function as seasonal and managed ponds under various operational regimes depending on the target water depth and water quality for each pond. The outboard, internal and landward levees would continue to be inspected and maintained as they presently are. As under current conditions, the ponds would continue to be actively managed throughout the year to provide a wide range of water and salinity levels for a variety of bird species guilds and regulatory goals for water quality. Water will continue to be circulated as needed to maintain salinity, dissolved oxygen and to manage other parameters. Monitoring, including bird surveys and nest success surveys, would continue. In addition, the monitoring, maintenance, and management at northern Eden Landing would continue as described in the 2007 Final EIS/R and various permitting documents. Impacts to sensitive wildlife species due to ongoing monitoring, maintenance, and management activities would be less than significant.

Alternative Eden A Level of Significance: Less than Significant

Alternative Eden B. Under Alternative Eden B, monitoring would include annual bird surveys, nest success, and other activities as described in the AMP. Maintenance activities would include trail upkeep, predator control, general vegetation control, invasive plant species control, and vandalism repairs. These activities would take place in the newly tidal areas instead of in the existing ponds. Fewer outboard and internal levees would be maintained (or repaired on failure) than in Alternative Eden A, but the landward eastern levee would be maintained for flood risk management and recreation purposes. The trail routes would also be maintained and regraded as needed; this is not expected to be necessary more than every few years. The tidal marsh, pilot channels, habitat transition zones and islands would be monitored to determine species trends and use. This alternative would also require occasional maintenance of the habitat transition zone that would be placed along the landward levee along the eastern side of the Inland Ponds and Southern Ponds. This would consist primarily of invasive plant control and mosquito abatement as necessary. Similar efforts could be required for the habitat islands formed from the remnant levees, but this may not

Overall, Alternative Eden B could result in a decrease in the amount of levee and water control structure operations, maintenance, and repair relative to Alternative Eden A and to current conditions.

The results of monitoring would inform adaptive management and the design of future phases of restoration. With implementation of program-level avoidance and minimization measures from the 2007 Final EIS/R, the AMP, and other CDFW management documents as well as compliance with expected permit and BO conditions, impacts to biological resources as a result of monitoring, maintenance, and management activities would be less than significant.

Alternative Eden B Level of Significance: Less than Significant

Alternative Eden C. Monitoring, maintenance, and management activities for Alternatives Eden B and Eden C are expected to be similar, except monitoring and maintenance would be more extensive under Alternative Eden C (and Eden D) due to an increased number of constructed elements, including water control structures which require regular inspection and manipulation. In addition, Alternative Eden C would retain some internal levees, and construct two additional recreational trail spurs with associated bridge infrastructure. Rather than the improved levee being on the east side of the Inland Ponds, as in

Alternative Eden B, the improved levees would be on the outboard levee (for habitat) and along the mid-complex levee (for flood risk management). The latter of these would also have a habitat transition zone. These features would need similar maintenance and repair as described for Alternative Eden B.

Monitoring under Alternative Eden C would include bird surveys and other activities as described in the AMP. Activities would include trail maintenance, predator control, general vegetation control, and vandalism repairs. Levees would be maintained (or repaired on failure, as practicable) as described in the Alternative Eden A. The improved levees and water control structures would all require more monitoring and maintenance than in the baseline condition or Alternative Eden A. Alternative Eden C would also contain more public access features and trails, most notably along one or both sides of the OAC channel out to the former site of the Alvarado Salt Works (see Impact 3.5-18 for full discussion on recreation and public access impacts). These features and trails would increase trail and viewing platform maintenance activities for Alternative Eden C.

The results of the monitoring would inform adaptive management and the design and future SBSP Restoration Project actions. With implementation of program-level avoidance and minimization measures from the 2007 Final EIS/R, the AMP, and other CDFW management documents as well as compliance with expected permit and BO conditions, impacts to biological resources as a result of monitoring, maintenance, and management activities would be less than significant.

Alternative Eden C Level of Significance: Less than Significant

Alternative Eden D. Monitoring, maintenance, and management activities for Alternatives Eden D are expected to be similar to Alternatives Eden B and Eden C, except monitoring and maintenance would be more extensive under Alternative Eden C and Eden D due to an increased number of constructed elements, including water control structures that require regular inspection and manipulation. In addition, Alternative Eden D would retain some internal levees (as with Alternative Eden C), but would not include the two additional recreational trail spurs or associated bridge infrastructure considered in Alternative Eden C. Similar to Alternative Eden C, Eden D would include improvements to the outboard levee (for habitat) and along the mid-complex levee (for flood risk management) and would require occasional maintenance of the habitat transition zone there, which would consist primarily of invasive plant control and mosquito abatement as necessary.

Monitoring under Alternative Eden D would include bird surveys and other activities as described in the AMP. The results of these surveys and the AMP will be used to determine if and when the Inland and Southern Ponds would be restored to tidal marsh. These additional project changes (in a decade or more), would vary the nature of maintenance activities, but are not expected to result in a significant change in the monitoring activities.

Maintenance activities would include trail upkeep, predator control, general vegetation control, and vandalism repairs. Levees would be maintained (or repaired on failure) as described in the Alternative Eden A. The improved levees and water control structures would all need more monitoring and maintenance than in the baseline condition or in Alternative Eden A. Alternative Eden D would also contain public access features and trails. These features and trails would require similar levels of trail maintenance as Alternative Eden B, and less that Alternative Eden C.

The results of the monitoring would inform adaptive management and the design of future phases of restoration. With implementation of program-level avoidance and minimization measures from the 2007 Final EIS/R, the AMP, and other CDFW management documents as well as compliance with expected permit and BO conditions, impacts to biological resources as a result of monitoring, maintenance, and management activities would be less than significant.

Alternative Eden D Level of Significance: Less than Significant

Phase 2 Impact 3.5-13: Potential effects of habitat conversion and pond management on steelhead.

Potential program-level impacts are addressed in Chapter 3.6 of the program-level evaluation found in the 2007 Final EIS/R. Here, the project-level impacts of the implementation of Eden Landing Phase 2 actions are assessed.

The federally listed threatened steelhead, California Central Coast Distinct Population Segment (DPS), is known to spawn in non-tidal portions of several South Bay creeks, including Coyote Creek, Stevens Creek, San Francisquito Creek, Alameda Creek (accessed by the ACFCC), and the Guadalupe River. This anadromous species makes use of tidal habitats during its migrations between freshwater, non-tidal habitats, and marine habitats. Tidal brackish channels provide habitat for juveniles during the process of smoltification (i.e., physiological adaptation to the saltwater environment). As a result, steelhead are expected to occupy and forage in channels within tidal marshes in the South Bay, potentially anywhere in the Phase 2 project areas, but particularly along the sloughs leading to and from spawning streams (2007 Final EIS/R).

The SBSP Restoration Project is expected to have a net benefit to steelhead by increasing estuarine habitat. Such habitat may be especially important as rearing habitat for juveniles. However, it is possible that migrating adult steelhead or foraging juveniles in estuarine habitats could inadvertently enter managed ponds and become entrained. If such fish are able to tolerate the conditions within the ponds and eventually return to tidal sloughs via pond outlets, the impact on such fish would likely not be substantial. However, managed ponds may have more shallow water, higher salinity, lower dissolved oxygen levels, or increased predation pressure (due to more limited plant cover or concentrations of fish in smaller areas) than tidal habitats. As a result, entrainment in managed ponds may impair the health or cause the mortality of steelhead (2007 Final EIS/R).

There is also some potential for steelhead to become temporarily “stranded” in restored marshes. For example, steelhead may enter marshes during high tides and become trapped in marsh ponds or pools (e.g., pools that form within borrow ditches, behind borrow ditch blocks). Such fish could potentially be subject to increased predation by being concentrated in small areas, but they are unlikely to perish due to low water quality or lack of food before another high tide enables them to “escape” back into channels. Overall, marsh restoration is expected to have a net benefit on steelhead by providing numerous channels that would serve as rearing habitat for juveniles. Most marshes that are actively restored, as opposed to those forming unintentionally from accidental breaches (e.g., under the No Action Alternative), are expected to be well drained, with complex channel networks that would provide extensive foraging habitat and cover for steelhead without the threat of entrapping them (2007 Final EIS/R).

Alternative Eden A (No Action). Under Alternative Eden A (the No Action Alternative), no new action would be taken. The southern Eden Landing Ponds would continue to function as managed ponds. In accordance with the NOAA Fisheries BO, when a viable steelhead run is restored upstream of ACFCC, improvements would be made to avoid or minimize potential entrainment of anadromous fish in managed ponds, including steelhead. One of three options would be implemented: a fish screen would be installed on the pond intake, those ponds would be managed seasonally to avoid intake during the in/out migration periods, or water control and pond management would occur through other sources. Because of the management controls discussed above, under the No Action Alternative, there would be a less than significant impact to steelhead as the ponds would be maintained and managed to preserve their current function and condition.

Alternative Eden A Level of Significance: Less than Significant

Alternative Eden B. Under Alternative Eden B, actions would include construction and operation of the offloading facility and associated infrastructure, raising bottom elevations in the Bay and Inland Ponds, breaching or otherwise connecting the Bay, Inland and Southern Ponds to tidal flows restore them to tidal marsh, constructing habitat transition zones, and providing a variety of other habitat enhancements (e.g., islands for birds). Many of the internal levees would be breached and/or lowered, and pilot channels would be excavated. Portions of the perimeter levees would be improved to provide high tide refugia habitat for birds, the salt marsh harvest mouse, and other species and for flood risk management. (Construction impacts within the ponds and in the tidal marsh habitats adjacent to the ponds are described in more detail in Impacts 3.5-1 and 3.5-2.) Pilot channels would facilitate draining and filling and also minimize areas of ponding at low tide that could trap fish and expose them to increased predation risk.

Construction of the offloading facility would occur in the work window for steelhead which spans from June 1 through November 30. The facility would likely also be operated during the steelhead work window, assuming a similar restriction would apply to projects that supply the dredged material. As a result, no direct effects to steelhead are expected to occur from construction of the offloading facility. In the event dredge material is received outside of the steelhead work window, operation of the offloading facility, feed water system pumps, and the booster pumps would generate moderate underwater noise and that could lead to behavioral changes. The operation of the offloading facility, feed water system, and booster pumps during the construction period would not be loud enough to cause injury or mortality of the steelhead. Entrainment would be avoided, due to the presence of fish screen placed on the feed water system intake. Shading of open water habitat and removal of habitat through use of piers and pipelines are not expected to result in effects on steelhead, as only a very small portion of the Bay would be affected and these areas would likely be avoided.

The breach locations on the OAC would provide access to the Bay and Inland Ponds for outmigrating steelhead smolts and for returning adults in ACFCC. Upstream reaches of Alameda Creek still have barriers to steelhead spawning habitat; however, access to tidal marsh near the mouth of the ACFCC would create extensive beneficial habitat for out-migrating steelhead once a restored run is established. The Bay Ponds would be connected to the ACFCC via an excavated channel through the tidal area of the J-Ponds. The Bay Ponds would be breached at Ponds E2 and E4 and the ACFCC would be connected to an appropriately sized water control structure. This would provide a new slough connection for outmigrating juvenile steelhead from the ACFCC into the large Bay Ponds, which would provide potential use as nursery (rearing) habitat.

Similar water control structures at the Southern Ponds would connect to the ACFCC and could also allow access to estuarine steelhead habitat in the Southern Ponds; however, the Southern Ponds are shallow and currently offer limited habitat value for steelhead juveniles relative to the Bay Ponds. As a result, despite the creation of a pilot channel, there is a reduced potential for adults migrating upstream or juveniles dispersing downstream to preferentially be attracted to the Southern Ponds. Under Alternative Eden B, all ponds would no longer be managed and would be subject to tidal action, though muted through a large water control structure into the Southern Ponds, such that outgoing tides would likely allow steelhead to exit the tidal area or remain in adequate open water area during desmoltification.

Steelhead are not expected to be within the southern Eden Landing themselves when the levees are modified, when dredge material is placed in the Bay and Inland Ponds, or when islands and habitat transition zones are created. While upstream spawning habitat is not present in OAC, the breach and tide channels are likely to only incidentally support steelhead juveniles. Immediately after breaching, changes in water quality (i.e., high turbidity, low dissolved oxygen) could result in effects on steelhead, if present. These effects would be minimized through use of avoidance and minimization measures, such as those from the 2007 Final EIS/R, the AMP, and other CDFW management documents, as well as compliance with expected permit and BO conditions. In-water work would be timed to the extent possible to avoid impacts to steelhead that might be up-migrating through ACFCC and incidentally through OAC, or when they are out-migrating. In addition, breaching would likely occur on the ingoing tide to allow sediments the opportunity to settle out in the ponds prior to the outgoing tide. If fish rescue and/or relocation are required during construction, these activities would be completed under an agency-approved plan to limit impacts.

Actions taken in Alternative Eden B would continue to create diversified estuarine habitat offering shelter and foraging habitat for juvenile steelhead. The net effect of actions taken under Alternative Eden B would be less than significant under CEQA and beneficial under NEPA.

Alternative Eden B Level of Significance: Less than Significant (CEQA); Beneficial (NEPA)

Alternative Eden C. Under Alternative Eden C, steelhead would receive similar habitat enhancements as Alternative Eden B at the Bay Ponds. These enhancements would occur via newly added access to the Bay Ponds created by breach, channel, and water control structure through the J-Ponds and the ACFCC. Construction and operation of the offloading facility and associated infrastructure, and bottom elevations would be raised in the Bay Ponds through the import of dredge materials, as in Alternative Eden B. However, the Inland Ponds and Southern Ponds would be retained and enhanced as managed ponds. The other main difference between Alternatives Eden B and Eden C with regard to fish habitat is that the location of the connection with the ACFCC. Whereas in Alternative Eden B, the channel and connection would be closer to the Bay and cut across the Alameda County-owned marsh; in Alternative Eden C, the connection would be located somewhat more eastward and extend north through the J-Ponds and into Pond E4. In addition, the Inland and Southern Ponds would become enhanced managed ponds instead of being made fully tidal. These ponds are unlikely to incidentally support steelhead juveniles but would be typically managed in a manner that would preclude the species from the Southern Ponds. Nevertheless, entrainment may occur within these ponds if steelhead juveniles incidentally migrate in the Inland or Southern Ponds.

The same construction related effects on steelhead associated with the offloading facility and associated infrastructure described under Alternative Eden B would also occur under Alternative Eden C.

Like Alternative Eden B, the Bay Ponds would be breached on the north side to connect them to the OAC and to restore fully tidal flows. This would enhance habitat connectivity for steelhead during and after the transition from mudflat to vegetated tidal marsh. Pilot channels would facilitate draining and filling and also minimize areas of ponding at low tide that could trap fish and expose them to increased predation risk.

General construction impacts and the avoidance measures described for Alternative Eden B would apply to Alternative Eden C. The restored tidal marsh in the Bay Ponds would create similar beneficial habitat for out-migrating steelhead as Alternative Eden B. Like Alternative Eden B, actions taken in Alternative Eden C would continue to create diversified estuarine habitat offering shelter and foraging habitat for steelhead. Actions proposed for Alternative Eden C would be only slightly less beneficial to steelhead as those proposed under Alternative Eden B because in the former, the Inland or Southern Ponds would provide some limited habitat and access for steelhead that would not be provided in the latter.

Overall, the improvement in nursery and foraging habitat by the restoration of Bay Ponds to tidal marsh would outweigh the potential impact to steelhead from entrainment at Inland and Southern Ponds. As a result, the impact of Alternative Eden C on steelhead is expected to be less than significant under CEQA and beneficial under NEPA.

Alternative Eden C Level of Significance: Less than Significant (CEQA); Beneficial (NEPA)

Alternative Eden D. Under Alternative Eden D, construction and operation of the offloading facility and associated infrastructure would raise bottom elevations in the Bay and Inland Ponds and the Bay Ponds would be restored to tidal marsh, but all breaches to the Bay Ponds would occur from the OAC. No breaches to the Bay Ponds would be constructed from the ACFCC. The Inland Ponds and Southern Ponds would be retained and enhanced as managed ponds under tidal marsh formed in the Bay Ponds and then could be similarly opened to full tidal flows. Pilot channels would facilitate draining and filling and also minimize areas of ponding at low tide that could trap fish and expose them to increased predation risk. The sole connection from the ACFCC would occur at the existing water control structure that would provide managed connectivity with the Southern Ponds. In the long-term, most of the water control structures in the Inland and/or the Southern Ponds may be removed or modified to provide fully tidal flows to the Inland Ponds and Southern Ponds, as in Alternative Eden B. The water control structures connecting the ACFCC would not be removed but would be operated with full flows, providing muted tidal conditions.

The same construction effects on steelhead associated with the offloading facility and associated infrastructure described under Alternative Eden B and Eden C would also occur under Alternative Eden D.

As described in Alternative Eden B, the Southern Ponds offer limited habitat value for steelhead juveniles relative to the Bay Ponds, and if entrained into the Southern Ponds, muted tidal action and access through the large water control structure would allow access to open water areas during desmoltification.

In the short term, the construction and operational impacts to steelhead would be similar to those described in Alternative Eden C. In the long term, the impacts to steelhead in the Southern Ponds would be similar to those described in Alternative Eden B, except that there would be no access from the ACFCC to the Bay Ponds. Because Alternative Eden D would not provide direct connections from the ACFCC to the Bay Ponds, the steelhead would not receive the same types of benefits as in the other Action Alternatives. There would still be some benefits from having tidal marsh form in the Bay Ponds, and adult steelhead could enter them from the OAC and forage there. Steelhead are not expected to regularly enter or become entrained in the Southern Ponds (due to management of the water control structures there) in the short term, but may have access to muted tidal channels during the long term. As a result, impacts on steelhead under Alternative Eden D are expected to be less than significant under CEQA and beneficial under NEPA.

Alternative Eden D Level of Significance: Less than Significant (CEQA); Beneficial (NEPA)

Phase 2 Impact 3.5-14: Potential impacts to estuarine fish.

Potential program-level impacts are addressed in Chapter 3.6 of the program-level evaluation found in the 2007 Final EIS/R. Here, the project-level impacts of the implementation of Eden Landing Phase 2 actions are assessed.

Overall, the long-term SBSP Restoration Project effects on estuarine fish are expected to be beneficial. In the South Bay, managed ponds support lower diversity of native fishes than tidal habitats, and only a few species are present in managed ponds in large numbers. Conversely, many of the fish recorded in the South Bay use tidal channels and mudflats at high tide, when they are inundated. These tidal habitats are particularly important as nursery habitat for juvenile fish. Thus, these tidal channels and mudflats are productive foraging habitats for estuarine fish in this system (Harvey 1988), and conversion of managed ponds to tidal habitats is expected to result in substantial increases in suitable habitat for estuarine fish populations in the South Bay (2007 Final EIS/R).

Based on observations of other SBSP actions and monitoring, the numbers of native estuarine fish have been trending positively, though there is some uncertainly in that conclusion given the relatively short duration of the observations so far. In general, though, it appears clear that former ponds restored to tidal action support more diverse, native fish communities than sloughs do and that more native species are found in restored ponds than in managed ponds.

Potential effects in green sturgeon (*Acipenser medirostris*) and longfin smelt (*Spirinchus thaleichthys*) are covered as part of this general discussion of estuarine fish. Green sturgeon are listed under the Federal ESA as endangered. Green sturgeon are anadromous fish that spend most of their adult life in the ocean or Bay, only entering freshwater rivers of the Sacramento River Basin to spawn (Moyle 2002). Juveniles spend 1 to 4 years rearing in freshwater, occupying shallow, low-flowing environments and feeding on amphipods and mysid shrimp. Green sturgeon are known to occur in the South Bay, but do not spawn in this area and are not expected to enter the ponds. The longfin smelt a state-listed threatened species that is also a candidate for listing under the FESA. Longfin smelt are present year-round in the South Bay. They have been caught in Coyote Creek and Alviso Slough in the far South Bay. Fish surveys conducted in 2013 by James Hobbs of U.C. Davis in Mt. Eden Creek and OAC did not detect green sturgeon, longfin smelt, or any other special-status fish species (J. Hobbs, pers. comm. 2016; Hobbs 2012).

The potential for adverse effects of restoration on estuarine fish is primarily from low water quality in discharges from seasonal ponds or managed ponds. However, through adaptive management, USFWS and CDFW have developed methods for minimizing discharges with low dissolved oxygen or high salinities. In general, though, the conversion of seasonal ponds and/or unenhanced managed ponds to tidal habitats or enhanced managed ponds as part of the SBSP Restoration Project would further reduce this potential impact (2007 Final EIS/R) by allowing full tidal exchange and adding control over circulation and ability to address water quality. Further, because Phase 2 actions would generally increase the transition of former salt-production ponds into tidal marsh, the expectation is that there would be and improvement in the amount and quality of habitat for estuarine fish.

Alternative Eden A (No Action). Under Alternative Eden A (the No Action Alternative), no new action would be taken. The southern Eden Landing ponds would continue to function as seasonal and managed ponds. The Bay Ponds would continue to support fish populations. Fish populations may also occur in the smaller Inland Ponds and Southern Ponds, but these would continue to be limited by intake at the water control structure and relatively high pond bottom elevations. These managed ponds allow discharge for longer portions of the day, draining into channels and sloughs at lower water surface elevations. Estuarine fish would continue to benefit from the created and enhanced habitats construction at northern Eden Landing in Phase 1. Existing impacts to estuarine fish could include low water quality in discharges from managed ponds; however, these impacts are generally minor already because pond managers monitor and manage for low water quality discharges. Also, there is some potential for entrapment of estuarine fish within these ponds, though any fish entering at higher, flooding tides could exit the same water control structure at lower, ebbing tides. No activities or pond management changes would be proposed under Alternative Eden A; therefore, there would be no impacts to estuarine fish relative to the baseline condition as a result of this alternative.

Alternative Eden A Level of Significance: No Impact

Alternative Eden B. Under Alternative Eden B, actions would include the placement of dredge materials in the Bay and Inland Ponds to raise pond bottom elevations, breaching the southern Eden Landing Ponds to restore them to tidal marsh, constructing habitat transition zones, and constructing habitat islands. (Construction impacts within the ponds and in the tidal marsh habitats adjacent to the ponds are described in more detail in Impacts 3.5-1 and 3.5-2.) The locations of levee lowering and breaching would be chosen in part to align with historic slough locations that would facilitate the development of complex estuary habitats. Pilot channels would be added to minimize areas of ponding at low tide that could trap fish and expose them to increased predation risk. Many of the perimeter and internal levees would be breached or lowered to improve flows and aquatic habitat connectivity, while others would be enhanced to provide high tide refuge or habitat for birds and flood risk management.

Construction and operation of the offloading facility and associated infrastructure could result in effects on estuarine fish. These effects could arise from underwater noise or visual disturbance, entrainment within pumps, shading of open water habitat and temporary removal of a small amount of foraging habitat. (Effects to bottom dwelling species from the submerged pipeline reducing north-south movement across the mudflats is discussed in Impact 3.5-4).

Installation of the piers through pile driving and operation of pumps would create underwater noise that may affect movement, foraging, and may cause temporary threshold shifts in hearing ability. The sound pressure levels are not expected to result in levels that would injure or cause mortality of estuarine fish (206 decibels), but instead may make the surrounding open water areas temporarily unsuitable for the species. An underwater noise analysis would be completed during project permitting to detail temporary affects to estuarine fish that may result from underwater noise. In order to reduce potential impacts from underwater noise on such fish, Best Management Practices (BMPs) for pile driving would be implemented, as applicable, depending on the pile driving methods. These BMPs may include the use of a cushion block, bubble curtains, and the “soft start” technique where pile driving intensity is slowly ramped up. In addition, the use of fish screens as described in the Chapter 2, Alternatives, would minimize the potential for entrainment, considering most estuarine fish individuals would be migrating or foraging adults or juveniles, and not larvae that may be impinged upon the screens. Shading of open water habitat and removal of habitat through use of piers and pipelines are not expected to result in effects on estuarine fish.

After placement and settlement of dredge materials, the Bay Ponds and Inland Ponds would be breached to connect them to the OAC, and the ACFCC would be connected to the Bay Ponds through a water control structure, a pilot channel, and a breach into Pond E4/E7. Both the OAC and ACFCC already contain tidal channels that provide potential habitat for estuarine fish, including longfin smelt and green sturgeon. This added connectivity would allow them use of the Bay Ponds and Inland Ponds. Water control structures would also connect the ACFCC to the Southern Ponds, and this connectivity could also benefit estuarine fish.

While adult green sturgeon do not spawn in the vicinity of the project, sub-adults utilize a wide variety of estuarine habitats in San Francisco Bay. Longfin smelt may spawn in the freshwater areas upstream in the ACFCC, and both young and adults may be present at Eden Landing. Given the abundant fish populations currently present in the Bay Ponds, the proximity of the southern Eden Landing ponds to San Francisco Bay, and the existing suitable habitat in the OAC and ACFCC, the restored tidal marsh and channels are expected to provide extensive and diverse foraging and nursery habitat for estuarine fish. Both the breaches and water control structure would improve fish access to estuarine habitat throughout the southern Eden Landing, though the shallower Inland and Southern Ponds would have less added habitat value for estuarine fish than the Bay Ponds would.

Estuarine fish may be present in southern Eden Landing when the levees are modified or when channels, islands, and habitat transition zones are created, which could result in direct injury or kill of estuarine fish, although this is unlikely since there are abundant adjacent open water areas that provide escape refugia. There could also be short-term impacts of construction activities (e.g. increased turbidity) nearby the breaches and channel excavations. These are not expected to significantly affect estuarine fish, which are well adapted to turbidity in the South Bay. Also, in-water work would be timed to the extent possible to avoid impacts to estuarine fish that might be present within the ponds or adjacent sloughs. If fish rescue and/or relocation would be required during construction, these activities would be completed under an agency-approved plan to limit impacts. The planned tidal restoration would result in more extensive channel networks, higher-order sloughs, tidal marsh and overall greater habitat diversity that is expected to be beneficial to estuarine fish.

The potential small, temporary impacts on estuarine fish would be more than offset by the long-term benefits and creation of diverse estuarine habitats that would support estuarine fish, including special-status species. Impacts to estuarine fish under Alternative Eden B would be less than significant under CEQA and beneficial under NEPA.

Alternative Eden B Level of Significance: Less than Significant (CEQA); Beneficial (NEPA)

Alternative Eden C. Under Alternative Eden C, estuarine fish (including green sturgeon and longfin smelt) would receive similar habitat enhancements at the Bay Ponds as Alternative Eden B. These enhancements would occur via newly added access to the Bay Ponds created by breach, channel, and water control structure through the J-Ponds and the ACFCC. Construction and operation of the offloading facility and associated infrastructure would raise the bottom elevations in the Bay Ponds. However, but the Inland Ponds and Southern Ponds would be retained and enhanced as managed ponds. The other main difference between Alternatives Eden B and Eden C with regard to fish habitat is that the location of the connection with the ACFCC. Whereas in Alternative Eden B, the channel and connection would be closer to the Bay and cut across the Alameda County-owned marsh; in Alternative Eden C, the connection would be located somewhat more eastward and extend north through the J-Ponds and into Pond E4. In addition, the Inland and Southern Ponds would become enhanced managed ponds instead of being made fully tidal. These ponds may incidentally support estuarine fish. Nevertheless, entrainment may occur within these ponds.

The same construction effects on estuarine fish associated with the offloading facility and associated infrastructure and BMPs described under Alternative Eden B would also occur under Alternative Eden C. Like Alternative Eden B, the Bay Ponds would be breached on the north side to connect them to the OAC and to restore fully tidal flows. This would enhance habitat connectivity for estuarine fish during and after the transition from mudflat to vegetated tidal marsh. Pilot channels would facilitate draining and filling and also minimize areas of ponding at low tide that could trap fish and expose them to increased predation risk. The enhanced managed ponds may increase habitat value for estuarine fish, but also result in increased abundance of non-native fish species and predation.

General construction impacts and the avoidance measures described for Alternative Eden B would apply to Alternative Eden C. The restored tidal marsh in the Bay Ponds would create similar beneficial habitat for estuarine fish as Alternative Eden B. Like Alternative Eden B, actions taken in Alternative Eden C would continue to create diversified estuarine habitat offering shelter and foraging habitat for estuarine fish. Actions proposed for Alternative Eden C would be slightly less beneficial as those proposed under Alternative Eden B because the, in the former, the Inland or Southern Ponds would provide some limited habitat and access for fish that would not be provided in the latter.

Overall, the addition of estuarine fish habitat acreage and the improvement in nursery and foraging habitat that would be created by the restoration of Bay Ponds to tidal marsh would outweigh the potential impact from construction, entrainment, non-native fish, or predation. The changes at the Inland and Southern Ponds are not expected to result in significant changes relative to the existing condition or the No Action Alternative. As a result, the impact of Alternative Eden C on estuarine fish is expected to be less than significant under CEQA and beneficial under NEPA.

Alternative Eden C Level of Significance: Less than Significant (CEQA); Beneficial (NEPA)

Alternative Eden D. Under Alternative Eden D, the offloading and associated infrastructure would be constructed and operated as with the other alternatives. The bottom elevations would be raised in the Bay and Inland Ponds through the import of dredge materials and the Bay Ponds would be restored to tidal marsh, but all breaches to the Bay Ponds would occur from the OAC. No breaches to the Bay Ponds would be constructed from the ACFCC. The Inland Ponds and Southern Ponds would be retained and enhanced as managed ponds under tidal marsh formed in the Bay Ponds and then could be similarly opened to full tidal flows. Pilot channels would facilitate draining and filling and also minimize areas of ponding at low tide that could trap fish and expose them to increased predation risk. The sole connection from the ACFCC would occur at the existing water control structure that would provide managed connectivity with the Southern Ponds. In the long-term, most of the water control structures in the Inland and/or the Southern Ponds may be removed or modified to provide fully tidal flows to the Inland Ponds and Southern Ponds, as in Alternative Eden B, which would benefit estuarine fish by allowing them to access and forage in these ponds as well. The water control structures connecting the ACFCC would not be removed but would be operated to allow full flows. The construction and operational impacts to steelhead would be similar to those described in Alternative Eden C. Because Alternative Eden D would not provide direct connections from the ACFCC to the Bay Ponds, estuarine fish would not receive the same degree of benefits as in the other Action Alternatives, though they would benefit from the connection via the OAC.

The same construction and operation effects on estuarine fish associated with the offloading facility and associated infrastructure and BMPs described under Alternative Eden B and Eden C would also occur under Alternative Eden D.

Overall, the addition of estuarine fish habitat acreage and the improvement in nursery and foraging habitat that would be created by the restoration of Bay Ponds to tidal marsh in the initial stage would outweigh the potential impact from construction, entrainment, non-native fish, or predation. The initial stage's enhancements at the Inland and Southern Ponds are not expected to result in significant changes relative to the existing condition or the No Action Alternative.

Further, if and when the Inland and Southern Ponds are opened to tidal flows in the second stage, there would be additional habitat for estuarine fish added then. As a result, the impact of Alternative Eden D on estuarine fish is expected to be less than significant under CEQA and beneficial under NEPA.

Alternative Eden D Level of Significance: Less than Significant (CEQA); Beneficial (NEPA)

Phase 2 Impact 3.5-15: Potential impacts to piscivorous birds.

Potential program-level impacts are addressed in Chapter 3.6 of the program-level evaluation found in the 2007 Final EIS/R. Here, the project-level impacts of the implementation of Eden Landing Phase 2 actions are assessed.

The piscivorous birds (e.g., pelicans, cormorants, grebes) of the South Bay forage in a variety of habitats and locations where prey fish are available. The low-salinity salt ponds that support fish, tidal sloughs and channels, edges of intertidal mudflats, non-tidal ponds and channels, and artificial lakes provide the highest-quality foraging areas. Large "frenzies" of feeding activity may be observed at these locations, presumably when conditions result in large fish concentrations. Brown pelicans usually plunge-dive for fish and therefore require water several feet deep, but American white pelicans and cormorants swim while feeding and can thus feed in shallower water. Although double-crested cormorants, western grebe (*Aechmophorus occidentalis*), Clark's grebes (*Aechmophorus clarkii*), and brown pelicans forage to varying degrees within the open waters of the Bay, American white pelicans do not, instead preferring non-tidal waterbodies (Goals Project 2000; Harvey 1988) (2007 Final EIS/R). Recent and ongoing monitoring of eared grebe suggests that bird counts initially declined in ponds, but have recently increased and in general are trending toward maintenance of baseline numbers. Other long-term monitoring data, suggest that fall abundance of piscivorous birds in SBSP Restoration Project ponds has increased from 2002 to 2005 and from 2008 to 2012. The winter and spring populations have increased slightly between 2002 and 2014 (De La Cruz et al., in press).

The effects of the SBSP Restoration Project on foraging piscivores depend in part on the project's effects on both the abundance and the availability of prey fish. Existing managed ponds with connections to the Bay may concentrate fish, thus potentially facilitating their capture by piscivorous birds. As a result, conversion of some low-salinity ponds to tidal habitats (as planned in parts of all of the Action Alternatives for Eden Landing) would reduce foraging habitat in managed ponds. However, as noted in the discussion of estuarine fish (Impact 3.5-14), tidal restoration is expected to result in a considerable increase in the overall habitat area and may improve abundance of estuarine fish in the South Bay. The tidal sloughs and channels that would develop in restored marshes are expected to be used heavily by foraging piscivores. The SBSP Restoration Project is expected to have a net benefit to most piscivorous species, because the minor impacts from the loss of managed ponds would be offset by improvements in foraging quality through increased shallow-water habitat for fish and invertebrates (2007 Final EIS/R).

The most important piscivorous species addressed in this section who's use could decline substantially due to the loss of managed pond habitat is the American white pelican (California species of special concern), which does not forage heavily in tidal habitats (2007 Final EIS/R). However, foraging of pond-associated piscivorous birds is expected to redistribute to other managed ponds in the area (e.g. other ponds in northern Eden Landing [approximately 1,720 acres], Cargill-managed ponds [thousands of acres]), and other managed ponds such as Ravenswood Pond SF2 and others (approximately 350 acres) and therefore losses from the South Bay are not expected to result in substantial declines of the west coast or continental populations.

Alternative Eden A (No Action). Under Alternative Eden A (the No Action Alternative), no new action would be taken. The ponds at southern Eden Landing would continue to function as a mix of managed and seasonal ponds. The Bay Ponds in particular currently offer a mix of low-salinity pond foraging habitat for piscivorous birds. Northern Eden Landing would continue to provide the range of effective habitats for piscivorous birds that were provided in Phase 1. Certain levees would continue to be maintained for water management, for inland flood risk management, and for PG&E access. The No Action Alternative would maintain the managed ponds in their current state, which provides suitable habitat for piscivorous birds. Piscivorous birds would not be impacted under Alternative Eden A.

Alternative Eden A Level of Significance: No Impact

Alternative Eden B. Alternative Eden B would raise pond bottom elevations and breach the Bay and Inland Ponds, and otherwise connect all of southern Eden Landing to regular tidal flows to facilitate their conversion to tidal marsh habitat. The alternative would also construct habitat transition zones against the eastern interior border and create islands from the remnant levees. It would also add other habitat enhancements and various flood risk management and public access features (trails and a viewing area), the latter on the eastern edge of the pond complex. A channel would be excavated between the ACFCC and the Bay Ponds to improve fish habitat connectivity and access to the large Bay Ponds. (Construction impacts within the ponds and in the tidal marsh habitats adjacent to the ponds are described in more detail in Impacts 3.5-1 and 3.5-2.) Because bottom sediments in the Bay and Inland Ponds would be raised to marsh plain elevations, these ponds are expected to recruit salt marsh vegetation when breached.

As discussed above, some piscivorous birds forage within open waters of the Bay. The construction and operation of the dredge material placement infrastructure would affect areas between the offloading facility and Pond E2. Although a small portion open water habitat would be affected, substantial amounts of foraging habitat would still be available in other open waters of the Bay. After this infrastructure is removed, piscivorous birds would most likely continue to use adjacent open water for foraging.

Tidally delivered sediment would continue to accrete in the Southern Ponds, allowing for a long-term transition to tidal marsh. Initially, the Southern Ponds would be good fish nursery habitat and continue to support piscivorous birds. As sediment accretion continues, most of the pond interiors would become vegetated, also enhancing cover for fish thereby reducing deep water and habitat for foraging birds.

Bird nesting and roosting habitat would be increased through the construction of islands and habitat transition zones. With selective breaching along historic slough meanders and the addition of island habitat, these restored aquatic areas would convert open water foraging habitat into a complex tidal marsh habitat that will continue to provide habitat for piscivorous bird species that forage in the tidal channels, sloughs, and open subtidal habitats.

Some sections of levees that could provide roosting habitat would be removed when the pond levees are lowered and breached. Pond-associated piscivores, such as the American white pelican, would likely redistribute locally as a result of the loss of managed pond habitat (e.g., to Cargill-managed ponds or to retained managed ponds in northern Eden Landing), and losses from the South Bay would not be expected to result in substantial declines of the west coast or continental populations.

Also, the construction and use of the recreational trails could reduce roosting habitat along the levees, but the trails would be largely limited to the eastern edges of southern Eden Landing, leaving large areas of levees and islands for roosting and waters for foraging (see Impact 3.5-18 for full discussion on recreation and public access impacts).

Overall, the actions taken in Alternative Eden B would reduce the amount of open water habitat for piscivorous bird species, but would retain some foraging habitat for species that use tidal channels, sloughs, and open subtidal habitats and improve forage for estuarine fish (which would provide forage for piscivorous birds), but pond use by these bird species may decline locally. However, piscivorous birds that prefer using managed ponds may be somewhat affected by this alternative, but would not be expected to be substantial on west coast or continental populations. Therefore, the impact of Alternative Eden B would be less than significant.

Alternative Eden B Level of Significance: Less than Significant

Alternative Eden C. Alternative Eden C is similar to Alternative Eden B at the Bay Ponds but differs because it would raise bottom elevations in only the Bay Ponds and retain the Southern Ponds and the Inland Ponds as enhanced managed ponds. There would also be a channel excavated between the ACFCC and the Bay Ponds to improve fish habitat connectivity and access to the large Bay Ponds. There would also be a greater extent of public access trails added than in Alternative Eden C, notably along one or both side of the OAC near the eastern end of the pond complex. There would again be habitat islands built from the remnant levees, and the mid-complex levee would be raised and improved and would also support a habitat transition zone projecting westward into the Bay Ponds.

As described for Alternative Eden B, the impacts associated with the Bay Ponds and islands and habitat transition zones would be similar under Alternative Eden C. The loss of the large Bay Ponds to tidal flows and the loss of some levee surfaces for roosting may cause pond use by piscivorous bird species to decline locally. Unlike Alternative Eden B, the retention and improvement of managed ponds may benefit pond-associated piscivorous birds if the Southern Ponds or the Inland Ponds are managed as open water foraging habitats suitable for piscivorous birds. To some extent, the AMP will guide any necessary changes to management of these ponds to balance the habitat requirements of multiple species and guilds of birds and other wildlife and according to season (summer, winter, spring/fall migration).

Overall, pond use by piscivorous birds may be somewhat adversely affected by this alternative, but they are expected to redistribute to suitable foraging habitat to nearby managed pond habitat, and population declines would not be expected to be substantial on the west coast or continental populations. The impact of Alternative C would therefore be less than significant.

Alternative Eden C Level of Significance: Less than Significant

Alternative Eden D. Under Alternative Eden D, bottom elevations would be raised in the Bay and Inland Ponds through the import of dredge materials, the Bay Ponds would be opened to tidal action and transition to tidal marsh habitat, and the Inland Ponds and Southern Ponds would initially become enhanced managed ponds, as described for Alternative Eden C. Later, the water control structures could be removed, the mid-complex levee regraded and breached, and these ponds opened to tidal flows. In the short term, Alternative Eden D is similar to Alternative Eden C (Bay Ponds as tidal marsh and Inland

Ponds and Southern Ponds as enhanced managed ponds), and in the long term is similar to Alternative Eden B (all ponds would be tidal marsh). The habitat transition zone would be placed on the interior of the westernmost Bay Ponds levees, projecting eastward into Ponds E1 and E2. There would be no added fish habitat connections between the ACFCC and the Bay Ponds and so less direct benefit of this aspect of the fish habitat improvements.

As described for Alternative Eden B, the impacts associated with the Bay Ponds and islands and habitat transition zones would be similar under Alternative Eden D. The loss of the large Bay Ponds to tidal flows and the loss of some levee surfaces for roosting may cause pond use by piscivorous bird species to decline locally. In the early years, the retention and improvement of managed ponds may benefit pond-associated piscivorous birds if the Southern Ponds or the Inland Ponds are managed as open water foraging habitats suitable for piscivorous birds. To some extent, the AMP will guide any necessary changes to the management of these ponds to balance the habitat requirements of multiple species and guilds of birds and other wildlife and according to season (summer, winter, spring/fall migration). In the later years, if the Inland Ponds and Southern Ponds are opened to tidal flows, the loss of managed pond habitat may have some additional but similar effects on these birds.

The public access features would be the same as those in Alternative Eden B and so would be located at some distance from the parts of Eden Landing most heavily used by piscivorous birds. There would be minimal potential for disturbance of roosting or foraging piscivorous birds.

Overall, pond use by piscivorous birds may be somewhat adversely affected by this alternative, but given the timing of actions under this alternative, they are expected to redistribute to suitable foraging habitat in nearby managed pond habitat, and population declines would not be expected to be substantial on the west coast or continental populations. The impact of Alternative Eden D would therefore be less than significant.

Alternative Eden D Level of Significance: Less than Significant

Phase 2 Impact 3.5-16: Potential impacts to dabbling ducks.

Potential program-level impacts are addressed in Chapter 3.6 of the program-level evaluation found in the 2007 Final EIS/R. Here, the project-level impacts of the implementation of Eden Landing Phase 2 actions on dabbling ducks are assessed.

Dabbling ducks forage in a variety of habitats in the South Bay, including mudflats, shallow subtidal habitats, tidal sloughs and marsh channels, marsh ponds, managed and muted tidal marsh, seasonal wetlands, managed ponds, and water treatment plants. In these areas, dabbling ducks feed on a variety of aquatic plants and invertebrates within the ponds. Because dabbling ducks do not typically dive for food, they usually forage in water less than 12 inches deep (Goals Project 2000). Within ponds, salinity is also important for these birds. The plants on which they feed cannot tolerate high salinities, and thus dabbling duck abundance tends to be highest on lower-salinity ponds (20 to 63 ppt). Dabbling duck abundance is moderate in medium-salinity ponds (60 to120 ppt), wherein foraging shifts to invertebrate prey, with few in ponds with salinity greater than 154 ppt (2007 Final EIS/ R).

Because large numbers of dabbling ducks use shallow managed ponds in the South Bay for foraging and roosting, conversion of ponds to tidal habitats may have some effect on South Bay numbers of these birds. However, as ponds are converted to tidal marsh, dabbling ducks may be able to retain some use of open water foraging habitat at higher tides. Roosting habitat may be retained on remnant levees, particularly those adjacent to habitat transition zones or otherwise well-buffered. Foraging habitat provided by tidal channels and sloughs and marsh ponds at low tide would be much reduced relative to existing conditions. There is low potential for density-dependent mortality due to disease (such as avian botulism; see Impact 3.5-22), predation, and disturbance by predators and humans as the ducks that use managed ponds are concentrated into fewer areas as a result of pond conversion. Based on long-term monitoring data, the winter populations of dabbling ducks doubled from 2002 to 2006 during Initial Stewardship Plan operations in the SBSP Restoration Project ponds. The fall and spring pond counts have increased during the same period and since implementation of Phase 1 have leveled with some fluctuations. These results may indicate the ponds have reached carrying capacity (De La Cruz et al., in press), alternatively, the spatial and temporal redistribution of dabbling duck use of tidal restoration areas, enhanced managed ponds and other remaining managed ponds have reached equilibrium. Additional tidal restoration could result in similar dispersion of some dabbling ducks over the entire SBSP Restoration Project area. A possible exception to this expected dispersion is the northern shoveler, the most abundant wintering dabbling duck, which appears to prefer ponds to open bay or tidal marsh habitat. The response of this species to Phase 2 actions will be monitored under the AMP, but this species has been observed in large numbers using a wide range of salinity in the ponds, from low (30 ppt) to moderately high (120 ppt) which will remain available throughout Eden Landing and the South Bay.

Overall, tidal restoration is expected to support a large amount of foraging and some roosting by dabbling ducks and remaining managed ponds or enhanced managed pond habitat available is expected to offset these adverse effects (2007 Final EIS/R).

Alternative Eden A (No Action). Under Alternative Eden A (the No Action Alternative), no new action would be taken. The ponds at southern Eden Landing would continue to function as a mix of managed open water and seasonal ponds. The Bay Ponds in particular will continue to provide a large area of low-salinity pond foraging habitat for dabbling ducks. Certain levees would continue to be maintained for water management, for inland flood risk management, and for O&M access. Northern Eden Landing would continue to provide the range of habitats for dabbling ducks that were provided in Phase 1. The No Action Alternative would maintain the managed ponds in their current state, which provides suitable habitat for dabbling ducks. Under the No Action Alternative, there would be no impact to dabbling ducks or their habitat.

Alternative Eden A Level of Significance: No Impact

Alternative Eden B. Alternative Eden B would raise pond bottom elevations and breach the Bay and Inland Ponds, and otherwise connect all of southern Eden Landing to regular tidal flows to facilitate their restoration to tidal marsh habitat. The alternative would also construct habitat transition zones against the eastern interior berm and create islands from the remnant levees. It would also add other habitat enhancements and various flood risk management and public access features (trails and viewing platforms), the latter on the eastern perimeter of the pond complex. (Construction impacts within the ponds and in the tidal marsh habitats adjacent to the ponds are described in more detail in Impacts 3.5-1 and 3.5-2.) Because bottom sediments in the Bay and Inland Ponds would be raised to marsh plain elevations, these ponds are expected to recruit salt marsh vegetation when breached.

Tidally delivered sediment would continue to accrete in the Southern Ponds, allowing for a long-term transition to tidal marsh. The Southern Ponds would initially support some intertidal mudflats, which would provide good forage habitat for dabbling ducks at higher tides. As sediment accretion continues, most of the pond interiors would become vegetated, with invertebrate populations and good forage quality. Because dabbling ducks tend to use shallow waters, foraging habitat value currently provided by the seasonal and open water managed ponds that the Inland Ponds and Southern Ponds would be much reduced.

The planned tidal restoration would likely result in more extensive channel networks, higher-order sloughs, and overall greater habitat diversity, which is expected to provide some foraging habitat and cover for dabbling ducks. Marsh habitat above the high tide line in the habitat transition zones could increase roosting habitat, but little value would be provided for foraging and nesting birds. Bird roosting habitat would be directly increased through the construction of islands and habitat transition zones. With selective breaching along historic slough meanders and the addition of island habitat, these restored aquatic areas would develop into complex tidal marsh habitat with benefits to dabbling duck species that forage for plants and invertebrates in shallow tidal channels, sloughs, and open subtidal and intertidal habitats.

Some sections of levee that could provide roosting habitat would be removed when the pond levees are lowered and breached. Also, the construction and use of the recreational trails could reduce roosting habitat along the levees, but the trails would be largely limited to the eastern perimeter of southern Eden Landing, leaving large areas of levees and islands for roosting and waters for foraging (see Impact 3.5-18 for full discussion on recreation and public access impacts).

Overall, open water pond foraging habitat for dabbling ducks would decline under Alternative Eden B, but tidal marsh and mudflat foraging habitat would improve within small geographic areas. Dabbling ducks would benefit from increased roosting habitat conditions on the islands and habitat transition zones while some existing habitat on levees would be reduced. Further, the implementation of ongoing monitoring and management actions would continue using the AMP.

Overall, the loss of significant amounts of open water foraging habitat and increases in conditions of roosting, and following the implementation of the AMP, the impact of Alternative Eden B to dabbling ducks would be less than significant.

Alternative Eden B Level of Significance: Less than Significant

Alternative Eden C. Alternative Eden C is similar to Alternative Eden B at the Bay Ponds but would raise bottom elevations in only the Bay Ponds and retain the Southern Ponds and the Inland Ponds as enhanced managed ponds. There would also be a greater extent of public access trails added than in Alternative Eden C, notably along one or both side of the OAC near the eastern end of the pond complex. There would also be habitat islands built from the remnant levees, and the mid-complex levee would be raised and improved and would support a habitat transition zone projecting westward into the Bay Ponds.

As described for Alternative Eden B, the actions in the Bay Ponds proposed for Alternative Eden C would benefit dabbling duck species that use tidal channels, sloughs, and open subtidal habitats to forage for plants and invertebrates within small geographic areas, but overall foraging habitat would be much reduced. The planned tidal restoration there would likely result in more extensive channel networks, higher-order sloughs, and overall greater habitat diversity, which is expected to provide some foraging habitat and cover for dabbling ducks. The habitat islands and habitat transition zones for roosting and the tidal marsh foraging habitat created under Alternative Eden C would also be expected to benefit dabbling ducks.

Unlike in Alternative Eden B, the retention and improvement of managed ponds would benefit dabbling ducks because the Southern Ponds or the Inland Ponds could be managed as shallow water habitats suitable for foraging by dabbling ducks. To some extent, the AMP will guide the necessary management of these ponds as they are used to balance the habitat demands of multiple species and guilds of birds and other wildlife.

The extent of pond-associated foraging habitat for dabbling ducks would decline under Alternative Eden C (but less so than under Alternative Eden B), but the quality of that habitat in the enhanced Southern Ponds and Inland Ponds would increase. Tidal marsh and mudflat foraging habitat in the Bay Ponds would also improve. Dabbling ducks would also benefit from increased roosting habitat on the islands and habitat transition zones. Further, the implementation of ongoing monitoring and management actions would persist using the AMP.

Overall, following the implementation of the AMP, the impact to dabbling ducks under Alternative Eden C would be less than significant under CEQA and beneficial under NEPA.

Alternative Eden C Level of Significance: Less than Significant (CEQA); Beneficial (NEPA)

Alternative Eden D. Under Alternative Eden D, bottom elevations would be raised in the Bay and Inland Ponds through the import of dredge materials, the Bay Ponds would be opened to tidal action and transition to tidal marsh habitat, and Inland Ponds and Southern Ponds would initially become enhanced managed ponds, as described for Alternative Eden C. Later, the water control structures could be removed, the mid-complex levee breached, and these ponds opened to tidal flows. In the short term, Alternative Eden D is similar to Alternative Eden C (Bay Ponds as tidal marsh and Inland Ponds and Southern Ponds as enhanced managed ponds), and in the long term is similar to Alternative Eden B (all ponds would be tidal marsh). The habitat transition zone would be placed on the interior of the westernmost Bay Ponds levees, projecting eastward into Ponds E1 and E2.

As described for Alternative Eden B and Eden C, the actions in the Bay Ponds proposed for Alternative Eden D would benefit dabbling duck species within small geographic areas, but overall foraging habitat would be much reduced. Initially, the Southern Ponds would be good forage habitat for dabbling ducks at higher tides. As sediment accretion continues, most of the pond interiors would become vegetated, with invertebrate populations and would provide some foraging habitat and cover. The habitat islands and habitat transition zones for roosting would also be expected to benefit dabbling ducks.

In the early years, the retention and improvement of managed ponds would benefit dabbling ducks because the Southern Ponds or the Inland Ponds could be managed as shallow water habitats suitable for foraging by dabbling ducks. The AMP will guide the necessary management of these ponds as they are used to balance the habitat demands of multiple species and guilds of birds and other wildlife. But in the later years, if the Inland Ponds and Southern Ponds are opened to tidal flows, the loss of managed pond habitat may have some additional detrimental effects on these birds.

The extent of pond-associated foraging habitat for dabbling ducks would decline under Alternative Eden D (but less so than under Alternative Eden B), but the quality of that habitat in the enhanced managed ponds would increase in the Inland and Southern Ponds. That condition would persist for a decade or more, after which the opening of the Inland Ponds and Southern Ponds to tidal flows would begin. Tidal marsh and mudflat foraging habitat in the Bay Ponds would improve. Dabbling ducks would also benefit from increased roosting habitat on the islands and habitat transition zones. Further, the implementation of ongoing monitoring and management actions would persist using the AMP.

Overall, following the implementation of the AMP, the impact to dabbling ducks under Alternative Eden D would be less than significant.

Alternative Eden D Level of Significance: Less than Significant

Phase 2 Impact 3.5-17: Potential impacts to harbor seals.

Potential program-level impacts are addressed in Chapter 3.6 of the program-level evaluation found in the 2007 Final EIS/R. Here, the project-level impacts of the implementation of Eden Landing Phase 2 actions are assessed.

Harbor seals are currently the only marine mammals that are permanent residents of San Francisco Bay. Harbor seals forage in nearshore marine habitats on a variety of fishes and invertebrates. Seals may use more than 10 sites around the Bay at any given time (Goals Project 2000), and any undisturbed intertidal habitat accessible to the open Bay could potentially be used by harbor seals. Because of the low numbers of areas where large numbers of harbor seals congregate in the South Bay, the disturbance of a primary haul-out or pupping area as a result of SBSP Restoration Project construction would be a significant impact (2007 Final EIS/R).

The nearest known harbor seal haul-outs are at Newark Slough, across the Bay at Bair Island (both about 6 miles away), near Mowry Slough (approximately 8 miles away), and at the mouth of Coyote Creek near Calaveras Point (about 11 miles away). These are generally too far away to be affected by airborne noise or other construction-related disturbances at southern Eden Landing. Harbor seals are expected to be present in the waters of the Bay near the offloading facility during its construction and operation of the pumps, and may be exposed to underwater noise above NMFS established thresholds of incidental harassment. An underwater noise analysis would be completed during project permitting to detail temporary affects to harbor seal that may result from underwater noise. In order to reduce potential impacts from underwater noise on harbor seal, BMPs for pile driving will be implemented, as applicable. Depending on the pile driving methods, these BMPs may include the use of a cushion block, bubble curtains, and the “soft start” technique where pile driving intensity is slowly ramped up.

In the long term, the project is expected to have a net benefit to harbor seals through enhancement of prey fish populations and the restoration of miles of tidal sloughs and channels that would serve as foraging areas and provide new haul-out sites. Although the effects of the SBSP Restoration Project on harbor seals are expected to be beneficial overall, the AMP includes a description of monitoring and adaptive management activities concerning this species (2007 Final EIS/R).

Alternative Eden A (No Action). Under Alternative Eden A (the No Action Alternative), no new action would be taken. The ponds at southern Eden Landing would continue to function as a mix of managed and seasonal ponds. There would be no changes to seal habitats or effects on individuals. No construction would occur under the No Action Alternative, so there would be no construction impacts to seals. Therefore, there would be no impacts of Alternative Eden A on harbor seals.

Alternative Eden A Level of Significance: No Impact

Alternative Eden B. Alternative Eden B would construct and operate an offloading facility and associated infrastructure, raise pond bottom elevations and breach the Bay and Inland Ponds, and otherwise connect all of southern Eden Landing to regular tidal flows to facilitate their conversion to tidal marsh habitat. The alternative would also construct habitat transition zones against the eastern interior border and create islands from the remnant levees. It would also add other habitat enhancements and various flood risk management and public access features (trails and viewing platforms). A channel would be excavated between the ACFCC and the Bay Ponds to improve fish habitat connectivity and access to the large Bay Ponds. (Construction impacts within the ponds and in the tidal marsh habitats adjacent to the ponds are described in more detail in Impacts 3.5-1 and 3.5-2.) Because bottom sediments in the Bay and Inland Ponds would be raised to marsh plain elevations, these ponds are expected to recruit salt marsh vegetation when breached.

The construction and operation of the offloading facility and the associated infrastructure (pipelines, booster pumps, etc.), may result in visual and noise disturbance to harbor seals. These disturbances may result in wide range of potential behavioral changes, and would be limited to those individuals present in the open waters near the facility. An underwater noise analysis would be completed during project permitting to detail temporary affects to harbor seal that may result from underwater noise. In order to reduce potential impacts from underwater noise on harbor seal, BMPs for pile driving will be implemented, as applicable, depending on the pile driving methods. These BMPs may include the use of a cushion block, bubble curtains, and the "soft start" technique where pile driving intensity is slowly ramped up. No noise or visual effects on existing haul outs sites are anticipated due to geographic separation; the offloading facility is more than 1 mile from the closest known haul out at Bair Island.

Tidally delivered sediment would accrete in the Southern Ponds, allowing for a long-term transition to tidal marsh. Initially, the Southern Ponds would be good fish nursery habitat. As sediment accretion continues, most of the pond interiors would become vegetated, enhancing fish populations.

With implementation of measures to avoid and minimize impacts (i.e., seasonal avoidance and pre-construction surveys), the potential for adverse impacts on harbor seals as part of construction would be expected to be limited and short term (see Impact 3.5-1). Because implementation of the project may result in increased estuarine fish abundance, there would be improved seal foraging habitat. Overall, the impact of Alternative Eden B would be less than significant under CEQA and beneficial under NEPA.

Alternative Eden B Level of Significance: Less than Significant (CEQA); Beneficial (NEPA)

Alternative Eden C. Alternative Eden C would raise bottom elevations, breach, and otherwise connect the Bay Ponds to tidal flows to facilitate their conversion to tidal marsh habitat. A mid-complex levee would be built for flood risk management and to separate them from the rest of southern Eden Landing, which would be enhanced managed ponds fitted with water control structures to allow more complete and timely control over water levels and quality in the Inland and Southern Ponds. The habitat transition zone would extend westward into the Bay Ponds, and there would again be remnant levees that would form islands.

The same construction effects on harbor seals associated with the offloading facility and associated infrastructure and BMPs described under Alternative Eden B would also occur under Alternative Eden C.

The same benefits to harbor seals associated with fisheries improvement described in Alternative Eden B would be expected from Alternative Eden C's tidal marsh restoration and connection to the Bay Ponds. However, the Inland Ponds and Southern Ponds would be retained and managed more for the benefit of various species and guilds of birds, and would be less likely to add the same types of benefits to seals. Still, the overall effect of Alternative Eden C would be an increase in amount and quality of forage habitat for seals.

With implementation of measures to avoid and minimize impacts (i.e., seasonal avoidance and pre-construction surveys), the potential for adverse impacts on harbor seals as part of construction would be expected to be limited and short term (see Impact 3.5-1). Because implementation of the project may result in increased estuarine fish abundance, there would be improved seal foraging habitat. Overall, the impact of Alternative Eden C would be less than significant under CEQA and beneficial under NEPA.

Alternative Eden C Level of Significance: Less than Significant (CEQA); Beneficial (NEPA)

Alternative Eden D. Under Alternative Eden D, bottom elevations would be raised in the Bay and Inland Ponds through the import of dredge materials, the Bay Ponds would be opened to tidal action and transition to tidal marsh habitat, and Inland Ponds and Southern Ponds would initially become enhanced managed ponds, as described for Alternative Eden C. Later, the water control structures could be removed, the mid-complex levee breached, and these ponds opened to tidal flows.

The same construction effects on harbor seals associated with the offloading facility and associated infrastructure and BMPs described under Alternative Eden B and Eden C would also occur under Alternative Eden D.

In the short term, Alternative Eden D is similar to Alternative Eden C (Bay Ponds as tidal marsh and Inland Ponds and Southern Ponds as enhanced managed ponds), and in the long term is similar to Alternative Eden B (all ponds would be tidal marsh). Because there would be no added connection between the ACFCC and the Bay Ponds, the direct benefit of this aspect of the fish habitat improvements is not expected in Alternative Eden D. But overall, the effect of Alternative Eden D would be a net improvement in the amount and quality of forage habitat for harbor seals.

With implementation of measures to avoid and minimize impacts (i.e., seasonal avoidance and pre-construction surveys), the potential for adverse impacts on harbor seals as part of construction would be expected to be limited and short term (see Impact 3.5-1). Because implementation of the project may result in increased estuarine fish abundance, there would be improved seal foraging habitat. Overall, the impact of Alternative Eden D would be less than significant under CEQA and beneficial under NEPA.

Alternative Eden D Level of Significance: Less than Significant (CEQA); Beneficial (NEPA)

Phase 2 Impact 3.5-18: Potential recreation-oriented impacts to sensitive species and their habitats.

Potential program-level impacts are addressed in Chapter 3.6 of the program-level evaluation found in the 2007 Final EIS/R. Here, the project-level impacts of the implementation of Eden Landing Phase 2 actions are assessed.

Improved recreational access to baylands within the South Bay is an important objective of the SBSP Restoration Project. Increased recreational use and the maintenance of trails and other public access and recreational facilities have the potential to disturb wildlife, result in the trampling of vegetation, decrease nesting success, increase predation, increase the introduction of non-native species, and decrease habitat quality. Ultimately, such impacts could result in decreases in the abundance of breeding, foraging, and roosting wildlife (2007 Final EIS/R).

Potential Eden Landing Phase 2 impacts include:

- Human disturbance of nesting birds can result in abandonment of nests and chicks, resulting in decreased reproductive success and increased predation, particularly of eggs and young. Disturbance of foraging and roosting may decrease the effectiveness or increase the stress of these activities. The trails and viewing platforms that are part of the Eden Landing Phase 2 alternatives all have some potential to increase these types of disturbance of the various bird species and guilds discussed in the rest of the impacts listed in this section.
- California Ridgway's rails along levee trails may be subject to higher predation risk because they may avoid high cover along trails during high tides (instead wading within the flooded marsh or using areas of sparser cover) due to human presence on the levee. Disturbance of rails could potentially lead to abandonment of nests and chicks, territorial displacement, exposure to predation or increased energetic requirements due to flushing, any of which may result in decreased survivorship and lower reproductive success (Overton 2007, USFWS 2013).
- Levee-top trails may impede the movement of Ridgway's rail or salt marsh harvest mouse populations between current and future restored tidal marsh habitats because of human disturbance and lack of vegetative cover.
- Nesting western snowy plovers may also be adversely affected by increased human use of the SBSP Restoration Project area. Disturbance could lead to territorial aggression, and reduced egg viability or nest abandonment and increased predation, particularly if disturbance causes plovers to remain off the nest for more than a few minutes. Recreation could have these same effects on other nesting birds, such as stilts, avocets, and terns.
- Increases in litter provide attractive food sources for predators, such as ravens, which pose an increased risk to predation on California Ridgway's rail, western snowy plovers and other nesting birds (USFWS 2013).
- Increased recreational use of levee trails could potentially reduce habitat quality in managed ponds for nesting, roosting, and foraging waterbirds. Although some species and individuals habituate to human activity, others would maintain some distance between areas they select for nesting, foraging, or roosting and trails or viewing platforms. The intervening distance is essentially little used by these individuals, reducing the extent of suitable habitat available.
- Waterfowl hunting is allowed in season (late October through January) in some of the ELER pond areas. Hunting is managed, permitted, and controlled by CDFW to minimize impacts on non-target wildlife, but the potential for disturbance even to species not being hunted exists.
- There is no expectation that the recreational activities associated with this project as designed and informed by the AMP could result in impacts to other wildlife species, such as fish or small mammals, approaching the level of significance (2007 Final EIS/R).

Recent studies on the impacts of recreational trails on bird species suggest that waterbirds, shorebirds, and western snowy plover would all be impacted by the addition of new trails near foraging and nesting habitats (Trulio et al. 2012a; Trulio et al. 2012b; Trulio et al. 2013). Recommendations from the studies suggest that new trails should be sited at least 100 to 165 feet away from shorebird foraging habitat, and new trails should be adjacent to wide rather than narrow borrow ditches where possible (Trulio et al. 2013). Trails should be located at least 600 feet away from western snowy plover nesting habitat (Trulio et al. 2012a, Pearl et al. 2015), and should be at least 400 feet away from waterfowl foraging habitat (Trulio et al. 2012b). Also, a study of tern and avocet nests on islands created at Pond SF2 suggests that the islands created greater than 300 feet from trails and 600 feet from viewing platform were not significantly affected by recreational access, though recreational use of the Pond SF2 trail has been low (Ackerman et al. 2014b).

As described in Chapter 2, the SBSP Restoration Project’s goal of completing the Bay Trail spine through southern Eden Landing would be advanced by adding one of several new trail alignments as part of the project, but the specific route would be dependent on the availability of levees and other lands not owned by CDFW. The various trail alternatives differ significantly in their routes through the Phase 2 project area, as shown on Figures 2-3, 2-4, and 2-5. Solely on CDFW-owned lands, the Bay Trail would extend from the existing terminus in northern Eden Landing along the eastern border of the Reserve, across the 20-tide-gate structure over the OAC channel into southern ELER, and then continue on CDFW levees to the southeast corner of Pond E6C. From there, three routes are proposed to connect the trail to the ACFCC levee. These routes are as follows:

- Route 1: On CDFW Property only, but crossing over a ACFCWCD stormwater detention basin channel in their “J” Ponds.
- Route 2: On CDFW & Cargill Property on the eastern and southern levees of the Southern Ponds, where they wrap around the Cargill-owned CP3C pond (Cargill owns the levees bordering this pond). The property would be required to be owned in fee title by another owner, as Cargill’s policy is no public access is allowed on their land.
- Route 3: On CDFW & Alameda County Property on the CDFW-owned levee on the eastern side of Pond E4C and then route onto County land to the east.

Most routes cannot be implemented in their entirety without land or easement acquisition. Even Route 1, which would be entirely on CDFW-owned levees or lands along the southern edge of Pond E6C and around the western edge of the Southern Ponds (the solid purple line on the maps), would cross over a storm water management channel and may require permission of, or coordination with, ACFCWCD to do so.

The northern portion of the trail and one of the three routes through the southern portion described above are in every Action Alternative. Together, and along with a viewing platform along the existing ACFCC Regional Trail, these components make up a “core” of new public access that would be added in Phase 2, regardless of the alternative that is eventually selected for implementation. The impacts discussions below describe the greatest potential for impacts related to recreational trail use disturbing sensitive wildlife species from the different routes and what the adjacent habitats (and thus types of wildlife) would be under the different Action Alternatives.

Alternative Eden A (No Action). Under Alternative Eden A (the No Action Alternative), no additional recreation access is planned. The “core” of new public access features described above would not be added. The ponds at southern Eden Landing would continue to function as a mix of managed and seasonal ponds. Recreation opportunities at northern Eden Landing would remain as implemented in Phase 1 and would not be extended into southern Eden Landing. Existing trails and other public access features in northern Eden Landing and the East Bay Regional Parks District’s regional trails along the ACFCC would continue to be maintained and used. Overall, under the No Action Alternative, there would be no new impacts to sensitive species and their habitats from recreation-orientated activities.

Alternative Eden A Level of Significance: No Impact

Alternative Eden B. Alternative Eden B would add the "core" of new public access components described in the paragraphs above. If selected, Route 1 would be constructed on approximately 7,500 feet of perimeter levees along the southern edge of Pond E6C and the northern edge of Pond E5C and E1C. Route 2 would be constructed on approximately 10,500 feet of perimeter levee along the landside portion of the Southern Ponds, spanning from the northern corner of Pond E4C, to the south and east around Pond E4C and then west and south along Pond CP3C ending at Cal Hill. Route 3 would be constructed on approximately 3,500 feet of perimeter levee along the landside portion of Pond E4C and then extend east for about 1,000 feet prior to connecting to Westport Way. Under Alternative Eden B, southern Eden Landing would be restored to tidal marsh and would not retain managed ponds for pond-associated wildlife, thus limiting the types of effects that are possible.

Increased recreational access resulting from Phase 2 activities has the potential to impact sensitive species and their habitats, largely from disturbance associated with trail users. However, such disturbance would likely be limited to relatively narrow corridors along the perimeter of the restored ponds where trails are placed on improved levees. Impacts from these trail improvements are expected to be minor because, with the exception of Route 1 and a portion of Route 2, all trails and viewing platforms would be on the eastern edge of Eden Landing or even further east and away from sensitive wildlife. In Alternative Eden B in particular, the entirety of southern Eden Landing would be restored to tidal marsh, leaving very large areas of the Reserve unaffected by the use of newly added trails along the eastern perimeter.

The proposed Phase 2 trails would likely decrease waterfowl foraging and roosting activity within 400 feet of the trail (Trulio et al. 2012b). In the Southern Ponds, as the habitat transitions from pond to mudflat to tidal marsh, the species impacted would also shift. Mudflat foraging habitat for shorebirds along the trail is expected to reduce foraging activity within 165 feet of the trail (Trulio et al. 2013). Thus the length of the trail along each habitat type could be correlated with potential effects to different types of species. Due to the large area of the ponds, however, affected foraging areas would be relatively small compared to the total restored pond area.

The viewing platform would be installed along the Alameda Creek Regional Trail which also receives regular visitation (see Section 3.6, Recreation Resources). Although project actions may cause roosting to occur at higher elevations and in closer proximity to recreational trails, islands for roosting and nesting birds would be constructed from the remnant levees (for the short term) and would be constructed in various locations within ponds in southern Eden Landing, away from trails, to reduce the potential for disturbance. Potential effects would be monitored and managed, and implementation of the AMP would ensure that impacts do not reach significant levels.

Use of these newly added features are not expected to lead to a significant impact on sensitive wildlife species, though there is potential for adverse impacts. Public access has considerable potential to improve public education concerning the importance of the SBSP Restoration Project, habitat restoration and South Bay conservation in general. Such education and public enjoyment of the South Bay's biological resources may be important in maintaining public support for bonds that could be sources of funding for future phases of restoration and long-term monitoring and management of SBSP Restoration Project-area habitats. With monitoring and implementation of the AMP, the impact of recreation would be expected to be less than significant.

Alternative Eden B Level of Significance: Less than Significant

Alternative Eden C. Alternative Eden C contains the same "core" public access features as Alternative Eden B, with several additional components. The first would be a pedestrian and bicycle bridge over the ACFCC to connect to the Bay Trail spine in and around the Coyote Hills Regional Park. The second would be a pair of trails along either side of the OAC (on levees along Pond E6A and E6) to a viewing platform located at the former location of the Alvarado Salt Works. A pedestrian/bicycle bridge would connect these two trails, which would thus form a loop out from the Bay Trail Spine. These new trails and one viewing platform would allow for recreational use in an area not previously accessible for this purpose.

Increased recreational access resulting from Phase 2 activities may impact sensitive species and their habitats. In the places where the "core" public access components would be added, similar extents of impacts from recreational trail use on wildlife would be present in Alternative Eden C as in Eden B, but notably, in Alternative Eden C, both the Inland Ponds and Southern Ponds would be retained and enhanced as managed ponds to provide habitat for pond-associated birds. Pond-associated species are more sensitive to human disturbance than are dabbling ducks that prefer marsh areas, where there may be cover or forage. Pond-associated species may use habitat further from trails and seek high tide roosting and nesting habitat along levees. Roosting and nesting pond-associated species may be subjected to potential disturbance from trail users.

Due to the importance of maintaining large areas of undisturbed potential nesting and roosting sites within the project area, trails would be limited to relatively narrow corridors along the edges of the ponds. Islands for roosting and nesting birds would be constructed from the remnant levees and would be located throughout southern Eden Landing away from proposed trails to further reduce the potential for disturbance. Further, these effects would be monitored and managed, and informed by activities supporting the AMP. In particular, under Alternative Eden C, the locations that are most likely to experience disturbance by recreational use of public access features are along the perimeter levees of southern Eden Landing, where the new public access trails and bridges would be added.

Use of these newly added features are not expected to lead to a significant impact on sensitive wildlife species, though there is potential for adverse impacts. Potential impacts identified from any studies would be addressed, as needed. As in Alternative Eden B, the benefits of public access which result in public support and funding for restoration would be expected with the new recreation features. With monitoring and implementation of the AMP, the impact of recreation would be less than significant.

Alternative Eden C Level of Significance: Less than Significant

Alternative Eden D. Though there are differences in the restoration and flood risk management aspects of Alternative Eden B and Alternative Eden D, the public access and recreation components of these two alternatives include the same trail routes and the same viewing platform. However, even though the trail routes and extents would be the same between these two alternatives, there are important potential differences because of the different restoration outcomes of the Inland Ponds and Southern Ponds. In Alternative Eden B, these ponds would become tidal marsh, but in Alternative Eden D, they would be enhanced managed ponds for a decade or more before being opened to tides and restoration toward tidal marsh. During that initial period, the potential impacts of recreational trail use would be similar to those described in Alternative Eden C for pond-associated birds and other wildlife species. Following that, the potential impacts of recreational trail use on wildlife would gradually transition from affecting pond-associated species and guilds to affecting marsh species (as in Alternative Eden B).

Increased recreational access resulting from Phase 2 activities may impact sensitive species and their habitats. In the places where the “core” public access components would be added, similar extents of impacts from recreational trail use on wildlife would be present in Alternative Eden D as in Eden B, with the aforementioned temporal changes in the types of wildlife that would be affected.

Use of these newly added features are not expected to lead to a significant impact on sensitive wildlife species, though there is potential for adverse impacts. Potential impacts identified from any studies would be addressed, as needed. As in Alternative Eden B, the benefits of public access which result in public support and funding for restoration would be expected with the new recreation features. With monitoring and implementation of the AMP, the impact of recreation would be less than significant.

Alternative Eden D Level of Significance: Less than Significant

Phase 2 Impact 3.5-19: Potential Impacts to special-status plants.

Potential program-level impacts are addressed in Chapter 3.6 of the program-level evaluation found in the 2007 Final EIS/R. Here, the project-level impacts of the implementation of Eden Landing Phase 2 actions are assessed.

As shown in Table 3.5-1, no threatened or endangered plant species[5] are known or have high potential to occur in the Eden Landing Phase 2 project area. No special-status plants have been documented within the boundaries of the Eden Landing Ecological Reserve (CDFW 2016b). Potential suitable habitat for one federally listed species, California seablite (*Suaeda californica*), occurs within and adjacent to southern Eden Landing; however, this species has not been documented with 5 miles of the project area. As shown in Table 3.5-1, documented occurrences are present, and potentially suitable habitat for a number of special-status plant species is present in or near the southern Eden Landing. These species include Congdon’s tarplant (*Centromadia parryi* ssp. *congdonii*), Hoover’s button-celery (*Eryngium aristulatum* var. *hooveri*), Point Reyes bird’s beak (*Chloropyron marittimum* ssp. *palustre*), saline clover (*Trifolium hydrophilum*), and small (dwarf) spikerush (*Eleocharis parvula*). Given the open water nature of the Bay Ponds and the active management of the Southern Ponds and Inland Ponds, suitable terrestrial habitat for these species is limited. These special-status plant species thus have limited potential to occur. If these species are present, then project activities could have potential to result in adverse impacts on the CNPS-listed special status species.

Preconstruction surveys would be conducted, as appropriate and necessary prior, to project implementation. In the event that special-status plant species are discovered during surveys, the following avoidance and minimization measures would be implemented to eliminate any significant impact of the project on these plant species: (1) special-status plant species would be avoided to the maximum extent feasible, and all special-status plant populations would be clearly marked and avoided during construction; (2) if avoidance of special-status plant species populations is not feasible, several different actions could take place. For areas that would be temporarily affected, the plants and the surrounding soil

[5] As noted in Table 3.5-3, Impact 3.5-19 is specific to species that are listed under or that are candidates for listing under the Federal or California Endangered Species Act or those that appear on the California Native Plant Society’s California Rare Plant Ranking list, which must be considered under CEQA. This impact does not include pickleweed, cordgrass, or other marsh plants which are part of important habitats and receive some protection as part of that ecological function but that are not themselves endangered or threatened.

would be collected, re-deposited in a nearby area, and replaced following construction. For areas that would be permanently impacted, the plants and the surrounding soil would be collected and relocated adjacent to impacted areas in suitable habitat. Whether special-status plants would colonize restored tidal and transitional habitats on their own or would have to be introduced to these areas is unknown, but the overall project impacts on special-status plants have the potential to be beneficial (2007 Final EIS/R).

In the long term, the SBSP Restoration Project is expected to improve conditions for most of the special-status plants with potential to occur in the area, including those listed above and others that occur primarily in upper tidal marsh habitat. Habitat transition zones would be created at the upper edge of some marshes by importing fill to produce broad, gently sloping areas adjacent to levees or adjoining upland habitat. These unique marsh-associated habitats, including the habitat transition zones and natural salt panne areas within upper salt marshes may become established with special status plant species or and would be incorporated, to the extent practicable, in the tidal restoration design. These habitat transition zones represent an important habitat type largely absent from the South Bay and would provide the opportunity for the re-introduction and establishment of special-status plant species. Also, tidal habitat restoration could eventually include the development of mature tidal marsh features (e.g., shell ridges, microtopographic differences) that could support special-status plant species (2007 Final EIS/R).

Alternative Eden A (No Action). Under Alternative Eden A (the No Action Alternative), no action would be taken. Southern Eden Landing would continue to function and be managed as a mix of seasonal and managed ponds with different pond bottom elevations and depths. No threatened or endangered plants species are known to occur in the vicinity of southern Eden Landing. Therefore, no impacts to existing special-status plants would be expected to occur from the No Action Alternative.

Alternative Eden A Level of Significance: No Impact

Alternative Eden B. Alternative Eden B would raise pond bottom elevations and breach the Bay and Inland Ponds, and otherwise connect all of southern Eden Landing to regular tidal flows to facilitate their conversion to tidal marsh habitat with islands and habitat transition zones. The changes to the existing levees, marshes, and pond interiors would have potential to directly affect individual special-status plants if they were present. However, none of those are known to be present in southern Eden Landing (as listed in Table 3.5-1 and shown on Figure 3.5-3). Use of information from preconstruction surveys and avoidance or relocation of any individual special-status plants identified would ensure no impacts to these species would occur, if present.

Alternative Eden B Level of Significance: No Impact

Alternative Eden C. Alternative Eden C would raise bottom elevations, breach, and otherwise connect the Bay Ponds to tidal flows to facilitate their conversion to tidal marsh habitat. A mid-complex levee would be built to separate them from the rest of southern Eden Landing, which would be enhanced managed ponds fitted with water control structures to allow more complete and timely control over water levels and quality in the Inland and Southern Ponds. The habitat transition zone would extend westward into the Bay Ponds, and there would again be remnant levees that would form islands. The changes to the existing levees, marshes, and pond interiors would have potential to directly affect individual special-status plants if they were present. However, none of those are thought to be present in southern Eden Landing (as listed in Table 3.5-1 and shown on Figure 3.5-3). With the use of preconstruction surveys and relocation of any individual special-status plants identified, there would be no impacts to these species, in the unlikely event they are present.

Alternative Eden C Level of Significance: No Impact

Alternative Eden D. Under Alternative Eden D, bottom elevations would be raised in the Bay and Inland Ponds through the import of dredge materials, the Bay Ponds would be opened to tidal action and transition to tidal marsh habitat, and Inland Ponds and Southern Ponds would initially become enhanced managed ponds, as described for Alternative Eden C. Later, the water control structures could be removed, the mid-complex levee breached, and these ponds opened to tidal flows. In the short term, Alternative Eden D is similar to Alternative Eden C (Bay Ponds as tidal marsh and Inland Ponds and Southern Ponds as enhanced managed ponds), and in the long term is similar to Alternative Eden B (all ponds would be tidal marsh). The same potential threats to special-status plant species, avoidance and minimization measures, and ability to relocate individual plants that may be present would be available under Alternative Eden D as in Alternative Eden C in the early years and as in Alternative Eden B in the later years. However, none of those are thought to be present in southern Eden Landing (as listed in Table 3.5-1 and shown on Figure 3.5-3). With the use of preconstruction surveys and relocation of any individual special-status plants identified, there would be no impacts to these species in the unlikely event they are present.

Alternative Eden D Level of Significance: No Impact

Phase 2 Impact 3.5-20: Colonization of mudflats and marsh plain by non-native Spartina and its hybrids.

Potential program-level impacts are addressed in Chapter 3.6 of the program-level evaluation found in the 2007 Final EIS/R. Here, the project-level impacts of the implementation of Eden Landing Phase 2 actions are assessed.

The tidal restoration of southern Eden Landing could provide new areas for the spread of smooth cordgrass, a highly invasive plant species, and its hybrids formed with native Pacific cordgrass. Smooth cordgrass hybrids are considered one of the three most significant invasive-species threats to San Francisco Bay (Grossinger et al. 1998). Restoration sites in salt ponds provide suitable elevations of unvegetated areas where seedlings can establish unhindered by competition and often in conditions sheltered from wave action. Given these ideal circumstances for establishment, smooth cordgrass and its hybrids could rapidly colonize restored salt ponds (Ayres et al. 2004) and become a dominant plant species in the restored tidal marshes if it is not controlled (2007 Final EIS/R). Since 2005, the Invasive Spartina Project has nearly eradicated invasive *Spartina* from the San Francisco Bay. The Invasive Spartina Project has effectively implemented ongoing monitoring to identify locations where invasive Spartina and its hybrids have become established, studied the establishment and genetics of hybrids, and treated identified areas. Today, *Spartina* is far less a concern than it was 10 years ago, prior to these aggressive eradication efforts. Since 2006, northern Eden Landing tidal restoration sites, including the Phase 1 actions, have been successfully managed by CDFW and treated by the Invasive Spartina Project, such that little, if any, invasive *Spartina* remains. Since 2010, the Invasive Spartina Project has been actively planting and successfully establishing native *Spartina foliosa* in restored marshes.

Intentional and unintentional breaching of levees and subsequent increases in tidal habitat could incidentally spread non-native *Spartina*. The SBSP Restoration Project expects that invasive *Spartina* will be successfully eradicated by the Invasive Spartina Project. The Invasive Spartina Project has been successful in reducing the total extent of patches of established invasive *Spartina* in the San Francisco Bay from over 800 acres to fewer than 30 acres. The size of the infestation in each of the remaining sites has also been diminishing. By 2014, 41 sites had less than 1 square meter of coverage by the non-native and the hybrid, and 49 sites were between 1 square meter and 1 acre. Ongoing control and eradication efforts have been shown to be possible and effective as long as adequate funding and staffing for the program are provided. Due to the regulatory requirement in the USFWS BO, that requires Ridgway's rail numbers above the baseline, total eradication of invasive Spartina has not been completed at the few remaining un-treated sites. Review of recent population indices supports allowing treatment to begin in the remaining untreated sites. This emphasizes the critical importance of the Invasive Spartina Project and its ongoing funding and support for staffing and other operations.

Thus, impacts under all alternatives are expected to be less than significant, even while acknowledging that invasive plants may not yet be completely and permanently eradicated in all locations. The SBSP Restoration Project is using the Invasive Spartina Project's 2010 BMPs document (SCC and USFWS 2010) to inform restoration and management efforts. The list of practices is as follows:

1. Do not plant non-native Spartina at any time
2. Verify genetics of native Spartina plantings
3. Do not plant native Spartina where it may become pollinated by hybrid Spartina
4. Monitor and remove
5. "Success" = "No non-native Spartina"
6. Do not open a new marsh (i.e., make the tidal connection) too near *Spartina alterniflora* or *S. alterniflora* hybrids
7. Clean equipment
8. Avoid potentially contaminated dredged material

The most relevant of these to the SBSP Restoration Project are numbers 4, 6, 7, and 8, because these would minimize the risk of spreading invasive *Spartina* and its hybrids into the restoration areas.

At a minimum, the 2007 Final EIS/R stated that the project would clean equipment and supplies to prevent the spread of seeds and plant material of non-native *Spartina* and other invasive plants during construction, restoration, and maintenance activities (2007 Final EIS/R).

Alternative Eden A (No Action). Under Alternative Eden A (the No Action Alternative), no action would be taken. The ponds at southern Eden Landing would continue to function as a mix of managed and seasonal ponds. Land managers would continue to regularly coordinate with the Invasive Spartina Project and use best practices with support from results of studies and the AMP. The SBSP Restoration Project has successfully restored tidal areas without increasing areas impacted by invasive *Spartina*. Rather, invasive Spartina and its hybrids have been nearly eradicated and would continue to be monitored, studied and eradicated. Therefore, with continued coordination with the Invasive Spartina Project and information provided by studies and the AMP, the impact of Alternative A would be less than significant.

Alternative Eden A Level of Significance: Less than Significant

Alternative Eden B. Alternative Eden B would raise pond bottom elevations and breach the Bay and Inland Ponds, and otherwise connect all of southern Eden Landing to regular tidal flows to facilitate their conversion to tidal marsh habitat with islands and habitat transition zones. Deposition of dredged material and construction of associated infrastructure, breaching and lowering of the levees, installing water control structures, and excavating channels for connectivity, and the subsequent creation of mudflats as marsh forms would increase the potential area for invasive *Spartina* to colonize, which would be a significant impact if it occurred. Compared with the other alternatives, Alternative Eden B would bring the largest and most rapid changes from current habitat conditions, which would increase the potential area for invasive *Spartina* to colonize. However, the project would implement the AMP and continue to collaborate with the Invasive Spartina Project to monitor and control smooth cordgrass and its hybrids. With these practices in place, colonization of mudflats and marsh plain by non-native *Spartina* would be less than significant.

Alternative Eden B Level of Significance: Less than Significant

Alternative Eden C. Alternative Eden C would raise bottom elevations, breach, and otherwise connect the Bay Ponds to tidal flows to facilitate their conversion to tidal marsh habitat. A mid-complex levee would be built to separate them from the rest of southern Eden Landing, which would be enhanced managed ponds fitted with water control structures to allow more complete and timely control over water levels and quality in the Inland and Southern Ponds. The habitat transition zone would extend westward into the Bay Ponds, and there would again be remnant levees that would form islands. As in Alternative Eden B, the deposition of dredged material and construction of associated infrastructure and breaching of the levees and subsequent creation of mudflats in the Bay Ponds would increase the potential area for invasive *Spartina* to colonize, if it occurred. In the Inland and Southern Ponds, in Alternative Eden D, however, there would be enhanced pond management with more static water levels, which reduce the likelihood of invasive *Spartina* establishment within ponds. In addition, as above, the project would implement the AMP and continue to collaborate with the Invasive Spartina Project to monitor and control smooth cordgrass and its hybrids. With these practices in place, colonization of mudflats and marsh plain by non-native *Spartina* would be less than significant.

Alternative Eden C Level of Significance: Less than Significant

Alternative Eden D. Under Alternative Eden D, bottom elevations would be raised in the Bay and Inland Ponds through the import of dredge materials, the Bay Ponds would be opened to tidal action and transition to tidal marsh habitat, and Inland Ponds and Southern Ponds would initially become enhanced managed ponds, as described for Alternative Eden C. Later, the water control structures could be removed, the mid-complex levee breached, and these ponds opened to tidal flows. In the short term, Alternative Eden D is similar to Alternative Eden C (Bay Ponds as tidal marsh and Inland Ponds and Southern Ponds as enhanced managed ponds), and in the long term is similar to Alternative Eden B (all ponds would be tidal marsh). The same potential risks of invasive *Spartina* colonization, precautions to avoid it, and means and opportunities to address it occurs would be available under Alternative Eden D as in Alternative Eden C in the early years and as in Alternative Eden B in the later years. Therefore, the potential impacts would be similar to those in the other Action Alternatives and less than significant.

Alternative Eden D Level of Significance: Less than Significant

Phase 2 Impact 3.5-21: Colonization by non-native Lepidium.

Potential program-level impacts are addressed in Chapter 3.6 of the program-level evaluation found in the 2007 Final EIS/R. Here, the project-level impacts of the implementation of Eden Landing Phase 2 actions are assessed.

Because *Lepidium* colonization occurs primarily in infrequently flooded, brackish marshes, it competes for resources with native brackish-marsh species such as bulrushes (2007 Final EIS/R). Figure 3.5-4 illustrates the known distribution of *Lepidium latifolium* in the South Bay. *Lepidium* may have effects on the species composition within marsh areas. Without tidal restoration in the far South Bay (i.e., the Alviso pond complex), continued sedimentation may result in increased colonization by the non-native perennial pepperweed (*Lepidium latifolium*) as the tidal prism continues to decrease and brackish marsh expands.

Conversely, the breaching of levees and subsequent increases in tidal prism could reduce the amount of brackish marsh habitat available for colonization by *Lepidium*, and importance of eradication and control programs by the CDFW/ELER staff and project partners. This would be a benefit. Because *Lepidium* only grows in a narrow brackish band, the restored tidal marshes will almost entirely self-limit the areas where *Lepidium* could grow. This would be a second form of benefit.

However, the large areas of created habitat transition zone would also provide new areas for potential *Lepidium* colonization (2007 Final EIS/R). On these habitat transition zones, ongoing eradication and control will be critical, as will active revegetation with native plants immediately after construction to resist initial *Lepidium establishment*. There is a risk of extensive *Lepidium* establishment on these habitat features if not properly controlled. All of the habitat transition zones being considered for Phase 2 action alternatives are readily accessible to staff from shore, so it would be feasible to perform the necessary eradication and control.

The BMP of cleaning equipment and supplies to prevent the spread of seeds and plant material of non-native *Lepidium* and other invasive plants would be implemented during construction and restoration activities and during maintenance activities such as driving on levees and mowing (2007 Final EIS/R).

LEGEND

- *Lepidium latifolium* Occurence
- Eden Landing Phase 2 Project Area
- Southern Eden Landing Ponds

AECOM
South Bay Salt Pond Restoration Project

Figure 3.5-4
Lepidium latifolium Distribution

Alternative Eden A (No Action). Under Alternative Eden A (the No Action Alternative), no action would be taken. The ponds at southern Eden Landing would continue to function as a mix of managed and seasonal ponds, and all of Eden Landing would continue to be managed to protect against *Lepidium*. Currently, *Lepidium* is visible on aerial images of tidal marsh areas adjacent to the Eden Landing pond complex. Under the No Action Alternative, no new construction or changes in management would occur; therefore, there would be no impact on existing populations of *Lepidium*.

Alternative Eden A Level of Significance: No Impact

Alternative Eden B. Alternative Eden B would raise pond bottom elevations and breach the Bay and Inland Ponds, and otherwise connect all of southern Eden Landing to regular tidal flows to facilitate their conversion to tidal marsh habitat with islands and habitat transition zones. The deposition of dredged material and construction of associated infrastructure and eventual opening of these ponds to tidal flows and marsh restoration could potentially open new areas for colonization by *Lepidium*. As pond bottom elevations are raised, and when new channels form, *Lepidium* could colonize the pond bottoms or channel margins. This colonization could be partially offset by the increased tidal prism, which could scour banks and reduce the potential for colonization. Later, as this reaches equilibrium, there would be places for *Lepidium* to establish. Alternative Eden B would also create upland habitat for *Lepidium* on the habitat transition zones, and on the remaining or improved levee sections. However, should *Lepidium* colonization take place in the new tidal or habitat transition zone areas, the AMP discussed in the 2007 Final EIS/R would be implemented to address the colonization. The implementation of the AMP would reduce this impact to a less-than-significant level.

Alternative Eden B Level of Significance: Less than Significant

Alternative Eden C. Alternative Eden C would raise bottom elevations, breach, and otherwise connect the Bay Ponds to tidal flows to facilitate their conversion to tidal marsh habitat. A mid-complex levee would be built to separate them from the rest of southern Eden Landing, which would be enhanced managed ponds fitted with water control structures to allow more complete and timely control over water levels and quality in the Inland and Southern Ponds. The habitat transition zone would extend westward into the Bay Ponds, and there would again be remnant levees that would form islands.

The raised pond bottoms and opening of the Bay Ponds could potentially open new areas for colonization there. As pond bottoms are raised and when new channels form, *Lepidium* could colonize the unvegetated pond bottoms and channel margins. This colonization could be partially offset by the increased tidal prism, which could scour banks and reduce the potential for colonization. This risk is somewhat reduced in the Inland Ponds and Southern Ponds because of the ability to manipulate water elevations to eliminate or control *Lepidium* if it begins to establish in these managed ponds. Alternative Eden C would also create upland habitat for *Lepidium* on the habitat islands, in the habitat transition zones, and on the improved mid-complex levee sections. However, should *Lepidium* colonization take place in the new tidal or upland areas, the AMP, discussed in the 2007 Final EIS/R, would be implemented to address the colonization. The implementation of the AMP would reduce this impact to a less-than-significant level.

Alternative Eden C Level of Significance: Less than Significant

Alternative Eden D. Under Alternative Eden D, bottom elevations would be raised in the Bay and Inland Ponds through the import of dredge materials, the Bay Ponds would be opened to tidal action and transition to tidal marsh habitat, and Inland Ponds and Southern Ponds would initially become enhanced managed ponds, as described for Alternative Eden C. Later, the water control structures could be removed, the mid-complex levee breached, and these ponds opened to tidal flows. In the short term, Alternative Eden D is similar to Alternative Eden C (Bay Ponds as tidal marsh and Inland Ponds and Southern Ponds as enhanced managed ponds), and in the long term is similar to Alternative Eden B (all ponds would be tidal marsh). The same potential risks of *Lepidium* colonization, precautions to avoid it, and means and opportunities to address it occurs would be available under Alternative Eden D as in Alternative Eden C in the early years and as in Alternative Eden B in the later years. Therefore, the potential impacts would be similar to those other Action Alternatives and less than significant.

Alternative Eden D Level of Significance: Less than Significant

Phase 2 Impact 3.5-22: Increase in exposure of wildlife to avian botulism and other diseases.

Potential program-level impacts are addressed in Chapter 3.6 of the program-level evaluation found in the 2007 Final EIS/R. Here, the project-level impacts of the implementation of Eden Landing Phase 2 actions are assessed.

Of the wildlife diseases that could potentially affect species in the South Bay, those affecting birds are of greatest concern because of the ease with which they may be transmitted (due to birds' mobility) and the large numbers of individuals that can potentially be exposed to diseases in flocks or colonies. Avian botulism, the avian disease with the greatest potential to affect large numbers of birds, is caused by a toxin produced by the bacterium *Clostridium botulinum*. This pathogen requires a protein source, warm temperatures, and anoxic or low-oxygen conditions to reproduce and is generally harbored by soil in the environment (De La Cruz et al., in press). Warm, shallow water, fluctuating water levels, high ambient temperatures, the presence of vertebrate and invertebrate carcasses, high nutrient levels, and rotting vegetation can contribute to the presence of *C. botulinum* (Washburn 2013). Botulism is a neurological disease that results in paralysis, often leading affected birds to show symptoms that include an inability to fly or to hold their heads above water (2007 Final EIS/R).

Monitoring for botulism has occurred in the South Bay since at least 1982. Since then, avian botulism has been linked to six large waterbird die-offs and some smaller outbreaks. The largest recent outbreak was in 1998 when over 1,400 birds were affected in San Jose and Sunnyvale (SFBBO 2012). Permanently flooded marshes often have higher concentrations of botulism compared to seasonally flooded marshes. The presence of dead animals, pesticides, and other nutrient inputs that lead to algae blooms and warm, brackish water with low levels of dissolved oxygen increases the potential for botulism. Water pollution control plants have been identified as likely contributors to botulism outbreaks (SFBBO 2012). The 2007 Final EIS/R identified the following proposed mechanisms that facilitate outbreaks of avian botulism in the South Bay:

- The sludge-bed theory, which suggests that botulism outbreaks occur as a result of the warm and often anaerobic conditions created in the sludge ponds and lagoons associated with water treatment plant facilities;
- The microenvironment theory, which suggests that shallow ponds of water, formed from mudflats temporarily isolated from water exchange during low tide, facilitate outbreaks because they are associated with invertebrate die-offs, which are often consumed in large quantities by foraging birds; or

- The bird carcass theory, which suggests that botulism outbreaks are caused by the spread of bacteria through infected carcasses as maggots and invertebrates ingest the bacteria and are then ingested by foraging birds.

The SBSP Restoration Project could potentially exacerbate existing occurrences of diseases, particularly avian botulism, if the project were to increase the incidence of conditions such as warm water temperatures and anoxic or low-oxygen conditions. Such conditions may be present in shallow managed ponds with poor water circulation, necessitating careful management of water circulation; marshes that are poorly drained may also harbor such conditions. The AMP includes a description of monitoring and adaptive management activities concerning water quality. The project could also potentially increase the occurrence of disease outbreaks by concentrating larger numbers of birds into smaller areas (e.g., fewer ponds) (2007 Final EIS/R).

Alternative Eden A (No Action). Under Alternative Eden A (the No Action Alternative), no new action would be taken. The ponds at southern Eden Landing would continue to function as they do now and be managed as they are now. No changes in exposure to avian botulism are expected to occur at southern Eden Landing as part of the No Action Alternative. Under the current management regime, the different groups of ponds (Bay Ponds, Inland Ponds, and Southern Ponds) are managed for habitat purposes (e.g., drawing some down in advance of western snowy plover nesting season and keeping others full for dabbling ducks) and to avoid causing water quality problems within the ponds or discharging waters that are above salinity limits. These actions involve circulating water as needed to control dissolved oxygen per the existing AMP and to mix water from different ponds to achieve acceptable salinity levels. Under the No Action Alternative, there would be no increase in exposure of wildlife to avian botulism and other diseases.

Alternative Eden A Level of Significance: No Impact

Alternative Eden B. Alternative Eden B would raise pond bottom elevations and breach the Bay and Inland Ponds, and would excavate channels to them and within them to make them fully tidal. The Southern Ponds cannot be fully breached to tidal flows, but they would be fitted with more and better water control structures to connect them to the ACFCC than they have now, and will also have internal breaches and channels excavated within them. Levee lowering in some places and improvements in others will also increase circulation while maintaining de facto flood protection. Habitat transition zones and islands would also be emplaced. Treated wastewater from USD and brackish groundwater from ARP wells could be used to irrigate portions of the habitat transition zones. Wastewater from USD would be chlorinated to kill bacteria and other pathogens, and then dechlorinated prior to use at the Inland Pond.

The raising of the bottom elevation through deposition of slurry material would create conditions which may exacerbate existing occurrences of avian botulism. These conditions in the Bay and Inland Ponds may include warm water temperature, low dissolved oxygen, and poor water circulation. These conditions would be limited to the Bay and Inlands Ponds until settlement and consolidation is complete, and would not be expected to affect the Bay or other nearby managed ponds. Because the habitat value for the fish and other invertebrates would be eliminated in these areas, there would be minimal habitat value for wildlife, and avian use is expected to be minimal. Therefore, the potential for exposure to the disease would be limited. In addition, the Bay and Inland Ponds would not be permanently flooded, nor are they located within water treatment facilities where higher concentration of botulism are more prevalent in untreated water, and thus the potential for the disease would be less.

Breaching and excavating the pilot channels and also selectively locating the sections of lowered levees at historic slough meanders would encourage improved water circulation in all ponds, thus reducing conditions that are conducive to avian botulism. The restored tidal habitats are not expected to foster wildlife diseases. The AMP includes a description of monitoring and adaptive management activities concerning water quality and avian response to changing habitats that is intended to identify and then avoid or minimize potential adverse effects. As a result, the implementation of the AMP would reduce this impact to a less-than-significant level.

Alternative Eden B Level of Significance: Less than Significant

Alternative C. Alternative Eden C would raise pond bottom elevations and breach the Bay Ponds and would excavate channels to them and within them to make them fully tidal. However, in Alternative Eden C, Inland Ponds and the Southern Ponds would be fitted with more and better water control structures to connect them to the OAC and ACFCC, respectively. This would make them enhanced managed ponds. Currently, the ability of CDFW's management to circulate water through these ponds is limited by the number, location, quality, and invert elevation of the water control structures in the Inland Ponds and Southern Ponds. Alternative Eden C would add several more of these structures and improve the ability to manage ponds differently from each other and achieve better water quality conditions while doing so. The Southern Ponds and the Bay Ponds would also have internal breaches and channels excavated within them to improve the filling and draining of these ponds. Levee lowering in some places and improvements in others will also increase circulation while maintaining de facto flood protection.

The same impacts associated with deposition of the slurry material described in Alternative B would occur under Alternative Eden C, but would be limited to the Bay Ponds. Thus, the geographic area that is susceptible to conditions that favor avian botulism would be reduced under Alternative Eden C.

Breaching and excavating the pilot channels, adding water control structures, and also selectively locating the sections of lowered levees at historic slough meanders would encourage improved water circulation in all ponds, thus reducing conditions that are conducive to avian botulism. The restored tidal and enhanced managed pond habitats that would result are not expected to foster wildlife diseases. The AMP includes a description of monitoring and adaptive management activities concerning water quality and avian response to changing habitats that is intended to identify and then avoid or minimize potential adverse effects. As a result, the implementation of the AMP would reduce this impact to a less-than-significant level.

Alternative Eden C Level of Significance: Less than Significant

Alternative Eden D. With regard to impacts associated with avian botulism and other diseases, the outcomes of Alternative Eden D would be much like those of Alternative Eden B in the short and medium term due to the similar deposition of the dredge material and essentially identical to Alternative Eden B in the long run if (as planned) the Southern Ponds and Inland Ponds are opened to tidal flows. If the Inland Ponds and Southern Ponds are not opened to tidal flows in the future, the same water management options in Alternative Eden C would persist. The AMP includes a description of monitoring and adaptive management activities concerning water quality and avian response to changing habitats that is intended to identify and then avoid or minimize potential adverse effects. As a result, the implementation of the AMP would reduce this impact to a less than significant level.

Alternative Eden D Level of Significance: Less than Significant

Phase 2 Impact 3.5-23: Potential impacts to bay shrimp populations.

Potential program-level impacts are addressed in Chapter 3.6 of the program-level evaluation found in the 2007 Final EIS/R. Here, the project-level impacts of the implementation of Eden Landing Phase 2 actions are assessed.

The epifaunal invertebrate community in the South Bay is dominated by several species of shrimps and crabs. Two native caridean shrimps, the California bay shrimp and the blacktail bay shrimp (*C nigricauda*), are common in tidal sloughs and in the Bay itself. The California bay shrimp supports the only commercial fishery remaining in the South Bay aside from the limited harvest of brine shrimp that occurs in salt ponds. The 2007 Final EIS/R cited unpublished data valuing the brine shrimp harvest of approximately 75,000 pounds at between $154,000 and $312,000 per year at that time. No additional data on this fishery was identified during the preparation of this document. A discussion of California bay shrimp life cycle details can be found in the 2007 Final EIS/R.

At a program level, the SBSP Restoration Project is expected to have a net benefit on bay shrimp by increasing (to Bay levels) the salinities in some freshwater sloughs and channels in the South Bay and increasing the amount of estuarine habitat. Such habitat is likely to be especially important to bay shrimp as nurseries for juveniles. However, some managed ponds (e.g., those managed specifically for small shorebirds) may have higher salinity and lower dissolved oxygen levels than some existing ponds. Releases of water from these ponds when conditions are not optimal could result in localized areas of low dissolved oxygen and high-salinity that may impair the health of, or cause mortality of, bay shrimp. Overall, the project has the potential to enhance the shrimp populations, which in turn could also provide economic benefits by revitalizing the shrimping industry. Although the effects of the SBSP Restoration Project on bay shrimp are expected to be beneficial overall, the AMP includes a description of monitoring and adaptive management activities concerning water quality and releases to the Bay (2007 Final EIS/R).

Alternative Eden A (No Action). Under Alternative Eden A (the No Action Alternative), no new action would be taken. Southern Eden Landing would continue to function as a mix of managed ponds of different depths, flow regimes, and salinities; levees would be maintained for inland flood risk management, as needed. No changes in bay shrimp populations would be anticipated at southern Eden Landing.

Low water quality in discharges could potentially adversely affect bay shrimp. Under the No Action Alternative, there would be no change to the current operation of these ponds and no change in the discharges from them compared to the baseline condition. Therefore, there would be no new impacts on bay shrimp as a result of Alternative Eden A.

Alternative Eden A Level of Significance: No Impact

Alternative Eden B. Alternative Eden B would use an offloading facility, booster pumps, and pipelines to import dredge materials and raise bottom elevations in the Bay and Inland Ponds, and breach or otherwise connect all of the ponds at southern Eden Landing with the OAC or the ACFCC to connect them to tidal flows and facilitate their conversion to tidal marsh habitat. It would also and add habitat transition zones and islands, raise and improve levees in some places, and lower levees in others. (Construction impacts within the ponds and in the tidal marsh habitats adjacent to the ponds are described in more detail in Impacts 3.5-1 and 3.5-2.) Shallow waters in some ponds and in the surrounding sloughs and Bay may provide some habitat for mysid shrimp.

The infrastructure placed in the Bay between the offloading facility and Pond E2 would have direct effects on benthic species on the mudflats along the pipeline route (those living at the sediment surface and in upper subsurface layer). Although effects to benthic species could occur during construction and operation of the dredge material placement infrastructure, intertidal mudflats are one of the most dominant habitats of the South Bay, and only a minimal percentage of the total mudflats area would be affected. In addition, effects from pipelines and booster pumps would only occur during a portion of the construction period, as the dredge material infrastructure would be removed prior to construction of the other restoration, flood risk management, and recreational components.

Although some shallow ponded mudflat habitat would be lost under Alternative Eden B, the conversion to tidal marsh and the development of tidal sloughs and smaller channels would be expected to have a net benefit on shrimp nursery habitat over the long-term. The selective breaching and other levee modifications along the lower portions of OAC and ACFCC would improve foraging habitat for juvenile shrimp migrating up to the brackish water of these tidally influenced waterways. Multiple breaches into and within the ponds would provide water circulation in the newly restored marshes, thus avoiding low-oxygen conditions. Tidal marsh habitat adjacent to sloughs would provide suitable low-salinity brackish estuarine habitat for juvenile shrimp migrating to summer foraging grounds.

The Action Alternatives for Phase 2 at Eden Landing are expected to benefit to bay shrimp by increasing the amount of tidal marsh habitat; Alternative Eden B has the greatest amount of added tidal marsh habitat. Such habitat is likely to be especially important as nurseries for juveniles. Therefore, the impact of Alternative Eden B would be less than significant under CEQA and beneficial under NEPA.

Alternative Eden B Level of Significance: Less than Significant (CEQA); Beneficial (NEPA)

Alternative Eden C. Alternative Eden C would raise pond bottom elevations and breach the Bay Ponds and convert them to tidal marsh, and add habitat transition zones at their eastern edge. However, Alternative Eden C would not open the Inland Ponds or Southern Ponds to tidal flows and would instead retain them as managed ponds while improving the ability of CDFW managers to operate the managed ponds to achieve better water quality outcomes. This would be accomplished through the addition of 11 water control structures and the retention of levees between the individual ponds in these groups. This would maximize flexibility of management and – while not directly adding habitat for mysid shrimp – would provide more control over potential problems with low dissolved oxygen or high salinity in the retained managed ponds. This would benefit the various mysid shrimp species by avoiding or reducing water quality conditions that impair them.

Shallow waters in some ponds and in the surrounding sloughs may provide some habitat for mysid shrimp. Although some shallow ponded mudflat habitat would be lost under Alternative Eden C, the conversion to tidal marsh and the development of tidal sloughs and smaller channels would be expected to have a net benefit on shrimp nursery habitat. The benefits of Alternative C are similar to those described for Alternative Eden B, except that the net benefit and amount of available tidal marsh habitat would be greater under Alternative Eden B. Therefore, the impact of Alternative Eden C would be less than significant under CEQA and beneficial under NEPA.

Alternative Eden C Level of Significance: Less than Significant (CEQA); Beneficial (NEPA)

Alternative Eden D. With regard to impacts on and benefits to mysid shrimp habitat and population levels, the outcomes of Alternative Eden D would be much like those of Alternative Eden C in the short and medium term and essentially identical to Alternative Eden B in the long run if (as planned) the Bay

Ponds and Inland Ponds are opened to tidal flows. If the Inland Ponds and Southern Ponds are not opened to tidal flows in the future, the benefits from Alternative Eden C would still be realized by these species. Overall, therefore, the impact of Alternative Eden D on mysid shrimp would be less than significant under CEQA and beneficial under NEPA.

Alternative Eden D Level of Significance: Less than Significant (CEQA); Beneficial (NEPA)

Phase 2 Impact 3.5-24: Potential impacts to jurisdictional wetlands or waters.

Jurisdictional wetlands and other waters occur in southern Eden Landing. Jurisdictional wetlands and other waters areas meet the regulatory definition of "Waters of the U.S." and are subject to the jurisdiction of the USACE under provisions of Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act. In San Francisco Bay, jurisdictional wetlands and other waters areas are also regulated by the BCDC. Jurisdictional wetlands and other waters are also subject to Section 401 of the Clean Water Act, administered in the State of California by the RWQCB; the project ponds are in the San Francisco RWQCB region.

Regionally, more than 90 percent of historic tidal wetlands in the Bay Area have been lost to diking, draining, and filling (Goals Project 1999). The jurisdictional wetland and water habitats included in the South Bay are open waters and subtidal habitats to the upper reaches of tidal action, the tidal and nontidal wetlands, and former salt evaporation ponds adjacent to the Bay. These habitats provide important wildlife habitat (as discussed in sections above), but also provide other services such as flood risk management, water quality improvements, and carbon sequestration.

The Eden Landing Phase 2 Action Alternatives involve levee breaching and lowering as well as channel excavation to open some ponds to tidal flows and adding water control structures to open others to enhance the ability to manage water quality and other conditions within some ponds retained as such. The overarching long-term mission of the SBSO Restoration Project is the restoration and enhancement of tidal marsh wetlands in the South Bay while providing for flood management and wildlife-oriented public access and recreation. To achieve these goals, the Phase 2 Action Alternatives would initially create adverse impacts to wetlands and other waters resulting from breaches, channel excavations, and other modifications to the levees and the surrounding fringing marshes. Additional fill-related impacts would come from building islands and habitat transition zones, and installing water control structures. However, the impacted acreage would be significantly smaller than the area of the restored wetlands.

The vast majority of conversion would be from jurisdictional other waters to wetlands, which the USACE considers special aquatic sites; special aquatic sites have increased value due to their increased ecological functions and values. The wetlands, in comparison to other waters, will provide higher-quality habitat for sensitive plant and animal species and refugia for many bird species.

Alternative Eden A (No Action). Under Alternative Eden A (the No Action Alternative), no new action would be taken. The southern Eden Landing ponds would continue to function as a mix of managed ponds with some ability control water depths and salinities. The existing levees would be retained as they are for wildlife and water quality control purposes, and they would continue to provide de facto flood protection. These actions would not have any impact on wetlands located in northern Eden Landing that were enhanced as part of the Phase 1. There would be no new impacts on jurisdictional wetlands or waters associated with Alternative Eden A.

Alternative Eden A Level of Significance: No Impact

Alternative Eden B. Alternative Eden B would use an offloading facility, booster pumps, and pipelines to import dredge materials and raise pond bottom elevations in the Bay and Inland Ponds. These ponds would be breached to connect them to tidal flows from OAC, and water control structures would be added to connect the Southern Ponds with the ACFCC. Channels would be excavated within the ponds and outside of them to improve draining and filling of the ponds with each tidal cycle. An additional channel would be excavated through the existing marsh south of the Bay Ponds for fish habitat enhancement by connecting the ACFCC (a steelhead run) with those Ponds.

To retain or improve the current levels of flood risk management, the existing levees on the eastern end of the pond complex would be raised and improved, while other internal and external levees would be breached or lowered to allow more rapid drainage of peak stormwater flows. Alternative Eden B would also add habitat transition zones along the eastern border and build habitat islands on remnant levees throughout the ponds. All of these changes would require at least some fill (temporary or permanent) in jurisdictional wetlands and waters.

The breaching of the levees and the creation or enlargement of uplands at the tops of improved levees and habitat transition zones would impact wetlands, both temporarily (disturbance during construction) and permanently (loss of wetland habitat where levees are breached). Wetlands and other waters would be impacted during construction as fill is added for the creation of the habitat transition zones and island habitat and as levees are breached.

Similarly, the excavation of pilot channels is necessary to connect the ponds with the OAC and ACFCC. This would create channels (other waters) in what are currently wetlands, which is another form of impact. Within the ponds themselves, the channels would be excavated in the pond bottoms, and those jurisdictional waters would still be waters, though that would still be a form of impact to be assessed.

The details of the areas and volumes of fill in all jurisdictional wetlands and other waters as well as the areas of other waters converted to wetlands, and the total area of wetlands and other waters lost will be developed in a later design stage and presented in the permitting step of this project. However, a qualitative examination of the maps and the conceptual look at the designs indicate that adverse impacts would be in the tens of acres, while over two thousand acres of wetlands would be established by these activities.

Overall, however, the Phase 2 construction activities in Alternative Eden B would result in the creation of significantly larger areas of wetlands than would be impacted. Similarly, the ecological function and value of other waters would be improved via many more connections and habitat enhancements. The small losses of wetland and other waters habitat would be replaced by high-value wetland habitat. In sum, these impacts on jurisdictional wetlands and other waters would be considered less than significant.

Alternative Eden B Level of Significance: Less than Significant

Alternative C. Alternative Eden C would use an offloading facility, booster pumps, and pipelines to import dredge materials and raise pond bottom elevations in the Bay Ponds, breach the Bay Ponds to connect them to tidal flows from OAC, and it would add water control structures to connect the Inland Ponds and the Southern Ponds to provide controlled connections with the OAC and ACFCC, respectively. The Bay Ponds would be restored to tidal marsh, and the Inland Ponds and Southern Ponds would be retained as enhanced managed ponds. Channels would be excavated within the ponds and outside of them to improve draining and filling of the ponds with each tidal cycle (in the Bay Ponds) or when management objectives require it (in the Inland Ponds and Southern Ponds). An additional channel would be excavated through the J-Ponds for fish habitat enhancement by connecting the ACFCC (a potential steelhead run once upstream barriers to migration are removed and a viable run is restored) with the Bay Ponds.

To retain or improve the current levels of flood risk management and to create hydraulic separation between the Bay Ponds and the rest of southern Eden Landing, a permanent mid-complex levee would be constructed. The mid-complex levee would extend across a diked marsh portion of the J-Ponds. Other internal and external levees in the Bay Ponds would be breached or lowered to allow more rapid drainage of peak stormwater flows. Alternative Eden C would also add habitat transition zones along the mid-complex levee border and build habitat islands on remnant levees. A portion of the western levee of Pond E2 would be improved to reduce potential for overtopping and scour of the restoring marsh. All of these changes would require at least some fill in jurisdictional wetlands and waters. In addition, the water control structures in the Inland Ponds and Southern Ponds would replace some portion of the existing levee footprint, but would still constitute fill in jurisdictional wetlands and other waters.

The breaching of the levees and the creation or enlargement of uplands at the tops of improved levees and habitat transition zones would impact wetlands, both temporarily (disturbance during construction) and permanently (loss of wetland habitat along breached levees). Wetlands and other waters would be impacted during construction as fill is added for the creation of the habitat transition zones and island habitat and as levees are breached.

Similarly, the excavation of pilot channels is necessary to connect the ponds with the OAC and ACFCC. This would create channels (other waters) in what are currently wetlands, which is another form of impact. Within the ponds themselves, the channels would be excavated in the pond bottoms, and those jurisdictional waters would still be waters, though that would still be a form of impact to be assessed.

The details of the areas and volumes of fill in all jurisdictional wetlands and other waters as well as the areas of other waters converted to wetlands, and the total area of waters lost will be developed in a later design stage and presented in the permitting step of this project. However, a qualitative examination of the maps and the conceptual look at the designs indicate that adverse impacts would be in the tens of acres, while over one thousand acres of tidal wetlands would be established and another thousand acres of other waters would be improved by these activities.

Overall, the Phase 2 construction activities in Alternative Eden C would result in the creation of significantly larger areas of jurisdictional wetlands and improved other waters than would be impacted. Similarly, the ecological function and value of other waters would be improved via many more connections and habitat enhancements. The small losses of jurisdictional wetland and other waters habitat would be replaced by high-value wetland habitat. In sum, these impacts on jurisdictional wetlands and other waters would be considered less than significant.

Alternative Eden C Level of Significance: Less than Significant

Alternative Eden D. Alternative Eden D would use an offloading facility, booster pumps, and pipelines to import dredge materials and raise bottom elevations in the Bay and Inland Ponds, breach the Bay Ponds to connect them to tidal flows from OAC, and in the short term, it would add water control structures to connect the Inland Ponds and the Southern Ponds to provide controlled connections with the OAC and ACFCC, respectively. The Bay Ponds would be restored to tidal marsh, and the Inland Ponds and the

Southern Ponds would be retained as enhanced managed ponds until the Bay Ponds had successfully established tidal marsh. At that time, if the results of AMP monitoring showed that managed ponds were no longer necessary for pond-dependent wildlife species, then water control structures would be removed to create new breaches, and the Inland and/or the Southern Ponds would also begin their conversion to tidal marsh. As in Alternative Eden C, Channels would be excavated within the ponds and outside of them to improve draining and filling of the ponds with each tidal cycle (in the Bay Ponds) or when management objective require it (in the Inland Ponds and Southern Ponds).

To retain or improve the current levels of flood risk management and to create hydraulic separation between the Bay Ponds and the rest of southern Eden Landing, a temporary mid-complex levee would be constructed. The existing backside levees along the eastern border of the pond complex would also be raised and improved for flood risk management. The mid-complex levee would extend across a currently marshy portion of the J-Ponds. Other internal and external levees in the Bay Ponds would be breached or lowered to allow more rapid drainage of peak stormwater flows. Alternative Eden D would also add a habitat transition zone along the westernmost levee of Ponds E1 and E2 and projecting into those ponds. That western levee of Ponds E1 and E2 would be improved to support the transition zone and provide other habitat benefits. As in the other Action Alternatives, there would be habitat islands formed on remnant levees. All of these changes would require at least some fill in jurisdictional wetlands and waters. In addition, the water control structures in the Inland Ponds and Southern Ponds would replace some portion of the existing levee footprint, but would still constitute fill in jurisdictional wetlands and other waters.

The breaching of the levees and the creation or enlargement of uplands at the tops of improved levees and habitat transition zones would impact wetlands, both temporarily (disturbance during construction) and permanently (loss of wetland habitat along breached levees). Wetlands and other waters would be impacted during construction as fill is added for the creation of the habitat transition zones and island habitat and as levees are breached.

Similarly, the excavation of pilot channels is necessary to connect the ponds with the OAC and ACFCC. This would create channels (other waters) in what are currently wetlands, which is another form of impact. Within the ponds themselves, the channels would be excavated in the pond bottoms, and those jurisdictional waters would still be waters, though that would still be a form of impact to be assessed.

The details of the areas and volumes of fill in all jurisdictional wetlands and other waters as well as the areas of other waters converted to wetlands, and the total area of waters lost will be developed in a later design stage and presented in the permitting step of this project. However, a qualitative examination of the maps and the conceptual look at the designs indicate that adverse impacts would be in the tens of acres, while over one thousand acres of tidal wetlands would be established and another thousand acres of other waters would be improved by these activities.

Overall, the Phase 2 construction activities in Alternative Eden D would result in the creation of significantly larger areas of jurisdictional wetlands and improved other waters than would be impacted. Similarly, the ecological function and value of other waters would be improved via many more connections and habitat enhancements. The small losses of jurisdictional wetland and other waters habitat would be replaced by high-value wetland habitat. In sum, these impacts on jurisdictional wetlands and other waters would be considered less than significant.

Alternative Eden D Level of Significance: Less than Significant

Phase 2 Impact 3.5-25: Potential construction-related loss of, or disturbance to, nesting raptors (including burrowing owls).

Raptors, including burrowing owls (*Athene cunicularia*), are known to occur in and near some of the SBSP Restoration Project ponds. The project ponds and the surrounding upland habitats may provide foraging, roosting, and nesting habitat. Suitable nesting habitat for many raptors can include trees, cliffs, and structures such as buildings or bridges; burrowing owls are ground nesters and use burrows (often created by ground squirrels or other rodents) in levees and open upland habitat for nesting. Northern harriers also nest on the ground in higher areas within marsh habitats, grasslands, or fields.

Burrowing owls are also present in ruderal habitats and grasslands (all now non-native) in scattered areas surrounding the salt ponds and marshes in the South Bay. Ruderal habitats, which are particularly extensive on former landfills, and grasslands, agricultural lands, and pastures in the Mountain View, Alviso, Fremont, and Newark areas provide foraging habitat for large numbers of diurnal raptors, such as red-tailed hawks, northern harriers, white-tailed kites (*Elanus caeruleus*), loggerhead shrikes (*Lanius ludovicianus*), peregrine falcons, and American kestrels (*Falco sparverius*). Many of these raptors are found foraging in wetlands, such as salt marshes and managed ponds as well. Burrowing owls are not known to be present in the Phase 2 project area at southern Eden Landing and the closest potential suitable habitat is at Coyote Hills Regional Park.

Once nests are established, raptors can be very sensitive to disturbance, such as from construction equipment. The availability of upland habitats for raptors would be reduced by a small amount at locations where levees are breached. Minimal impacts to tall nesting structures, such as electric line poles, or trees, are anticipated as part of the Phase 2 southern Eden Landing project, as only one short section of an obsolete power line would be removed. Some raptors may benefit from increased prey in the number of other nesting birds or small rodents that could be present on islands, habitat transition zones, or tidal marshes.

Raptors are protected under the federal Migratory Bird Treaty Act of 1918 and some are protected under the Endangered Species Act of 1973. Raptors, including burrowing owls, are also protected under state law (see Fish and Game Code Sections 3503, 3503.5, 3505, and 3513 and Title 14 California Code of Regulations Sections 251.1, 652, and 783–786.6). Burrowing owls are known to inhabit burrows within SBSP Restoration Project levees though not at southern Eden Landing; other raptors are known to nest in or roost on power poles proximate to the area of the SBSP Restoration Project that could be disturbed or removed by construction activity.

Alternative Eden A (No Action). Under Alternative Eden A (the No Action Alternative), no new action would be taken. Therefore, no impacts to nesting raptors would occur.

Alternative Eden A Level of Significance: No Impact

Alternative Eden B. Alternative Eden B would raise pond bottom elevations and breach the Bay and Inland Ponds, and excavate channels to connect the ponds to tidal flows and facilitate their conversion to tidal marsh habitat. This alternative would also raise and improve sections of levees for flood risk management, restoration purposes, or to support a recreational trail. Alternative Eden B would also create habitat islands and add habitat transition zones, add a long section of recreation trail and a viewing platform. (Construction impacts within the ponds and in the tidal marsh habitats adjacent to the ponds are described in more detail in Impacts 3.5-1 and 3.5-2.)

As noted above, (burrowing owls and harriers excluded) raptor habitat is generally trees, buildings, or other taller structures. Other than power lines and towers, these habitat elements are largely absent from the Phase 2 project area at southern Eden Landing, which reduces the potential for impacts on most raptors. There are two PG&E distribution lines that run through the project area and electrical towers to support them. One of these lines runs along the northern border of southern Eden Landing parallel to and south of the OAC. It would be removed because its only use was to power a pump that would be removed as part of the project. The other line cuts across the Southern Ponds and would remain with some improvements to the concrete foundations of the towers to keep the metal tower legs out of the water.

Implementation of the levee modifications, channel excavations, and other habitat or infrastructure improvements could potentially impact nesting raptors through noise and visual disturbance. The recreation trail could also impact nesting raptors because – depending on which of the three routes is chosen, it may run near grassy areas, uplands, or developed areas that are suitable raptor nesting and foraging habitat (see Impact 3.5-18 for full discussion on recreation and public access impacts).

There is no known burrowing owl habitat nearby, so this species is not likely to be affected, but there could be noise-related disturbances to raptors from general construction activities and also when fill material is driven into the project staging areas in haul trucks.

To minimize this impact, work would be done outside of the nesting season to the extent practicable. If work were to occur during the nesting season, pre-construction surveys would be conducted to identify any nesting raptors within 500 feet of the project construction areas (or an agency-approved distance); burrowing owl surveys would follow the CDFW protocol, as provided in *Staff Report on Burrowing Owl* (CDFG 2012). Should any nesting raptors be identified, nest locations would be recorded, and an agency-approved buffer would be established for working in the area. If construction cannot be timed to avoid nesting raptors and they are identified during pre-construction surveys, a biological monitor would be present to monitor disturbance to any nesting birds. With the implementation of these measures, the impact of Alternative Eden B to nesting raptors would be less than significant.

Alternative Eden B Level of Significance: Less than Significant

Alternative Eden C. Alternative Eden C would raise pond bottom elevations and breach the Bay Ponds, and excavate channels to connect the Bay Ponds to tidal flows to facilitate their conversion to tidal marsh habitat. Meanwhile, the Inland and Southern Ponds would be retained and enhanced as managed ponds for a range of wildlife needs. This alternative would also raise and improve sections of levees for flood risk management, restoration purposes, or to support a recreational trail. Alternative Eden C would also create habitat islands and add habitat transition zones, and add the same long section of recreation trail and a viewing platform described above as well as a loop trail to the Alvarado Salt Works site and bridges over the OAC and ACFCC.

The impacts from habitat conversion, construction disturbance, and recreational trail use would be similar to those proposed under Alternative Eden B, except they would be in different locations, and those associated with trail use would greater due to the additional constructed elements (see Impact 3.5-18 for full discussion on recreation and public access impacts). The operation of water control structures is manual and done by a single staff member, which should provide little disturbance to any raptors nearby. Construction work on the PG&E infrastructure could disturb raptors.

The avoidance and minimization measures described for Alternative Eden B would be applied to reduce impacts to nesting raptors. With the implementation of these measures, the impacts to nesting raptors would be less than significant.

Alternative Eden C Level of Significance: Less than Significant

Alternative Eden D. With regard to potential impacts on nesting raptors or their habitat in the Phase 2 project area at southern Eden Landing, Alternative Eden D would be similar to Alternative Eden C in the short and medium term and similar to Alternative Eden B in the long term. With implementation of the avoidance and minimization measures described above, the impacts to nesting raptors would be less than significant.

Alternative Eden D Level of Significance: Less than Significant

Impact Summary

Phase 2 impacts and levels of significance are summarized in Table 3.5-4. The levels of significance are those remaining after implementation of program-level mitigation measures, project-level design features, the AMP, and other Reserve management documents and practices. The Biological Resources analysis required no project-level mitigation measures to reduce the impacts to a level that was less than significant.

Table 3.5-4 Phase 2 Summary of Impacts – Biological Resources

IMPACT	ALTERNATIVE EDEN A	ALTERNATIVE EDEN B	ALTERNATIVE EDEN C	ALTERNATIVE EDEN D
SBSP Impact 3.5-1: Potential construction-related loss of or disturbance to special-status, marsh-associated wildlife.	NI	LTS	LTS	LTS
SBSP Impact 3.5-2: Potential construction-related loss of or disturbance to nesting pond-associated birds.	NI	LTS	LTS	LTS
SBSP Impact 3.5-3: Potential reduction in numbers of small shorebirds using San Francisco Bay, resulting in substantial declines in flyway-level populations.	NI	LTS	LTS/B	LTS
SBSP Impact 3.5-4: Loss of intertidal mudflats and reduction of habitat for mudflat-associated wildlife species.	NI	LTS	LTS	LTS
SBSP Impact 3.5-5: Potential habitat conversion impacts to western snowy plovers.	NI	PS	LTS	LTS
SBSP Impact 3.5-6: Potential reduction in the numbers of breeding, pond-associated waterbirds (avocets, stilts, and terns) using the South Bay due to reduction in habitat, concentration effects, displacement by nesting California gulls, and other Project-related effects.	NI	LTS	LTS	LTS
SBSP Impact 3.5-7: Potential reduction in the numbers of non-breeding, salt-pond-associated birds (e.g., phalaropes, eared grebes, and Bonaparte's gulls) as a result of habitat loss.	NI	LTS	LTS	LTS

IMPACT	ALTERNATIVE EDEN A	ALTERNATIVE EDEN B	ALTERNATIVE EDEN C	ALTERNATIVE EDEN D
SBSP Impact 3.5-8: Potential reduction in foraging habitat for diving ducks, resulting in a substantial decline in flyway-level populations.	NI	LTS	LTS	LTS
SBSP Impact 3.5-9: Potential reduction in foraging habitat for ruddy ducks, resulting in a substantial decline in flyway-level populations.	NI	LTS	LTS	LTS
SBSP Impact 3.5-10: Potential habitat conversion impacts on California least terns.	NI	LTS	LTS	LTS
SBSP Impact 3.5-11: Potential loss of pickleweed-dominated tidal salt marsh habitat for the salt marsh harvest mouse and salt marsh wandering shrew and further isolation of these species' populations due to breaching activities and scour.	NI	LTS/B	LTS/B	LTS/B
SBSP Impact 3.5-12: Potential disturbance to or loss of sensitive wildlife species due to ongoing monitoring, maintenance, and management activities.	LTS	LTS	LTS	LTS
SBSP Impact 3.5-13: Potential effects of habitat conversion and pond management on steelhead.	LTS	LTS/B	LTS/B	LTS/B
SBSP Impact 3.5-14: Potential impacts to estuarine fish.	NI	LTS/B	LTS/B	LTS/B
SBSP Impact 3.5-15: Potential impacts to piscivorous birds.	NI	LTS	LTS	LTS
SBSP Impact 3.5-16: Potential impacts to dabbling ducks.	NI	LTS	LTS/B	LTS
SBSP Impact 3.5-17: Potential impacts to harbor seals.	NI	LTS/B	LTS/B	LTS/B
SBSP Impact 3.5-18: Potential recreation-oriented impacts to sensitive species and their habitats.	NI	LTS	LTS	LTS
SBSP Impact 3.5-19: Potential impacts to special-status plants.	NI	NI	NI	NI
SBSP Impact 3.5-20: Colonization of mudflats and marsh plain by non-native *Spartina* and its hybrids.	LTS	LTS	LTS	LTS
SBSP Impact 3.5-21: Colonization by non-native *Lepidium*.	NI	LTS	LTS	LTS
SBSP Impact 3.5-22: Increase in exposure of wildlife to avian botulism and other diseases.	NI	LTS	LTS	LTS
SBSP Impact 3.5-23: Potential impacts to bay shrimp populations.	NI	LTS/B	LTS/B	LTS/B
SBSP Impact 3.5-24: Potential impacts to jurisdictional wetlands or waters.	NI	LTS	LTS	LTS
SBSP Impact 3.5-25: Potential construction-related loss of, or disturbance to, nesting raptors (including burrowing owls).	NI	LTS	LTS	LTS

Note: Alternative A is the No Action (No Project Alternative under CEQA).

B = Beneficial (NEPA only)

LTS = Less than Significant

NI = No Impact

The levels of significance for the impacts listed above assume that the Adaptive Management Plan and all program-level mitigation measures are integral components of the project and that management responses would be implemented based on ongoing monitoring and applied studies.

3.6 Recreation Resources

This section of the Draft Environmental Impact Statement/Report (EIS/R) describes the existing recreational resources within the project area for Phase 2 of the South Bay Salt Pond (SBSP) Restoration Project at Eden Landing Ecological Reserve (ELER, or Reserve). It then analyzes whether the project implementation would cause a substantial adverse effect on recreational resources. The information presented is based on a review of existing recreational resources within the Eden Landing Phase 2 project area and vicinity, including existing local agency bicycle/pedestrian trail plans, and other pertinent federal, state, and local regulations. The analysis of the project's potential impacts to recreational resources is presented for each alternative. The program-level mitigation measures described in Chapter 2, Alternatives, would be implemented as part of this project. Therefore, this section only identifies additional mitigation measures as needed, related to recreation resources.

Appendix G, Public Access and Recreation Resources Technical Appendix, contains a detailed discussion of recreation resources for the Phase 2 project area and provides information on the following topics:

- Regulatory framework;
- Existing recreation and public access facilities;
- Recreation regulatory permit requirements;
- Phase 1 recreation and public access features;
- Phase 2 public access and recreation alternatives;
- Consistency with regional recreation resources plans;
- Projected trail use; and
- Recreation and public access design guidelines.

3.6.1 Physical Setting

Methodology

The development of the baseline conditions, significance criteria, and impact analysis in this section is commensurate to and reliant on the analysis conducted in the 2007 SBSP Restoration Project Final Environmental Impact Statement/Report (2007 Final EIS/R). It is incorporated by reference. The baseline conditions specific to the Eden Landing Phase 2 project area is based on the current conditions of these areas.

Regional Setting

The Phase 2 project area includes the ponds in the southern half of Eden Landing. All of the Eden Landing pond complex ponds are owned and managed by the California Department of Fish and Wildlife (CDFW) as part of the ELER. In between some of the CDFW-owned lands, the Alameda County Flood Control and Water Conservation District (ACFCWCD) owns a stormwater channel, a stormwater detention basin, and a section of existing high marsh. There are also some private inholdings – including ponds, levees, and other lands – owned by Cargill Inc. (Cargill). To the east of the project area itself, there are other parcels and facilities owned by the Union Sanitary District (USD), a private landfill operation company, and a mix of other private owners.

Project Setting

Existing recreation and public access facilities in and near the project area (as well as facilities proposed by projects or general, master, or recreation plans other than the SBSP Restoration Project) are described in Table 3.6-1. This list is not meant to be comprehensive or exhaustive of every public access opportunity or recreational resource, but it is intended to give a sense of the existing conditions regarding recreation and public access in the vicinity of Eden Landing. Figure 3.6-1 shows the existing and planned public access routes for the Bay Trail. Figure 3.11-1 shows transit services and bike paths in the vicinity of southern Eden Landing. The Bay Trail is discussed in more detail in Section 3.6.2, Regulatory Setting.

Table 3.6-1 Existing Public Access and Recreation at or near Eden Landing

Recreational Features	Nearby Locations
Trails	▪ Phase 1 of the SBSP Restoration Project added year-round and seasonal trails inside of northern Eden Landing (a Bay Trail spur). ▪ The nearest segment of the Bay Trail on open space is in northern Eden Landing over a mile to the north of the Phase 2 project area. City streets used for Bay Trail access are approximately 0.5 mile to the east. ▪ The Alameda Creek Regional Trail is an EBRPD-managed pair of trails on both levees of the ACFCC, one of which is on the southern border of Eden Landing. ▪ The Coyote Hills Regional Park is to the south of the ACFCC and includes several trails.
Boating	Phase 1 of the SBSP Restoration Project added a launch for non-motorized boats (e.g., kayaks) along Mt. Eden Creek, which drains into San Francisco Bay from northern Eden Landing.
Access Points and Staging Areas	Northern Eden Landing ▪ The Phase 1 actions (trails and non-motorized boat launch in northern Eden Landing) are connected to the existing Bay Trail parking lot and staging area. Alameda Creek Regional Trail ▪ There is a parking area and a trail access point on the north side of the Alameda Creek Regional Trail east of the Phase 2 project area. This access includes equestrian staging. Eden Shores Access ▪ Bay Trail connector via Eden Shores neighborhood, Hayward
Historic Features	▪ Oliver Salt Works at the northwest end of Pond E13 ▪ Union City Salt Works at the northwest end of Pond E6
Waterfowl Hunting	CDFW allows limited waterfowl hunting, currently 10 annually specified days within the season, by issuing written permission at a hunter check station for certain portions of Eden Landing.
Dog Use	Dogs are allowed for retrieval use in hunting areas during waterfowl hunting season. Dogs are allowed on leash on the Alameda Creek Regional Trail. Dogs are precluded from certain sections of the Bay Trail, including areas within Eden Landing, per EBRPD regulations.
Equestrian Use	Horses are allowed on Alameda Creek Regional Trail.
Fishing	Fishing by boat is allowed in the Bay and sloughs and from shore in areas designated by CDFW.
Active Recreation	▪ Gordon E. Oliver Eden Shores Park, Hayward, located 1,000 feet east of a project proposed trail, has basketball, tennis, playfields, parking area and picnic facilities ▪ Sea Breeze Park, Union City, located 700 feet east of the project proposed Route 3 and 3,000 feet east of Routes1 and 2, has ball fields, play area, picnic facilities and parking area.

ACFCC = Alameda Creek Flood Control Channel
EBRPD = East Bay Regional Park District
CDFW = California Department of Fish and Wildlife
SBSP = South Bay Salt Ponds

LEGEND

- Eden Landing Phase 2 Project Area
- Southern Eden Landing Ponds
- Bay Trail (Existing - On Street)
- Bay Trail (Existing - Off Street)
- Bay Trail (Planned)
- Other Trail (Existing)
- Existing Salt Works Site
- Existing Trailhead
- Existing Parking Lot

4/17/2017 **User** alexander.remar | **Map location** \\Oakland.na.aecomnet.com\Oakland\Projects\GIS\Projects\South Bay Salt Ponds 2016\02 Maps\02 Map Production and Reports\EdenEIR\Recreation\Figure3.6-1 Recreation.mxd

AECOM
South Bay Salt Pond Restoration Project

Figure 3.6-1
Bay Trail and Other Recreation Features

3.6.2 Regulatory Setting

This section provides a summary of the regulatory framework pertaining to the public access and recreation features of the SBSP Restoration Project. More complete descriptions of recreation-related plans and policies of federal, state, and local agencies are described in Appendix G.

Regulatory and Managerial Framework

California Department of Fish and Wildlife

CDFW is the owner of Eden Landing, and as an ecological reserve, the Eden Landing pond complex is governed by laws and directives that guide public use and recreation on State ecological reserves. The State's ecological reserve system was authorized by the California Legislature in 1968 and is designed to conserve areas for the protection of rare plants, animals, and habitats, and to provide areas for education and scientific research. The reserves also provide recreational opportunities for wildlife viewing, outdoor education, hunting, and fishing, subject to regulation. At ELER, bicycles and horseback riding are allowed only on designated trails.

Aside from the existing Alameda Creek Regional Trail segment at the western end of the Alameda Creek Flood Control Channel (ACFCC), recreation use currently within the Phase 2 area is generally limited to seasonal waterfowl hunting (currently 10 days per year with written permission from CDFW).

Bay Conservation and Development Commission

The San Francisco Bay Conservation and Development Commission (BCDC) is a California state planning and regulatory agency with regional authority over the San Francisco Bay (or Bay) and the Bay's shoreline. The McAteer-Petris Act (California Government Code 66600 – 66682) is the key legal provision under California state law that preserves San Francisco Bay from indiscriminate filling and to regulate shoreline public access. The McAteer-Petris Act requires that any person or governmental agency wishing to place fill in, or to extract materials exceeding 20 dollars in value from, or make any substantial change in use of any land, water, or structure within the area of BCDC's jurisdiction must secure a permit from BCDC.

BCDC administers the *San Francisco Bay Plan* (Bay Plan) for the long-term use of the Bay, reviews applications for projects that fall within BCDC jurisdiction. With respect to the ELER, the Bay Plan states: "The California Department of Fish and Game manages and proposes to restore 5,500 acres of salt ponds and adjacent tidal habitats added to the Eden Landing Ecological Reserve to a mix of tidal and managed pond habitats. The proposed restoration use would be in accord with Bay Plan policies and provides excellent wildlife compatible recreation opportunities."

Association of Bay Area Governments Bay Trail

The Bay Trail, administered by Association of Bay Area Governments (ABAG), is a planned recreational corridor that, when complete, would encircle San Francisco Bay and San Pablo Bay with a continuous network of bicycling and hiking trails. It would connect the shoreline of all nine Bay Area counties, link 47 cities, and cross major toll bridges in the region. To date, approximately 310 miles of the alignment – over 60 percent of the Bay Trail's ultimate length – have been completed.

Segments of the Bay Trail are located near the Eden Landing Phase 2 project area, including a segment of the Bay Trail that was added in northern Eden Landing as part of Phase 1 of the SBSP Restoration

Project. Many of the public access facilities that would be constructed as part of the project could connect to these existing trail segments. Some new trail segments being considered as part of Phase 2 actions are not currently segments of the Bay Trail but could be considered to become part of the Bay Trail network in the future, if appropriate.

The Bay Trail Plan includes a shoreline spur to the Bay at Old Alameda Creek (OAC), as well as a bridge across ACFCC to access Coyote Hills Regional Park (see Figure 3.6-1). The spur trail on Mt. Eden Creek, constructed under Phase 1 of the SBSP Restoration Project, was included along the managed ponds in northern Eden Landing to provide a similar experience for trail users and because it was anticipated that a spur trail along OAC would be problematic because of potential tidal breaches and adjacent species conservation concerns. Although not a regulatory agency, ABAG has an interest in the project as a partner and potential funding source. The Bay Trail Plan has been prepared in consultation with local governments, and is periodically amended and updated in consultation with them. BCDC considers the Bay Trail Plan in making determinations as to whether a project is consistent with their policies on public access.

San Francisco Bay Area Water Trail (Water Trail)

The Water Trail was authorized by the San Francisco Bay Area Water Trail Act, which was signed into law in September 2005. The Water Trail is a network of access sites (or "trailheads") that enables people using non-motorized small boats or other beachable sailcraft, such as kayaks, canoes, dragon boats, and stand-up paddle and windsurf boards, to safely enjoy single and multiple-day trips around San Francisco Bay.

Non-motorized boat launch facilities constructed in the Phase 1 actions at northern Eden Landing are designated as existing Water Trail Sites; they have launch facilities that are used for non-motorized small boat access and are open to the public. No additional Water Trail facilities are planned for Phase 2.

East Bay Regional Park District

The East Bay Regional Park District (EBRPD) is a system of public parks and trails in Alameda and Contra Costa counties. The EBRPD owns and manages over 120,000 acres of open space, protected habitat, and other parklands. The 2013 District Master Plan provides the guidance for future expansion of parks trails and services. Policies relevant to Phase 2 public access at Eden Landing are discussed in Appendix G.

EBRPD is the owner and operator of Coyote Hills Regional Park, located south of Eden Landing, and Hayward Regional Shoreline, located north of Eden Landing. EBRPD also operates the Alameda Creek Regional Trail under an agreement with the ACFCWCD and manages the Bay Trail "spine" in the northern Eden Landing area, but not the "spur" trails and non-motorized launch. At the present time, no formal arrangements exist between CDFW and EBRPD for maintenance and shared responsibility of trails and other public access features in the Phase 1 or Phase 2 project area.

Alameda County Flood Control and Water Conservation District

The ACFCWCD is part of Alameda County Public Works Agency, responsible for maintaining the area's flood control facilities, including channels, levees, pumps and infrastructure related to flood control and stormwater management. The ACFCWCD provides planning, design and inspection of flood control projects, maintains flood control infrastructure, reviews new developments and supports watershed enhancement and education. ACFCWCD does not construct or manage trails, and would need to enter into an agreement with another entity for trail management, making them responsible for construction, maintenance, and operations of the trail, including patrol policing and emergency response. Flood control channels and creeks in the Eden Landing Phase 2 project area are in Zone 3A.

Some of the proposed trail route options are located on County lands, including levees, access roads, ponds and the 20-tide gate structure crossing on OAC.

Cargill, Inc.

Cargill owns and operates lands in the Phase 2 project area including Cargill Pond 3C (CP3C), Cal Hill and Turk Island. Proposed Trail Route 2 would be located on the existing Cargill owned levee only if an agreement with Cargill and all stakeholders were reached, or if they no longer owned the property.

City of Hayward

ELER is within the city limits of Hayward, as are portions of County-owned lands west of Westport Way. Facilities that are located within the Reserve would not be subject to regulation by the City, since they are State-owned lands.

City of Union City

The eastern and southern part of the Eden Landing Phase 2 project area, including County and Cargill-owned lands, is within the Union City limits. In 2004, Union City (Alta Planning 2004) commissioned a study analyzing the feasibility of a Bay Trail segment from the EBRPD trail in northern Alameda County to the Alameda Creek Regional Trail. Some of the trails proposed for the Phase 2 actions include portions of the trail segments analyzed as part of this feasibility study, including the northern Eden Landing segment along OAC, and portions of Trail Route Option 3. In addition to access at Union City Boulevard, the study identified five community connecters, "*an important part of the Bay Trail system, ensuring that residents of neighborhoods located near the primary Bay Trail alignment have ready access to the regional trail network*." These community connecters were located at the OAC south levee, Horner Street, Whipple/Benson Road, Mariner Park, and Westport Way. These routes have been incorporated into the City's Bicycle and Pedestrian Plans, as well as those of Alameda County.

Depending on the alignment selected, recreation and public access improvements completed as part of the project (but outside the boundaries of the Reserve) may be subject to permit review and approval by Union City.

Alameda Countywide Bicycle and Pedestrian Plans

The Alameda County Transportation Commission (ACTC) plans, funds and delivers transportation programs to expand and improve access and mobility in Alameda County. They administer funds from local state and federal funding sources, including Measures B and BB, vehicle registration, Clean Air funds, State Transportation Improvement Program and federal programs.

The Countywide Bicycle and Pedestrian Plans (ACTC 2012a, 2012b) adopted by ACTC identify specific investments and strategies to maintain, manage, and improve the non-motorized transportation network in Alameda County. The bicycle and pedestrian plans incorporate the ABAG Bay Trail Plan components (ACTC central and south) within the Eden Landing Phase 2 project area, including the Bay Trail spine (with notation that final alignment is to be determined), a spur trail on OAC, and a bridge across ACFCC.

The plans also include a new connection to the city street network in the general vicinity of the 20-tide gate structure.

Coordination with ACTC would be needed if the project partnered with them for funding of bicycle and pedestrian improvements.

Accessibility Regulations

Access to project facilities by people of all abilities is subject to regulations and standards set forth by the United States Access Board (https://www.access-board.gov/). The United States Access Board is an independent federal agency that promotes equality for people with disabilities, and develops and maintains design criteria for the built environment. The United States Access Board has developed standards for facilities as part of the Americans with Disabilities Act (ADA), which ensures access to the built environment for people with disabilities. The ADA Standards establish design requirements for the construction and alteration of facilities subject to this law. These enforceable standards apply to places of public accommodation, commercial facilities, and state and local government facilities.

In California, the State has adopted a set of design regulations for accessible facilities that incorporate both State mandates and federal ADA standards. These provisions are contained in the California Code of Regulations, Title 24, Part 2, California Building Code (CBC). CBC contains building design and construction requirements relating to fire and life safety, structural safety, and access compliance. The 2016 CBC became effective on January 1, 2017 and is updated every 3 years.

Recreation and public access facilities that are built as part of Phase 2 would need to comply with Title 24 and ADA accessibility regulations. This will be reviewed as part of permitting actions for project construction.

Recreation-Related Review and Permits

Proposed recreation components may be subject to various state and federal regulations that would require approvals and/or permits for proposed recreation and public access development. Table 3.6-2 provides a summary of the types of permits or agreements that may be required to carry out specific construction or maintenance activities associated with recreation and public access development.

Table 3.6-2 Recreation-Related Regulations and Permit Summary

Administering Agencies	Design Review/Agreement/Permit	Regulation
USFWS	Issues “no effect” or “not likely to affect” letter.	Consultation with USACE under Section 7
	Protects against destruction of migratory bird nests and possession of migratory bird “parts.”	Migratory Bird Treaty Act
	Federal Lead Agency	National Environmental Policy Act
CDFW	State Lead Agency; Project Applicant	California Environmental Quality Act
BCDC	Conducts reviews and issues permits for filling, dredging, substantial change in use, or development activities within the shoreline band, at the salt ponds or managed wetland areas, including recreation-related projects.	McAteer-Petris Act
RWQCB	Issues water quality certification.	Section 401 of the Clean Water Act, Porter-Cologne Water Quality Act

Administering Agencies	Design Review/Agreement/Permit	Regulation
USACE	Issues Nationwide or Individual Permit to perform dredge or fill activities in the Waters of the U.S., including wetlands.	Section 404 of Clean Water Act
	Issues permit to create obstructions or fill of navigable waters of the U.S. (bridges)	Section 10 of the Rivers and Harbors Act of 1899
	Alteration of federal flood control levees (Bridge at ACFCC)	Section 408, Operations and Maintenance
United States Coast Guard	Navigable waterways (bridges)	Section 9, Coast & Harbors Act
EBRPD	Review if project partner for implementation: consultation regarding temporary closure of EBRPD trails, if needed	Master Plan and Trails Plan consistency
Alameda County	Construction of facilities on County-owned land (Responsible Agency)	Grading, encroachment, use agreement
Union City and/ or Hayward	Construction of facilities on land within the City limits that is not within County or State owned lands (Responsible Agency)	Grading, encroachment, use agreement possible design or recreation review

ACFCC = Alameda Creek Flood Control Channel

BCDC = San Francisco Bay Conservation and Development Commission

CDFW = California Department of Fish and Wildlife

EBRPD = East Bay Regional parks District

RWQCB = San Francisco Bay Regional Water Quality Control Board

USACE = United States Army Corps of Engineers

USFWS = United States Fish and Wildlife Service

California Department of Fish and Wildlife

As the primary landowner, CDFW will be the primary internal review and approval agency for public access and regulatory facilities implemented on its lands. Currently, there is no public access within the Eden Landing Phase 2 project area, except when hunting on specified dates with access from the OAC trail. South of the Reserve boundaries public access is provided on the Alameda Creek Regional Trail segment at the western end of the ACFCC.

Hunting. Since the acquisition in 2003, CDFW has permitted limited waterfowl hunting on specified dates (currently 10 days annually between November and January, providing entry by written permission from CDFW at a hunter check station) within the ELER lands in the Phase 2 area, as well as areas north of OAC that were part of the Phase 1 actions. Restoration actions within the Eden Landing Phase 2 project area would change the use and configuration of the current pond system, affecting the physical area available for such recreation activities, and/or the character of the recreation experience. For instance, managed ponds provide the best conditions for waterfowl hunting, so an increase in tidal ponds may reduce the physical area available for waterfowl hunting.

Only a portion of the southern Eden Landing ponds (those within the “Open Hunt Zone”) is currently open to hunting. With implementation of Phase 2 actions, there could be a considerable loss of hunting opportunities in those managed ponds that transition to tidal marsh habitat. Managed ponds at northern Eden Landing would remain, and hunting opportunities would continue to be available in those managed ponds and existing tidal areas. North Creek marsh in northern Eden Landing, which has been open to full tidal action for approximately 10 years, has been a popular waterfowl hunting area, as are fully tidal areas within OAC, and the outboard Whale’s Tail Marsh and mouth of Mount Eden Creek areas. More isolated marsh areas are accessed by hunters using small boats or kayaks, while some remaining berms and perimeter levees provide access by foot for hunting along and within such tidal areas.

Where existing blinds are removed to facilitate Phase 2 restoration activities, installation of new blinds (to facilitate hunting) by CDFW would be consistent with Reserve policies in areas where the use or management changes. Should access to the disabled access blind cease due to project design, it would be relocated to a similar location to provide an equivalent recreation experience, where feasible and available. Relocated blinds could reduce hunter access for others or contribute to overcrowding if quotas remain the same.

Public Access. For other recreation facilities added as part of Phase 2 implementation, use and operation would be prescribed by the managing authority and regulatory permit conditions. For instance, for portions of any trail designated as Bay Trail "spine" (the primary segment connecting Pond 20B in north Eden Landing with the Alameda Creek Regional Trail), it is expected that bicycles would be allowed, and the trail would be open year-round with the exception of waterfowl hunt days. As is the current practice, the Bay Trail spine would be closed to general use on waterfowl hunt days (currently 10 days per year) to ensure public safety. In addition, hunters are allowed to drive on portions of the Bay Trail spine to reach areas more remote from the sole entry allowed at the hunter check station. Any other trails (such as those that provide point access) might be similarly subject to seasonal closures or other restrictions. Equestrian use, which is allowed on the EBRPD's ACFCC trail, may be regulated or restricted within the Phase 2 area. Management of dog use would likely be coordinated with policies on adjacent non-Reserve trails that connect to any new trail constructed for Phase 2.

Bay Conservation and Development Commission

BCDC would have jurisdiction in the Eden Landing Phase 2 recreation and public access components and administer permit conditions related to their authority, as appropriate. As discussed above, a BCDC permit is required for filling, dredging, and substantial change in use of land, water, or structures within the area of BCDC's jurisdiction. Typical BCDC permit conditions include requirements for public access and other improvements, as related to the construction, installation, use, and maintenance of public access areas. Permit conditions might also include making a commitment to ongoing management and monitoring of public access improvements. Recreation and public access facilities would be evaluated for compliance with the State's climate change policies, including sea-level rise.

Recreation and public access facilities included in Phase 2 actions would be evaluated by BCDC for compliance with Bay Plan and ABAG Bay Trail Plan and policies. Where a proposed alignment does not fully comply with policies such as sea-level rise, alternate design strategies may be appropriate; these are discussed in Section 7 of the Public Access and Recreation Resources Technical Appendix (Appendix G), and may include features such as:

- Constructing a trail footprint of sufficient width to allow raising the trail in the future (and have a trail with sufficient functional width).
- Reserving additional lands on the sides of unimproved trail for dedicated future trail improvements.
- Dedicating an alternate alignment where the trail would be located in the future. For instance, according to the Reserve Manager, the Mt. Eden Creek spur trail is intended to replace the ABAG Bay Trail planned spur trail along OAC out to the Bay at Whale's Tail Marsh.

Trails on Alameda County or Cargill Lands

Some of the trail options being evaluated would be placed on lands not owned by CDFW. This includes the trail connection from northern Eden Landing to the Phase 2 area, as well as portions of several trail routes at the perimeter of the Phase 2 area. For those routes to be implemented, the owners of those parcels (e.g., Cargill, Alameda County) would have to sell, donate or enter into an agreement with the lead agency or implementing entity for public access, such as easement, memorandum of understanding or license agreement, for trail construction, use and/or management. The landowners would also review and approve of the designs, plans, and other details.

Depending on the location of the proposed recreation and public access facilities located outside of the ELER (e.g., those on private and/or City or County –owned lands), local and regional jurisdictions may have regulatory review authority. In addition, the lead agency may partner with local or regional entities (e.g., EBRPD) to execute specific recreation-related agreements for implementation of public access components. Depending on the location and type of facilities to be built, agencies that may have review and/or permit requirements over proposed recreational components include the cities of Hayward and/or Union City, EBRPD and Alameda County.

3.6.3 Proposed Recreation and Public Access Facilities

The Phase 2 project area at Eden Landing includes all eleven CDFW-owned ponds in the southern half of Eden Landing; the levees surrounding each pond; the fringing marsh outside of these levees; the ACFCWCD-owned storm water detention ponds and high marsh, portions of the OAC channel, the northern levee of the ACFCC, and some Cargill-owned levees bordering CDFW's ponds. A USD outflow pipe and East Bay Discharge Authority (EBDA) treated wastewater force main immediately adjacent to the border of Eden Landing is also included in the project area, as well as connections to Alameda County Water District's (ACWD) Aquifer Reclamation Program (ARP) wells. Existing Pacific Gas and Electric (PG&E) power transmission and distribution lines are also included in the project area. Recreation and public access facilities are evaluated that would be located on lands owned by ACFCWCD and Cargill, as well as construction access that would occur across land owned by USD, Union City, and Alameda County.

The Eden Landing Phase 2 Action Alternatives propose restoration, flood management, and recreation/ public access activities in the southern half of Eden Landing. Existing trails, trailheads, access points and viewing platforms in the surrounding areas that are not within the project area would remain unchanged; however, some existing trail facilities may be subject to temporary closure or relocation during project construction.

The Action Alternatives focus on different restoration and flood risk management options: (1) restoring the entire area to predominantly tidal marsh; (2) restoring a mix of tidal marsh and managed ponds; and (3) a two-stage restoration that would restore the entirety of southern Eden Landing to tidal marsh with an adaptive management process. Three recreation and public access route options are evaluated within the context of the Action Alternatives. The proposed recreation and public access features would construct a segment of the Bay Trail spine through southern Eden Landing to close an existing gap in the Bay Trail. The recreation and public access features would provide access to existing parks and trails by adding two local connector trails, and would also provide interpretive amenities. The new recreation and public access facilities would provide public access to CDFW lands that would not occur without the project.

At a minimum, the Action Alternatives include construction of a Bay Trail spine segment to provide partial-to-complete closure of a gap in the Bay Trail. This trail is proposed along one of three routes being evaluated in the Action Alternatives. Additional spur trails could also be implemented, as shown in Alternative Eden C; these trails would not be considered the primary Bay Trail spine.

Two construction access points have been identified to accommodate site construction, via the Horner/Veasy Street access, and via Westport Way in the vicinity of Sea Breeze Park. The SBSP Restoration Project intends to coordinate with EBRPD, the City of Union City, and other adjacent landowners (including USD and ACFCWCD) regarding these access points as "community connections" that would provide ongoing public access connections through agreement with the underlying property owners. Although physical improvement of the access roads or trails for construction purposes (such as leveling, widening and/or surfacing) may be necessary, it is anticipated that physical improvements needed to convert this access for trail use will be minimal, such as signage and entry gates.

The proposed recreation and public access features are shown in Chapter 2, Alternatives.

Alternative Eden A (No Action)

Under Alternative Eden A, no new public access or recreation features would be completed. Existing trails, the non-motorized boat launch, and other features in northern Eden Landing would be retained and managed by CDFW, as would the EBRPD's Alameda Creek Regional Trail along the north and south ACFCC levees. The latter of these would continue to be separately maintained by EBRPD. Seasonal hunting in portions of Eden Landing would continue. The existing Bay Trail spine would continue to have a gap between the current trail near the Eden Shores development (along the eastern edge of northern Eden Landing) and the Alameda Creek Regional Trail adjacent to ACFCC and Coyote Hills Regional Park. See Figures 2-3 and 3.6-1 for the location of existing trails.

Recreation and Public Access Components Included in all Action Alternatives

Each of the Action Alternatives includes extending the Bay Trail from the existing trail in northern Eden Landing near the Eden Shores development to the southeast corner of Pond E6C. The Bay Trail would extend approximately 16,000 feet from the junction of Pond NCMP and Pond 20B, south and east along the border of ELER, across the 20-tide gate structure in the OAC channel and on the ACFCWCD levee near Veasy Street and USD into southern ELER. It would then continue on CDFW levees to the southeast corner of Pond E6C. There would be no restoration, levee improvements or flood risk management measures implemented in the northern ponds associated with completion of this trail segment. Fencing, infrastructure or other improvements may be needed to protect ACFCWCD facilities, as discussed in Appendix G**.**

The existing levees in this portion of northern Eden Landing are at elevations 7 to 9 feet (North American Vertical Datum of 1988 or NAVD88) for interior levees, and 10 feet along OAC, with a crest width of 9 to 12 feet. The USD/ACFCWCD levee is at elevation 14 to 16 feet (NAVD88) with a surfaced width of 12 feet or more. Levees on the east side of Ponds E5 and E6 are at elevations 12 feet (NAVD88) and above, with a minimum crest width of at least 12 feet, and the east side of Pond E4C is at elevation 11 feet (NAVD88) with a surfaced width of 6 feet or less.

Trail Route Options. From this location, the trail would continue on one of three routes:

- Route 1: CDFW Property only; 7,400 linear feet; to be placed on existing or improved levees.

- Route 2: CDFW & Cargill Property (subject to sale, easement, or use agreement with CDFW or another cooperating partner); 10,500 linear feet; to be placed on the eastern and southern levees of the Southern Ponds, where they wrap around the CP3C and Cal Hill or provide access to Turk Island.
- Route 3: CDFW & Alameda County Property; approximately 5,200 linear feet; to be placed on the CDFW-owned levee on the eastern side of Pond E4C and then route onto County lands to the east onto existing sidewalks in Union City at Westport Way. The eastern portion of this trail would be located on 1,000 feet of existing 10 to 12 foot-wide access road to be improved for trail use, terminating at Westport Way, at approximate elevation 7 to 8 feet.
- Each of the Action Alternatives would include one new viewing platform on the Alameda Creek Regional Trail.
- Each of the Action Alternatives would include improvements to the project construction access roads at two locations to allow neighborhood access to the trail.

This section describes each of these route options within the context of the restoration and flood management alternatives being evaluated.

Route 3 Modifications. During the scoping process for the Phase 2 project at southern Eden Landing, an additional trail segment for Route 3 was under consideration. As discussed above, Route 3 includes a segment that connect from the bridge over the ACFCWCD channel, around Pond E4C, and then along the 1,000 feet of improved access road to Westport Way. From there, however, an additional trail segment would have turned south through County-owned lands located behind houses on Monterey Drive, and wrap around to Union City Boulevard. The trail would have used Union City Boulevard sidewalks for about 700 feet, and then ACFCWCD access roads (at elevation 9 feet [NAVD88], with a width of at least 8 to 10 feet) for about 3,000 feet until it connected with the Alameda Creek Regional Trail.

This route was identified as the preferred alignment in the Union City Bay Trail Feasibility Study, with the caveat that this segment could be one of the most challenging, with potential wetland/biological impacts, berm/fill geotechnical and structural issues, right of way ownership, and cost, including either extensive fill and retaining wall, or construction of a boardwalk behind Monterey Drive (estimated at 1.4 to 2.9 million in 2005 dollars). Due to the range of potential environmental issues and costs associated with this segment, Route 3 was subsequently shortened to terminate at Westport Way. The additional trail segment (south of Westport Way) would not be precluded if implemented as a future, separate project by local agencies, but would not be implemented as part of Phase 2 actions.

Alternative Eden B

Alternative Eden B focuses on restoring much of the Phase 2 area to tidal marsh. In this alternative, the existing levee along the eastern edge of the project area would be raised and improved, as would the levees along the northern and western edges of CP3C. Levees would also be improved for habitat separation purposes along the western edge of Pond E1C and the southern edge of Pond E6C. Trails south of OAC would be located on levees improved for habitat or flood risk management purposes, and would be constructed of sufficient width to comply with Bay Trail guidelines, with a minimum top width of 18 feet. See Figure 2-4 for the proposed trails in Alternative B.

Recreation/Public Access Alternative Eden B, Route 1

Minimum trail width: 18 feet (south of OAC) **Trail elevation:** minimum 12 feet (south of OAC)

Route B1 includes continuation of the Bay Trail from its current trail within the Phase 1 area on existing CDFW and Alameda County facilities 16,000 feet to the southeast corner of Pond E6C.

From there, it would continue an additional 7,400 feet southwesterly on the improved habitat levees, terminating at the Alameda Creek Regional Trail east of the J-ponds. One 300-foot long pedestrian bridge would be constructed crossing the J-ponds at the southwestern tip of Pond E6C. One viewing platform with interpretive exhibits would be constructed along the Alameda Creek Regional Trail.

Anticipated shoreline views would be predominantly of tidal marsh, with water views expected at OAC and at the Alameda Creek Regional Trail terminus.

Recreation/Public Access Alternative Eden B, Route 2

Minimum trail width: 18 feet (south of OAC) **Trail elevation:** minimum 12 feet (south of OAC)

Route B2 includes continuation of the Bay Trail from its current trail within the Phase 1 area on existing CDFW and Alameda County facilities 16,000 feet to the southeast corner of Pond E6C.

From there, it would continue an additional 10,500 feet south and west along Pond E4C improved levee, west/south along CP3C levee and connect with the Alameda Creek Regional Trail on the west side of Cal Hill (owned by Cargill). One 250-foot long pedestrian bridge would be constructed crossing the J-ponds at the southeastern tip of Pond E6C. One viewing platform with interpretive exhibits would be constructed along Alameda Creek Regional Trail.

Anticipated shoreline views would be predominantly of tidal marsh, with water views expected at OAC and at the Alameda Creek Regional Trail terminus.

Recreation/Public Access Alternative Eden B, Route 3

Minimum trail width: 8 to 10 feet (south of OAC) **Trail elevation:** 7 to 8 feet

Route B3 includes continuation of the Bay Trail from its current trail within the Phase 1 area on existing CDFW and Alameda County facilities 16,000 feet to the southeast corner of Pond E6C.

From there, it would continue south along Pond E4C improved levee, then east along an existing access road that terminates at Westport Way. No new Bay Trail facilities would be built south of Westport Way. One viewing platform with interpretive exhibits would be constructed along Alameda Creek Regional Trail.

Anticipated shoreline views would include tidal marsh, managed lands, and landscaped urban areas, with water views expected at OAC and along the Alameda Creek Regional Trail.

Alternative Eden C

Alternative Eden C focuses on a combination of tidal marsh and permanently managed ponds. This would be accomplished by constructing a mid-complex levee bisecting the project area, with a habitat separation levee along a portion of the existing Bay shoreline. Trails would be located on existing and unimproved levees at current widths and elevations, except for a 1,000-foot long section west of Pond E1C. Where the trail is located adjacent to managed ponds or other habitat areas, operations and maintenance (O&M) agreements would be used to permit routine maintenance, however, the ability to provide maintenance and reconstruction may be constrained in the future due to potential wildlife or habitat disruption. See Figure 2-5 for the proposed trails in Alternative C.

Alternative Eden C includes several features for improved recreation and public access; these would be completed in addition to any of the Alternative Eden C trail route options:

- A 600-foot long bridge over ACFCC near Pond E2C to connect with the existing Bay Trail that continues to the south. This bridge would be high enough in the center to allow periodic channel dredging as well as high enough over its entire length to allow 100-year floods to pass beneath the bridge. The bridge would be intended to be accessible to pedestrians and bicycles and not necessarily by maintenance vehicles.
- A new Bay Trail spur trail to the former site of the Alvarado Salt Works. This spur trail would run along the northern edge of Pond E6 to a viewing platform and interpretive feature that would be included there to explain the history and the remnant structures there. The mid-complex levee would be built to the west of the former salt works site so that its degradation would not be accelerated. From this point, a 500-foot long bridge would cross over the OAC channel, and a parallel trail would run eastward, back to the Bay Trail spine, along the southern levees of Pond A8 and E6A to form a loop. The total length of this trail loop is approximately 13,500 feet.

Recreation/Public Access Alternative Eden C, Route 1

Minimum trail width: 8 feet (south of OAC) **Trail elevation:** minimum 8 to 9 feet

In addition to the recreation features described above, Route C1 includes continuation of the Bay Trail from its current trail within the Phase 1 area on CDFW and Alameda County facilities 16,000 feet to the southeast corner of Pond E6C.

From there, it would continue an additional 7,400 feet southwesterly on an existing levee, terminating at the Alameda Creek Regional Trail east of the J-ponds. One 300-foot long pedestrian bridge would be constructed crossing the J-ponds at the southwestern tip of Pond E6C. One viewing platform with interpretive exhibits would be constructed along Alameda Creek Regional Trail.

Trail improvements would include clearing, grading, and/or surfacing the existing levee surface as needed to be appropriate for trail use, but no levee reconstruction, widening or raising for the trail elevation would be completed, except for a 1,000-foot long section to be located on the improved levee west of Pond E1C. This route would be protected from flooding and sea-level rise impacts by the improved levee further west.

In some areas, the trail would be located on unimproved levees that may deteriorate over time, necessitating maintenance such as topping or reconstruction to provide usable trail width and elevation.

Anticipated shoreline views would be predominantly of managed ponds and the improved levee, with water views expected on the 1,000-foot long segment of improved levee, at OAC and at the Alameda Creek Regional Trail terminus.

Recreation/Public Access Alternative Eden C, Route 2

Minimum trail width: 8 to 10 feet (south of OAC) **Trail elevation:** minimum 8 to 9 feet

In addition to the recreation features described above, Route C2 includes continuation of the Bay Trail from its current trail within the Phase 1 area on CDFW and Alameda County facilities 16,000 feet to the southeast corner of Pond E6C.

From there, it would continue an additional 10,500 feet south and west along Pond E4C existing levee, west/south along the existing CP3C levee and connect with the Alameda Creek Regional Trail on the west side of Cal Hill (owned by Cargill). One 250-foot long pedestrian bridge would be constructed crossing the J-ponds at the southeastern tip of Pond E6C. One viewing platform with interpretive exhibits would be constructed along Alameda Creek Regional Trail.

Trail improvements would include clearing, grading, and/or surfacing the existing levee surface as needed to be appropriate for trail use, but no levee reconstruction, widening or raising for the trail elevation would be completed. This route would be protected from flooding and sea-level rise impacts by the improved levee further west.

In some areas, the trail would be located on unimproved levees that may deteriorate over time, necessitating maintenance such as topping or reconstruction to provide usable trail width and elevation.

Anticipated shoreline views would be predominantly of managed ponds, with water views expected at OAC and at the Alameda Creek Regional Trail terminus.

Recreation/Public Access Alternative Eden C, Route 3

Minimum trail width: 8 to 10 feet (south of OAC) **Trail elevation:** 7 to 8 feet

In addition to the recreation features described above, Route C3 includes continuation of the Bay Trail from its current trail within the Phase 1 area on CDFW and Alameda County facilities 16,000 feet to the southeast corner of Pond E6C.

From there, it would continue south along Pond E4C improved levee, then east along an existing access road that terminates at Westport Way. One viewing platform with interpretive exhibits would be constructed along Alameda Creek Regional Trail. This option would also include the bridge across ACFCC.

Trail improvements would include clearing, grading, and/or surfacing the existing land surface as needed to be appropriate for trail use, but no levee widening or raising for the trail would be completed. This route would be protected from flooding and sea-level rise impacts by the improved levee further west.

Anticipated shoreline views would include managed ponds, lands and landscaped urban areas, with water views expected at OAC and at the Alameda Creek Regional Trail terminus.

Alternative Eden D

Alternative Eden D provides a two-stage approach to tidal restoration, to be accomplished by constructing an improved habitat levee at the existing Bay shoreline, as well as a temporary levee bisecting the project area. In this alternative, the Inland and Southern Ponds are intended to eventually become salt marsh subject to tidal action but may be retained as managed ponds, if ongoing Adaptive Management Plan

(AMP) monitoring of pond-associated wildlife shows that it is necessary. A new habitat levee and habitat transition zone would be built at the existing Bay shoreline, but the existing levees that currently provide access to the western side of Eden Landing would be breached, and no public access or recreation facilities would be provided in that area. See Figure 2-6 for the proposed trails in Alternative D.

Recreation/Public Access Alternative Eden D, Route 1

Minimum trail width: 8 feet (south of OAC) **Trail elevation:** minimum 8 to 9 feet

Route D1 includes continuation of the Bay Trail from its current trail within the Phase 1 area on existing CDFW and Alameda County facilities 16,000 feet to the southeast corner of Pond E6C.

From there, it would continue an additional 7,400 feet southwesterly on an existing levee, terminating at the Alameda Creek Regional Trail east of the J-ponds. One 300-foot long pedestrian bridge would be constructed crossing the J-ponds at the southwestern tip of Pond E6C. One viewing platform with interpretive exhibits would be constructed along Alameda Creek Regional Trail.

Trail improvements would include clearing, grading, and/or surfacing the existing land surface as needed to be appropriate for trail use, but no levee reconstruction, widening or raising for the trail elevation would be completed.

In some areas, the trail would be located on unimproved levees that may deteriorate over time, necessitating maintenance such as topping or reconstruction to provide usable trail width and elevation.

Anticipated shoreline views would include managed ponds transitioning to tidal marsh, with water views expected at OAC and at the Alameda Creek Regional Trail terminus.

If Alternative Eden D1 is selected for implementation, it is likely that portions of the route along the existing J-ponds and E6C levees will eventually be lost due to settlement, deterioration and sea-level rise. The portion of the trail that is located on the temporary levee could be retained as a spur trail (this portion of the levee would need to be retained), and/or improvements considered to create a loop trail through Turk Island and along the improved levee along E1C.

Recreation/Public Access Alternative Eden D, Route 2

Minimum trail width: 18 feet (south of OAC) **Trail elevation:** minimum 12 feet

Route D2 includes continuation of the Bay Trail from its current trail within the Phase 1 area on existing CDFW and Alameda County facilities 16,000 feet to the southeast corner of Pond E6C.

From there, it would continue an additional 10,500 feet south and west along Pond E4C improved levee, west/south along CP3C levee (owned by Cargill) and connect with the Alameda Creek Regional Trail on the west side of Cal Hill (Cargill). These levees would be improved for flood risk management. One 250 foot long pedestrian bridge would be constructed crossing the J-ponds at the southeastern tip of Pond E6C. One viewing platform with interpretive exhibits would be constructed along Alameda Creek Regional Trail.

Anticipated shoreline views would be predominantly of managed ponds, transitioning to tidal marsh, with water views expected at OAC and at the Alameda Creek Regional Trail terminus.

Recreation/Public Access Alternative Eden D, Route 3

Minimum trail width: 8 to 10 feet (south of OAC) **Trail elevation:** 7 to 8 feet

Route D3 includes continuation of the Bay Trail from its current trail within the Phase 1 area on existing CDFW and Alameda County facilities 16,000 feet to the southeast corner of Pond E6C.

From there, it would continue south along Pond E4C improved levee, then east along an existing access road that terminates at Westport Way. One viewing platform with interpretive exhibits would be constructed along Alameda Creek Regional Trail.

Anticipated shoreline views would include managed lands transitioning to tidal marsh, and landscaped urban areas, with water views expected at OAC and at the Alameda Creek Regional Trail terminus.

3.6.4 Environmental Impacts and Mitigation Measures

Significance Criteria

The significance criteria for evaluating environmental impacts and mitigation measures related to recreation resources were developed in the 2007 Final EIS/R, from which this document tiers. For the purposes of this EIS/R, the project would cause a significant impact to recreational resources if it:

- Would not be consistent with regional and local laws and recreation plans including CDFW mission and regulatory requirements;
- Would not be consistent with existing recreational uses;
- Would substantially reduce recreational opportunities at existing facilities;
- Would substantially displace public recreation activities or opportunities and comparable recreation opportunities would not be available;
- Would cause an increase in the use of existing recreational facilities such that substantial physical deterioration of the facilities would occur or be accelerated; or
- Would include recreational facilities which might have an adverse physical effect on the environment.

Under the No Action Alternative, no new recreation and public access facilities would be constructed. Impact evaluations for the Action Alternative are evaluated based on the existing conditions described in Section 3.6.3 above, and not the proposed conditions that would occur under the No Action Alternative. This approach is consistent with California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) protocols for analyzing project impacts. In this case, the No Action Alternative represents the continuation of the current management actions provided for in the area and would continue to be subject to evaluation of future actions or actions taken under the AMP. Typical O&M practices would continue into the future.

As explained in Section 3.1.2, Environmental Setting and Impact Analysis, while both CEQA Regulations for Implementing NEPA and the CEQA Guidelines were considered during the impact analysis, impacts identified in this Draft EIS/R are characterized using CEQA terminology. Beneficial impacts (as defined by NEPA of the project are also identified. Please refer to Section 3.1.2 for a description of the terminology used to explain the evaluation and the significance determinations of the impacts.

Program-Level Evaluation

The 2007 Final EIS/R evaluated potential recreation impacts of three long-term program-level alternatives. Programmatic Alternative A would be the No Action Alternative. Programmatic Alternative B would be a 50/50 mix of tidal marsh and enhanced managed ponds called the Managed Pond Emphasis. Programmatic Alternative C would be a mix of 90 percent tidal marsh/10 percent managed pond called the Tidal Marsh Emphasis. The determination was made in the 2007 Final EIS/R that under the implementation of Programmatic Alternative C, there would be a less-than-significant impact to most recreation resources. Under CEQA, that alternative would result in less-than-significant impacts on the provision of new public access and recreation facilities, including the opening of new areas for recreational purposes and completion of the Bay Trail spine.

In the 2007 Final EIS/R, it was determined that Programmatic Alternatives B and C would provide public access and recreation in areas of the South Bay that never existed before, allowing recreation, education and informational interpretive opportunities. They would also allow for gaps in the Bay Trail spine to be closed and provide connection to existing trail segments outside the SBSP Restoration project area. These trail connections would provide more proximal access to the Bay, its shoreline and adjacent restored areas that would not be possible without the Project. These positive impacts from the Project provide considerable benefits to a large urbanized group of recreational and research-based visitors.

Consistency with Public Access Policies

Shoreline Access

Phase 2 actions would essentially move the Bay shoreline to the east, replacing some or all managed ponds with tidal marsh. Point access to the open bay shoreline will continue to be provided in all alternatives via the Alameda Creek Regional Trail, as well as the existing trails in northern Eden landing, created as part of Phase 1. Alternative Eden C would provide improved shoreline access with a loop trail at OAC.

Strategies to Address Sea-Level Rise for Public Access Facilities

Project trail components may be affected by future sea-level rise and storm activity during the life of the project. In such cases, regional policies indicate that public access facilities should:

- Be set back far enough from the shoreline to avoid flooding;
- Be elevated above expected flood levels;
- Be designed to tolerate flooding; or
- Employ other means of addressing flood risks.

Levees that are improved for flood risk management or habitat separation are currently proposed to be raised to a minimum elevation of 12 feet NAVD88 with a 12-foot crest width and at least 4:1 side slopes (in some alternatives, some improved levees also have habitat transition zones to assist in long-term sea-level rise adaptation). Some trail improvements are proposed to be located on existing unimproved levees, where improvements would include leveling and surfacing the levee top, but not raising or widening for trail purposes. Depending on the alternative, these levees and facilities may be landward of levees that are higher and or improved or otherwise are suitable as flood risk management infrastructure.

Levee improvements have been designed to provide equivalent levels of de facto flood protection for inland areas, as compared to the existing conditions, for southern Eden Landing. Project levees are not intended to protect against sea-level rise. To provide potential future adaptive management, such as raising a levee's top elevation where feasible and needed, some of the levees would need to have a wider footprint or be created at a higher elevation to allow for raising the trail elevation in the future with sufficient width. This may require steeper side slopes, a narrower trail surface, use of retaining walls, rails or other features in the future to ensure trail user safety. This is discussed in more detail in Appendix G.

Public Access and Impacts to Wildlife; Adaptive Management

A central theme to developing and implementing the overall SBSP project has been the concept of "adaptive management." Under an adaptive management approach, the outcomes of previously implemented restoration efforts and ongoing management actions are evaluated and analyzed, and the resulting information is used to address uncertainties, modify management, and/or to develop new strategies to lessen impacts and achieve better restoration results. This approach is particularly effective with regards to potential impacts of trail use on future wildlife, especially threatened and endangered species that would inhabit the restored ponds. The public access and wildlife compatibility studies conducted for the project have identified potential impacts from trail use in certain areas and on certain species, such as the endangered western snowy plover.

The programmatic portion of the 2007 Final EIS/R contained the following notation referring to certain trails and facilities along OAC and in southern Eden Landing: *"Denotes trails that were identified during the alternatives development process as being of particular concern to permitting agencies for potential to disrupt habitat."* These locations are where known threatened and endangered species occur and where important habitat exists for California Ridgway's rail, California black rail, salt marsh harvest mouse, and western snowy plover.

This notation indicated that the concerns of those agencies with respect to certain trails or recreational features may preclude the implementation of public access and recreation features that were represented conceptually in the 2007 Final EIS/R.

The public access alternatives evaluated as part of Phase 2 project actions has included extensive input from regulatory agencies as well as site-specific studies. All proposed trails are located on existing levees, and several project alternatives include the construction of habitat transition zones to increase habitat diversity. These features could provide a buffer between trails and areas that is expected to become habitat to sensitive species in the future.

The Eden Landing Phase 2 Action Alternatives were developed with a focus on habitat restoration that also provides flood risk management and overall habitat enhancement along with public access facilities. Of the more than 2,000 acres at southern Eden Landing site, recreation and public access features would directly impact approximately 7 to 10.8 acres (if all options shown in Alternative Eden C are implemented), as discussed in Appendix D. Additionally, several public access features shown in the 2007 Final EIS/R were eliminated, which would further reduce potential wildlife impacts due to human use.

Recreation and Public Access Features Not in Current Plan

The programmatic portions of the 2007 Final EIS/R included the following recreation and public access features that were not included in Phase 1 and are not included in the current plans for the Phase 2 actions:

- Wildlife viewing platform at the northwest corner of Pond E6A (in northern Eden Landing).
- Wildlife viewing platform within the Southern Ponds.
- Potential trail alignments along the north and west side of Pond E6C, rather than only on the east and south sides.
- Bay Trail alignment along the east side of Pond E4C and CP3C (instead, one proposed alignment has shifted further west and wraps around the Southern Ponds; another stays east and terminates at Westport Way).

The Action Alternatives under consideration for Phase 2 at Eden Landing include substitutes for some features that were not included in these alternatives. For example, there is a proposed wildlife viewing platform along the Alameda Creek Regional Trail adjacent to the Southern Ponds and not far from the location on the map of Programmatic Alternative C. Adjustments to portions of the Bay Trail spine through southern Eden Landing have been made to reflect constraints from the review of preliminary alternatives and updated restoration and flood risk management analyses. They would provide similarly enhanced access features to those shown in the 2007 Final EIS/R.

Consistency with Regional Planning Policies

Consistency with recreation and public access goals and policies as they relate to shoreline or waterfront access may vary depending on the habitat or flood risk management alternative initially selected as the preferred alternative or ultimately selected for implementation. Many of these policies include considerations for implementation feasibility, avoiding adverse impacts on wildlife, the selection of appropriate locations for public access features, or other constraints. Selection of recreation and public access features must be balanced with other project goals, and an alternative could be consistent with these policies even while not providing every public access feature shown in previous project documents. In addition, trail route options on lands that are not part of the Reserve may be precluded if the owners of those lands and/or other project partners do not agree to participate in construction and/or ongoing operations, maintenance and management. Permanent access arrangements, including agreements or easements may be necessary, and if such arrangements cannot be implemented, an alternate alignment would need to be provided in order to fully meet project and regulatory goals and policies for recreation and public access, including completion of the Bay Trail spine.

Recreation resources for the Action Alternatives and trail route options, and consistency with specific BCDC, ABAG Bay Trail and EBRPD policies, are discussed in Appendix G.

Project-Level Evaluation

Phase 2 Impact 3.6-1: Provision of new public access and recreation facilities, including the opening of new areas for recreational purposes and completion of the Bay Trail spine.

Alternative Eden A (No Action). Under Alternative Eden A, no new public access or recreation features would be completed. Existing trails and staging areas in northern Eden Landing, as well as the annual waterfowl hunt program would continue (see Figures 2-3 and 3.6-1 for the location of existing trails). EBRPD's Alameda Creek Regional Trail and staging area, as well as the non-motorized boat launch, and parks and trails within Union City, Hayward, and Fremont would also continue to be used and maintained separately.

The No Action Alternative would not be consistent with SBSP Restoration Project goals to provide recreation and public access. Public access as part of a future phase is not precluded at the southern Eden Landing ponds, but portions of a given location or trail alignment could be limited or precluded depending on future habitat conditions and resource management needs. This alternative also would not further the implementation of BCDC's Bay Plan and would be inconsistent with the ABAG Bay Trail Plan, EBRPD Master Plan, and the Bicycle and Pedestrian Plans of Alameda County and the Cities of Hayward and Union City, but would not preclude such actions.

Because Alternative Eden A would provide similar levels of recreation access in the southern Eden Landing ponds as existing conditions (primarily limited waterfowl hunting), impacts to public access and recreation facilities would be less than significant.

Alternative Eden A Level of Significance: Less than Significant

Alternative Eden B

Under Alternative Eden B, new recreation and public access facilities would be built on improved levees to connect the existing Bay Trail with Alameda Creek Regional Trail (see Figure 2-4 for the proposed trails in Alternative B). In addition, raised pond bottom elevations and restored tidal marsh and other habitats would enhance wildlife-viewing, consistent with regional public access policies to provide wildlife viewing opportunities.

During the preliminary design phase of this project, hydrodynamic modeling showed a need to add breaches and sections of lowered levees along the northern boundary of the Bay Ponds (i.e., the southern levee of the OAC where a Bay Trail spur had been proposed by others) in order to obtain adequate draining and filling of the ponds. This makes retention of these levees in their current condition incompatible with restoring tidal marshes while maintaining current levels of flood risk management, unless bridges and/or boardwalks are provided for the spur trail to span the breaches, and this would likely be prohibitively expensive and could adversely affect sensitive species. Given these constraints, Alternative Eden B is consistent with policies regarding providing maximum feasible public access and wildlife- and water-viewing opportunities along the OAC.

Alternative Eden B neither includes nor precludes installation of a bridge over the ACFCC. That bridge was included as a potential feature in the 2007 Final EIS/R as a way to offset losses from what was then thought to be a necessary permanent closure of the existing Alameda Creek Regional Trail on the northern side of the ACFCC levee. However, the hydraulic modeling and analysis conducted since then indicates that there is no need to close that trail segment. All existing trails in the Eden Landing area would be retained.

In general, the public access and recreation components proposed in Alternative Eden B would increase public access. It would substantially increase public access to tidal marsh areas and provide new community connector trails. This alternative would provide additional facilities that currently do not exist. This alternative does not include the bridge over ACFCC, but does not preclude future implementation by another project proponent at this location, or at another location that would facilitate Bay Trail gap closure.

Alternative Eden B1. Under Alternative Eden B1, new recreation and public access facilities would be built on levees that would be improved for habitat or flood risk management. The trail would connect the existing Bay Trail with Alameda Creek Regional Trail. In addition, restored tidal marsh and other habitats would add and enhance wildlife-viewing and water-viewing opportunities. Alternative Eden B1 would be consistent with regional recreation and public access policies by adding the Bay Trail spine through southern Eden Landing and adding a viewing platform. This alternative does not preclude future implementation of a bridge over the ACFCC by another project proponent. The public access and recreation components proposed would increase public access and provide additional facilities that currently do not exist. Therefore, impacts to public access and recreation facilities would be less than significant.

Alternative Eden B1 Level of Significance: Less than Significant

Alternative Eden B2. Under Alternative Eden B2, new recreation and public access facilities would be built on improved flood risk management levees on Reserve and other lands to connect the existing Bay Trail with Alameda Creek Regional Trail. In addition, restored tidal marsh and other habitats near trails would enhance wildlife-viewing opportunities. Alternative Eden B2 would be consistent with regional recreation and public access policies by adding the Bay Trail spine through southern Eden Landing and adding a viewing platform. As above, this alternative does not preclude future implementation of a bridge over the ACFCC by another project proponent. The public access and recreation components proposed would increase public access and provide additional facilities that currently do not exist, making it less than significant.

Alternative Eden B2 Level of Significance: Less than Significant

Alternative Eden B3. Under Alternative Eden B3, new recreational and public access facilities would be built that would increase recreational access in the area. Some public access facilities would be built on improved levees, or on existing access roads. As above, this alternative does not preclude future implementation of a bridge over the ACFCC by another project proponent.

Alternative Eden B3 would not complete the Bay Trail spine within the project area; rather this alternative would include a route that terminates at existing streets. This would not be fully consistent with regional public access and recreation policies and project goals to complete the Bay Trail spine through the project area as described in the 2007 Final EIS/R. Portions of this alternative would provide water views and access to what would become the new intertidal shoreline, which is consistent with external plans and policies for public access.

Implementation of the proposed facilities would not preclude completion of additional public access facilities in the future, but they would not be part of this project phase, nor implemented by the lead agency, and therefore, the project goal of completing the Bay Trail spine would not be met. The public access and recreation components proposed would increase public access and provide additional facilities that currently do not exist, but does not include completion of the Bay Trail spine, leaving a 1 mile gap in the trail.

Although Alternative Eden B3 would not compare favorably to other route options because it does not meet the project goal of completing the Bay Trail spine, the proposed public access and recreation components would increase public access and provide additional facilities that currently do not exist. Therefore, impacts to public access and recreation facilities would be less than significant.

Alternative Eden B3 Level of Significance: Less than Significant

Alternative Eden C

Under Alternative Eden C, there would be new public access and recreational facilities that would increase recreational facilities in the project area (see Figure 2-5 for the proposed trails in Alternative C). Most of the new trails would be located on existing levees that would not need to be improved for habitat or flood risk management purposes, since this alternative features a flood risk management levee that bisects the site further west. Some of the proposed Bay Trail spine would be located on existing unimproved levees that may deteriorate over time, and may need periodic repair to remain functional, with sufficient width for an accessible trail meeting regional trail standards. The Bay Trail would be located east of the improved levee, so wildlife-viewing opportunities would primarily be of managed ponds. Alternative Eden C provides more shoreline viewing opportunities and additional Bay access via the OAC loop trail.

During the preliminary design phase of this project, hydrodynamic modeling showed a need to add breaches and sections of lowered levees along the northern boundary of the Bay Ponds (i.e., the southern border of the OAC where a Bay Trail spur had been proposed) in order to obtain adequate draining and filling of the ponds. This makes retention of these levees in their current condition incompatible with restoring tidal marshes to the Bay Ponds while maintaining current levels of flood risk management. Extensive bridges and/or boardwalks to span the breaches would be prohibitively expensive and such trails and facilities could adversely affect sensitive resources. Levee lowering is not proposed along the northern boundary of the Inland Ponds.

Alternative Eden C would add the most public access features of any of the Action Alternatives by including installation of a bridge over ACFCC (which is part of the conceptual plan for the Bay Trail in Alameda Countywide Bicycle and Pedestrian Plans) and expanded water viewing opportunities along OAC as well as the trail and additional viewing platform at the Alvarado salt works site. This is consistent with the provision of additional trails and facilities as described in the 2007 Final EIS/R. Unlike Alternatives Eden B and Eden D, the spur trail and the bridge over the OAC would be along managed ponds in northern Eden Landing and connect to the Inland Ponds which would be retained as managed ponds and protected from daily tidal flows by the enhanced mid-complex levee to the west. The retention of these managed ponds allows Alternative Eden C to potentially provide more feasible public access than Alternatives Eden B or Eden D.

Alternative Eden C1. Under Alternative Eden C1, the trail would run between managed ponds on existing unimproved levee berms. Alternative Eden C1 would be consistent with external policies to maximize feasible public access. It includes installation of a bridge over ACFCC and expanded water viewing opportunities along OAC. This is consistent with the provision of additional trails and facilities as described in the 2007 Final EIS/R.

The public access and recreation components proposed would increase public access. This alternative would provide additional facilities that currently do not exist. Implementation of these proposed facilities would not preclude completion of additional public access facilities in the future, and the impact would be less than significant under CEQA and beneficial under NEPA.

Alternative Eden C1 Level of Significance: Less than Significant (CEQA); Beneficial (NEPA)

Alternative Eden C2. Under Alternative Eden C2, the trail would be located on Reserve levees and other existing levees owned by others, where such access could become available. Alternative Eden C2 would be consistent with external policies to maximize feasible public access. It includes installation of a bridge over ACFCC and expanded water viewing opportunities along OAC. This is consistent with the provision of additional trails and facilities as described in the 2007 Final EIS/R. The trail would not be located near the new shoreline, and some portions of the trail would not include open Bay shoreline views.

The public access and recreation components proposed would increase public access. This alternative would provide additional facilities that currently do not exist. Implementation of these proposed facilities would not preclude completion of additional public access facilities in the future, and the impact would be less than significant under CEQA and beneficial under NEPA.

Alternative Eden C2 Level of Significance: Less than Significant (CEQA); Beneficial (NEPA)

Alternative Eden C3. Under Alternative Eden C3, the trail would be located on Reserve levees and an access road, ending at Westport Way in Union City. Alternative Eden C3 would not complete the Bay Trail spine within the project area; rather this alternative would include parts of the route and terminate at existing streets. This would not be fully consistent with regional public access and recreation policies and project goals to complete the Bay Trail spine through the project area as described in the 2007 Final EIS/R. Portions of this alternative would provide water views and access at OAC and ACFCC, which is consistent with external plans and policies for public access.

Implementation of the proposed facilities would not preclude completion of additional public access facilities in the future, but they would not be part of this project phase, nor implemented by the lead agency, and therefore, the project goal of completing the Bay Trail spine would not be met. The public access and recreation components proposed would increase public access and provide additional facilities that currently do not exist, but does not include completion of the Bay Trail spine, leaving a 1 mile gap in the trail.

Although Alternative Eden C3 would not compare favorably to other route options because it does not meet the project goal of completing the Bay Trail spine, the proposed public access and recreation components would increase public access and provide additional facilities that currently do not exist. Therefore, impacts to public access and recreation facilities would be less than significant.

Alternative Eden C3 Level of Significance: Less than Significant

Alternative Eden D

Under Alternative Eden D, new recreation and public access facilities would be built on improved levees and/or existing unimproved levees to connect the existing Bay Trail with Alameda Creek Regional Trail (see Figure 2-6 for the proposed trails in Alternative D). Some levees (those in the Inland Ponds) would be improved to an elevation of 10 feet NAVD88 prior to the placement dredge materials. Restored tidal marsh and other habitats would enhance wildlife- and water-viewing opportunities.

During the preliminary design phase of this project, hydrodynamic modeling showed a need to add breaches and sections of lowered levees along the northern boundary of the Bay Ponds (i.e., the southern border of the OAC where a Bay Trail spur had been proposed) in order to obtain adequate draining and filling of the ponds. This makes retention of these levees in their current condition incompatible with restoring tidal marshes while maintaining current levels of flood risk management. Extensive bridges and/or boardwalks to span the breaches would be prohibitively expensive and such trails and facilities could adversely affect sensitive resources. Given these constraints, Alternative Eden D is consistent with policies regarding providing maximum feasible public access and wildlife- and water-viewing opportunities along the OAC.

Alternative Eden D neither includes nor precludes installation of a bridge over the ACFCC. That bridge was included as a potential feature in the 2007 Final EIS/R as a way to offset losses from what was then thought to be a necessary permanent closure of the existing Alameda Creek Regional Trail on the northern side of the ACFCC levee. However, the hydraulic modeling and analysis conducted since then indicates that there is no need to close that trail segment. All existing trails in the Eden Landing area would be retained.

In general, the public access and recreation components proposed in Alternative Eden D would increase public access. It would substantially increase public access to tidal marsh areas and provide new community connector trails. This alternative would provide additional facilities that currently do not exist. This alternative does not include the bridge over ACFCC, but does not preclude future implementation by another project proponent at this location, or at another location that would facilitate Bay Trail gap closure.

This alternative would increase access to tidal marsh areas and managed ponds, but portions of the trail would not provide long-term resilience to tidal flows that may eventually be introduced there. There would be a potential need to raise the levee or relocate a segment of the Bay Trail (i.e., a segment of Route 1 between Pond E6C and the ACFCC) at some point in the future, which may affect adjacent restored habitat.

Alternative Eden D1. Under Alternative Eden D1, new recreation and public access facilities would be built on an improved flood risk management levee as well as an existing unimproved levee along managed ponds that would transition to tidal marsh habitat. Facilities would enhance water- and wildlife-viewing opportunities. This alternative does increase access to tidal marsh areas, to be considered part of the new shoreline, but portions of the trail would not be designed for resilience, with the potential need to relocate further inland in the future.

In general, this alternative would provide additional recreational facilities that currently do not exist. Implementation of these proposed facilities would not preclude completion of additional public access facilities in the future. However, a permanent, long-term Bay Trail spine would not be ensured, and may require relocation in the future. A segment of Route 1 between Pond E6C and the ACFCC would not be constructed on improved levees and therefore the trail may be subject to intermittent coastal inundation at some point in the future after removal of the temporary mid-complex levee. In addition, restored habitat adjacent to this trail segment could constrain or prohibit implementation of new public access in the future.

The placement of the Bay Trail spine on unimproved levees, at a width and elevation inconsistent with regional public access policies, may necessitate additional repairs or improvements in the future, the construction of which could cause adverse environmental effects, since the trail would be located adjacent to habitat created for wildlife use. However, the project would not preclude completion of additional public access facilities in the future and the trail could be relocated to reestablish the trail connection if coastal inundation closes the trail and if reconstruction of this trail segment is precluded due to habitat and consequent permitting challenges.

Although Alternative Eden D1 would not compare favorably to other route options because a portion of the trail segment between Pond E6C and the ACFCC would not provide long-term resilience to tidal flows, the proposed public access and recreation components of Alternative Eden D1 would increase public access and provide additional facilities that currently do not exist. Therefore, impacts to public access and recreation facilities would be less than significant.

Alternative Eden D1 Level of Significance: Less than Significant

Alternative Eden D2. Under Alternative Eden D2, new recreation and public access facilities would be built on improved levees constructed for flood risk management to connect the existing Bay Trail with Alameda Creek Regional Trail. Wildlife-viewing would be of managed ponds transitioning to tidal influence (representing the "new" shoreline) and provide wildlife viewing opportunities.

This alternative would increase public access and provide additional facilities that currently do not exist. Implementation of these proposed facilities would not preclude completion of additional public access facilities in the future. Some public access features proposed under Alternative Eden C may not be completed as part of Alternative Eden D2, but substantial new features are added with the opportunity to add or improve more in the future as part of this project or others. Because of this, the impacts to public access and recreation facilities would be less than significant.

Alternative Eden D2 Level of Significance: Less than Significant

Alternative Eden D3. Under Alternative Eden D3, the trail would be located on Reserve levees and access roads and would end at Westport Way. Alternative Eden D3 would not complete the Bay Trail spine but would instead add much of it and then reroute the trail on to existing streets. This would not be fully consistent with project goals to complete the Bay Trail spine. Portions of this alternative may not be considered shoreline access or provide shoreline views.

Implementation of the proposed facilities would not preclude completion of additional public access facilities in the future, but they would not be part of this project phase, nor implemented by the lead agency, and therefore, the project goal of completing the Bay Trail spine would not be met. The public access and recreation components proposed would increase public access and provide additional facilities that currently do not exist, but does not include completion of the Bay Trail Spine, leaving a 1 mile gap in the trail.

Although Alternative Eden D3 would not compare favorably to other route options because it does not meet the project goal of completing the Bay Trail spine, the proposed public access and recreation components would increase public access and provide additional facilities that currently do not exist. Therefore, impacts to public access and recreation facilities would be less than significant.

Alternative Eden D3 Level of Significance: Less than Significant

Phase 2 Impact 3.6-2: Permanent removal of existing recreational features (trails) in locations that visitors have been accustomed to using and that would not be replaced in the general vicinity of the removed feature.

Alternative Eden A (No Action). Under Alternative Eden A, there are currently no existing recreational features (trails) that are in use or would be permanently removed. Existing trails on levees adjacent to the project area would not be affected. Hunting opportunities would be unchanged. There would be no impact.

Alternative Eden A Level of Significance: No Impact

Alternative Eden B. Under Alternative Eden B, there are currently no existing recreational features (trails) that are in use that would be permanently removed. Existing trails in northern Eden Landing and the Alameda Creek Regional Trail would remain. The limited waterfowl hunting (currently 10 days specified annually) would continue, though there would be a loss of available managed ponds for hunting. Hunting would be constrained during construction, particularly at the Bay and Inland Ponds during dredge material placement. Hunting would also be constrained post-construction due to public use of some trail segments, unless seasonal closure of those trail segments is used to avoid potential safety concerns. The overall land area available for hunting could remain similar to its present state if additional portions of the Hunt Closed Zone were added to the Open Hunt Zone. Regardless, within the larger area, managed ponds at northern Eden Landing would remain, and hunting opportunities would continue to be available in nearby managed ponds and existing tidal areas. North Creek marsh in northern Eden Landing, which has been open to full tidal action for approximately 10 years, has been a popular waterfowl hunting area, as are fully tidal areas within OAC, and the outboard Whale’s Tail Marsh and mouth of Mount Eden Creek areas. More isolated marsh areas are accessed by hunters using small boats or kayaks, while some remaining berms and perimeter levees provide access by foot for hunting along and within such tidal areas. Because hunting opportunities exist in tidal areas and because alternative locations are available for hunting in the northern Eden Landing managed ponds, impacts would be less than significant.

Alternative Eden B Level of Significance: Less than Significant

Alternative Eden C. Under Alternative Eden C, there are currently no existing recreational features (trails) that are in use that would be permanently removed. Existing trails in northern Eden Landing and the Alameda Creek Regional Trail would remain. The limited waterfowl hunting (currently 10 days specified annually) would continue, though there would be a loss of available managed ponds for hunting. Hunting would be constrained during construction, particularly at the Bay Ponds during dredge material placement. Hunting would also be constrained post-construction due to public use of some trail segments, unless seasonal closure of those trail segments is used to avoid potential safety concerns. The overall land area available for hunting could remain similar to its present state if additional portions of the Hunt Closed Zone were added to the Open Hunt Zone. Regardless, within the larger area, managed ponds at northern Eden Landing would remain, and hunting opportunities would continue to be available in managed ponds and existing tidal areas. Because hunting opportunities exist in tidal areas and because alternative locations are available for hunting in the northern Eden Landing managed ponds, impacts would be less than significant.

Alternative Eden C Level of Significance: Less than Significant

Alternative Eden D. Under Alternative Eden D, there are currently no existing recreational features (trails) that are in use that would be permanently removed. Existing trails in northern Eden Landing and the Alameda Creek Regional Trail would remain. The limited waterfowl hunting (currently 10 days specified annually) would continue, though there would be a loss of available managed ponds for hunting. Hunting would be constrained during construction, particularly at the Bay and Inland Ponds during dredge material placement. Hunting would also be constrained post-construction due to public use of some trail segments, unless seasonal closure of those trail segments is used to avoid potential safety concerns. The overall land area available for hunting could remain similar to its present state if additional portions of the Hunt Closed Zone were added to the Open Hunt Zone. Regardless, within the larger area, managed ponds at northern Eden Landing would remain, and hunting opportunities would continue to be available in managed ponds and existing tidal areas. Because hunting opportunities exist in tidal areas and because alternative locations are available for hunting in the northern Eden Landing managed ponds, impacts would be less than significant.

Alternative Eden D Level of Significance: Less than Significant

Phase 2 Impact 3.6-3: 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.

Alternative Eden A (No Action). Under Alternative Eden A, no new public access or recreation features would be completed. Existing trails adjacent to the area would continue to be used and separately maintained, and limited waterfowl hunting, currently 10 days specified annually, would continue. There would be no increase in recreation use as a result of this alternative, and there would be no impacts on adjacent recreational facilities.

Alternative Eden A Level of Significance: No Impact

Alternative Eden B. Under Alternative Eden B, additional recreation and public access facilities would provide a partial or complete connection (depending on the route that is feasible to construct) between two existing trail segments with trailhead parking areas (i.e., the Alameda Creek Regional Trail and staging area, and ELER Bay Trail and staging area). In addition, two construction access roads, at Veasy Street and Westport Way, would be improved to provide neighborhood access to the Bay Trail.

Use of the new trail and public access facilities by visitors may increase use and demand for existing trailhead facilities. The projected increase in recreation use as a result of this alternative is estimated to be approximately 150 to 250 additional users per day during peak use periods. New trail segments and viewing facilities are proposed, and this incremental increased use is minimal, and within the capacity of existing facilities.

Provision of two new neighborhood access connections could also reduce potential deterioration of existing trailheads. This is consistent with local and regional bicycle, pedestrian, and trail plans.

This alternative would not substantially increase recreation use or cause substantial physical deterioration of adjacent recreational facilities and the impact would be less than significant.

Alternative Eden B Level of Significance: Less than Significant

Alternative Eden C. Under Alternative Eden C, additional recreation and public access facilities would provide a partial or complete connection (depending on the route that is feasible to construct) between two existing trail segments with trailhead parking areas (i.e., the Alameda Creek Regional Trail and staging area, and ELER Bay Trail and staging area). In addition, two construction access roads, at Veasy Street and Westport Way, would be improved to provide neighborhood access to the Bay Trail.

Use of the new trail and public access facilities by visitors may increase use and demand for existing trailhead facilities. The projected increase in recreation use as a result of this alternative is estimated to be approximately 150 to 250 additional users per day during peak use periods. New trail segments and viewing facilities are proposed, and this incremental increased use is minimal, and within the capacity of existing facilities.

Provision of two new neighborhood access connections could also reduce potential deterioration of existing trailheads. This is consistent with local and regional bicycle, pedestrian, and trail plans.

This alternative would not substantially increase recreation use or cause substantial physical deterioration of adjacent recreational facilities and the impact would be less than significant.

Alternative Eden C Level of Significance: Less than Significant

Alternative Eden D. Under Alternative Eden D, additional recreation and public access facilities would provide a partial or complete connection (depending on the route that is feasible to construct) between two existing trail segments with trailhead parking areas (i.e., the Alameda Creek Regional Trail and staging area, and ELER Bay Trail and staging area). In addition, two construction access roads, at Veasy Street and Westport Way, would be improved to provide neighborhood access to the Bay Trail.

Use of the new trail and public access facilities by visitors may increase use and demand for existing trailhead facilities. The projected increase in recreation use as a result of this alternative is estimated to be approximately 150 to 250 additional users per day during peak use periods. New trail segments and viewing facilities are proposed, and this incremental increased use is minimal, and within the capacity of existing facilities.

Provision of two new neighborhood access connections could also reduce potential deterioration of existing trailheads. This is consistent with local and regional bicycle, pedestrian, and trail plans.

This alternative would not substantially increase recreation use or cause substantial physical deterioration of adjacent recreational facilities and the impact would be less than significant.

Alternative Eden D Level of Significance: Less than Significant

Phase 2 Impact 3.6-4: Result in substantial adverse physical impacts associated with the provision of new or physically altered park and recreational facilities, or result in the need for new or physically altered park and recreational facilities, the construction of which could cause significant environmental impacts.

Alternative Eden A (No Action). Under Alternative Eden A, no new public access or recreation facilities would be provided under Phase 2. Therefore, there would be no physical impacts associated with construction of park and recreational facilities.

Alternative Eden A Level of Significance: No Impact

Alternative Eden B. Under Alternative Eden B, depending on the route chosen, recreation and public access facilities would be provided on existing levees, levees improved for habitat separation and/or flood risk management purposes, and existing access roads. Physical impacts associated with construction of recreation and public access facilities would include minor grading and surfacing of levees, construction of a viewing platform at the edge of an existing trail, as well as bridge crossings, with associated physical impacts. Facilities would be designed, where reasonable and feasible, to meet policies for sea-level rise resiliency and Bay Trail guidelines.

The physical impacts associated with implementing trail-related levee improvements and bridge crossings are addressed in the geology/soils, hydrology, water quality, biology, and other resource sections of this EIS/R. Trail-related levee improvements and bridge crossings represent less than 0.5 percent of the total project area. According to the respective sections on geology/soils, hydrology, water quality, and biology, the project has been designed to fully address physical impacts associated with all project components.

Improved recreation and public access facilities, including completion of a new trail segment, and additional viewing facilities is consistent with SBSP Restoration Project goals and other project plans and policies to provide public access, resilient design, and wildlife viewing opportunities. None of these new or alternative public access and recreation features would adversely affect any others or necessitate other new features, the construction of which would bring adverse environmental impacts. The impacts would be less than significant.

Alternative Eden B Level of Significance: Less than Significant

Alternative Eden C. Under Alternative Eden C, depending on the route chosen, recreation and public access facilities would be provided on existing levees, levees improved for flood risk management purposes, and access roads. Physical impacts associated with construction of recreation and public access facilities would include minor grading and surfacing of levees, construction of a viewing platform at the edge of the existing trail, as well as bridge crossings, with associated physical impacts. Depending on existing levee condition, trails may not meet all Bay Trail design guidelines such as trail width, or other public access plans and policies.

Trails located on unimproved levees would often be located inland of other levees improved to provide flood risk management. These facilities would not be exposed to tidal flows and would therefore be afforded this protection. The bridges at OAC and ACFCC would be high enough to allow for periodic channel dredging and 100–year floods.

The physical impacts associated with implementing trail-related levee improvements and bridge crossings are addressed in the geology/soils, hydrology, water quality, and biology resource sections of this EIS/R. Trail-related improvements and bridge crossings represent less than 0.5 percent of project area. According to the respective sections on geology/soils, hydrology, water quality, and biology, the project has been designed to fully address physical impacts associated with all project components.

Improved recreation and public access facilities, including completion of a new trail segment, and additional viewing facilities are consistent with SBSP Restoration Project goals and public access plans and policies, including resilient design and wildlife viewing opportunities. In addition, Alternative Eden C would provide more public access features than other Action Alternatives, including two bridges for enhanced connectivity with regional trails, and a loop trail to an interesting cultural site (historic salt works).

Although the improved mid-complex levee may be subject to wave run-up, overtopping, and ponding at some point in the future, levees improved to 12 feet NAVD88 would generally be protected from coastal inundation during interim future conditions.[1] Because the mid-complex levee provides a barrier to coastal inundation, landward trails located along the Bay and Inland Ponds would also be protected from damaging flows. The backside levee of Ponds E5 and E6 is generally above 11 feet NAVD88, while the backside levee at Pond E6C is at 9 feet NAVD88 or more. The lowest trail segment is between Pond E6C and the ACFCC with a low point in the trail at elevation of 8 feet NAVD88. Although sections of the trail would likely be closed during large storm and tidal events, substantial damage that would necessitate relocation of the trail is not anticipated.

Because the project has been designed to fully address physical impacts associated with all project components including trail-related levee improvements and bridge crossings, and because physically altered park and recreational facilities would not be required as a result of the project, impacts would be less than significant.

Alternative Eden C Level of Significance: Less than Significant

Alternative Eden D. Under Alternative Eden D, depending on the route chosen, recreation and public access facilities would be provided on existing levees, levees improved for flood risk management purposes, or access roads. Physical impacts associated with construction of recreation and public access facilities would include minor grading and surfacing of levees, the construction of a viewing platform along the existing trail, as well as bridge crossings, with associated physical impacts. Facilities would not initially be designed to be consistent with sea-level rise resiliency policies, but nor would they be exposed to tidal flows for a period of years following initial completion of full tidal restoration of the Bay Ponds. When the Inland Ponds are no longer needed as open water, seasonal or managed ponds and the next stage of tidal restoration is constructed, additional improvements may be needed. It is also possible that, under Alternative Eden D, tidal flows would never be introduced to the Inland Ponds or Southern Ponds, if AMP studies show the need to retain these areas or portions thereof as managed ponds to support migratory and/or resident waterbirds.

The physical impacts associated with implementing trail-related levee improvements and bridge crossings are addressed in the geology/soils, hydrology, water quality, and biology resource sections of this EIS/R. Trail-related levee improvements and bridge crossings represent less than 0.5 percent of project area. According to the respective sections on geology/soils, hydrology, water quality, and biology, the project has been designed to fully address physical impacts associated with all project components.

Some facilities would not be designed to be consistent with sea-level rise policies for resilient design and/or Bay Trail design guidelines. For example, depending on existing levee condition, trails may not meet ABAG Bay Trail design guidelines such as trail width. However, in this alternative, those facilities would be located behind a temporary levee that would protect the trail from being exposed to tidal flows, and therefore the trail is afforded this protection.

[1] Based on best estimates for sea-level rise in the Bay, which is an increase of 0.9 feet for interim future conditions in 2050 (projections range from 0.4 to 2 feet) (National Research Council 2012), coastal stillwater elevations for mean higher high water (MHHW), the 10-year and 100-year events (Appendix D), and estimates for wave run-up.

Under Alternative Eden D, though the routes are the same as Alternative Eden B, there would be somewhat less improvement of the levees supporting those routes. Thus, some of the levees on which the trail would be constructed are in fair to poor condition, and may need additional maintenance over time. This trail would be located inland of a mid-complex levee that may be breached many years subsequent to tidal restoration of the Bay Ponds, as much as a decade or more, to return tidal flows to the Inland Ponds. If that occurs, this levee and the associated trail may need to be further raised and improved.

If Route 1 is selected and if the staged marsh restoration in the Inland Ponds proceeds, that trail would potentially bisect tidal marsh with the potential for marsh and wildlife disruption, as discussed in the Section 3.5, Biological Resources. The placement of the Bay Trail spine on the unimproved levees between Pond E6C and the ACFCC, at a width and elevation inconsistent with various public access policies, may necessitate ongoing maintenance, additional repairs or improvements, or other new features, the construction of which could cause adverse environmental impacts, since the trail would be located adjacent to habitat created for wildlife use, or would need to be relocated elsewhere.

Although Pond E6C levees would be improved to an elevation of 10 feet NAVD88 prior to placement of dredge material in the Inland Ponds, some levees along the Route 1 trail segment between Pond E6C and the ACFCC may be subject to regular coastal inundation at some point in the future when the temporary mid-complex levee is breached or removed. Under interim future conditions, inundation could occur for short periods of time every 2 weeks at the lowest point in the trail, making this section of the trail unusable without future modifications.[2] Levees improved to 12 feet NAVD88 would rarely be overtopped.

Adaptive management would be used to address trail resiliency prior to the development of substantial adverse effects under future conditions, such as regular trail damage from frequent overtopping, frequent trail closures, or dangerous trail conditions. Adaptive management measures could include widening and raising the trail or relocating the trail along the improved levees in alternate locations of southern Eden Landing. Adverse effects to wildlife and other aspects of the environment would be minimized or avoided, where reasonable and feasible. Substantial, unmitigated adverse effects are not anticipated.

Because adaptive management would be used to address trail resiliency prior to the development of substantial adverse physical impacts under future conditions, and because impacts would be minimized and avoided during implementation of alternative measures (levee raising or trail realignment), impacts would be less than significant.

Alternative Eden D Level of Significance: Less than Significant

Phase 2 Impact 3.6-5: Result in the temporary construction-related closure of adjacent public parks or other recreation facilities, making such facilities unavailable for public use.

Alternative Eden A (No Action). Under Alternative Eden A, no activities would occur under Phase 2 that would result in the temporary closure of adjacent public park and recreation facilities.

Alternative Eden A Level of Significance: No Impact

[2] Ibid.

Alternative Eden B. Under Alternative Eden B, temporary closure of some of the existing recreation facilities may be necessary due to construction of the restoration project elements and flood risk management and recreation improvements, including reconstruction of some levees that currently provide public access (Alameda Creek Regional Trail, and portions of the north Eden Landing Bay Trail). The construction contractor would be required as part of the construction bid documents to provide alternative routes to access public facilities, wherever safe and feasible. Some areas would be closed at least periodically to the public during construction; however, existing recreation features near the area and in most of Phase 1 would be available. All closures would be posted in advance of construction activities, and closure notice materials would direct users to alternate recreation features. Closures of the Alameda Creek Regional Trail are not anticipated during the initial portion of the construction period when dredge materials are placed in the Bay and Inland Ponds.

In Phase 1 of the SBSP Restoration Project, permit conditions associated with construction related to closure of existing facilities required the following protocols. Similar measures may be employed at southern Eden Landing to address effects related to trail closure.

- Limit trail closures to the immediate work area, and minimum time needed.
- Provide a Public Access Plan, indicating how public access will be accommodated during construction; signage to inform and direct trail users to alternate routes or about areas affected; and possible use of flaggers in the vicinity of construction activity.

Although public notification of all closures would be posted and alternate recreation opportunities would be provided, construction activities related to the project would result in the temporary closure of existing trails and recreation facilities; therefore, impacts are significant and unavoidable.

Alternative Eden B Level of Significance: Significant and Unavoidable

Alternative Eden C. Under Alternative Eden C, temporary closure of some of the existing recreation facilities may be necessary due to construction of the restoration project elements and flood risk management and recreation improvements, including reconstruction of some levees that currently provide public access (Alameda Creek Regional Trail, and portions of the north Eden Landing Bay Trail). The construction contractor would be required as part of the construction bid documents to provide alternative routes to access public facilities, wherever feasible. Some areas would be closed to the public during construction; however, existing recreation features near the area and in most of Phase 1 would be available. All closures would be posted in advance of construction activities, and closure notice materials would direct users to alternate recreation features. Closures of the Alameda Creek Regional Trail are not anticipated during the initial portion of the construction period when dredge materials are placed in the Bay Ponds.

In Phase 1 of the SBSP Restoration Project, permit conditions associated with construction related to closure of existing facilities required the following protocols. Similar measures may be employed at southern Eden Landing to address effects related to trail closure.

- Limit trail closures to the immediate work area, and minimum time needed
- Provide a Public Access Plan, indicating how public access will be accommodated during construction; signage to inform and direct trail users to alternate routes or about areas affected; and possible use of flaggers in the vicinity of construction activity.

Although public notification of all closures posted and alternate recreation opportunities provided, construction activities related to the project would result in the temporary closure of existing trails and recreation facilities; therefore, impacts are significant and unavoidable.

Alternative Eden C Level of Significance: Significant and Unavoidable

Alternative Eden D. Under Alternative Eden D, temporary closure of some of the existing recreation facilities may be necessary due to construction of the restoration project elements and flood risk management and recreation improvements, including reconstruction of some levees that currently provide public access (Alameda Creek Regional Trail, and portions of the north Eden Landing Bay Trail). The construction contractor would be required as part of the construction bid documents to provide alternative routes to access public facilities, wherever feasible. Some areas would be closed to the public during construction; however, existing recreation features near the area and in most of Phase 1 would be available. All closures would be posted in advance of construction activities, and closure notice materials would direct users to alternate recreation features. Closures of the Alameda Creek Regional Trail are not anticipated during the initial portion of the construction period when dredge materials are placed in the Bay and Inland Ponds.

In Phase 1 of the SBSP Restoration Project, permit conditions associated with construction related to closure of existing facilities required the following protocols. Similar measures may be employed at southern Eden Landing to address effects related to trail closure.

- Limit trail closures to the immediate work area, and minimum time needed.
- Provide a Public Access Plan, indicating how public access will be accommodated during construction; signage to inform and direct trail users to alternate routes or about areas affected; and possible use of flaggers in the vicinity of construction activity.

Although public notification of all closures posted and alternate recreation opportunities provided, construction activities related to the project would result in the temporary closure of existing trails and recreation facilities; therefore, impacts are significant and unavoidable.

Alternative Eden D Level of Significance: Significant and Unavoidable

Impact Summary

Phase 2 impacts and levels of significance are summarized in Table 3.6-3. The levels of significance are those remaining after implementation of program-level mitigation measures, project-level design features, the AMP and other Refuge management practices. In some cases, the design of recreation and public access facilities could include completion of the OAC loop or the bridge over the ACFCC or incorporate strategies discussed in Appendix G to reduce impacts to levels that would be less than significant.

For temporary impacts associated with construction activities that include construction-related closures of popular public access and recreation facilities (Impact 3.6-5 for the Action Alternatives) there are no feasible mitigation measures to reduce these impacts to less than significant. The specific construction activity and associated closure would be related to installing the water control structure(s) along the ACFCC levee and the existing public access trail that runs atop it. This trail would be reconstructed and reopened once the water control structure is in place, but that closure would be significant and unavoidable.

Table 3.6-3 Phase 2 Summary of Impacts – Recreation Resources

IMPACT	ALT. EDEN A	ALT. EDEN B			ALT. EDEN C			ALT. EDEN D		
		Route 1	Route 2	Route 3	Route 1	Route 2	Route 3	Route 1	Route 2	Route 3
Phase 2 Impact 3.6-1: Provision of new public access and recreation facilities, including the opening of new areas for recreational purposes and completion of the Bay Trail spine.	LTS	LTS	LTS	LTS	LTS/B	LTS/B	LTS	LTS	LTS	LTS
Phase 2 Impact 3.6-2: Permanent removal of existing recreational features (trails) in locations that visitors have been accustomed to using and that would not be replaced in the general vicinity of the removed feature.	NI	LTS			LTS			LTS		
Phase 2 Impact 3.6-3: 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.	NI	LTS			LTS			LTS		
Phase 2 Impact 3.6-4: Result in substantial adverse physical impacts associated with the provision of new or physically altered park and recreational facilities, or result in the need for new or physically altered park and recreational facilities, the construction of which could cause significant environmental impacts.	NI	LTS			LTS			LTS		
Phase 2 Impact 3.6-5: Result in the temporary construction-related closure of adjacent public parks or other recreation facilities, making such facilities unavailable for public use.	NI	SU			SU			SU		

Notes: Alternative Eden A is the No Action Alternative (No Project Alternative under CEQA).
B = Beneficial (NEPA only)
LTS = Less than Significant
NI = No Impact,
PS = Potentially Significant
SU = Significant and Unavoidable

3.7 Cultural Resources

This section of the Draft Environmental Impact Statement/Report (EIS/R) characterizes the existing cultural resources within the Phase 2 project area at the Eden Landing Ecological Reserve (ELER, or Reserve) and analyzes whether implementation of the project-level actions of the phased restoration efforts associated with the South Bay Salt Pond (SBSP) Restoration Project would cause a substantial adverse change to historical resources. The information presented is based on a review of existing cultural resources within the area and other pertinent federal, state, and local regulations, which are presented in Section 3.7.2, Regulatory Setting. Section 3.7.1, Physical Setting, is included to establish the origin and environmental and cultural context of the resources. Using this information as context, an analysis of the cultural-resources-related environmental impacts of the project is presented for each alternative in Section 3.7.3, Environmental Impacts and Mitigation Measures. The program-level mitigation measures described in Chapter 2, Alternatives, would be implemented as part of the project. Therefore, this section only includes additional, project-level mitigation measures, as needed.

3.7.1 Physical Setting

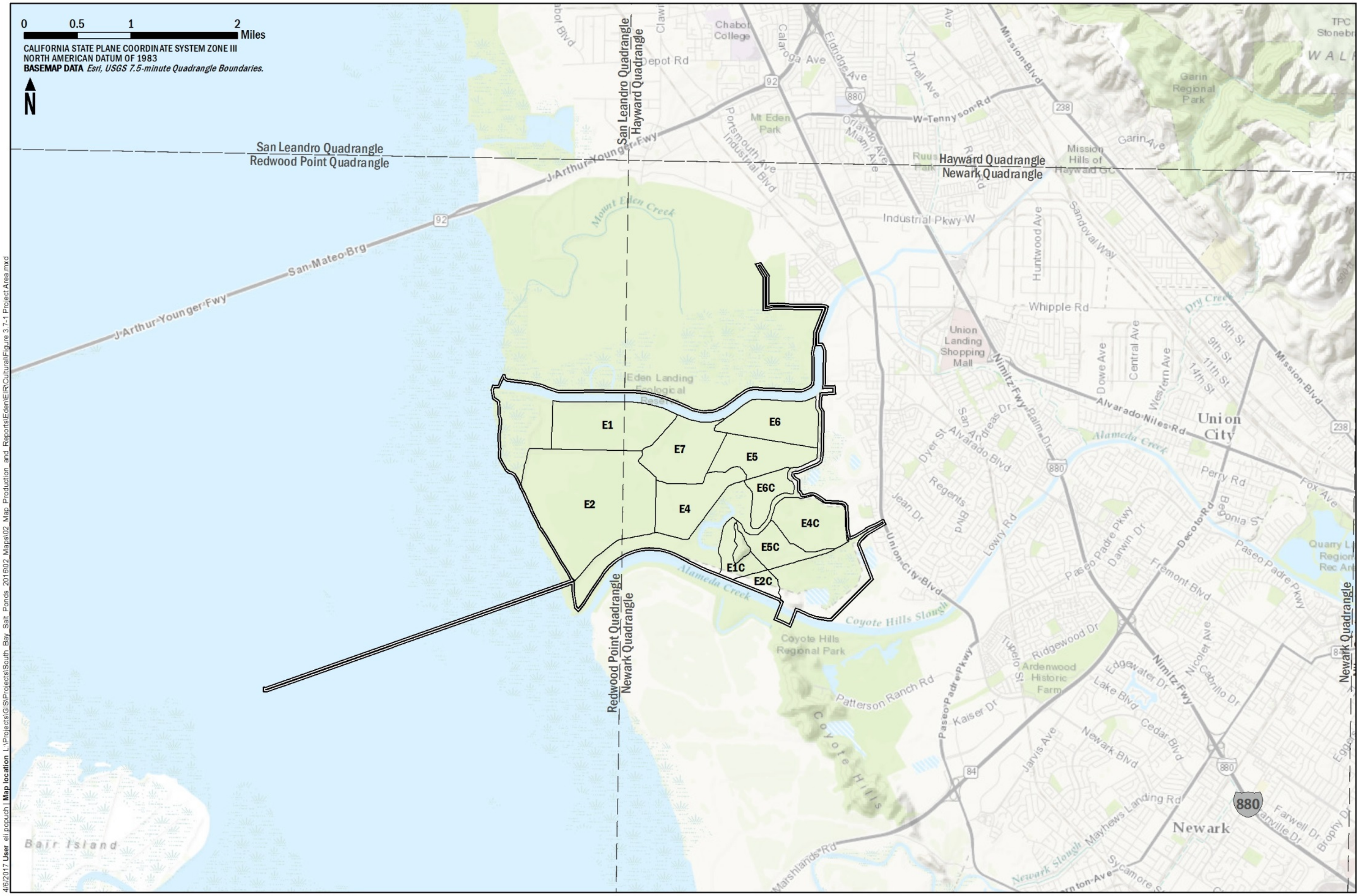
The South Bay, including the SBSP Restoration Project, includes portions of San Mateo, Santa Clara, and Alameda Counties and comprises approximately 50,000 acres of shoreline mudflats and marshes as well as low hills and valleys ranging from sea level to approximately 25 feet (8 meters) above mean sea level in elevation. The Eden Landing Phase 2 project area is solely within Alameda County, includes over 2,000 acres, and is depicted on two United States Geological Survey 7.5-minute topographical quadrangle maps: *Redwood Point* and *Newark* (Figure 3.7-1). Vegetation within the project areas consists of marsh species, including cordgrasses, pickleweeds, and other salt-tolerant plant species.

The Area of Potential Effects (APE) for the Eden Landing Phase 2 project area includes all areas of potential ground disturbance, staging, etc., within the following ponds of the ELER: E1, E1C, E2, E2C, E4, E4C, E5, E5C, E6, E6C, and E7 (Figure 3.7-1). It also includes the Alameda County-owned J-ponds and a section of existing high marsh habitat; levees bordering ponds and inholding still owned by Cargill; and portions of the channels and fringing marshes along Old Alameda Creek (OAC) and the Alameda Creek Flood Control Channel (ACFCC).

Methodology

A program-level record search was performed by the Northwest Information Center (NWIC) of the California Historical Resources Information System in Rohnert Park, California, in September 2013 (NWIC file 13-0330) and a project-level follow-up search by AECOM on June 2016 (NWIC 15-1787). The updated record search covered the APE for the Eden Landing Phase 2 alternatives and a ¼-mile search radius.

The results of previous surveys—conducted in 2006 and 2007 by United States Fish and Wildlife Service (USFWS) archaeologists and architectural historians for the 2007 SBSP Restoration Project Final EIS/R (2007 Final EIS/R; Speulda-Drews and Valentine 2007, 2009) and by various others—were also relied on to establish existing conditions.



LEGEND

Eden Landing Phase 2 Project Area

Southern Eden Landing Ponds

USGS 7.5-Minute Quadrangle Boundary

AECOM

South Bay Salt Pond Restoration Project

Figure 3.7-1

Project Area

The purpose of the NWIC search was to determine the location and nature of previously recorded cultural resources within the Eden Landing Phase 2 APE and assess whether cultural resource inventory surveys had been previously conducted within the APE. In addition, the record search and associated background documentary review provides the context for cultural resources in the APE.

The NWIC search included examination of information resources such as:

- Office of Historic Preservation Historic Property Directory;
- California Inventory (1996);
- California Historic Landmarks (1996);
- National Register of Historic Places (2000 and updates);
- California Points of Historical Interest (1992 and updates); and
- Historic maps.

The NWIC search identified nine previously recorded cultural resources studies that documented surveys covering portions of the APE (Table 3.7-1). Most of these studies focused on the northern boundary of the current APE along OAC, where Eden Landing ponds E1, E7, and E6 are located. The NWIC search identified one previously recorded cultural resource (P-01-11437, the Eden Landing Salt Works Historic Landscape) within the Eden Landing Phase 2 APE (Table 3.7-2). In addition, the Eden Landing Salt Works Historic Landscape includes one cultural resource (FWS-07-12-01) that was not identified by the NWIC search. This resource was recorded as a domestic refuse scatter in the vicinity of the J. Quigley Alvarado Salt Works (Valentine and Speulda-Drews 2007) in the northern portion of ponds E7 and E6 along OAC. The State Historic Preservation Office (SHPO) concurred that the J. Quigley Alvarado Salt Works' (FWS-07-12-01) is eligible for the National Register of Historic Places under Criteria A and D (OHP 2009).

Table 3.7-1 Previous Cultural Resource Inventories within the Eden Landing Phase 2 APE

PONDS	NUMBER OF INVENTORIES
Bay Ponds (Ponds E1, E2, E4, and E7)	1
Inland Ponds (Ponds E5, E6, and E6C)	6*
Southern Ponds (Ponds E1C, E2C, E4C, and E5C)	6*

*Denotes a portion of a previously conducted study also lies within this pond.

Table 3.7-2 Previously Recorded Cultural Resources within the Eden Landing Phase 2 APE

PONDS	RECORDED RESOURCES	
	PREHISTORIC	HISTORIC-ERA
Bay Ponds (Ponds E1, E2, E4, and E7)	0	2
Inland Ponds (Ponds E5, E6, E6C)	0	0*
Southern Ponds (Ponds E1C, E2C, E4C, and E5C)	0	1

* Denotes a portion of a previously recorded resource also lies within this pond.

In addition to the resources and inventory studies identified during the NWIC search, the Eden Landing Salt Works Historic Landscape and FWS 07-12-01 have been recorded as part of the USFWS's ongoing consultation with the SHPO to resolve adverse effects for the broader SBSP Restoration Project (Speulda-Drews and Valentine 2007). As a part of this recordation, many of the accessible portions of the levees within each pond complex were surveyed. Figure 3.7-2 depicts those areas previously surveyed near Eden Landing, including surveys conducted for the SBSP Restoration Project programmatic analysis and those areas surveyed subsequently for the Eden Landing Phase 2 actions.

Regional Setting

The 2007 Final EIS/R contains a thorough explanation of the prehistoric setting, history of archaeological research in the region, ethnographic setting, and historic setting—including the Spanish and Mexican periods, the Gold Rush, and subsequent American development of the South Bay. Although these broad-context statements are useful in understanding the broader historic context of the project area, much of the information is not directly relevant to the specific resources identified within the Eden Landing Phase 2 APE. Brief summaries of the historic contexts are included below, with more attention given to those topics that have direct relevance to an understanding of the resources within the Eden Landing Phase 2 APE. For a more general discussion of the cultural resources setting of the project area, please refer to Section 3.8 of the 2007 Final EIS/R.

Geomorphic Setting

This brief discussion of soils and geologic units provides a context for both archaeological materials, which have been influenced by geomorphic changes in the Bay Area over the past ca. 13,500 years (roughly the time that humans have occupied California), and paleontological resources (fossils, etc.), which are subsumed under the cultural resources discipline by the California Environmental Quality Act (CEQA). For a more complete analysis of the geologic setting, see Section 3.4, Geology, Soils, and Seismicity. The soils underlying the Phase 2 APE consist of youngest bay mud over semi-consolidated alluvial deposits (Witter et al. 2006). The bay mud ranges from 20 to 40 feet thick within the APE (McDonald et al. 1978). The bay mud within the APE was most likely deposited in the last approximately 4,000 years, as sea levels stabilized and sedimentation at the bay margin began to keep pace with sea-level rise. The bay mud is overlain by Quaternary alluvial sediments of variable lithology, which represent the historic ground surface during the late Pleistocene and early Holocene, prior to inundation of San Francisco Bay (Bay).

The entire southern rim of San Francisco Bay has been heavily used since humans entered the region. Rising sea levels and concomitant sedimentation likely have buried older prehistoric sites. Gold Rush-era placer mining resulted in the deposition of hundreds of millions of cubic meters of sediment around the Bay, likely burying additional prehistoric and early historic sites along the Bay's edge. Agriculture, the salt industry, and other bayshore development have contributed to the destruction or obscuration of evidence of human use.

LEGEND

Eden Landing Phase 2 Project Area

Southern Eden Landing Ponds

Previous Survey (Various)

AECOM

South Bay Salt Pond Restoration Project

Figure 3.7-2

Cultural Resources Surveys

Prehistoric Setting

Prehistoric use of the bayshore has been clearly identified, but the density of occupation and use have most likely been underestimated because so many sites have been obscured by the processes noted above. Semi-systematic documentation of the most visible prehistoric resources did not begin until the early twentieth century, by which time it was noted that many mound and shellmound sites had already been damaged or destroyed (Nelson 1909). Prehistoric sites generally cluster in the vicinity of a water source or other relatively obvious resources such as food collection areas (e.g., oak trees) or tool stone deposits. However, being able to predict likely site locations does not mean that they have all been found. Rather, it is assumed that many sites will never be found unless a construction project of some type accidentally uncovers them.

The earliest well-documented entry and spread of humans into California occurred at the beginning of the Paleo-Indian Period (11,500 to 6,000 B.C.). Their social units are thought to have been small and highly mobile. Known sites have been identified in the contexts of ancient pluvial lake shores and coastlines, as evidenced by such characteristic hunting implements as fluted projectile points and chipped stone crescent forms. Few archaeological sites have been found in the Bay Area that date to the Paleo-Indian or the ensuing Lower Archaic (6,000 to 3,000 B.C.) periods. The lack of sites from earlier periods may be because of high sedimentation rates (inundation of the bay by the Pacific Ocean and the associated alluvial deposition), leaving the earliest sites deeply buried and inaccessible.

During the Middle Archaic Period (3,000 to 500 B.C.) the broad regional patterns of foraging subsistence strategies gave way to more intensive procurement practices. Populations were growing and occupying more diverse settings. Permanent villages that were occupied throughout the year were established, primarily along major waterways, including the establishment of the first shellmound sites along the Bay shore. The current body of archaeological evidence indicates that the mounds served multiple purposes as residential places, ceremonial locations, and burial sites with many diverse and complex aspects.

The onset of status distinctions and other indicators of growing sociopolitical complexity mark the Upper Archaic Period (500 B.C. to A.D. 700). Exchange systems become more complex and formalized and evidence of regular, sustained trade between groups was seen for the first time. Several technological and social changes characterized the Emergent Period (A.D. 700 to 1800). The bow and arrow were introduced, ultimately replacing the dart and atlatl. Territorial boundaries between groups became well established. It became increasingly common that distinctions in an individual’s social status could be linked to acquired wealth. Exchange of goods between groups became more regularized with more goods, including raw materials, entering into the exchange networks. In the latter portion of this period (A.D.1500 to 1800), exchange relations became highly regularized and sophisticated. The clamshell disk bead became a monetary unit for exchange, increasing quantities of goods moved greater distances, and vocational specialists arose to govern various aspects of production and exchange.

Ethnographic Setting

At the time of European contact, the Eden Landing Phase 2 project area and its vicinity were occupied by Costanoan, also known as Ohlone, tribal groups. For a discussion of the lifeways and history of these groups, please refer to the 2007 Final EIS/R.

Historic Setting

In addition to the historic context developed for the 2007 Final EIS/R, a very in-depth history of the South Bay salt works has been developed in a separate document: *Historic Context of the South Bay Salt Pond Restoration Project* which was an appendix to the 2007 Final EIS/R (Watt 2005). The report focuses on the historic-era conversion of the salt marshes and development of salt ponds, the rise of the salt industry, and the types of features and structures associated with this industry. Given that most of the identified historic-era resources in the APE are associated with this history, portions of that context are included in the following sections. However, for a more complete discussion of the historic context, please refer to the EDAW 2005 document, available online: http://www.southbayrestoration.org/documents/permit-related/Historic%20Salt%20AppendixD.pdf

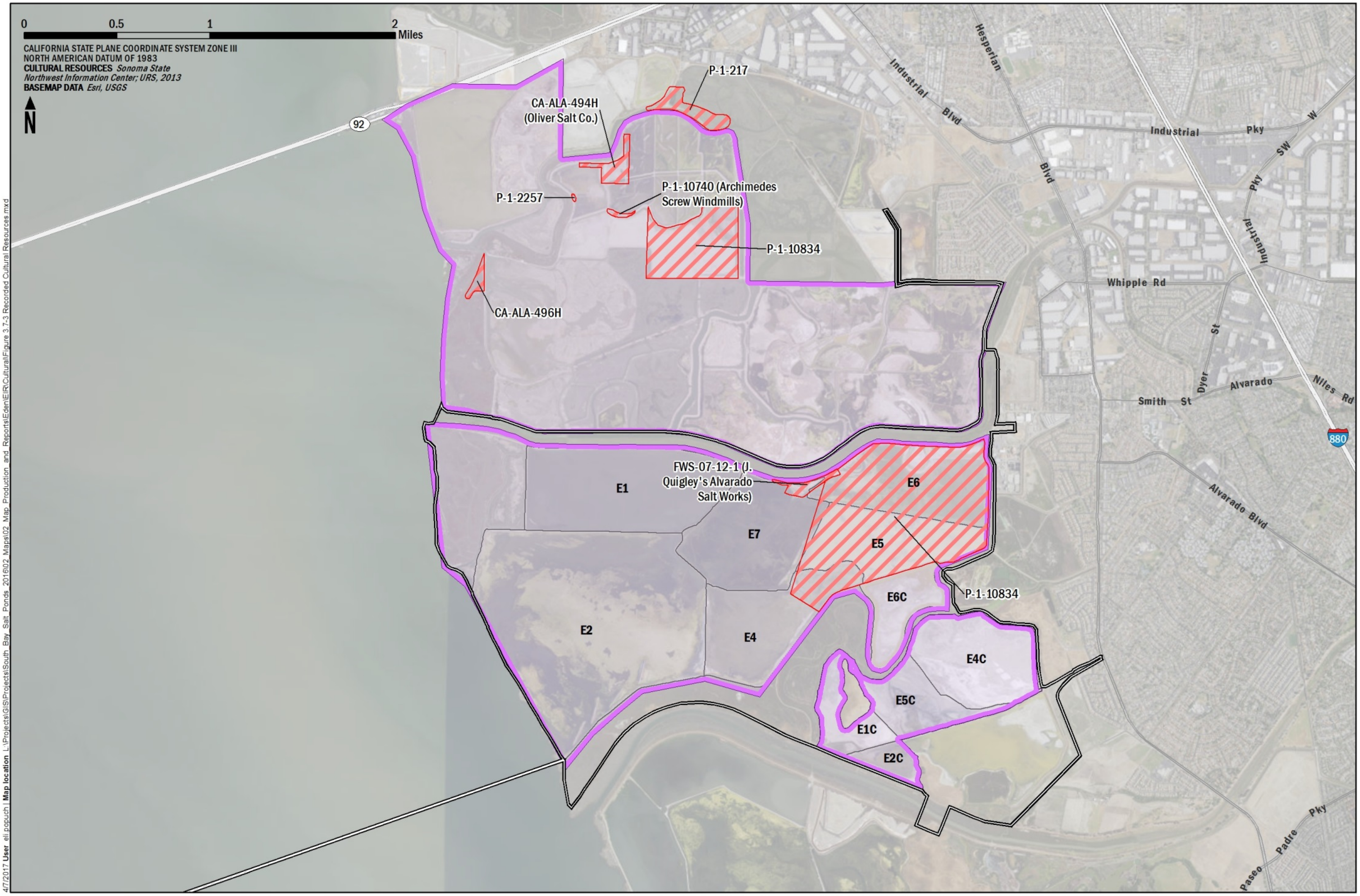
Spanish and Mexican Periods

Twenty-one years after the establishment of Mission San Francisco de Asís by Juan Bautista de Anza in San Francisco in 1776, Fermiin Francisco de Lausén established Mission San José using labor from the Native Americans from Mission Santa Clara de Asís (Payne 1987). The Santa Clara Valley was a prime location for a mission because of its mild winters and long growing season for crops. Another three missions were built in the Santa Clara Valley: Santa Clara de Asís (1777), Santa Cruz (1791), and San Juan Bautista (1797). The missions were self-sustaining, raising a variety of grains and crops (including an extensive orchard or olive and fruit trees), as well as livestock such as cattle, horses, and sheep. Mission San José duplicated the Native American methods of harvesting salt by scraping it off rocks or naturally-occurring ponds along the bay margin. Missionaries eventually produced enough salt to export moderate quantities to Europe (Watt 2005).

Mexico achieved independence from Spain in 1821, and in 1822 California was declared a territory of the Mexican republic. In 1834, the Mexican government secularized the missions and divided their land holdings into ranchos; portions of several ranchos are in the project area. Rancho *Potrero de los Cerritos* is located within the Eden Landing Phase 2 APE (Beck and Haase 1974). During this time, Americans also began migrating to Alta California, and tensions rose as the new settlers began to occupy the rancho lands. The Mexican War of 1846 ended with the signing of the Treaty of Guadalupe Hidalgo in February 1848 and the cession of California to the United States.

American Period Industry

The most obvious evidence of human occupation in the project area is the various salt works structures and remnants, ditches and levees, the salt ponds themselves, and the detritus (historic and modern) that has collected around them (Figure 3.7-3). The Phase 2 SBSP Restoration Project area is clearly part of a larger, contiguous complex that lines almost the entire southern rim of San Francisco Bay. The Eden Landing Salt Works was determined to retain sufficient integrity to be considered a cultural landscape, as defined by the National Park Service (NPS), and to meet the eligibility criteria for listing to the National Register of Historic Places (NRHP) (and, by extension, to the California Register of Historical Resources [CRHR]) (see the definition of a cultural landscape in Section 3.7.2, Regulatory Setting).



LEGEND

Eden Landing Phase 2 Project Area

Eden Landing Salt Works Historic Landscape District

Cultural Resource Discussed in Text

AECOM
South Bay Salt Pond Restoration Project

Figure 3.7-3
Recorded Cultural Resources

The first construction of levees to create artificial salt ponds in the Bay Area was completed by John Johnson in 1853 (EDAW 2005). Johnson homesteaded near Mt. Eden, north of the Eden Landing project area, and “squatted” on a small tract of 14 acres that he enclosed with levees for the production of salt. His first harvest measured 25 tons and was shipped to San Francisco by schooner for the hide and leather tanning trade (EDAW 2005). The San Francisco Bay, with its natural tidal marshlands, was a prime environment to be modified for the mining of salt. Gradually the Mt. Eden area along the East Bay shoreline stretching from San Lorenzo Creek south to Alvarado (present-day Union City) developed into several small salt producing operations mostly run by Danish and German immigrant families. Between 1850 and 1910 there were more than 25 different small salt operations located between Mt. Eden Creek and Coyote Hills Slough, with ponds ranging in size from 30 to 50 acres (Speulda-Drews and Valentine 2007).

Initially, the demand for salt was fairly low; this crude product was mostly used for preserving food and hides. However, an effort to improve the inferior quality of Bay salt shifted the reliance on imports and increased the demand for local salt (Ver Planck 1958). Likewise, after the discovery in 1859 of the Comstock Lode in Nevada, it became cost prohibitive to import foreign salt used in the process for treating silver ores compared to the local product, and demands for Bay Area salt increased (EDAW 2005). Despite suffering bouts of over production, the salt industry grew during the latter half of the 19th century with several standout companies capable of producing more than 10,000 tons of salt per year: Union Pacific, Carmen Island, Oliver Salt, and American Salt Company (Ver Planck 1958). Of those four companies, only Carmen Island was located within the Eden Landing Phase 2 APE (Figure 3.7-4).

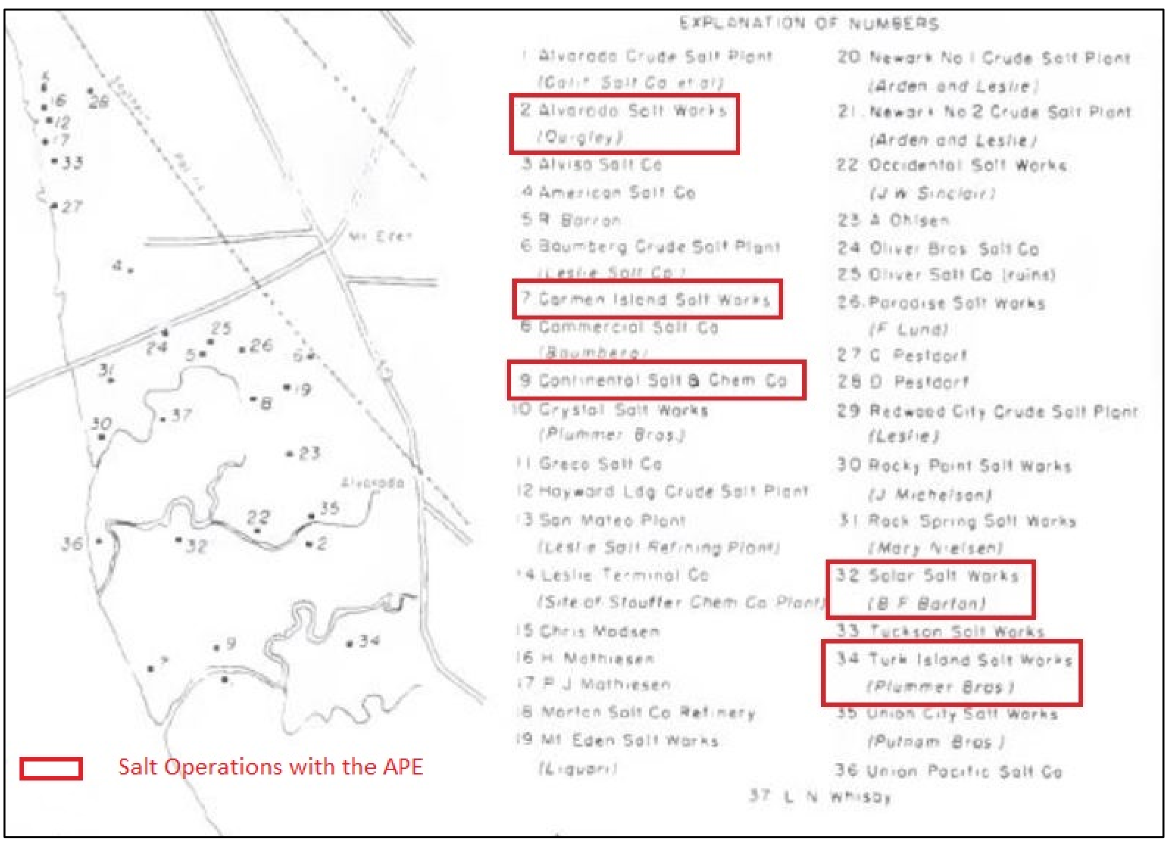


Figure 3.7-4. Salt Operations within the Eden Landing Phase 2 APE (in red) (Ver Planck 1958: Figure 1:n.d.)

From 1910 through the late 1920s, the market demand for salt increased beyond the capacity of the small producers. Larger salt manufacturing companies began to organize and consolidate the smaller operations in order to meet demand. Prior to the consolidation, four salt companies were operating within the current APE: 1) Alvarado Salt Works (owned by John Quigley) located in pond E6; 2) Carmen Island Salt Works located in pond E2; 3) Plummer Brothers located in pond in E5C; and, 4) Solar Salt Works (owned by B.F. Barton) located in pond E1(Ver Planck 1958). With the founding of three new salt producers: the California Salt Company (1901), the Continental Salt and Chemical Company (1900), and the Leslie Salt Refining Company (1901), the consolidation of the smaller operations, including those within the current APE, began and changed the industry in the Bay area forever (Ver Planck 1958). A handful of companies, including Carmen Island Salt Works, were immediately absorbed by the California Salt Company, which later became the Leslie-California Salt Company in 1924. The Plummer Brothers operated until 1920, when they were bought by the Turk Island Salt Company, which was later absorbed in 1927, again, by the Leslie-California Salt Company. The Continental Salt & Chemical Company located in pond E2 was also sold to the Leslie-California Salt Company in the mid-1920s (Ver Planck 1958). The Alvarado Salt Works was sold in 1908 to West Shore Salt Company, which only reported production for another two years (Ver Planck 1958). The Solar Salt Works was owned by Pioneer Salt Company after the death of Barton around 1916, then continued production until the late 1920s when it was sold to the Oliver Salt Company; the Leslie-California Salt Company absorbed the Oliver Salt Company in 1931 (Ver Planck 1958). By 1930, the number of salt operations dropped from 28 to only five; and by the 1940s, Leslie Salt Company became the only major operator in the region (EDAW 2005; Ver Planck 1958).

The Leslie Salt Refining Company was established in 1901. After acquiring the California Salt Company and the Continental Salt and Chemical Company, it was reincorporated as the Leslie-California Salt Company in 1924. The company continued to purchase or lease operations in order to increase efficiency and production, and grew into the largest salt-producing company in San Francisco. For a complete discussion of the evolution of the salt industry in the South Bay and associated features of this industry on the landscape, see the EDAW 2005 report referenced earlier in this section (http://www.southbayrestoration.org/documents/permit-related/Historic%20Salt%20AppendixD.pdf).

Project Setting

The Eden Landing pond complex—the southern half of which includes the Bay Ponds, the Inland Ponds, and the Southern Ponds—are all part of the larger Eden Landing Salt Works Historic Landscape (P-01-11437). The larger Eden Landing Salt Works Historic Landscape was evaluated by USFWS for NRHP eligibility as a historic salt works landscape.

It was determined that the Eden Landing Salt Works retains sufficient integrity and that it meets

> "eligibility criteria A and D as defined by the NRHP as a historic landscape. The integrity of the district is diminished by over-printing and removal of the processing plants, residences, landings, and small-scale features. Yet, the overall Eden Landing Salt Pond Historic Landscape provides an opportunity to interpret the evolution of the solar salt industry. Distinctive features of the Eden Landing Salt Pond Historic Landscape are reflected by the pattern of spatial organization, circulation networks, and adapting the natural environmental conditions. Creation of the solar salt manufacturing landscape required building levees, harnessing the tidal surge, and transporting water among the ponds. Character defining elements of the historic landscape are the perimeter levees, interior pond divisions, archaeological sites associated with the family-owned processing plants and landings, and the Archimedes screw pump. Non-contributing elements include the

> modern water-control structures, pumphouses, and hunting blinds." (Speulda-Drews and Valentine 2007:19-20)

The SHPO concurred with this determination of eligibility in 2010 (OHP 2010:2).

Numerous smaller cultural features, such as hunting blinds, landings, and piers were also identified by USFWS during surveys of the Eden Landing pond complex in 2007. The SHPO concurred that these smaller features lacked integrity and were considered non-contributing elements of the historic landscape. Likewise, water control structures are scattered throughout ponds. As there are no water control structures that are more than 50 years old, they are considered non-contributing (Valentine and Speulda-Drews 2007).

Bay Ponds

Two previously recorded cultural resources are within the APE for the Phase 2 Eden Landing area of the Bay Ponds, which includes E1, E2, E4, and E7 (Figure 3.7-3). A portion of the Union City Alvarado Salt Ponds (P-01-10834) is located partially within Pond E7, with the majority extending east into Pond E6 of the Inland Ponds. This resource was determined not eligible for listing in the NRHP as the "salt ponds/levees and related features…does not have enough historic authenticity or enough integrity to be able to convey its importance during the period of significance (1862-1896)" (Shoup and Baker 2007; Speulda-Drews and Valentine 2007). Shoup and Baker (2007:5) included the caveat in their evaluation that "if, in the future, the overall Alameda County Leslie Salt Company operations are evaluated as an historic landscape, it is conceivable that some of the levees/ponds…may be considered contributing elements." The USFWS agreed with this assessment and the Union City Alvarado Salt Ponds (P-01-10834) is included within the Eden Landing Salt Works Historic Landscape as a contributing element.

Also partially within Pond E7 and E6 (of the Inland Ponds) is the archaeological site for the J. Quigley Alvarado Salt Works (FWS-07-12-1). Valentine and Speulda-Drews (2007) reported that this site contains a domestic scatter, railroad ties, and boardwalk associated from John Quigley's salt works that was in operation in 1862 until 1909. Based on ceramics identified on site, it may be possible this resource is "associated with a short-term camp inhabited by the Japanese or Chinese contract laborers working at the Alvarado Salt Works" (Speulda-Drews and Valentine 2007). The J. Quigley Alvarado Salt Works (FWS-07-12-1) was determined eligible for listing in the NRHP under criteria A and D (OHP 2009).

Inland Ponds

As discussed above, two previously recorded cultural resources—the Union City Alvarado Salt Ponds (P-01-10834) and the J. Quigley Alvarado Salt Works (FWS-07-12-1)—are partially located within the Eden Landing APE for the Phase 2 Eden Landing area of the Inland Ponds (Figure 3.7-3). The Inland Ponds include Ponds E5, E6, and E6C (Figure 3.7-3).

Southern Ponds

The Southern Ponds include Ponds E1C, E2C, E4C, and E5C and are located north of the ACFCC, south of the Inland Ponds (Figure 3.7-3). These ponds do not contain any known cultural resources. Only small portions of the eastern and southern levees were subject to previous cultural resources investigations (Bard and Ogrey 1982; Reese 2005; Speulda-Drews and Valentine 2007) (Figure 3.7-2).

3.7.2 Regulatory Setting

A number of federal, state, regional, and local regulations have been established to protect cultural resources and preserve them for future generations. In California, the two most applicable sets of legislation include Section 106 of the National Historic Preservation Act (NHPA) (Section 106), and CEQA.

Federal Regulations

Section 106 requires federal agencies to take into consideration the potential effects of proposed undertakings on historic properties, and to allow the Advisory Council on Historic Preservation the opportunity to comment on a proposed undertaking. Historic properties are cultural resources listed on or considered eligible for inclusion in the NRHP. The regulations implementing Section 106[1] are promulgated by the Secretary of the Interior, as codified in Title 36 Code of Federal Regulations (CFR) Part 800.

Section 106 requirements apply to properties both on the NRHP and not formally determined eligible but that are considered to meet the eligibility requirements (may include situations where SHPO arrives at a consensus regarding a historic property). This consensus may be reached through the provisions of a Programmatic Agreement or other such document or may result from case-by-case consultation. The NHPA authorizes the Secretary of the Interior to maintain and expand a National Register of districts, sites, buildings, structures and objects of significance in American history, architecture, archaeology, engineering and culture. A property may be listed in the NRHP if it meets criteria for evaluation as defined in 36 CFR 60.4:

The quality of significance in American history, architecture, archaeology, engineering and culture is present in districts, sites, buildings, structures and objects that possess integrity of location, design, setting, materials, workmanship, feeling and association and:

a. That are associated with events that have made a significant contribution to the broad patterns of our history; or

b. That are associated with the lives of persons significant in our past; or

c. That embody the distinctive 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

d. That have yielded, or may be likely to yield, information important in prehistory or history.

There is also a requirement for an APE map, as described in Section 106 and codified in Title 36 CFR 800.4(a)(1). USFWS submitted a letter to the SHPO on July 16, 2004, requesting confirmation of the APE map for the SBSP Restoration Project. The APE map designates the SBSP Restoration Project boundary, as shown on Figure 1-2 of the 2007 Final EIS/R, as the Project's APE. The SHPO sent a letter to USFWS dated November 19, 2004, indicating that the agency concurred with USFWS's determination of the project's APE. The Phase 2 Eden Landing APE falls completely within the 2007 APE and, therefore, does not require additional concurrence from SHPO.

---

[1] Documents that include the full text of Section 106 and guidance on working with its provisions may be found at http://www.achp.gov/work106.html.

The Section 106 review process occurs in four steps: initiation of the process; identification of historic properties; assessment of adverse effects; and resolution of adverse effects. Public involvement, particularly from Native Americans, is strongly encouraged during each of these steps. Section 106 consultation with Native Americans is the responsibility of the lead agency and, therefore, is not included in this document.

Cultural Landscapes

As discussed above, the SBSP Restoration Project area is a heavily modified environment that has been evaluated as a historic cultural landscape, representative of the late-nineteenth- and early-twentieth-century development of industrial salt production along the south San Francisco Bay shore. Project goals to reestablish tidally influenced salt marsh are intended to change the existing landscape, in direct contradiction to the many years of human-made modifications. To properly document, assess, and evaluate cultural landscapes, USFWS uses the NPS guidelines. These guidelines provide standards for undertaking a cultural landscape analysis, including procedures for identifying, evaluating, and managing cultural landscapes in the United States.

The SBSP Restoration Project Historic Context Report (EDAW 2005) was used in conjunction with an evaluation framework developed in consultation with the SHPO to determine the significant features of the solar salt industry landscape. As discussed above, the determination was made that the Eden Landing Salt Works ponds constitute a Historic Landscape with the primary contributing elements being “the perimeter levees, interior pond divisions, archaeological sites associated with the family-owned processing plants and landings, and the Archimedes screw pump. Non-contributing elements include the modern water-control structures, pumphouses, and hunting blinds.” (Speulda-Drews and Valentine 2007:19-20). The Archimedes screw pumps are not located within the current APE. The SHPO has concurred with a finding of adverse effect on the Eden Landing Works Historic Landscape, which is considered a historic property under Section 106, and Historic American Landscape Survey (HALS) documentation has been undertaken as mitigation for effects to this historic landscape. For a more complete description of NPS guidelines and definitions with regards to cultural landscapes, please refer to the 2007 Final EIS/R.

State Regulations

CEQA offers directives regarding impacts on historical resources, unique archaeological resources, and unique paleontological resources. CEQA states generally that if implementation of a project would result in significant environmental impacts, then public agencies should determine whether such impacts can be substantially lessened or avoided through feasible mitigation measures or feasible alternatives. This general mandate applies equally to significant environmental effects related to certain cultural resources.

Only significant cultural resources (e.g., “historical resources” and “unique archaeological resources”) need to be addressed. The CEQA Guidelines (AEP 2016) define a “historical resource” as, among other things, “a resource listed or eligible for listing on the CRHR (CEQA Guidelines, Section 15064.5, subd. (a)(1); see also Public Resources Code Sections 5024.1, 21084.1). A historical resource may be eligible for inclusion on the CRHR, as determined by the State Historical Resources Commission or the lead agency, if the resource:

(1) Is associated with events that have made a significant contribution to the broad patterns of California’s history and cultural heritage; or

(2) Is associated with the lives of persons important in our past; or

(3) 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 values; or

(4) Has yielded, or may be likely to yield, information important in prehistory or history.

A resource is presumed to constitute a “historical resource” if it is included in a “local register of historical resources” unless “the preponderance of evidence demonstrates that it is not historically or culturally significant” (CEQA Guidelines, Section 15064.5, subd. (a)(2)). In addition, the CEQA Guidelines requires consideration of unique archaeological sites (Section 15064.5). (See also Public Resources Code Section 21083.2.) A “unique archaeological resource” is defined as: “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.” (Section 21083.2(h))

If an archaeological site does not meet the criteria for inclusion on the CRHR but does meet the definition of a unique archaeological resource as outlined in the Public Resource Code (Section 21083.2), it is entitled to special protection or attention under CEQA. Treatment options under Section 21083.2 of CEQA include activities that preserve such resources in place in an undisturbed state. Other acceptable methods of mitigation under Section 21083.2 include excavation and curation.

CEQA also requires assessment of impacts to paleontological resources. Although CEQA does not define what “a unique paleontological resource or site” is, the definition of a unique archaeological resource described above is considered equally applicable to recognizing a unique paleontological resource. CEQA Section 15064.5 (a)(3)(D), which indicates “generally, a resource shall be considered historically significant if it has yielded, or may be likely to yield, information important in prehistory or history,” provides additional guidance.

Public Resources Code Section 15064.5(e) of the state CEQA Guidelines requires that excavation activities be stopped whenever human remains are uncovered and that the county coroner be called in to assess the remains. If the county coroner determines that the remains are those of Native Americans, the Native American Heritage Commission must be contacted within 24 hours. At that time, Section 15064.5(d) of the CEQA Guidelines directs the lead agency to consult with the appropriate Native Americans as identified by the Native American Heritage Commission and directs the lead agency (or applicant), under certain circumstances, to develop an agreement with the Native Americans for the treatment and disposition of the remains.

Regional/Local Regulations

The Eden Landing Phase 2 project area lies within Hayward, California where the goals and policies for the preservation and protection of cultural resources are documented in the resources listed below. The similar goals and policies from the adjacent Union City are also included for completeness, though they apply only indirectly.

City of Hayward: The Hayward 2040 General Plan (City of Hayward 2014) includes the following relevant cultural goals and policies:

Historic Districts and Resources:

Goal LU-8: Preserve Hayward's historic districts and resources to maintain a unique sense of place and to promote an understanding of the regional and community history.

LU-8.3 Historic Preservation Ordinance: The City shall maintain and implement its Historic Preservation Ordinance to safeguard the heritage of the city and to preserve historic resources.

LU08.6 Historic Preservation Standards and Guidelines: The City shall consider *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings* when evaluating development applications and City projects involving historic resources, or development applications that may affect scenic views of the historic context of nearby historic resources.

City of Union City. Union City's 2002 General Plan (City of Union City 2002) includes the following relevant cultural resources goals and policies:

Archaeological and Historical Resources:

Goal NHR-C.1: To protect, to the extent possible, the City's significant archaeological and historical resources.

Policies:

- NHR-C.1.3: The City shall encourage the preservation of public landmarks.
- NHR-C.1.4: The City shall use appropriate State and Federal standards in evaluating the significance of historical resources found in the city.
- NHR-C.1.5: The City shall support public and private efforts to preserve, rehabilitate, and continue the use of historic structures and sites.
- NHR-C.1.6: The City shall support efforts to protect and recover archaeological resources.

3.7.3 Environmental Impacts and Mitigation Measures

Overview

This section describes environmental impacts and mitigation measures related to cultural resources. It includes a discussion of the criteria used to determine the significance of impacts. This discussion includes consideration of resources under NHPA and CEQA, but without offering the confusion of using two sets of similar terminology. The impacts and mitigation measures below are generally discussed using CEQA language such as "significant impacts" rather than "adverse effects." Potential impacts are characterized by evaluating direct, indirect, short-term (temporary), and long-term effects. Impact evaluations for the Action Alternatives are assessed based on the existing conditions described in Section 3.7.1, Physical Setting, and not the proposed conditions that would occur under the No Action

Alternative.[2] This approach is consistent with CEQA, which requires that project impacts be evaluated against existing conditions. In this case, the No Action Alternative represents no change from current management direction or level of management intensity provided in the Adaptive Management Plan (AMP) and other Eden Landing Ecological Reserve management documents and practices.

As a reminder, cultural resources may be historic or prehistoric. The word "historic" may be a temporal reference, or it may signify the importance of a resource from either the historic or prehistoric era. A "historical resource," as defined by CEQA, is a site that is eligible or potentially eligible for listing on the CRHR. For example, a resource that dates to the historic-era does not inherently mean that it has the significance to qualify as a historical resource (CEQA) or historic property (NHPA). The reader must follow the context of the discussion to understand which use of the word is being made.

Significance Criteria

NHPA

Under NHPA, if it is determined that historic properties may be affected by an undertaking, the agency proceeds with the Section 106 process, assessing adverse effects (called significant impacts under CEQA). The definition of adverse effects is found in Section 800.5(a)(1) of the regulations of NHPA. The definition of adverse effects states:

> An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the National Register. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative.

Adverse effects on historic properties include, but are not limited to:

- Physical destruction of or damage to all or part of the property;
- Alteration of a property, including restoration, rehabilitation, repair, maintenance, stabilization, hazardous material remediation, and provision of handicapped access, that is not consistent with The Secretary of Interior's Standards for the Treatment of Historic Properties (36 CFR Part 68) and applicable guidelines;
- Removal of the property from its historic location;
- Change of the character of the property's use or of physical features within the property's setting that contribute to its historic significance;
- Introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features;

[2] "No Action Alternative" is the NEPA term. It corresponds to the CEQA term "No Project Alternative." This Draft EIS/R uses No Action throughout.

- Neglect of a property that causes its deterioration, except where such neglect and deterioration are recognized qualities of a property of religious and cultural significance to an Indian tribe or Native Hawaiian organization; and
- Transfer, lease, or sale of property out of federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property's historic significance.

This significance criterion is discussed below in Phase 2 Impact 3.7-2, which addressees the potential disturbance of the historic salt ponds and associated structures, which may be considered a significant cultural landscape within the Phase 2 project.

CEQA

According to the CEQA Guidelines, an impact to a cultural resource is considered significant if implementation of the proposed project or alternatives under consideration would:

- Cause a substantial adverse change in the significance of a historical resource as defined in Section 15064.5.
- Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5.
- Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.
- Disturb any human remains, including those interred outside of formal cemeteries.

The CEQA Guidelines (California Code of Regulations Section 15064.5) define “substantial adverse change” as physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings. The significance criteria listed above are included in Impact 3.7-1, which addresses the potential disturbance of known or unknown cultural resources located within the Eden Landing Phase 2 project ponds, and in Impact 3.7-2, which addressees the potential disturbance of the historic salt ponds and associated structures that may be considered a significant cultural landscape within the Eden Landing Phase 2 project ponds.

As explained in Section 3.1.2, although both the CEQ Regulations for Implementing NEPA (CEQ 2015) and the CEQA Guidelines (AEP 2016) were considered during the impact analysis, impacts identified in this Draft EIS/R are characterized using CEQA terminology.

Program-Level Evaluation Summary

Three program-level alternatives were considered and evaluated in the 2007 Final EIS/R: the No Action Alternative (Programmatic Alternative A); the Managed Pond Emphasis (Programmatic Alternative B); and the Tidal Marsh Emphasis (Programmatic Alternative C). Programmatic Alternative C was selected and is the alternative implemented under the Phase 1 restoration actions completed to date. Therefore, a summary of the impacts for Programmatic Alternative C from the 2007 Final EIS/R is provided below.

Under Programmatic Alternative C, the 2007 Final EIS/R concluded that impacts to unanticipated cultural resources would be less than significant with implementation of SBSP Mitigation Measure 3.8-1 (discussed in Chapter 2, Alternatives) and that impacts to the historic salt ponds cultural landscape would be less than significant with implementation of SBSP Mitigation Measure 3.8-2 (also discussed in Chapter 2).

As discussed above, since completion of the 2007 Final EIS/R, implementation of Mitigation Measure 3.8-2 has consisted of surveys and determinations of eligibility for the Alviso Salt Works Historic Landscape and the Eden Landing Salt Works Historic Landscape, and the Ravenswood salt works was determined to not constitute a historic resource. Mitigation for impacts to the Alviso and Eden Landing landscapes was codified in the *Memorandum of Agreement between the U.S. Fish & Wildlife Service and the California State Historic Preservation Officer, Regarding the South Bay Salt Pond Restoration Project, Including Restoration of Former Industrial Salt Ponds to Tidal Salt Marsh and Other Wetland Habitats, Including the Former Salt Works Sites within the Alviso Unit on the Don Edwards San Francisco Bay National Wildlife Refuge and California Department of Fish and Game's Eden Landing Ecological Reserve; Alameda and Santa Clara Counties, California* (MOA) (USFWS 2012, also included as Appendix F). Execution of the Memorandum of Agreement (MOA) constitutes completion of the Section 106 process. All stipulations of the MOA, including survey and recordation, have been completed, except for stipulation IIB—which consists of public interpretation that would be included as part of Phase 2—and ongoing monitoring stipulations that will occur during each phase of the SBSP Restoration Project.

Although impact evaluation to paleontological resources was not directly addressed in the 2007 Final EIS/R, such an analysis was not considered necessary due to the nature of sediments within the project's vertical APE and the lack of potential for impacts. As described above in "Geomorphic Setting," the project area is underlain by late Holocene bay mud. Project impacts would be focused on the built-up levees themselves, with some minimal excavation into underlying sediments (channels, etc.). Impacts would be confined to historic-era fill or the underlying bay mud, with no potential for harboring unique paleontological resources. As such, there is no need for additional consideration of paleontological impacts.

Project-Level Evaluation

Phase 2 Impact 3.7-1: Potential disturbance of known or unknown cultural resources.

The scale and scope of the SBSP Restoration Project area necessarily means that there is a wide range of known and unknown cultural resources that may be disturbed by some aspect of individual restoration activities. Because of natural geomorphic processes and historic-era landscape modifications, some of these resources may be obscured, and only encountered during project-related earthmoving activities. Accidental discoveries made during construction may be unavoidable; however, as emphasized in the NHPA, CEQA, and local plans and policies, wherever practicable, preservation of cultural resources is preferred over additional damage and/or data recovery.

Alternative Eden A (No Action). Under the No Action Alternative, no new activities would be implemented as part of the Eden Landing Phase 2 project. The California Department of Fish and Wildlife (CDFW) would continue maintaining and operating the ponds as part of the ELER and according to the *Eden Landing Ecological Reserve System E2 and E2C Operation Plan* and the activities described in the AMP, and in accordance with current CDFW practices. Therefore, Alternative A would not adversely affect historical resources.

Alternative Eden A Level of Significance: No Impact

Alternative Eden B. The historic-era cultural landscape remnants of the Union City Alvarado Salt Ponds (P-01-10834) (Baker and Smith 2007), is partially located within the Bay Pond E7 and the Inland Ponds (E4, E5, E6), south of OAC. Baker and Smith (2007) evaluated this resource and found it not to be eligible for the NRHP due to lack of "historic authenticity or enough integrity to…convey its importance." Likewise, this resource is included in the MOA as not eligible for the NRHP, and not included in the treatment plan (USFWS 2012: Attachment 2). As such, P-01-10834 does not need to be considered further.

Located within, and to the west of, the Union City Alvarado Salt Ponds (P-01-10834) in Ponds E6 and E7, an historic-era archaeological site (FSW-07-12-1) was recorded by Valentine and Speulda-Drews (2007) near a proposed breach location along OAC and a proposed pilot channel between Ponds E6 and E7. This resource contains a domestic artifact scatter (including ceramic tableware fragments and glass food container fragments), railroad ties, and boardwalk. Due to its proximity to the J. Quigley Alvarado Salt Works, Speulda-Drews and Valentine (2007) surmised it may have been a short-term camp for laborers working at the Alvarado Salt Works. FSW-07-12-1 was evaluated and determined eligible under Criteria A and D of the NRHP (OHP 2009); and raising bottom elevations in the Bay and Inland Ponds, the excavation of a pilot channel, and increased inundation from the breach would cause a substantial adverse change to FSW-07-12-01. Mitigation Measure II.C in the MOA accounts for archaeological resources within the ELER that are contributing elements of the historic landscape and will be dealt with according to the treatment plan (USFWS 2012). The treatment plan includes documentation with photography, GPS (global positioning system) mapping, and limited subsurface testing of features and selective surface collection, in addition to yearly monitoring until the salt marsh habitat has been reestablished (USFWS 2012: Attachment 2). For the Oliver Salt Works site in northern Eden Landing, annual monitoring was conducted for 5 years until the marsh was re-established. It is anticipated that a similar duration would be required at the Alvarado Salt Works. Implementation of the treatment plan will resolve the project-related impacts associated with known cultural resources.

There is also a potential that previously undocumented cultural resources are present below the surface, which were not evident during surveys. SBSP Mitigation Measure 3.8-1, described in in Chapter 2, Alternatives, would be implemented as part of the Eden Landing Phase 2 project to reduce potential impacts to unrecorded cultural resources. Measures include site surveys, pre-construction contractor education, construction monitoring, and procedures for unanticipated finds or if human remains are found. For example, measures for site surveys include requirements that qualified professional archaeologists inventory portions of the restoration site that have not been previously examined. If surveys reveal the presence of cultural resources (e.g., unusual amounts of shell, animal bone, bottle glass, ceramics, and structure/building remains), and those resources have not been dealt with sufficiently in any Cultural Landscape documentation, the resources would be documented according to current professional standards. Depending on the evaluation, additional measures may be required, including avoidance of the resource through changes in construction methods.

Pile driving may be required to install bridges, water control structures, and the offloading facility. During bridge construction, piles would likely be driven in the slough separating the Inland Ponds from the Southern Ponds. Approximately 30 temporary mooring piles would also be driven in the deepwater channel of the Bay, to secure the offloader, landing barges, delivery vessels, and supporting equipment. While there is a very low potential for encountering archaeological material within bay mud, some isolated burials have been found. If the pile driving activity is deep enough to extend below the bay mud, then there is also some potential for encountering archaeological resources in the deeper strata (although no such sites have been found to date). Geotechnical borings could provide information about the presence of cultural resources prior to pile driving and if those areas were found to have cultural resources, additional protection measures would be implemented as indicated in SBSP Mitigation Measure 3.8-1. Since mitigation measures required by the MOA and SBSP Mitigation Measure 3.8-1 would be implemented as part of the Eden Landing Phase 2 project, project-related impacts to recorded or unrecorded cultural resources would be less than significant.

Alternative Eden B Level of Significance: Less than Significant

Alternative Eden C. As discussed above for Alternative Eden B, cultural resource FWS-07-12-1 is within the northeastern portion of these ponds. A viewing platform and trail are proposed in the area, as well as a water control structure on the OAC levee, improvement to the interior levee between Ponds E6 and E7, the creation of a habitat transition zone within Pond E7, and raising bottom elevations in the Bay Ponds. All of these proposed improvements would cause a substantial adverse change to FSW-07-12-01, with the increased inundation and the possibility of vandalism. However, this site is included in the MOA and the implementation of the treatment plan, which includes monitoring and data collection, will resolve the project-related impacts associated with known cultural resources. Alternative Eden C could have similar impacts to previously undocumented cultural resources as those discussed in Alternative Eden B. Pile driving for bridge crossing at OAC and the ACFCC could also occur. Since mitigation measures required by the MOA and SBSP Mitigation Measure 3.8-1 (described in Chapter 2, Alternatives) would be implemented as part of the Eden Landing Phase 2 project, project-related impacts to recorded or unrecorded cultural resources would be less than significant.

Alternative Eden C Level of Significance: Less than Significant

Alternative Eden D. As discussed above, cultural resource FWS-07-12-1 is within the northeastern portion of these ponds. A water control structure on the OAC levee, the excavation of a pilot channel between Ponds E6 and E7, and raising bottom elevations in the Bay and Inland Ponds are proposed. These actions would cause an adverse change to FSW-07-12-1. However, this site is included in the MOA and the implementation of the treatment plan, which includes monitoring and data collection, will resolve the project-related impacts associated with known cultural resources. Alternative Eden D could have similar impacts to previously undocumented cultural resources as those discussed in Alternative Eden B. Since mitigation measures required by the MOA and SBSP Mitigation Measure 3.8-1 (described in Chapter 2, Alternatives) would be implemented as part of the Eden Landing Phase 2 project, project-related impacts to recorded or unrecorded cultural resources would be less than significant.

Alternative Eden D Level of Significance: Less than Significant

Phase 2 Impact 3.7-2: Potential disturbance of the historic salt ponds and associated structures which may be considered a significant cultural landscape.

Alternative Eden A (No Action). Under the No Action Alternative, no new activities would be implemented as part of the Eden Landing Phase 2 project. The California Department of Fish and Wildlife (CDFW) would continue maintaining and operating the ponds as part of the ELER and according to the *Eden Landing Ecological Reserve System E2 and E2C Operation Plan* and the activities described in the AMP, and in accordance with current CDFW practices. Therefore, Alternative A would not adversely affect historical resources.

Alternative Eden A Level of Significance: No Impact

Alternative Eden B. As discussed in Section 3.7.1, Physical Setting, the southern Eden Landing ponds are a contributing element of the Eden Landing Salt Works Historic Landscape, which has been determined by the SHPO to be a historic property and, therefore, is considered a historical resource under CEQA as well. The proposed Phase 2 project activities would cause substantial adverse change to the ponds and other landscape features that are contributing elements of the historic landscape. These impacts were previously identified in the 2007 Final EIS/R. Because SBSP Mitigation Measure 3.8-1 (described in Chapter 2, Alternatives) would be implemented as part of the Phase 2 project, project-related impacts to recorded or unrecorded cultural resources would be less than significant. The primary element of this mitigation measure is the determination of eligibility of the cultural landscapes and completion of HALS recordation for those pond complexes considered to be historic landscapes. The HALS mitigation for the SBSP Restoration Project was codified in the MOA (USFWS 2012). SHPO concurred with the determination of eligibility for the Eden Landing Salt Works Historic Landscape (OHP 2010). The HALS recordation has since been completed by USFWS for the Eden Landing Salt Works (HALS CA-91), accepted by the NPS, and submitted to the SHPO and Library of Congress for curation. Given the execution of the MOA and associated treatment plan and mitigation measures, Phase 2 impacts have already been reduced to a less-than-significant level.

Alternative Eden B Level of Significance: Less than Significant

Alternative Eden C. As discussed above for Alternative Eden B, the entire Eden Landing unit has been determined to be a historic property by the SHPO and Phase 2 impacts to the historic landscape have been previously mitigated through execution of the MOA and associated treatment plan and mitigation measures, including HALS documentation. As such, Phase 2 impacts have already been reduced to a less-than-significant level.

Alternative Eden C Level of Significance: Less than Significant

Alternative Eden D. As discussed above for Alternative Eden B, the entire Eden Landing unit has been determined to be a historic property by the SHPO and Phase 2 impacts to the historic landscape have been previously mitigated through execution of the MOA and associated treatment plan and mitigation measures, including HALS documentation. As such, Phase 2 impacts have already been reduced to a less-than-significant level.

Alternative Eden D Level of Significance: Less than Significant

Impact Summary

Phase 2 impacts to cultural resources and the levels of significance are summarized in Table 3.7-3. The levels of significance are those remaining after implementation of program-level mitigation measures, project-level design features, and the AMP and other Eden Landing Ecological Reserve management documents and practices. The cultural resources analysis required no project-level mitigation measures to reduce the impacts to a level that was less than significant.

Table 3.7-3 Phase 2 Summary of Impacts – Cultural Resources

IMPACT	ALTERNATIVE EDEN A	ALTERNATIVE EDEN B	ALTERNATIVE EDEN C	ALTERNATIVE EDEN D
Phase 2 Impact 3.7-1: Potential disturbance of known or unknown cultural resources.	NI	LTS	LTS	LTS
Phase 2 Impact 3.7-2: Potential disturbance of the historic salt ponds and associated structures which may be considered a significant cultural landscape.	NI	LTS	LTS	LTS

Notes:

Alternative Eden A is the No Action Alternative (No Project Alternative under CEQA).

LTS = Less than Significant

NI = No Impact

3.8 Land Use and Planning

This section of the Draft Environmental Impact Statement/Report (EIS/R) describes the existing land uses and policies within the Eden Landing Phase 2 project area and assess the consistency of the proposed project with existing land use regulations and conformance with local plans. The information presented is based on a review of federal, state, regional, county and city planning documents presented in the regulatory framework section of this chapter. Using this information as context, an analysis of land use related environmental impacts of the project is presented for each alternative. The program-level mitigation measures described in Chapter 2 would be implemented as part of this project. Therefore, this section only includes additional mitigation measures as needed.

3.8.1 Physical Setting

Methodology

The development of the baseline conditions, significance criteria, and impact analysis in this section is commensurate to and reliant on the analysis conducted in the 2007 South Bay Salt Pond (SBSP) Restoration Project EIS/R (2007 Final EIS/R). Applicable regional and local plans and policies were reviewed for information on existing land uses and goals for future development. City and county general plans and land use and zoning codes applicable to the Eden Landing Phase 2 project area identify land use goals, policies, and existing land use designations in the Phase 2 project area and for lands immediately surrounding. The policy discussion is organized according to the jurisdictions that provide regulatory oversight to lands within and adjacent to the Eden Landing Phase 2 project area.

Regional Setting

The Eden Landing Ecological Reserve (ELER, or Reserve) is situated in Alameda County and forms a tidally influenced boundary between South San Francisco Bay (South Bay) and upland urban communities. Hayward, Union City, and Fremont are located to the north, east, and south (Figure 3.8-1). The Reserve is owned and managed by the California Department of Fish and Wildlife (CDFW) and is approximately 6,400 acres in total. Old Alameda Creek (OAC), which flows east to west through the Reserve, splits the Reserve into what is known as a “northern” and “southern” area. Tidal restoration, flood risk management, and recreation improvements to the northern portion of the Reserve were addressed in the Phase 1 EIS/R and have since been implemented.

The Eden Landing Phase 2 project area consists of the southern portion of the Reserve between OAC and the Alameda County Flood Control Channel (ACFCC). Land uses surrounding the Eden Landing Phase 2 project area consist of urban development (single and multifamily residential, commercial, and industrial uses), open space and recreation areas, tidal mudflats, salt flats, salt marsh, creeks, flood control levees, rural land, and wildlife interpretative areas. The Eden Landing Phase 2 project area is within the municipal boundaries of the City of Hayward. Union City borders the Inland Ponds and Southern Ponds associated with the Eden Landing Phase 2 project area. Dominant land uses adjacent to the Eden Landing Phase 2 project area within Union City include single and multifamily residential, recreation, and commercial based uses. Fremont is located south of the Eden Landing Phase 2 project area and the ACFCC. This area includes active salt ponds managed by Cargill. The outer western boundary of the Eden Landing Phase 2 project area is bounded by South Bay. Major drainages within the pond complex that discharge into San Francisco Bay include OAC and ACFCC.

LEGEND

City Boundary

Eden Landing Phase 2 Project Area

Southern Eden Landing Ponds

AECOM

South Bay Salt Pond Restoration Project

Figure 3.8-1

City Boundaries

Project Setting

The Phase 2 project area is comprised of 11 individual ponds (i.e., E1, E1C, E2, E2C, E4, E4C, E5, E5C, E6, E6C, and E7) and encompasses roughly 2,300 acres of former salt ponds within the southern area of the Reserve. These 11 ponds are frequently discussed according to the following groups, which are based on their proximity and similarity to each other:

- The Bay Ponds – Ponds E1, E2, E4, and E7 are the four large ponds closest to San Francisco Bay (or Bay);
- The Inland Ponds – Ponds E5, E6, and E6C are somewhat smaller ponds in the northeast portion of the complex; and
- The Southern Ponds – Ponds E1C, E2C, E4C, and E5C are in the southeastern portion of the complex. They are referred to in some documents as “the C-Ponds”. They are separated from the Inland Ponds and the Bay Ponds by an Alameda County-owned freshwater outflow channel and diked marsh areas known collectively as “the J-Ponds”. The Southern Ponds surround a natural hill known as Turk Island that is on a private inholding.

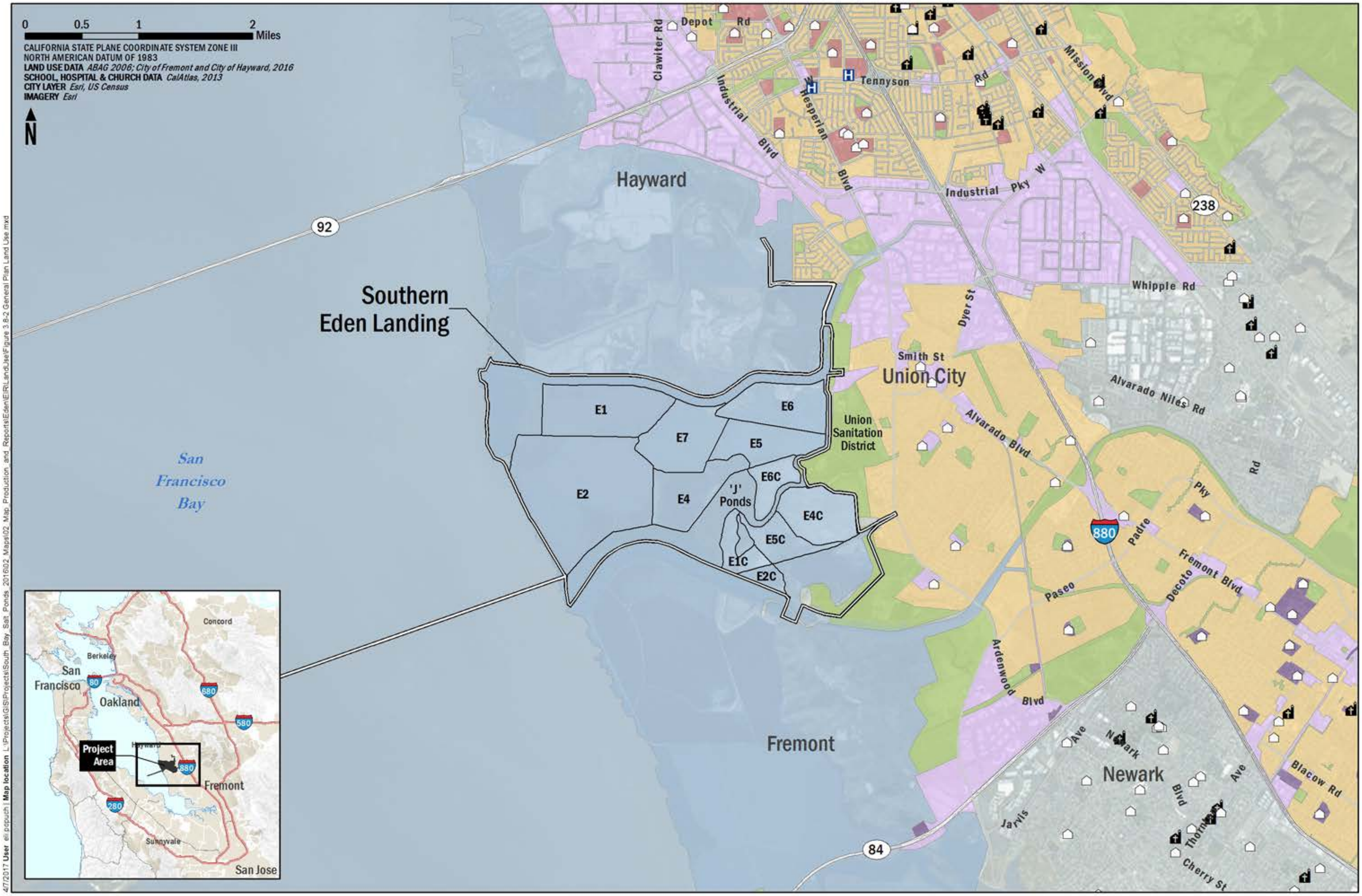
The Hayward General Plan designates the entire Reserve as “Bayland” (City of Hayward, 2014). The Hayward General Plan broadly defines “Baylands” as, “open space resources located along the Hayward shoreline.” The Hayward General Plan further defines “Baylands” as a resource that is intended to transition from salt ponds to freshwater marsh over time. Though non-specific to location or means, the General Plan also anticipates that, “Baylands” will see improvements to regional flood protection levees and the construction of new recreation amenities along the shoreline (City of Hayward, 2014). Hayward has zoned the entire Eden Landing Phase 2 project area as “Flood Plain District [FP],” (City of Hayward, Section 10-1.2100). The purpose of the “FP” [zoning] district is, “to protect persons and property from the hazards of development in areas subject to tidal or flood water inundation, and to protect the community from the costs which may be incurred by premature development in such area(s).”

General Plan land use categories surrounding the Eden Landing Phase 2 project area include residential, commercial, and industrial uses as shown in Figure 3.8-2, as well as local roads, flood control basins, other restoration areas, and recreational or other public facilities.

3.8.2 Regulatory Setting

Under Sections 65300–65403 of the California Government Code, all cities and counties in California are required to provide comprehensive long-range plans for lands within their jurisdictions which contain seven mandatory elements: land use, housing, conservation, open space, circulation, noise, and safety. The Eden Landing Phase 2 project area is within the City of Hayward, and as discussed above, the Hayward General Plan identifies land use goals and existing land use designations to the Eden Landing Phase 2 project area.

In addition, a number of regional plans have been developed by San Francisco Bay Area agencies— some individually, some in collaboration with other agencies. These agencies acknowledge a variety of environmental interests in the Bay Area and in some cases include the SBSP in their discussions, analyses, policies and/or objectives.



LEGEND

Land Use

- Baylands/S.F. Bay
- Commercial/ Industrial
- Open Space
- Other/Miscellaneous
- Publicly Owned
- Residential
- City Boundary
- Eden Landing Phase 2 Project Area
- Southern Eden Landing Ponds
- Hospital
- School
- Church

AECOM

South Bay Salt Pond Restoration Project

Figure 3.8-2

General Plan Land Use

The following regional plans were reviewed for this project analysis:

- Water Quality Control Plan for the San Francisco Basin (Basin Plan) – San Francisco Bay Regional Water Quality Control Board (RWQCB);
- Baylands Ecosystem Habitat Goals Report – San Francisco Bay Area Wetlands Ecosystem Goals Project;
- San Francisco Bay Plan (Bay Plan) – San Francisco Bay Conservation & Development Commission (BCDC);
- CALFED Record of Decision and EIR/S – CALFED Bay Delta Authority;
- CALFED Ecosystem Restoration Program; Draft Stage 1 Implementation Plan – CALFED Bay Delta Authority;
- Plan Bay Area – Association of Bay Area Governments (ABAG) and the Metropolitan Transportation Commission (MTC)
- Comprehensive Conservation and Management Plan – The San Francisco Estuary Project;
- Implementation Strategy – San Francisco Bay Joint Venture (SFBJV);
- Comprehensive Conservation Plan (CCP) – Don Edwards San Francisco Bay National Wildlife Refuge (Refuge)
- Invasive Spartina Project – California State Coastal Conservancy/United States Fish and Wildlife Services (USFWS);
- Long Term Management Strategy (LTMS) for Dredge Material – United States Environmental Protection Agency;
- South Bay Salt Pond Restoration Feasibility Analysis – Stuart W. Siegel; Philip A.M. Bachand; and
- Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California – USFWS.

Only regional plans and city plans that refer specifically to the Eden Landing Phase 2 project area are discussed in this section. Other relevant local and regional plans and regulations are discussed in other sections of Chapter 3 in this EIS/R.

Regional Plans

Regional plans discussed below contain objectives typically developed by a variety of stakeholders regarding environmental issues that transcend the geographic and jurisdictional boundaries which exist under the city and county framework. Regional plans address land uses when they discuss the intensity of development throughout the region. Some regional plans advocate for developing specific areas and conserving other areas, while other plans discuss the impacts of potential future development and other activities on existing habitats and resources.

Basin Plan – San Francisco Bay Regional Water Quality Control Board

The San Francisco Bay RWQCB was founded in 1950 with the purpose of protecting the quality of surface water and groundwater within the San Francisco Bay region for beneficial uses. The State Water Quality Control Board required that the RWQCB develop a Basin Plan for San Francisco Bay, and the first comprehensive Basin Plan was adopted in 1975. The most recent amendment was adopted in 2015.

The Basin Plan is the master policy document that contains descriptions of the legal, technical, and programmatic bases of water quality regulation in the San Francisco Bay region. The Basin Plan must include a statement of beneficial water uses that the RWQCB will protect, the water quality objectives needed to protect the designated beneficial water uses, and the implementation plans for achieving the water quality objectives through its regulatory programs (2007 Final EIS/R).

The Basin Plan makes reference to salt marsh ecosystems, specifically within the context of wetland restoration using dredged material. However, no direct reference to the South Bay salt ponds, particularly with regard to land use plans or decisions, is made.

San Francisco Bay Plan – San Francisco Bay Conservation and Development Commission

The McAteer-Petris Act (Cal. Govt. Code Sections 66600–66694) is the California state law that established the San Francisco BCDC as a state agency; prescribes BCDC's powers, responsibilities and structure; and describes the broad policies the Commission must use to determine whether permits can be issued for activities in and along the shoreline of San Francisco Bay. BCDC's Bay Plan, adopted in 1969 and subsequently amended, has a twofold goal: "to protect the Bay as a great natural resource for the benefit of present and future generations" and to "develop the Bay and its shoreline to their highest potential with a minimum of Bay filling."

Plan Bay Area

Plan Bay Area is a long-range integrated transportation and land-use/housing strategy through 2040 for the San Francisco Bay Area. On July 18, 2013, the Plan was jointly approved by the ABAG Executive Board and by MTC. The plan includes the region's Sustainable Communities Strategy and the 2040 Regional Transportation Plan and represents the next iteration of a planning process that has been in place for decades.

Plan Bay Area marks the nine-county region's first long-range plan to meet the requirements of California's landmark 2008 Senate Bill 375, which calls on each of the state's 18 metropolitan areas to develop a Sustainable Communities Strategy to accommodate future population growth and reduce greenhouse gas emissions from cars and light trucks. Working in collaboration with cities and counties, the Plan advances initiatives to expand housing and transportation choices, create healthier communities, and build a stronger regional economy (ABAG and MTC 2013).

Implementation Strategy – San Francisco Bay Joint Venture

The SFBJV is a collaborative effort by 27 public agencies and private non-profit and corporate organizations to protect, restore, increase and enhance wetlands, riparian habitat and associated uplands throughout the San Francisco Bay region to benefit birds, fish and other wildlife. Its Implementation Strategy details the organization's efforts to restore the San Francisco Estuary.

The Implementation Strategy has set an overall habitat goal for nonprofit, provide, and public agencies to acquire, restore, and enhance tidal marshes, tidal flats, and salt ponds as “Bay Habitats.” To that end, the Implementation Strategy suggests that SFBJV will work with Cargill to explore ways to enhance the habitat values of the Santa Clara County-based salt ponds for water-fowl and shorebirds (SFBJV 2001). It also makes reference to the Mid-Peninsula Regional Open Space District overseeing the tidal marsh restoration of a 200-acre salt pond.

Invasive Spartina Project – California State Coastal Conservancy (SCC)/ USFWS

The San Francisco Estuary Invasive Spartina Project is a regionally coordinated effort of federal, state, and local agencies and private landowners with the ultimate goal of arresting and reversing the spread of non-native cordgrasses in the San Francisco Estuary (SCC and USFWS 2014). Since the peak of the invasive Spartina invasion in 2005, the Control Program has resulted in the elimination of more than 772 net acres (nearly 97 percent) of non-native cordgrasses from more than 20,000 acres of infested tidal marsh and 25,000 acres of mudflats bay-wide. The area of non-native Spartina has been reduced markedly since the first full season of effective treatment started in 2005. In most areas where non-native Spartina has been eradicated, the result has been rapid and large-scale return to a native plant species dominated habitat at low- and mid-marsh elevations, and a return to the natural mudflat and tidal channel conditions at lower elevations. As the marshes recover from the Spartina invasion over time, it is anticipated that native plant diversity will passively recover in most marshes.

In May 2014 the California State Coastal Conservancy adopted an authorization of grant funds for the funding of revegetation and enhancement projects. The revegetation program goals are to: (1) Enhance and accelerate *Spartina foliosa* re-establishment at selected marshes through introduction of plugs or propagated seedlings that will support associated faunal communities including California Ridgway’s rail (*Rallus longirostris obsoletus*; formerly California clapper rail) foraging and nesting habitat; (2) Enhance and accelerate post-treatment marsh succession and complexity with introduction of other native marsh plant species (such as *Grindelia stricta*), which have a tall shrubby structure that will provide clapper rail nesting substrate, cover and high tide refugia; and (3) Provide additional high tide refugia by constructing high tide refuge islands (SCC and USFWS 2014).

U.S. Environmental Protection Agency (USEPA) – Long Term Management Strategy for Dredge Material

The LTMS for Dredge Material is a cooperative effort of USEPA, the United States Army Corps of Engineers (USACE), State Water Resources Control Board (SWRCB), RWQCB, and BCDC to develop a new approach to dredging and dredged material disposal in the San Francisco Bay Area. An average of six million cubic yards of sediments must be dredged every year in order to maintain safe navigation in and around San Francisco Bay, resulting in controversy surrounding appropriate management of such an effort. The major goals of the LTMS are to: (1) “maintain in an economically and environmentally sound manner those channels necessary for navigation in San Francisco Bay and Estuary and eliminate unnecessary dredging activities in the Bay and Estuary;” (2) “conduct dredged material disposal in the most environmentally sound manner;” (3) “maximize the use of dredged material as a resource;” and (4) “establish a cooperative permitting framework for dredging and dredged material disposal applications” (USEPA 1998).

The Final Policy EIS/Programmatic EIR for the LTMS addresses the salt ponds in and around the South Bay mainly within the context of its role as habitat for a number of species, including the California least tern (*Sterna antillarum browni*), western snowy plover (*Charadrius nivosus* ssp. *nivosus*), California Ridgway's rail, salt marsh harvest mouse (*Reithrodontomys raviventris*), and California brown pelican (*Pelecanus occidentalis californicus*). While the presence of such species causes restrictions on potential management strategies, dredged material disposal has potential benefits, such as the creation or restoration of seasonal wildlife habitats by raising and modifying topography and thus improving wetland hydrology (USEPA 1998). Disposal of dredge material in the salt ponds would require a BCDC permit.

USFWS – Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California

The Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California features five endangered species: two endangered animals – California Ridgway's rail and salt marsh harvest mouse – and three endangered plants – Suisun thistle (*Cirsium hydrophilum* var. *hydrophilum*), soft bird's-beak (*Chloropyron molle* ssp. *molle*), and California sea-blite (*Suaeda californica*). The biology of these species is at the core of the recovery plan, but the goal of this effort is the comprehensive restoration and management of tidal marsh ecosystems. The ultimate goal of this recovery plan is to recover all focal listed species so they can be delisted. The interim goal is to recover all endangered species to the point that they can be changed from endangered to threatened status. Within a 50-year planning period (based on estimated time to achieve sufficiently mature restored tidal marsh habitats), the Service expects that the following species recovery objectives will be met: (1) "Secure self-sustaining wild populations of each covered species throughout their full ecological, geographical, and genetic ranges;" (2) "Ameliorate or eliminate the threats, to the extent possible, that caused the species to be listed or of concern and any future threats;" and (3) "Restore and conserve a healthy ecosystem function supportive of tidal marsh species" (USFWS 2013).

County and City General Plans

County general plans contain goals, policies and implementation measures that provide planning guidance for the future. The Land Use Elements of the general plans contain goals concerning land use and are designed to serve as the basis for development decision-making for county lands.

City general plans act as "blueprints" for the long-term physical development of each city and contain goals, policies and implementation measures that provide planning guidance for the future. The Land Use Element of each general plan designates land uses within the respective city and presents land use goals and policies for future land use development decision-making for city lands.

The Eden Landing Phase 2 project area is located within the boundaries of the City of Hayward within Alameda County, but situated on land owned and managed by CDFW. Relevant goals and policies from applicable county and city general plans are presented below for the Eden Landing Phase 2 project area.

Phase 2 Project Area Plans

Planning documents relevant to the Phase 2 project area include the Alameda County General Plan, Hayward General Plan, Union City General Plan, Fremont General Plan, and the CDFW Eden Landing Reserve Management Plan.

Alameda County General Plan. The Eden Landing Phase 2 project area is designated as Open Space in the Alameda County General Plan. The Alameda County General Plan, adopted in 1973, does not include a Land Use Element, and instead incorporates land use elements from each city General Plans and unincorporated area specific plans. However, policies applicable to the Salt Ponds are discussed in the May 4, 1995 Amended Open Space Element and are described as follows:

Shoreline and Bay Open Space - Principles for Shoreline and Bay Open Space

- Preserve Natural Ecological Habitats in Shoreline Areas: Outstanding natural ecological habitats in shoreline areas of the County should be designated for protection and maintenance as wildlife preserves as a means of protecting marine and wildlife and to permit ecological studies; and
- Provide for Orderly Transition of Phased out Salt Extraction Areas to Uses Compatible with the Open Space Plan: Salt extraction areas, which will be operative through the plan period, should be designated as permanent open space. Areas that will not be active through the plan period should be phased out according to a planned program in such a manner as to maintain salt production cycles. Phased out areas should be converted to uses permitted within waterfront open spaces such as wildlife refuges or recreation areas. No filling of salt extraction areas should be permitted except for recreation purposes in selected areas as indicated on adopted local or regional plans.

City of Fremont General Plan. The City of Fremont General Plan was adopted on May 7, 1991 and updated in 2011. The City is divided into planning areas, one of which is the Baylands Planning Area which includes lands under the Bay, salt ponds, wetlands, seasonal wetlands, and other uses associated with the Bay and wildlife habitat.

The goals, policies and implementation measures contained in the Open Space Element related to salt ponds include the following (City of Fremont 2011):

Goal 2-6: Open Space. An open space “frame” around Fremont, complemented by local parks and natural areas, which together protect the City’s natural resources, provide opportunities for recreation, enhance visual beauty, and shape the City’s character.

Policy 2-6.3: Baylands. Manage Fremont’s Baylands as permanent open space. The habitat and ecological value of these areas should be conserved and restored to the greatest extent possible… Planning for the baylands should consider the effects of climate change and sea level rise.

City of Hayward General Plan. The Hayward General Plan 2040 was adopted in 2002 and amended on July 1, 2014 (City of Hayward 2014). No land use policies make specific reference to the SBSPs; however, the Land Use element of the General Plan recognizes that Baylands (*e.g.*, Marshes and Salt Ponds) comprise nine square miles within Hayward. The General Plan’s Land Use Map identifies the pond complex as Baylands.

The Natural Resource Element of the General Plan includes the following goal concerning the baylands (*e.g.*, Marshes and Salt Ponds) (City of Hayward 2014):

Goal NR-3: Preserve, enhance, and expand natural baylands, wetlands, marshes, hillsides, and unique ecosystems within the Planning Area in order to protect their natural ecology, establish the physical setting of the city, provide recreational opportunities, and assist with improved air quality and carbon dioxide sequestration.

Union City General Plan. Union City’s General Plan was adopted in 2002 (City of Union City 2002). No land use policies make specific reference to the South Bay salt ponds or the Reserve.

The eastern edge of the Eden Landing pond complex is directly adjacent to Union City. The majority of the land within the Union City limits is zoned for Open Space. The Open Space designation is described as follows in the Union City General Plan Land Use Element:

- The purpose of this [Open Space] designation is to conserve lands that should remain as open space for passive and active recreation uses, resource management, flood control management and public safety. Uses that would typically be appropriate in this land use designation include but are not limited to public parks, playgrounds, golf courses and driving ranges, parkways, vista areas, wetlands, wildlife habitats and outdoor nature laboratories; stormwater management facilities; and buffer zones separating urban development and ecologically sensitive resources (p. LU-7) (City of Union City 2002).

However, some land abutting the complex is zoned Civic Facility and Special Industrial. The Civic Facility designation is applied to:

- …the City's major public buildings and facilities owned by City, County, state, federal or other public agencies that serve the general public. Uses include but are not limited to wastewater treatment facilities, water tanks, electrical substations, public educational facilities, community centers, libraries, museums, government offices and courts (*e.g.*, Civic Center), transit facilities and stations, and public safety facilities (*e.g.*, police and fire stations) (p. LU-7).

The Special Industrial designation provides:

- space for the lightest industrial operations and non-manufacturing uses that support nearby manufacturing that exhibit virtually no nuisance characteristics. Non-manufacturing uses include educational, administrative, sales and service activities. This designation provides for a smaller scale of uses, on smaller sites than would typically be found in Light Industrial designated areas. In Special Industrial designated areas, nuisance characteristics of noise, odor, traffic generation, unsightliness or hazardous materials storage or handling are avoided, and almost all uses will be conducted entirely within enclosed buildings (p. LU-6).

The Special Industrial designation typically includes small scale, high quality industrial park developments and is often applied as a buffer adjacent to major thoroughfares where large landscaped setbacks are provided and as a transition area between higher intensity industrial uses and other lower intensity uses. Performance standards are applied to eliminate, or minimize to the extent reasonably possible, any potential for adverse effects (City of Union City 2002).

CDFW Eden Landing Land Management Plan. The mission of CDFW is to manage California's diverse fish, wildlife, and plant resources, and the habitats upon which they depend, for their ecological values and for their use and enjoyment by the public. This includes habitat protection and maintenance in a sufficient amount and quality to ensure the survival of all species and natural communities. Section 1019 of the California Fish and Game Code requires the Department to draft and adopt Land Management Plans (LMPs) for any property wholly under its jurisdiction and that was purchased after January 1, 2002. LMPs document management goals and objectives, and other necessary information for consistent and effective management of CDFW Wildlife Areas and Ecological Reserves. LMPs describe future conditions and contain long-range guidance to accomplish the purposes for which a Refuge or Reserve was established. The CDFW manages the ELER according to the Final EIR for the ELER (Baumberg Tract) Restoration and Management Plan (CDFW 1999) and the *Eden Landing Ecological Reserve System E2 and E2C Operation Plan* (Operations Plan; CDFW 2016), which implemented the Initial

Stewardship Plan and describes the current pond management activities that are carried out to meet the goals and objectives for managed ponds within the ELER Phase 2 project area. The Operations Plan will be revised, as appropriate, reflecting the implementation of Phase 2.

The broad objectives of the Operations Plan for the Phase 2 ponds at southern Eden Landing include the following:

- Maintain year-round open water habitat of various depths in Ponds E1, E2, E7, E4 and E5 and E2C and deeper open water habitat in winter in all E2 and E2C System ponds. Muted tidal circulation via Ponds E2 and E2C.
- Maintain discharge salinity into San Francisco Bay (Pond E2) and ACFCC (Pond E2C) at less than 44 parts per thousand (ppt) via muted tidal circulation in Ponds E2 and E2C.
- Operate Cargill Pond 3C (CP3C) as part of E2C system as year-round open water, though it is not owned by CDFW.
- Manage for different waterbird guilds in summer vs. winter by varying depth and salinity of the ponds.
- Maintain prey base for overwintering ducks, migratory shorebirds and resident waterbirds.

The CDFW meets these overarching objectives through the control of tidal flow into and discharge out of the ponds. Tidal flows into and discharge out of the ponds are primarily influenced by, 1) pond bottom elevations and 2) existing water control structure's access to tidal flux. These basic parameters are further influenced by seasonal changes in weather, and diurnal and annual fluctuations in the tides. As per the Operations Plan, the management of tidal flux primarily affects water surface elevation and salinity, and its effect on species use, and water quality. The Operations Plan ensures the CDFW is accountable for the management objectives described above, and these objectives are achieved at a pond specific level.

Finally, though not a formal part of the Operations Plan, CDFW does operate portions of Eden Landing to include public access for recreational use of hiking trails, kayak launches, and seasonal waterfowl hunting areas.

3.8.3 Environmental Impacts and Mitigation Measures

Significance Criteria

For the purposes of this Draft EIS/R, a significant land use and planning impact would occur if the project would:

- Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect;
- Conflict with existing land use and zoning designations;
- Conflict with applicable habitat conservation plan or natural community conservation plan in the area; or

- Convert important farmlands (Prime Farmland, Unique Farmland, Farmland of Statewide Importance) to nonagricultural use, conflict with existing zoning for agricultural use or a Williamson Act contract, or involve other changes in the existing environment which, due to their location or nature, could result in conversion of farmland to nonagricultural use.

The Eden Landing Phase 2 project area is designated by the City of Hayward as Baylands. However, the ELER is under CDFW jurisdiction and not subject to county or city land use jurisdiction. In areas subject to city or county plans, policies, or regulations, applicable regulatory requirements and policy guidelines of those jurisdictions will be met, as appropriate.

Regional plans and applicable general plans contain goals and policies which promote restoration of the salt ponds in the South Bay, including the Eden Landing Phase 2 project area. The proposed SBSP Restoration Project long-term alternatives would be consistent with these land use plans or designations. Therefore, implementation of the project would not conflict with applicable land use plans or existing land use and zoning designations.

There are no habitat conservation plans or natural community conservation plans in place that cover the Eden Landing Phase 2 project area. The salt ponds are not located within an established community, and no actions under consideration would physically divide a community. Therefore, there is no further discussion of these topics and no need to include a full discussion of an impact related to them.

No important farmlands (prime farmland, farmland of statewide importance, unique farmland, or farmland of local importance) as identified by the Department of Conservation Farmland Mapping and Monitoring Program occur within the Eden Landing Phase 2 project area. As such, no impacts to important farmlands would result from implementation of the project.

Impact evaluations for the Action Alternatives are evaluated based on the existing conditions described in Section 3.8.2 above, and not the proposed conditions that would occur under the No Action Alternative. This approach is consistent with the California Environmental Quality Act (CEQA) and National Environmental Policy act (NEPA) protocol for analyzing project impacts. In this case, the No Action Alternative represents the continuation of current management direction or level of management intensity provided in the Adaptive Management Plan (AMP) into the future, with no change in that management.

As explained in Section 3.1.2, while both Council on Environmental Quality Regulations for Implementing NEPA and the CEQA Guidelines were considered during the impact analysis, impacts identified in this Draft EIS/R are characterized using CEQA terminology. Please refer to Section 3.1.2 for a description of the terminology used to explain the severity of the impacts.

Program-Level Evaluation

Three programmatic-level alternatives were considered and evaluated in the 2007 Final EIS/R. This included: (A) the No Action Alternative; (B) the Managed Pond Emphasis; and (C) the Tidal Habitat Emphasis. At the program level, the decision was made to select Alternative C and implement Phase 1 actions. Programmatic Alternative C has been carried forward as Alternative A (No Action) in this EIS/R as it represents the continuation of existing conditions that would occur absent the implementation of one of the action alternatives for Phase 2. The Programmatic EIS/R evaluated the potential land use and planning impacts of three long-term alternatives. It was determined Alternative C would have no impact or less than significant impacts on land use and planning resources. The land uses proposed under Programmatic Alternative C would be similar to those described above for Programmatic Alternative B;

however, the ratio of tidal habitat to managed ponds would be greater under Alternative C. The preservation of open space areas, protection of wildlife habitat, and provision of new recreation facilities would result in a beneficial impact. None of the alternatives would introduce land uses that would be incompatible with surrounding uses. Therefore, Programmatic Alternative C would not introduce land uses that would be incompatible with surrounding uses and impacts would be less than significant.

Project-Level Evaluation

Phase 2 Impact 3.8-1: Land use compatibility impacts.

Alternative Eden A (No Action). Under Alternative Eden A, no new actions would be implemented as part of the Eden Landing Phase 2 project. Levees around the ponds used for flood risk management and the trails adjacent to the project area would continue to be maintained and none of the activities that would occur would be incompatible with surrounding land uses. The preservation of open space areas, protection of wildlife habitat, and provision of new recreation facilities would be consistent with applicable local land use plans and the AMP, which was adopted for the purposes of avoiding or mitigating an environmental impact. Therefore, Alternative Eden A would not change current land uses, and there would be no impacts.

Alternative Eden A Level of Significance: No Impact

Alternative Eden B. Under Alternative Eden B, all of the southern Eden Landing ponds would be restored to tidal action to promote recovery of tidal marsh habitat in one phase of construction and project implementation. The backside levees along the eastern edge of the Inland and Southern Ponds would be improved for added flood risk management. Along these improved backside levees, habitat transition zones would be constructed, and the Bay Trail spine would be extended on raised levees. Bottom elevations would be raised in the Bay and Inland Ponds, and there would be pilot channel excavation, water control structures, and a number of other habitat improvements to achieve the various restoration goals.

The project area currently functions as open space managed by CDFW. Implementation of Phase 2 project actions associated with Eden Alternative B would retain the open space nature of the project area, and enhance its habitat value. It would also add public access opportunities and retain and improve existing ones bordering the project area. As such, the proposed conversion of the project area to tidal marsh would remain similar to and consistent with its existing land use definition. This alternative would not result in the development of any uses (*e.g.*, residential, commercial or industrial uses) that would be incompatible with the existing uses of the site. The proposed project would preserve the open space nature of the area, while improving habitat value and increasing recreational use. The proposed function as tidal marsh is an allowed use within the Baylands zoning district and is envisioned by the future land use plan in the Hayward, Union City, and Fremont General Plans. Alternative Eden B would be consistent with the governing land use plans, the CDFW Eden Landing Land Use Management Plan, and the AMP. The beneficial reuse of dredge materials at the site is also consistent with the regional LTMS for dredge material. Therefore, the proposed use as dominantly tidal marsh is consistent with existing land use plans and impacts associated with land use compatibility would be less than significant.

Alternative Eden B Level of Significance: Less than Significant

Alternative Eden C. Under Alternative Eden C, a combination of tidal marsh restoration and enhanced managed ponds would be constructed within the project area. Bottom elevations would be raised and the

Bay Ponds would be restored to tidal marsh, similar to Alternative Eden B; however, the Inland and Southern Ponds would transition from ponds to enhanced managed ponds. This alternative would include a mid-complex levee that would provide de-facto flood protection to the adjacent inland cities. Current levels of de-facto flood protection would be maintained through levee raising and other improvements. Habitat transition zones and other habitat features (e.g., pilot channels, islands, water control structures) would be added, and recreational opportunities would be increased through construction of new trail(s), a viewing platform, and interpretive recreation facilities in addition to those included in Alternative Eden B.

The CDFW currently manages this portion of Eden Landing as open space and would not alter its use of the project area under Alternative Eden C. This alternative would not result in the development of any uses (*e.g.*, residential, commercial or industrial uses) that would be incompatible with the existing uses of the site. The proposed project would preserve the open space nature of the area, while improving habitat value and increasing recreational use. Similar to Alternative Eden B, explained above, under the Hayward Land Use Element, the Baylands are expected to be restored to tidal marsh, which would improve the nearby wetland habitats. The CDFW, along with the cities of Hayward, Fremont, and Union City, express the intention of restoring this area and enhancing the habitat value. Alternative Eden C would be consistent with the governing land use plans, the CDFW Eden Landing Land Use Management Plan, and the AMP. The beneficial reuse of dredge materials at the site is also consistent with the regional LTMS for dredge material. As such, implementation of this alternative would not result in any land use compatibility conflicts and impacts would be less than significant.

Alternative Eden C Level of Significance: Less than Significant

Alternative Eden D. Under Alternative Eden D, a two-staged approach would be employed to restore the entire Eden Landing Phase 2 project area to tidal marsh. The first step of this project would restore the Bay Ponds to tidal marsh and construct a temporary mid-complex levee to separate the Bay Ponds from the Inland and Southern Ponds. Bottom elevations would be raised in the Bay and Inland Ponds and the Inland and Southern Ponds would be managed ponds until the Bay Ponds are established as tidal marsh, after which, the rest of southern Eden Landing could be restored to tidal marsh as well. Current levels of de-facto flood protection would be maintained through levee raising and other improvements. Habitat transition zones and other habitat features (e.g., pilot channels, islands, water control structures) would be added, as well as the same Bay Trail spine and other recreational opportunities described in Alternative Eden B.

The CDFW currently manages this portion of Eden Landing as open space and would not alter its use of the project area under Alternative Eden D. This alternative would gradually convert the southern portion of Eden Landing into tidal marsh, which is consistent with the existing land use designation of the project area. Similar to Alternative Eden B, explained above, under the Hayward Land Use Element, the Baylands are expected to be restored to tidal marsh, which would improve the nearby wetland habitats. The CDFW, along with the cities of Hayward, Fremont, and Union City, express the intention of restoring this area and enhancing the habitat value. Alternative Eden D would be consistent with the governing land use plans, the CDFW Eden Landing Land Use Management Plan, and the AMP. The beneficial reuse of dredge materials at the site is also consistent with the regional LTMS for dredge material. Therefore, proposed use as dominantly tidal marsh is consistent with existing land use plans and therefore and impacts associated with land use compatibility would be less than significant.

Alternative Eden D Level of Significance: Less than Significant

Impact Summary

Phase 2 impacts and levels of significance are summarized in Table 3.8-1. The levels of significance are those remaining after implementation of program-level mitigation measures, project-level design features, Eden Landing Land Management Plan, the Adaptive Management Plan, and other CDFW management documents and practices. The land use analysis required no project-level mitigation measures in order to reduce the impacts to a level that was less than significant.

Table 3.8-1 Phase 2 Summary of Impacts – Land Use

IMPACT	ALTERNATIVE EDEN A	ALTERNATIVE EDEN B	ALTERNATIVE EDEN C	ALTERNATIVE EDEN D
Phase 2 Impact 3.8-1: Land use compatibility impacts	NI	LTS	LTS	LTS

Notes:

Alternative A is the No Action (No Project Alternative under CEQA).

LTS = Less than Significant; NI = No Impact

3.9 Public Health and Vector Management

This section of the Draft Environmental Impact Statement/Report (EIS/R) describes the existing public health and vector management within the Eden Landing Phase 2 project area and analyzes whether implementation of the project would cause a substantial adverse effect on public health and vector management practices. The information presented is based on a review of existing public health and vector management within the area and other pertinent federal, state, and local regulations, which are presented in Section 3.9.2, Regulatory Setting. Using this information as context, an analysis of the public health and vector-management-related environmental impacts of the project is presented for each alternative. The program mitigation measures described in Chapter 2, Alternatives, would be implemented with the project. Therefore, this section only includes additional project-specific mitigation measures as needed.

3.9.1 Physical Setting

Methodology

The development of the baseline conditions, significance criteria, and impact analysis for public health and vector management is commensurate to and reliant on the analysis conducted in the 2007 South Bay Salt Pond (SBSP) Restoration Project Final EIS/R (2007 Final EIS/R). The baseline conditions specific to the Eden Landing pond complex are based on the current conditions of this area, which are based on the information and data gathered for preparation of this Draft EIS/R.

Regional Setting

As stated in the programmatic portion of the 2007 Final EIS/R, there are five species of mosquitoes that are routinely controlled by the mosquito and vector control agencies in the South San Francisco Bay (South Bay) area: the summer salt marsh mosquito (*Aedes dorsalis*), winter salt marsh mosquito (*Aedes squamiger*), Washino's mosquito (*Aedes washinoi*), western encephalitis mosquito (*Culex tarsalis*), and winter marsh mosquito (*Culiseta inornata*).

The ecology of these mosquitoes is summarized in the programmatic discussion in the 2007 Final EIS/R. All five of these species can be found in the southern half of Eden Landing, and individuals can disperse distances that are large enough for breeding populations to migrate into the project area from other areas or to disperse from the project area into other locations. None of these species is specific to the southern half of Eden Landing. Within the Eden Landing Phase 2 project area, the Alameda County Mosquito Abatement District (ACMAD) is responsible for managing and controlling mosquito populations in Alameda County.

Project Setting

Potential habitats for several mosquito species are found in the Eden Landing Phase 2 project area. Table 3.10-1 of the 2007 Final EIS/R listed the habitat types in the SBSP Restoration Project and the mosquito species associated with those habitats. A similar version of that table, modified to the Phase 2 Eden Landing ponds, is provided in Table 3.9-1.

Table 3.9-1 indicates that under the existing conditions, the Eden Landing Phase 2 project area is currently classified as muted tidal salt marsh. Section 3.5, Biological Resources, provides a detailed description of the habitats present in the Eden Landing Phase 2 pond complex.

Within the Eden Landing Phase 2 project area, the four Bay Ponds are large, open water ponds with vigorous wave action. The Inland Ponds and Southern Ponds are managed seasonally for different wildlife and water quality goals, but under that management system, they are a seasonally and annually varied mix of habitats that may include the descriptions in Table 3.9-1 for muted tidal salt marsh and seasonal brackish (though tending toward more saline) wetlands. Habitats in and around Eden Landing support seasonal habitat for five different species of mosquitos.

Table 3.9-1 Mosquito Species Found in the SBSP Restoration Project Eden Landing Phase 2 Area

HABITATS	MOSQUITO SPECIES	PHASE 2 POND GROUP
Open water salt pond with vigorous wave action, tidal mudflat, high-salinity salt ponds	None	Bay Ponds; portions of the Inland Ponds
Fully tidal salt marsh: higher ground with pools or borrow channels that do not flush	*Aedes squamiger* (winter), *Aedes melanimon* (fall), *Aedes dorsalis* (summer), *Aedes taeniorhynchus* (summer), *Culiseta inornata* (winter)	None
Muted tidal salt marsh, pools, and channels that do not flush vigorously	*Aedes squamiger* (winter), *Aedes melanimon* (fall), *Aedes dorsalis* (summer), *Aedes taeniorhynchus* (summer), *Culiseta inornata* (winter)	Inland Ponds and Southern Ponds
Seasonal wetland; brackish to nearly freshwater pools with vegetated margins	*Aedes squamiger* (winter), *Aedes melanimon* (fall), *Aedes dorsalis* (summer), *Aedes taeniorhynchus* (summer), *Aedes washinoi* (winter freshwater), *Culex tarsalis* (spring, summer), *Culex erythrothorax* (summer in tules), *Culex pipiens* (foul freshwater), *Culiseta incidens* (spring, fall freshwater), *Culiseta inornata* (winter)	Inland Ponds and Southern Ponds
Vernal pools, upland freshwater marsh	*Aedes washinoi* (winter), *Culex tarsalis* (spring, summer), *Culex erythrothorax* (summer in tules), *Culex pipiens* (foul freshwater), *Culiseta incidens* (spring, fall freshwater), *Culiseta inornata* (winter)	None

Tidal marshes that lack vigorous tidal flow can provide suitable mosquito breeding habitat. But functional tidal marshes with vigorous tidal flow do not provide high-quality habitat for the most troublesome mosquito species in the Bay Area, and maintenance and restoration of natural tidal flushing in these marshes are effective at limiting mosquito populations while sustaining the natural hydrology of the marsh (San Francisco Bay Joint Venture 2004, as cited in the 2007 Final EIS/R). Project actions that convert former small or shallow ponded areas to well-drained functional tidal marsh or that improve the ability to rapidly change water levels, salinity, and other constituents through mixing and circulation would not increase the difficulty of mosquito control.

Detailed records are maintained by the local mosquito and vector control districts concerning major mosquito breeding areas, population densities, and control techniques and materials. The mosquito and vector control management that occurs within the Eden Landing pond complex is conducted by the ACMAD and follows techniques described in the SBSP Restoration Project’s Adaptive Management Plan (AMP). The California Department of Fish and Wildlife (CDFW) staff coordinates with the ACMAD to allow the monitoring and, if necessary, control of mosquitoes on the Eden Landing Ecological Reserve

(ELER, or Reserve) to minimize public health risks from mosquito-borne diseases. Wetland management Best Management Practices for proactive mosquito control are regularly used. These include, but are not limited to, water management techniques, and maintenance and improvement of water control structures. CDFW also coordinates with the ACMAD on timing of flood-up schedules and any problems with unplanned flooding.

The goal of the vector control portion of the AMP is to maintain or improve current levels of vector management. Through the AMP, mosquito and vector control focuses on monitoring for specific triggers and implementing management actions after a trigger has been signaled. Monitoring protocols have been employed to pinpoint problem areas for vector management. Monitoring parameters include:

- Presence/absence of mosquitoes in former salt ponds
- Number of acres of breeding mosquitoes
- Number of larvae per sampling ‘dip’ in potential breeding habitat
- Number of acres within the project area treated for mosquitoes
- Costs/level of effort (e.g., hours spent in treatment, amount of material applied, helicopter cost) to control mosquitoes

If any of the vector control AMP management triggers are signaled, AMP management actions are deployed. Management actions are triggered when the following circumstances are discovered as a result of monitoring:

- Detection of breeding mosquitoes in a former salt pond
- Detectable increase in monitoring parameters (relative to the baseline), particularly in areas with human activity/exposure
- Detection of mosquitoes that are known disease vectors and/or are of particular concern (i.e., *Aedes squamiger*, *A. dorsalis*) in the project area

The AMP lists and describes the following vector control management actions and directs implementation of the following activities when necessary:

- Adjust design to enhance drainage or tidal flushing, control vegetation in ponded areas, and/or facilitate access (for control) to marsh ponds.
- Increase level of vector control (preferably only as an interim measure while design issues are addressed to reduce mosquito breeding habitat).
- Study relationship between fish abundance and fish community composition with mosquito larval abundance in marsh features (e.g., ponds and pannes) and managed ponds.
- Ensure management actions throughout implementation of the AMP are consistent with mosquito management policies in the Don Edwards San Francisco Bay National Wildlife Refuge.

Mosquito control techniques employed by the ACMAD in cooperation with management of the ELER emphasize minimization and disruption of suitable habitat and control of larvae through chemical and biological means, as opposed to the spraying of adults. Control techniques most often include source reduction, source prevention, larviciding, use of predatory fish, and use of bacteria that are toxic to mosquito larvae. The ACMAD thereby minimizes the number and severity of mosquito outbreaks and addresses those that do occur. The environmental baseline does not have significant mosquito-control or vector-related public health problems in the Eden Landing Phase 2 project area, which consists of open spaces that do not have homes or businesses within them.

3.9.2 Regulatory Setting

The activities of the ACMAD are governed by federal and state regulations, including the Clean Water Act (CWA), the Federal Endangered Species Act (ESA), the California ESA, the federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), the California Health and Safety Code, and the California Food and Agriculture Code. The ACMAD discharges aquatic pesticides and biological control into waters of the United States pursuant to the National Pollutant Discharge Elimination System (NPDES) permit program. These permits are occasionally amended or replaced.

The ACMAD follows specific protocols to avoid affecting endangered species. These protocols are included and described in the vector control portion of the AMP to avoid effects to sensitive species or their habitat (i.e., nesting bird habitat or endangered species habitat) when conducting vector control activities. Additional procedural processes are necessary, including consultation with wildlife agencies, if an endangered species or designated critical habitat would be adversely affected from vector control activities. These processes would result in additional measures to be implemented to minimize effects to endangered species or designated critical habitat.

Per FIFRA, any pesticide that is used must be licensed by the United States Environmental Protection Agency (USEPA) and used in accordance with the specifications and labeled directions. Also, the ACMAD may only use pesticides that are registered for use in California. Individuals must be certified by the California Department of Health Services (CDPH) to apply pesticides or work under the direct supervision of somebody that is certified (CDPH 2005).

3.9.3 Environmental Impacts and Mitigation Measures

Overview

The thresholds of significance for potential Eden Landing Phase 2 impacts to public health and vector management follow. The rationale for the potential impacts as they relate to the significance criteria can be found in Section 3.10.3 of the programmatic discussion in the 2007 Final EIS/R and in summary form below. In tiering from the 2007 Final EIS/R, the impacts and analysis for Eden Landing Phase 2 match the style, format, and content contained in the programmatic discussion in the 2007 Final EIS/R, but consider new effects under Eden Landing Phase 2 that were not been specifically considered in the programmatic discussion in the 2007 Final EIS/R.

Significance Criteria

As defined in the programmatic discussion in the 2007 Final EIS/R, a significant impact to public health and vector control would result if the project would cause “a substantial increase in the need for vector management activities in any of the Eden Landing Phase 2 project areas as a result of implementation of project activities.”

As explained in Section 3.1.2, Environmental Setting and Impact Analysis, although both the Council on Environmental Quality (CEQ) Regulations for Implementing the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA) Guidelines were considered during the impact analysis, the impacts identified in this Draft EIS/R are characterized using CEQA terminology. Refer to Section 3.1.2 for a description of the terminology used to explain the severity of the impacts.

Program-Level Evaluation Summary

In the programmatic portion of the 2007 Final EIS/R, the determination was made that under Programmatic Alternative C, the impacts to public health and vector management would be less than significant. Also, Programmatic Alternative C would result in a less-than-significant increase in mosquito populations, and the implementation of the AMP would not result in a substantial increase in the need for vector management activities.

Project-Level Evaluation

Phase 2 Impact 3.9-1: Potential increase in mosquito populations.

Alternative Eden A (No Action). Under Alternative Eden A, the No Action (No-Project) Alternative, the CDFW would continue maintaining and operating the Eden Landing pond complex in accordance with the *Eden Landing Ecological Reserve System E2 and E2C Operation Plan*, the AMP, and current CDFW practices. Under this alternative, no new actions would be implemented as part of the Eden Landing Phase 2 project. The high-priority levees around the ponds would be maintained to continue to provide de facto inland flood protection. Also, the existing Pacific Gas and Electric Company (PG&E) distribution lines and the access to them would be maintained by others under this alternative.

ACMAD would continue to monitor and mitigate any mosquito and vector management issues that may arise and would continue to adhere to the vector control portion of the AMP and follow CDFW practices. Because no new construction would occur under Alternative Eden A, the AMP management actions would be limited to adjusting the level of vector control at the ponds, as needed, and ensuring AMP activities are consistent with CDFW mosquito management practices. By design, the established AMP management triggers would lead to the implementation of the AMP management actions early enough to avoid substantial increases in the need for vector management activities. The AMP management actions would also minimize potential increases in mosquito populations. Therefore, impacts under Alternative Eden A would be considered less than significant.

Alternative Eden A Level of Significance: Less than Significant

Alternative Eden B. Under Alternative Eden B, full tidal marsh restoration would be achieved during a single stage of construction and project implementation. Bottom elevations would be raised in the Bay and Inland Ponds, the easternmost levees would be fortified to allow continued provision of de facto inland flood protection, and the San Francisco Bay (or Bay)-facing levees would be breached to allow tidal flows to Ponds E1 and E6. Pilot channels would be excavated to help the ponds fill and drain and to prevent residual ponding at low tides. After establishment of full tidal marsh habitat, the amount of viable mosquito-breeding habitat in the project area would decrease. The increase in tidal action would allow the ponds to be flushed more thoroughly, which would decrease the amount of potential mosquito-breeding habitat in the area. However, some new upland areas (e.g., habitat transition zones) would be constructed adjacent to the improved levees. Upland areas have the potential to increase the amount of mosquito-breeding habitat if they are not designed, constructed, and maintained so that water does not pool in them.

The upland areas in this alternative would be designed to enhance drainage and therefore lower the risk of mosquitoes establishing breeding habitats in these areas. They would also be placed so as to be accessible from adjacent levees to allow easier access by the ACMAD.

As described above in the analysis for Alternative Eden A, mosquito and vector management would continue to follow the vector control portion of the AMP and current CDFW practices. Under this alternative, the amount of viable mosquito-breeding habitat would be expected to decrease within the project area. By design, the implementation of the AMP management actions would occur early enough, due to the established AMP management triggers, to avoid substantial increases in the need for vector management activities while minimizing potential increases in mosquito populations. Therefore, impacts under Alternative Eden B would be less than significant.

Alternative Eden B Level of Significance: Less than Significant

Alternative Eden C. Under Alternative Eden C, the Bay Ponds would be restored to tidal marsh as described above in Alternative Eden B; however, the Inland and Southern Ponds would be retained as enhanced managed ponds. Bottom elevations would be raised in the Bay Ponds, and levee breaches and excavated pilot channels would be used to transition the Bay Ponds into tidal marsh habitat. Pilot channels would also help the ponds fill and drain and prevent residual ponding at low tides. An improved levee would be constructed mid-complex for flood risk management. Water control structures would be installed to manage water quality, depth, salinity, and other features, as necessary. This alternative would create managed ponds that could serve as viable breeding habitat for several Alameda County mosquito species. The Inland Ponds and Southern Ponds would continue to be large, open water ponds with vigorous wave action that would discourage mosquito production, though the ponds are managed seasonally for different wildlife and water quality goals.

Although this alternative may increase the amount of mosquito-breeding habitat in the area, water control structures would be installed so that the CDFW or ACMAD would be able to alter the water characteristics to produce unfavorable mosquito-breeding conditions. Habitat transition zones, habitat islands, and the raised levee could potentially provide depressions that could fill with water and support mosquito breeding, but through the implementation of the AMP, the design of these upland areas would be configured to enhance drainage. Also, the habitat transition zones and the raised mid-complex levee would be located to allow access for ACMAD staff to execute necessary mosquito control measures. By design, the implementation of the AMP management actions would occur early enough, due to the established AMP management triggers, to avoid substantial increases in the need for vector management activities while minimizing potential increases in mosquito populations. Therefore, impacts under Alternative Eden C would be less than significant.

Alternative Eden C Level of Significance: Less than Significant

Alternative Eden D. Under Alternative Eden D, all of southern Eden Landing would be restored to tidal marsh in a staged implementation approach. Bottom elevations would be raised in the Bay and Inland Ponds, and the Bay Ponds would be made tidal in the first stage, as in Alternatives Eden B and Eden C. Pilot channels would be excavated to help the ponds fill and drain and to prevent residual ponding at low tides. Similar to Alternative Eden C, a mid-complex levee would be constructed and the Inland and Southern Ponds would become managed ponds. This mid-complex levee could be temporary, though. If ongoing studies show that pond-dependent species are not being significantly affected by converting ponds to tidal marsh, then—once the Bay Ponds are restored to tidal marsh—the mid-complex levee and other levees would be breached and/or water control structures would be removed. Over time, the Inland and Southern Ponds would ultimately transition to tidal marsh.

During the transition period when the Inland and Southern Ponds are temporary managed ponds, mosquito-breeding habitat could potentially increase. If Alternative Eden D is fully implemented, and the transition to tidal marsh has been achieved, viable mosquito habitat would decrease in the project area due to tidal flushing, as described in Alternative Eden B. If tidal flushing does not take place, then the Inland Ponds and Southern Ponds would remain as described in Alternative Eden C. The Inland Ponds and Southern Ponds would continue to be large, open water ponds with vigorous wave action that would discourage mosquito production, though the ponds are managed seasonally for different wildlife and water quality goals. By design, the implementation of the AMP management actions would occur early enough, due to the established AMP management triggers, to avoid substantial increases in the need for vector management activities while minimizing potential increases in mosquito populations. Therefore, impacts under Alternative Eden D would be less than significant.

Alternative Eden D Level of Significance: Less than Significant

Impact Summary

Phase 2 impacts for public health and vector control and their levels of significance are summarized in Table 3.9-2. The levels of significance are those remaining after implementation of program-level mitigation measures, project-level design features, and the AMP. The public health and vector management analysis required no project-level mitigation measures to reduce the impacts to a level that was less than significant.

Table 3.9-2 Phase 2 Summary of Impacts – Public Health and Vector Management

IMPACT	ALTERNATIVE EDEN A	ALTERNATIVE EDEN B	ALTERNATIVE EDEN C	ALTERNATIVE EDEN D
Phase 2 Impact 3.9-1: Potential increase in mosquito populations.	LTS	LTS	LTS	LTS

Notes: Alternative A is the No Action Alternative (No Project Alternative under CEQA).

LTS = Less than Significant

This page intentionally left blank

3.10 Socioeconomics and Environmental Justice

This section of the Draft Environmental Impact Statement/Environmental Impact Report (EIS/R) characterizes the existing socioeconomic and environmental justice conditions near the Eden Landing Phase 2 project area and analyzes whether the project would cause a substantial adverse effect on population, employment, housing, or minority and low-income populations near the project area. The information presented is based on a review of existing socioeconomic data as well as other pertinent federal, state and local regulations, which are presented in the regulatory framework setting section. Using this information as context, an analysis of the socioeconomic and environmental justice impacts of the project is presented for each alternative. Program-level mitigation measures described in Chapter 2, Alternatives, would be implemented with the project. Therefore, this section only discusses additional mitigation measures as needed.

3.10.1 Physical Setting

Methodology

Socioeconomics

The socioeconomic analysis describes the potential impacts of the project on population growth, employment, and housing in the census tracts included within a one-mail “study area” around the actual Eden Landing Phase 2 project area, as well as the adjacent cities and county. Historic and current regional population and economic information from the U.S. Census (2000a, 2010), and the State of California Department of Finance are presented in the Socioeconomics section for Alameda County and its relevant subparts, which are as follows:

- City of Hayward
- City of Union City
- City of Fremont
- Study area (composed of census tracts 4403.32, 4403.31, 4403.04, 4403.05 and 4403.06)

Environmental Justice

This subsection provides an overview of minority and low-income populations in the Eden Landing Phase 2 study area. The topics addressed in the environmental justice analysis are race and ethnicity, and relevant economic indicators of social well-being, which include income and poverty. Specifically, data from the American Community Survey 2010 to 2014 is presented to evaluate if any communities of concern exist locally. This is done by comparing percentage of minority and low-income populations in the study area, relative to the city and the region.

Project Setting

Socioeconomics

The Eden Landing Phase 2 project activities occur in one large pond complex. The socioeconomic climate around the Eden Landing pond complex is that of large, developed communities with strong economies. These communities experienced slow population growth (0.5 percent per year) during the decade of 2000 to 2010. But population growth has accelerated to 1.3 percent since, given their proximity to a rapidly growing Silicon Valley (Table 3.10-1). Population for Alameda County as a whole is projected to grow at a similar annual rate of 1.0 percent through 2020 and a slightly lower annual rate of 0.8 percent through 2040 (State of California, Department of Finance 2014), implying that the region will continue to grow at a higher rate than it did in the last decade.

Table 3.10-1 County and City Populations (2000-2016)

COUNTY AND CITY	TOTAL POPULATION			ANNUAL GROWTH %	ANNUAL GROWTH %
	2000	2010	2016	2000-2010	2010-2016
Alameda County	1,443,939	1,510,271	1,627,865	0.5	1.3
Fremont	203,413	214,089	229,324	0.5	1.2
Hayward	140,030	144,186	158,985	0.3	1.6
Union City	66,869	69,516	72,952	0.4	0.8

Sources: State of California, Department of Finance 2012, 2016.

Employment in these communities remained consistent, and in some cases declined through the 10-year period between 2000 and 2010. Since 2010, employment grew rapidly at an annual rate of 2.5 percent, and as a result these communities are currently experiencing low unemployment rates as seen in Table 3.10-2. The majority of the jobs are in the high wage management, professional and related occupations sector (ACS 2010-2014). Employment for the county as a whole is projected to experience high to moderate job growth (approximately 1.5 percent annually), particularly in the high wage occupation sectors (State of California, Employment Development Department 2015).

Table 3.10-2 County and City Labor Force and Unemployment (2000-2016)

COUNTY AND CITY	EMPLOYMENT			UNEMPLOYMENT %
	2000	2010	2016	2016
Alameda County	741,900	697,100	804,500	4.6
Fremont	102,200	99,500	114,900	3.6
Hayward	63,300	64,100	74,200	6.5
Union City	31,300	31,400	36,000	4.2

Sources: US Census 2000b. State of California, Employment Development Department 2016.

Note: Data for 2016 is the latest monthly estimate for August, 2016. Historical data for 2000 and 2010 are annual estimates. Data for the year 2000 has been sourced from US Census 2000 for the citywide estimates and State of California 2016 for Countywide estimates.

Over the past few years, population growth has increased rapidly in these communities, while the growth in housing units has lagged behind. As such, these communities have high ratios of persons per household and extremely low vacancy rates as seen in Table 3.10-3.

Table 3.10-3 County and City Housing and Occupancy Rates (2016)

COUNTY AND CITY	HOUSEHOLDS	HOUSEHOLDS	HOUSING UNITS		
	TOTAL	PERSONS PER HOUSEHOLD	TOTAL	OCCUPIED	VACANCY RATE %
Alameda County	1,588,787	2.79	593,662	569,029	4.1
Fremont	227,673	3.09	75,386	73,593	2.4
Hayward	155,692	3.22	49,292	48,285	2.0
Union City	72,434	3.49	21,464	20,744	3.4

Sources: State of California, Department of Finance 2016.

As shown in Table 3.10-4, the Eden Landing Phase 2 study area houses a substantial percentage of the local population, and 28.2 percent of Union City's population resides within the 5 census tracts that make up the study area. As a percent of the regional population, the study area comprises of 4.6 percent of the total population in the cities of Fremont, Hayward and Union City.

Table 3.10-4 Eden Landing Phase 2 SBSP Study Area Population

POND COMPLEX	LOCAL CITYWIDE[1] POPULATION	POPULATION IN STUDY AREA[2]	PERCENT OF CITYWIDE POPULATIONS IN STUDY AREA
Eden Landing	71,675	20,244	28.2

Source: American Community Survey 2010-2014

Notes:

[1] Made up of Union City

[2] Made up of census tracts 4403.32, 4403.31, 4403.04, 4403.05 and 4403.06

Environmental Justice

Table 3.10-5 compares the percentage of non-white residents living in the study area with the percentage of non-white residents in the surrounding cities. The study area has a slightly higher percentage of non-white residents than Union City as a whole, and the Asian (not Hispanic or Latino) race/ethnicity group is the largest race/ethnicity group (making up over 60 percent of the total population). In comparison with the regional population as well, the study area has a higher percentage of non-white residents.

Tables 3.10-6 and 3.10-7 compare the economic well-being of the residents of study area with the surrounding communities. The study area has a lower percentage of individuals living under the poverty line and a higher mean household income than Union City as a whole. In comparison with the regional population, the study area has lower poverty and higher income levels.

Table 3.10-5 Eden Landing Phase 2 SBSP Study Area Non-White Population

POND COMPLEX	PERCENT OF REGIONAL[1] POPULATION THAT IS NON- WHITE	PERCENT OF CITYWIDE[2] POPULATION THAT IS NON-WHITE	PERCENT OF STUDY AREA[3] POPULATION THAT IS NON-WHITE
Eden Landing	79	86	88

Source: American Community Survey 2010-2014

Notes:

[1] Made up of Hayward, Union City, and Fremont.

[2] Made up of Union City

[3] Made up of census tracts 4403.32, 4403.31, 4403.04, 4403.05 and 4403.06

Table 3.10-6 Eden Landing Phase 2 SBSP Study Area Population Below Poverty Level

POND COMPLEX	PERCENT OF REGIONAL[1] POPULATION THAT IS BELOW POVERTY LINE	PERCENT OF CITYWIDE[2] POPULATION THAT IS BELOW POVERTY LINE	PERCENT OF STUDY AREA[2] POPULATION THAT IS BELOW POVERTY LINE
Eden Landing	9.4	8.4	6.6

Source: American Community Survey 2010-2014

Notes:

[1] Made up of Hayward, Union City, and Fremont.

[2] Made up of Union City

[3] Made up of census tracts 4403.32, 4403.31, 4403.04, 4403.05 and 4403.06

Table 3.10-7 Eden Landing Phase 2 SBSP Study Area Mean Household Income

POND COMPLEX	MEAN HOUSEHOLD INCOME FOR REGIONAL[1] POPULATION	MEAN HOUSEHOLD INCOME FOR CITYWIDE[2] POPULATION	MEAN HOUSEHOLD INCOME FOR STUDY AREA[3] POPULATION
Eden Landing	$99,400	$99,892	$112,700

Source: American Community Survey 2010-2014

Notes:

[1] Made up of Hayward, Union City, and Fremont.

[2] Made up of Union City

[3] Made up of census tracts 4403.32, 4403.31, 4403.04, 4403.05 and 4403.06

For the purposes of this analysis, an area with a non-white population exceeding 50 percent and higher than that of the citywide population is considered to have a minority population and with respect to environmental justice, are considered communities of concern. By that definition, the census tracts within the study area are considered to be minority communities. Low-income areas are defined as those where the percentage of the population below the poverty line is “meaningfully greater” than the citywide or regional average. The census tracts within the study area have a lower percentage of population below the poverty line as compared to the city as well as the surrounding cities, and are thus not considered low-income populations.

The minority communities of concern within the study area have been evaluated to determine if they would be disproportionately affected by any of the proposed project activities.

3.10.2 Regulatory Setting

Relatively few of the cities that surround the South Bay Salt Ponds (SBSP) Restoration Project include relevant strategies, policies, or implementation measures pertaining to environmental justice in their general plans. Those that do are discussed below.

Federal Regulations

Executive Order (EO) 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (February 11, 1994), requires all federal agencies to seek to achieve environmental justice by "…identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations."

State Regulations

There are no specific requirements for the analysis of socioeconomic and environmental justice issues under state law. California Environmental Quality Act (CEQA) Guidelines Section 15131(a) through (c) provides guidance on the discussion of economic and social effects in an Environmental Impact Report (EIR) (AEP 2016). Specifically, such effects may be included in an EIR but "shall not be treated as significant effects on the environment." However, economic and social effects may be used to determine the significance of physical changes caused by a project, but these changes "need not be analyzed in any detail greater than necessary to trace the chain of cause and effect." CEQA Guidelines provide for the consideration of economic, social, and particularly housing factors, together with technological and environmental factors, to determine whether changes in a project are feasible to reduce or avoid the significant effects on the environment identified in the EIR.

Regional/Local Regulations

This section discusses the policies related to socioeconomics and environmental justice in the cities surrounding the Eden Landing Phase 2 activities.

Socioeconomics

City of Union City: Union City's General Plan Housing Element was adopted January 27, 2015 (City of Union City 2015) and includes the following relevant goals and policies related to socioeconomics and environmental justice:

> Goal HE-B: To encourage construction and maintenance of affordable housing in Union City.
>
> Policy HE-B.1: The city shall give priority to multifamily housing project applications that provide affordable housing on-site to ensure that they are expedited.
>
> Policy HE-B2: The city shall continue to provide financial and regulatory incentives and use State and Federal funding assistance for the production of affordable housing.
>
> Policy HE-B3: The City shall ensure, through conditions of approval, that residential units that are required to sell or rent at below-market rates and are included within a housing development are produced simultaneously with market-rate housing.
>
> Policy HE-B.4: The city shall continue to implement the Affordable Housing Ordinance.

Policy HE-B.5: In accordance with the provisions of State law, the City shall grant density bonuses for qualifying projects as an incentive for the development of lower-income and senior citizen housing.

Policy HE-B.6: The City shall support and facilitate the construction of secondary dwelling units on single family designated and zoned parcels as a means of proving affordable housing.

Policy HE-B.7: The City shall continue to work with local non-profit organizations and the Alameda County Housing Authority to acquire and bank properties for the development of affordable housing.

Policy HE-B.8: The City shall strive to preserve as many assisted, at-risk units as possible, given the availability of funding.

Policy HE-B.9: The City shall defer certain fees on affordable housing developments until issuance of a Certificate of Occupancy to help offset development costs for affordable housing.

Goal HE-E: To promote equal opportunity to secure safe, sanitary, and affordable housing for everyone in the community regardless of age, religion, race, creed, sex, sexual orientation, marital status, ancestry, national origin, disability, economic level, and other arbitrary factors.

Policy HE-E.1: The City shall promote housing opportunities for all persons age, race, creed, religion, sex, sexual orientation, marital status, ancestry, national origin, color, disability, economic level, or other barriers that prevent choice in housing.

Policy HE-E.2: The City shall continue to support and enforce laws and programs that promote equal housing opportunities and provide fair-housing and rental-mediation services.

Policy HE-E3: As appropriate, the City shall continue to support fair housing programs through the City's Community Development Block Grant Program.

City of Hayward: Various elements of the Hayward General Plan 2040 (adopted July 1, 2014) (City of Hayward 2014) include the following relevant goals and policies related to socioeconomics and environmental justice:

Economic Development Element:

Goal ED-1.9: The City shall encourage the development of specialty businesses that reflect the diverse ethnic and cultural groups of the Hayward Community.

Community Health and Quality of Life Element:

Goal HQL-1.6: The City shall address health inequities in Hayward by striving to remove barriers to healthy living, avoiding disproportionate exposure to unhealthy living environments, and providing a high quality of life for all residents, regardless of income, age or ethnicity.

Goal HQL-6.3: The City shall facilitate the development of a range of housing types, including affordable housing, multi-generational housing, independent living, and assisted living for Hayward seniors.

Goal HQL-12.3: The City shall encourage and/or promote cultural and ethnic programs and activities of local interest.

City of Fremont: Various elements of the City of Fremont General Plan (Adopted December 13, 2011) include the following relevant goals and policies related to socioeconomics and environmental justice:

Housing Element:

Policy 3.01: Be creative and a leader in identifying and leveraging available funding resources in order to provide the maximum of amount of affordable housing.

Policy 3.03: Facilitate the development of a diverse housing stock provides a range of housing types and affordability levels throughout the community.

Policy 4.02: Continue to support housing programs for special needs households such as seniors, disabled, homeless, and families in crisis.

Economic Development Element

Policy 6-6.1: Promoting Fremont as a city that has a broad variety of occupations and family incomes, ethnic and lifestyle diversity and a variety of housing accommodations, a broad range of commercial services, educational opportunities, and many recreational options.

3.10.3 Environmental Impacts and Mitigation Measures

Significance Criteria

For the purposes of this Draft EIS/R, the project would have a significant impact if it would result in the following:

- Displace, relocate, or increase area businesses because of the expected increase in recreational users;
- Change lifestyles and social interactions;
- Disproportionately affect minority communities or low-income communities;
- Change the ethnic or racial composition in the community; or
- Change local employment opportunities or community tax bases.

The significance criteria identified above are established based on EO 12898 and the Environmental Impact Checklist for some of the More Common Social Concerns in the United States Fish and Wildlife Service (USFWS) Reference Handbook (USFWS 2007). Because CEQA does not identify social and economic effects as significant, National Environmental Policy Act (NEPA) regulations were used to determine potential effects. The Eden Landing Phase 2 SBSP Restoration Project would not substantially affect local employment opportunities or change the community tax base. Therefore, this significance criterion is not discussed below.

Program-Level Evaluation Summary

The 2007 EIS/R assessed the impact of the three program-level alternatives. In all of these alternatives, the assessment showed that no construction or demolition of any facilities that would change the community tax base would occur. That document also stated that Programmatic Alternative A would not affect local employment opportunities but that there may be minor increases in local employment opportunities associated with management of the tidal habitat/ponds and new recreational facilities under Programmatic Alternatives B and C. However, the creation of additional jobs, if any, at either of the land-owning or -managing entities in the SBSP Restoration Project (USFWS or the California Department of Fish and Wildlife [CDFW]) would not substantially affect local employment opportunities.

As explained in Section 3.1.2, although both the Council on Environmental Quality (CEQ) Regulations for Implementing NEPA and the CEQA Guidelines were considered during the impact analysis, impacts identified in this Draft EIS/R are characterized using CEQA terminology, but NEPA regulations were used to determine potential effects. Please refer to Section 3.1.2 for a description of the terminology used to explain the severity of the impacts.

Project-Level Evaluation

Phase 2 Impact 3.10-1: Displace, relocate, or increase area businesses, particularly those associated with the expected increase in recreational users.

Alternative Eden A (No Action). Under Alternative Eden A, no new activities would occur as part of Eden Landing Phase 2. The southern Eden Landing ponds would continue to be monitored and managed through the activities described in the Adaptive Management Plan (AMP) and in accordance with current USFWS practices. No new recreation or public access features will be added, and as such would not be expected to change business conditions in the long term. Therefore, no impact to area businesses would occur, and there would be few, if any, substantial changes in the local employment opportunities or community tax bases.

Alternative Eden A Level of Significance: No Impact

Action Alternatives. The Action Alternatives for Eden Landing Phase 2 are Alternative Eden B, Eden C, and Eden D. All three Action Alternatives would have similar levels and types of impacts from the perspective of socioeconomics and environmental justice and as such have been evaluated together.

These alternatives propose the construction of a range of new recreational and public access facilities, which would include viewing platforms and new trails. These new facilities would primarily be an extension of existing services and would not be expected to substantially increase the recreational uses of the facilities (detailed recreational use projections and analysis are presented in Section 3.6, Recreation Resources). As such, business activity for surrounding businesses that cater to these recreational users could be expected to increase slightly, and there could be minor associated increases in local employment opportunities or community tax bases. Therefore the effects of Eden Landing Phase 2 on local business would be less than significant under CEQA and beneficial under NEPA.

Action Alternatives Level of Significance: Less than Significant (CEQA); Beneficial (NEPA)

Phase 2 Impact 3.10-2: Change lifestyles and social interactions.

Alternative Eden A (No Action). Under Alternative Eden A, no new activities would occur as part of Eden Landing Phase 2. The Eden Landing ponds would continue to be monitored and manages through the activities described in the AMP and in accordance with current USFWS practices. The local communities would experience no changes to their existing conditions. Therefore, no impacts to the current lifestyles and social interactions would be expected.

Alternative Eden A Level of Significance: No Impact

Action Alternatives. The Action Alternatives for Eden Landing Phase 2 are Alternative Eden B, Eden C and Eden D. All three Action Alternatives would have similar levels of impacts from the perspective of socioeconomics and environmental justice, and as such have been evaluated together.

These alternatives proposed the construction of new recreational and public access facilities, which would provide enhanced access to outdoor recreational activities and improve the "livability" for the local communities. The increase in recreational opportunities could have a small but beneficial effect on the lifestyles and social interactions for the communities surrounding the Eden Landing pond complex.

Action Alternatives Level of Significance: Less than Significant (CEQA); Beneficial (NEPA)

Phase 2 Impact 3.10-3: Effects disproportionately placed on densely populated minority and low-income communities or effects on the ethnic or racial composition in a community.

Alternative Eden A (No Action). Under Alternative Eden A, no new activities would occur as part of Eden Landing Phase 2. The Eden Landing ponds would continue to be monitored and managed through the activities described in the AMP and in accordance with current CDFW practices. These communities would remain similar to existing conditions.

The potential for impacts related to changes in flood risk or severity would be unchanged relative to the current flood risk. Although, there are minority communities of concern in the study area, the impacts from flooding would remain similar to those in the larger community, and would not be exclusively limited to areas with minority communities. Therefore, no disproportionate effects to the minority communities would be expected.

Alternative Eden A Level of Significance: No Disproportionate Effect (NEPA)

Action Alternatives. The Action Alternatives for Eden Landing Phase 2 are Alternative Eden B, Eden C, and Eden D. All three Action Alternatives would have similar levels of impacts from the perspective of socioeconomics and environmental justice, and as such have been evaluated together.

These alternatives propose raising pond bottom elevations, levee modifications, construction of habitat construction zones and habitat islands, installation of water control structures, and the addition of new recreation and public access facilities, most notably several miles of the Bay Trail spine. These actions would involve the delivery of dredge materials to the ponds from an offloading facility in the Bay and delivery via truck of fill material from off-site excavation areas through the surrounding communities to the Eden Landing Phase 2 project area. These have the potential to cause short-term construction disturbance impacts (e.g. noise from construction, increases truck traffic and congestion, dust or other construction emissions), which are evaluated in more detail in Chapters 3.11, Traffic, 3.12, Noise, and

3.13, Air Quality. The construction activity itself would occur at some distance from residents, and the short-term construction disturbance impacts would be experienced by residents of the larger regional community as well as non-residents that are employed in local businesses or users of local roads or trails. The impacts from the short-term construction activity would not occur exclusively in areas where there are minority communities of concern. The temporary nature of construction activity and because these activities are not occurring in exclusively minority communities, the Action Alternatives would not disproportionately affect minority communities.

The potential for impacts related to changes in flood risk or severity, as discussed in Section 3.2, Hydrology, and in the Southern Eden Landing Preliminary Design Memorandum (Appendix D), would be avoided through the design of appropriate levee modifications, channels, and water control structures to maintain or improve the current flood risk. Although, there are minority communities of concern in the study area, the impacts from flooding would be similar to the larger community, and would not be exclusively limited to areas with minority communities. Therefore, no disproportionate effects to the minority communities would be expected.

Action Alternatives Level of Significance: No Disproportionate Effect (NEPA)

Impact Summary

Phase 2 impacts and levels of significance are summarized in Table 3.10-8. The levels of significance are those remaining after implementation of program-level mitigation measures, project-level design features, the AMP and other Refuge management documents and practices. The socioeconomics and environmental justice analysis required no project-level mitigation measures to reduce the impacts to a level that was Less than Significant.

Table 3.10-8 Phase 2 Summary of Impacts: Socioeconomics and Environmental Justice

IMPACT	ALT. EDEN A	ALT. EDEN B	ALT. EDEN C	ALT. EDEN D
Phase 2 Impact 3.10-1: Displace, relocate, or increase area businesses, particularly those associated with the expected increase in recreational users.	NI	LTS/B	LTS/B	LTS/B
Phase 2 Impact 3.10-2: Change lifestyles and social interactions.	NI	LTS/B	LTS/B	LTS/B
Phase 2 Impact 3.10-3: Effects disproportionately placed on densely populated minority and low-income communities or effects or racial composition in a community.	NDE	NDE	NDE	NDE

Notes: Alternative A is the No Action Alternative (No Project Alternative under CEQA).

B = Beneficial (NEPA only)
LTS = Less than Significant
NDE = No Disproportionate Effect
NI = No Impact

3.11 Traffic

This section of the Draft Environmental Impact Statement/Report (EIS/R) describes the existing regional transportation network within the Eden Landing Phase 2 project area and analyzes whether implementation of the project would cause a substantial adverse effect on transportation resources. The information presented is based on a review of the existing regional transportation network within the area and other pertinent federal, state and local regulations, which are presented in the regulatory framework setting section. Using this information as context, an analysis of transportation-related environmental impacts of the project is presented for each alternative. The program-level mitigation measures described in Chapter 2, Alternatives, would be implemented with the project. Therefore, this section only includes additional, project-level mitigation measures as needed.

3.11.1 Physical Setting

Methodology

The development of the baseline conditions, significance criteria, and impact analysis in this section is commensurate to and reliant on the analysis conducted in the 2007 South Bay Salt Pond (SBSP) Restoration Project Final EIS/R (2007 Final EIS/R). The project traffic impact analysis is based on the traffic volumes identified by the California Department of Transportation (Caltrans) and local jurisdictions. Construction period project traffic impact analysis is based on the traffic volumes and significance criteria identified in the Traffic Impact Analysis for Eden Landing Phase 2, which is presented as Appendix H to this Draft EIS/R.

Regional Setting

The Eden Landing Phase 2 portion of the SBSP Restoration Project consists of ponds on the eastern shores of San Francisco Bay (or Bay) in the vicinity of the cities of Hayward, Union City, and Fremont. The Eden Landing Ecological Reserve (ELER, or Reserve) is owned and managed by the California Department of Fish and Wildlife (CDFW), in Alameda County. The transportation network in and around San Francisco Bay consists of highways, surface streets, bicycle routes, public transit, railways, passenger ferries, and air transportation facilities.

Highways

The major north-south trending highway on the eastern side of the San Francisco Bay near the Eden Landing Phase 2 project area is Interstate 880, as described below.

- **I-880** extends along the eastern side of the Bay and connects I-80 in Oakland to State Route (SR) 17 in San Jose. I-880 is located east of the Eden Landing Phase 2 area, and travels through the cities of Fremont, Hayward, Milpitas, and Union City among many others.

The major east-west trending highways in the San Francisco Bay near the Eden Landing Phase 2 project area include SR 92 and SR 84, as described below.

- **SR 92**, which originates from I-880 in Hayward and crosses the Bay via the San Mateo Bridge and continues west to Half Moon Bay. In the SBSP Restoration Project area, SR 92 is adjacent to the northern boundary of the Eden Landing pond complex.

- **SR 84**, which originates in the East Bay and crosses the San Francisco Bay via the Dumbarton Bridge, is located several miles to the south of Eden Landing near portions of the of the SBSP Restoration Project that are on the United States Fish and Wildlife Service (USFWS)-owned Don Edwards San Francisco Bay National Wildlife Refuge (Refuge).

Streets and Bicycle Routes

Within each individual jurisdiction in the Eden Landing Phase 2 project area, the street network consists of arterial streets, collector streets, and local streets. Typically, arterial streets are high-capacity roads that accommodate through traffic between highways and urban centers. Collector streets supplement the arterial streets and provide access within residential neighborhoods and commercial and industrial areas. Local streets offer the lowest level of mobility and primarily provide access to bordering properties. Local streets are designed such that ease of access, pedestrian safety, and parking have priority over traffic movement. The street network in the vicinity of the project area is shown on Figure 3.11-1.

Many designated trails and bicycle routes are present nearby or adjacent to the project area. Bicycle routes are classified as separated off-street paths for the exclusive use of bicycles and pedestrians (Class I), striped bike lanes on a street or highway (Class II), or designated signed routes without a marked lane operating in mixed flow with motor vehicles (Class III). Bicycles may also operate legally on any roadway, regardless of whether a bike route class designation exists. Trails (Class I routes) most appropriate for transportation via bicycle include the Bay Trail, which runs adjacent to much of northern Eden Landing and the East Bay Regional Park District's Alameda Creek Regional Trail, which runs along the Alameda Creek Flood Control Channel (ACFCC). See Section 3.6, Recreation for more detailed information on the regional and local trail network.

Public Transit

The public transit network in the region consists of rail and bus systems. Bay Area Rapid Transit (BART) provides service in the Eden Landing Phase 2 project area, passing through the cities of Hayward, Union City and Fremont generally east of the Eden Landing pond complex. Alameda-Contra Costa Transit District (AC Transit) provides service throughout the East Bay as well as express service across the Dumbarton Bridge and Bay Bridge to San Francisco. In addition, the Union City has its own bus system called Union City Transit, which provides times connections with BART and the Union Landing Transit Center. The Union Pacific Railroad network extends through the region on both sides of the Bay and provides both freight and passenger service. Amtrak's Capitol Corridor route provides intercity rail passenger service between Sacramento and San Jose.

Water Transportation

San Francisco Bay is a major navigational and recreational waterbody that connects the Eden Landing Phase 2 ponds via watercraft. Currently, there are no public ferry routes in the southern portion of San Francisco Bay. The closest passenger ferries are from Oakland and Alameda (north of Eden Landing) across San Francisco Bay to San Francisco and Oyster Point in the City of South San Francisco.

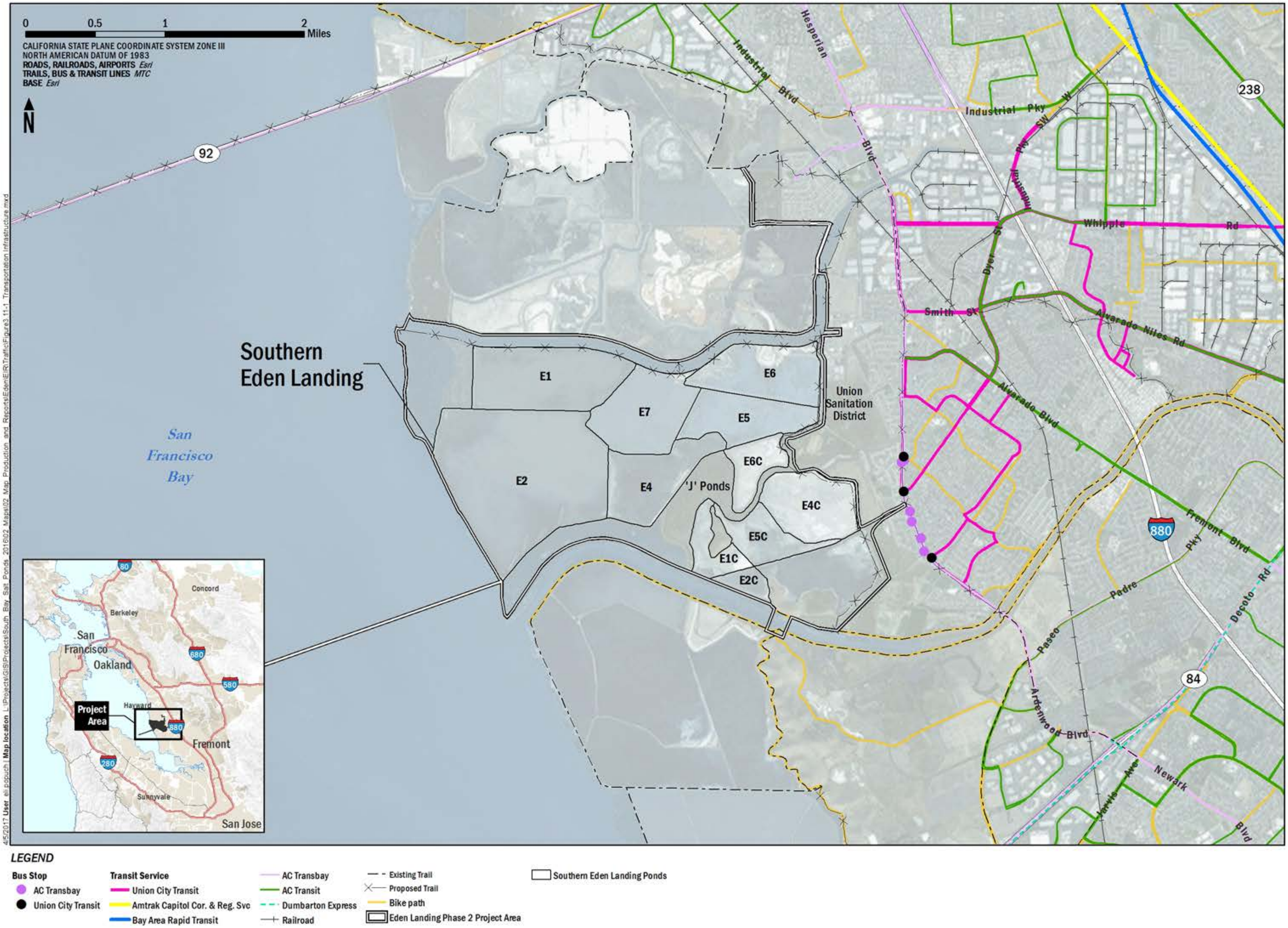


Figure 3.11-1
Transportation Network

Public Parking Facilities

Public parking is available near southern Eden Landing for the publicly accessible portions of the project area. Table 3.11-1 presents an inventory of the off-street parking, including handicapped parking.

Table 3.11-1 Off-Street Parking near Eden Landing Phase 2 Areas

Location	Number of Spaces	Owner
Eden Landing Ecological Reserve – northern entrance; Bay Trail connection	24 (2 h)	California Department of Fish and Wildlife
Alameda Creek Regional Trail Staging Area	25 (3 h)	East Bay Regional Parks District

Notes: h = handicapped parking spaces

Project Setting

SR 92 bounds the Eden Landing pond complex to the north, and I-880 is approximately two miles to the east. SR 84 is approximately 1.5 miles to the south According to the Caltrans Traffic and Vehicle Data Systems Unit, traffic volumes in 2014 for SR 92 at the San Mateo-Hayward bridge toll plaza (closest measuring point to Eden Landing Road, which leads into northern Eden Landing) were 8,900 vehicles during the peak hour[1] and 106,000 average daily traffic (ADT) during the peak month (Caltrans 2014). According to the Caltrans Traffic and Vehicle Data Systems Unit, traffic volumes in 2014 for I-880 at Whipple Road (which leads to Union City Boulevard and eventually to northern Eden Landing) were 14,000 vehicles during the peak hour[2] and 209,000 ADT during the peak month (Caltrans 2014).

The primary public access to the Eden Landing pond complex is via SR 92 and Eden Landing Road through the ELER and along internal roads that previously supported salt production operations. Access at this location is almost entirely for CDFW staff because the pond complex is mostly off-limits to the public (except for users of existing trails and hunters on specific hunt days). Public access to the Eden Landing pond complex is available only along trails that extend along the perimeter of the pond complex, including those along the east side of the ELER and along the ACFCC. As described in Section 3.7, Recreation Resources, bicyclists and pedestrians are allowed on these trails, but off-trail access is prohibited. Staging areas for the trails occur at various points east of the pond complex along the trails. Roadways in the vicinity of the ELER include Union City Boulevard, Hesperian Boulevard, Eden Landing Road, Arden Road, Dyer Street, Baumberg Avenue, and the residential streets in the Eden Shores development. These roadways are accessible from other local roadways and either SR 92 or I-880. Coyote Hills Regional Park provides access to the southern side of the Alameda Creek Regional Trail.

No AC Transit bus lines travel directly to the Eden Landing pond complex. AC Transit routes along streets bordering Eden Landing include Route 83 that travels along Clawiter Road, Eden Landing Road, and Arden Road; Route S that travels along Eden Shores Boulevard and terminates at the western end of the street; Routes 97 and SB that run along Union City Boulevard. Union City Transit routes 1, 5, 7, 8, and 9 all have portions of their routes along Union City Boulevard.

[1] Peak hour values indicate the volume in both directions; in urban and suburban areas, the peak hour normally occurs every weekday.
[2] Peak hour values indicate the volume in both directions; in urban and suburban areas, the peak hour normally occurs every weekday.

The closest commercial airport is Oakland International Airport, which is approximately 12 miles north of the Phase 2 portion of Eden Landing. The Hayward Executive Airport is approximately 2.5 miles to the north of the Eden Landing pond complex. The Union Pacific Railroad extends through Hayward in the north-south direction between Eden Landing and I-880 (outside of the project area).

3.11.2 Regulatory Setting

State, regional, and local agencies have jurisdiction over the transportation network and over circulation in and around the project area. Caltrans has authority over the state highway system, including mainline facilities and interchanges. Caltrans is responsible for the planning, design, and construction of highway improvements, as well as for operations and maintenance.

The Alameda County Transportation Commission (ACTC) is responsible for county-wide transportation planning. This includes highway and roadway improvements and the operation of public transit systems, shuttles, and carpool, bicycling and pedestrian programs. In addition, this agency is responsible for long-range regional transportation planning in coordination with the Metropolitan Transportation Commission.

Alameda County is responsible for the maintenance of roadways in unincorporated areas of the counties as well as for coordination with ACTC, for regional transportation planning projects.

The cities of Hayward, Union City, and (nearby) Fremont have jurisdiction over their respective city streets, bike paths, public trails, and parking facilities in the project area. These cities have adopted General Plans that include strategies and policies regarding the operation of the transportation network. The General Plans and applicable goals and policies are included below.

City of Hayward

The Hayward General Plan 2040 (City of Hayward 2014) includes the following policies that are relevant to the Eden Landing Phase 2 project:

GOAL LU-1- Promote local growth patterns and sustainable development practices that improve quality of life, protect open space and natural resources, and reduce resource consumption, traffic congestion, and related greenhouse gas emissions.

GOAL M-2 - Connect Hayward to regional and adjacent communities' transportation networks and reduce the impacts of regional through traffic in Hayward.

M-2.1 Regional Coordination - The City shall continue to coordinate its transportation planning with regional agencies (Caltrans, Metropolitan Transportation Commission, and Alameda County Transportation Commission) and adjoining jurisdictions.

M-2.3 Multi-Jurisdictional Transportation - Corridors The City shall work with the Metropolitan Transportation Commission, Caltrans, BART, AC Transit, and adjacent communities to improve city roadways, pedestrian ways, bicycle facilities, and transit corridors to connect with neighboring and regional transportation networks and contribute to a regional multimodal transportation system.

M-2.5 Regional Traffic Impacts The City shall review and comment on development applications in Alameda County and adjoining cities which may impact Hayward's transportation systems, and shall suggest solutions to reduce negative effects on local circulation and mobility.

GOAL M-4 - Enhance and maintain local access and circulation, while protecting neighborhoods from through traffic.

M-4.3 Level of Service - The City shall maintain a minimum vehicle Level of Service (LOS) E at signalized intersections during the peak commute periods except when a LOS F may be acceptable due to costs of mitigation or when there would be other unacceptable impacts, such as right-of-way acquisition or degradation of the pedestrian environment due to increased crossing distances or unacceptable crossing delays.

GOAL M-11 - Balance the safe and efficient movement of goods with local access and circulation needs.

M-11.1 Goods Movement - The City shall provide an efficient transportation system for the movement of goods and services through and within Hayward, while meeting the safety and mobility needs of all roadway users.

M-11.2 Designated Truck Routes - The City shall require trucks to use designated routes and shall prohibit trucks on local streets to address traffic operations and safety concerns in residential neighborhoods.

City of Union City

Union City's 2002 General Plan Policy Document (2002) includes the following policies that are relevant to the Eden Landing Phase 2 project:

Goal TR-A.1 - To establish a safe, convenient, and efficient roadway system that minimizes peak-hour traffic congestion.

TR-A 1.3 - The City shall continue to implement its policy that traffic LOS will not exceed mid-range LOS D at all signalized intersections on arterial and collector streets, with the exception of intersections on major regional routes, including I-880, Mission Boulevard (SR 238) and the Route 84/Decoto Road corridor. Levels of Service are described in Table TR-4.

TR-A.1.6 - The City shall establish truck routes that will minimize noise impacts and safety hazards on the community. The City shall require all new projects in the Central Technology Center to use Whipple Road as a truck route. The City shall discourage the use of Alvarado-Niles Road as a truck route (see Figure TR-3).

TR-A.1.7 - The City shall identify preferred routes for truck service to businesses that are convenient and in conformance with A.1.6 above.

City of Fremont

The City of Fremont General Plan (2011) includes the following policies that are relevant to the Eden Landing Phase 2 project:

- **Policy 3-3.4 Transportation Systems Management:** Implement transportation systems management measures to reduce peak hour congestion and make the most efficient use of the city's transportation infrastructure.
- **Policy 3-3.5 Transportation Infrastructure Maintenance:** Provide adequate funding to maintain roads, bridges, sidewalks, bike paths, and other transportation facilities in good operating condition.
- **Policy 3-4.1 Relating Vehicle Speed to Reflect Land Use and Community Character:** Manage traffic on arterials and collectors to reduce unnecessary travel delays and maintain efficient vehicle flow. However, auto speed and convenience may be diminished in some locations in order to achieve a more livable, walkable, and attractive community. In general, lower vehicle speeds will be encouraged in pedestrian-oriented areas such as the Town Centers and city center. Roadway design and operation in these areas should emphasize community character, access to adjacent commercial and mixed land uses, and the accommodation of multiple travel modes, rather than vehicle speed.
- **Policy 3-4.4 Mitigating Development Impacts:** Require new development to mitigate its impacts on mobility conditions through traffic impact fees, street and intersection improvements, transportation demand management programs, and other measures.
- **Policy 3-5.2 Regional Trail Development:** Promote and coordinate the planning of pedestrian and bicycle trail systems with Alameda County, Newark, Milpitas, Union City, Santa Clara County, Association of Bay Area Governments, Bay Conservation and Development Commission, East Bay Regional Parks District, San Francisco Public Utilities Commission, Alameda County Flood Control and Water Conservation District (AFCWCD), and other jurisdictions and organizations.
- **Policy 3-6.2 Truck Routes:** Protect residential neighborhoods from intrusion by truck traffic by maintaining and enforcing an efficient system of designated truck routes.
- **Policy 3-7.1 Parking Management:** Manage on-street parking to ensure the efficient use of curbside space, avoid conflicts with residents and neighborhoods, and provide adequate customer parking for local businesses.

3.11.3 Environmental Impacts and Mitigation Measures

Overview

This section includes an analysis of potential short-term (construction) and long-term (operation) traffic impacts of the Eden Landing Phase 2 project. Impact evaluations for the action alternatives are assessed based on the existing conditions described in Section 3.11.2 above; they are not assessed based on the proposed conditions that would occur under the No Action Alternative. This approach mimics what was done for the 2007 Final EIS/R and in the EIS/R for the Phase 2 at the Refuge. In this case, the No Action Alternative represents no change from the current management direction or level of management intensity provided in the Adaptive Management Plan (AMP) and in CDFW management documents for Eden Landing. In addition, mitigation measures are recommended, as necessary, to reduce significant traffic impacts.

The result of the analysis process was a set of alternatives, including the No Action Alternative, a National Environmental Policy Act (NEPA) term (also referred to as the "No Project Alternative" under California Environmental Quality Act (CEQA), but the NEPA term will be used throughout this Draft EIS/R).

Significance Criteria

For the purposes of the Draft EIS/R, a significant traffic impact would occur if the project would result in the following:

- Conflict with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation, including mass transit and non-motorized travel and relevant components of the circulation system, and including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit;
- Conflict with an applicable congestion management program, including but not limited to LOS standards and travel demand measures or other standards established by the county congestion management agency for designated roads or highways;
- Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks;
- Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment);
- Result in inadequate emergency access; or
- Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities.

The Eden Landing Phase 2 project would not result in an increase in air traffic or require a change to existing air traffic patterns. The project would not increase hazards due to design features or incompatible uses, as the project would involve only restoration of tidal marsh wetlands or other habitat improvements and inclusion of recreational facilities within open space areas away from public roads. Recreational facilities proposed along levees within the boundaries of the southern Eden Landing ponds would be designed in accordance with relevant guidelines and regulations, and would not constitute a hazard for those who use the facilities. The project would not result in inadequate access to local streets, including for emergency access, as road closures are not expected during construction or operation. The project would not result in lengthy delays for transit riders and would not conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or decrease the performance or safety of such facilities.

As explained in Section 3.1.2, while both Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of the NEPA and the CEQA Guidelines (AEP 2016) were considered during the impact analysis, impacts identified in this Draft EIS/R are generally characterized using CEQA terminology; NEPA terms are used for potentially beneficial impacts, if any. Please refer to Section 3.1.2 for a description of the terminology used to explain the severity of the impacts.

Approach to Analysis

Construction

Construction activities under the Eden Landing Phase 2 project would include the transport of equipment, material, and workers to and from the southern Eden Landing ponds. The number of vehicle trips needed for construction of restoration, flood risk management, and recreational features would be greater than the number of vehicle trips needed for construction (or decommissioning/destruction) of dredge material infrastructure. Because these phases of the construction would not be concurrent, the traffic analysis was based on the number of vehicle trips needed during the restoration component of the construction period, to provide traffic estimates commensurate with the highest use during construction.

Access routes to the Eden Landing Phase 2 area would include the major highways surrounding the pond complex and local roadways. Multiple access routes are available from I-880 to the Phase 2 project area. These include various arterial, collector, and local streets that provide access to the ponds from these highways. The access routes would use a combination of Union City Boulevard (collector street), Bettencourt Way (local street), Whipple Road (arterial street), Horner Street (local street), Veasy Street (local street), Carmel Way, and Westport Way.

Staging areas would be established for equipment and material storage within the Eden Landing pond complex itself and avoid affecting local roads or other infrastructure.

Construction-related traffic estimates are provided below. The assumptions and logic behind these estimates are explained fully in Appendix H to this Draft EIS/R. The most important of those assumptions involve the direction (north or south) from which the off-site material would be trucked and which of two different entry points to southern Eden Landing would be used. The split of those trips was varied by alternative, but in all cases, a maximum of 200 truckloads per day over a 10-hour work day was used in combination with an 11-cubic yard capacity haul truck to assess the greatest possible impact on traffic congestion. In all likelihood, these assumptions are overly conservative, as they would require all of the upland fill material to be available at once and that it could all be hauled in and placed within southern Eden Landing at once, which would require stockpiling and double-handling. In all likelihood, the upland fill material would not all be ready at once and it would only be imported at the rate at which it could be placed.

The alternatives for the Eden Landing pond complex differ with respect to the duration (or months[3] required) for net importing of upland fill material based on the volumes required for construction activities, as shown in Table 3.11-2. These volumes represent a worst-case scenario where habitat transition zones would need to be built entirely with imported upland fill material and no beneficially reused dredge material. In addition, the traffic analysis assumes that work crew transport would be approximately 10 to 20 people per day (assuming a single crew) and that equipment would be imported only once per season.

Intersection Evaluation

This section summarizes the methodologies used to perform peak hour intersection capacity analysis at signalized intersections. In accordance with CEQA requirements, an Environmental Impact Report (EIR) must include a description of the existing physical environmental conditions in the vicinity of the project.

[3] For this analysis, a typical month has 22 work days.

Those conditions, in turn, “will normally constitute the baseline physical conditions by which a lead agency determines whether an impact is significant” (CEQA Guidelines §15125[a]). A LOS analysis was conducted based on the traffic data collected by AECOM and by utilizing the Synchro 9.0 software package, and based on the methodologies outlined in the Highway Capacity Manual (Transportation Research Board 2000). The resulting LOS and delays were compared for the existing and project conditions. LOS, which measures traffic operating conditions, varies from LOS A to LOS F. Table 3.11-3 presents a description of LOS and provides the associated delays with each LOS for signalized intersections.

Table 3.11-2 Earthwork Volumes, Upland Fill Material Delivery, and Duration by Alternative

ALTERNATIVE	Estimated Earthwork Volume (cubic yards)			MAX TRIPS PER DAY*	DURATION (DAYS)
	Cut	Fill	Net Import		
Eden B	155,000	247,000	92,000	200	42
Eden C	112,000	171,000	59,000		27
Eden D	94,000	248,000	154,000		70

*The maximum truck trips per day are based on the highest number of haul trucks that can safely be moved into and out of the site which is 200. Assumes 11 cy of material per truckload and 10-hour working days.

Table 3.11-3 Level of Service and Average Vehicular Delay Definitions for Signalized Intersections

LOS	Average Vehicular Delay (seconds)	Definition
A	< 10	Free-flow speeds prevail. Vehicles are almost completely unimpeded in their ability to maneuver within the traffic stream. Very low control delay. Occurs when progression is extremely favorable and most vehicles arrive during the green phase. Many vehicles do not stop at all.
B	> 10 and < 20	Free-flow speeds are maintained. The ability to maneuver with the traffic stream is only slightly restricted. Occurs with good progression, short cycle lengths, or both. More vehicles stop than with LOS A.
C	> 20 and < 35	Flow with speeds at or near free-flow speeds. Freedom to maneuver with the traffic stream is noticeably restricted, and lane changes require more care and vigilance on the part of the driver. Occurs when a given green phase does not serve queued vehicles and overflow occurs. The number of vehicles stopping is significant at this level, though many still pass through the intersection without stopping.
D	> 35 and < 55	Speeds decline slightly with increasing flows. Freedom to maneuver with the traffic stream is more noticeably limited, and the driver experiences reduced physical and psychological comfort. The influence of congestion becomes more noticeable. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.
E	> 55 and < 80	Operation at capacity. There are virtually no usable gaps within the traffic stream, leaving little room to maneuver. Any disruption can be expected to produce a breakdown with queuing. High delay values generally indicate poor progression, long cycle lengths, and high volume-to-capacity (v/c) ratios. Individual cycle failures are frequent.
F	> 80	Represents a breakdown in flow. Oversaturation of the intersection often occurs. Arrival flow rates exceed the capacity of the lane groups. Also, high v/c ratios occur with many individual cycle failures.

Source: Highway Capacity Manual (Transportation Research Board 2000)
LOS = level of service
v/c ratio = volume-to-capacity ratio

Traffic Impacts

The Traffic Impact Analysis for Eden Landing Phase 2 (included as Appendix H to this Draft EIS/R) was prepared to analyze the impact of construction-related traffic on each of the Action Alternatives. The most intensive construction activity in terms of added traffic would result from the delivery of upland fill material for the construction of levees and habitat transition zones. Specific quantities (cubic yards) and duration of the import periods are provided in Table 3.11-2. Therefore, the analysis performed focuses on the hourly trips required to deliver the required materials in the shortest time and number of days possible. Construction routes were analyzed to determine the maximum amount of trucks that could feasibly deliver upland fill within a single 10-hour work day. The analysis uses a different mix of northbound and southbound deliveries as well as a maximum number of trips per hour (200 truckloads per day was the maximum).

To operationalize the above-listed significance criteria, the Eden Landing Phase 2 project-level analysis adapted them to specific locations and conditions. To do so, the traffic impact criteria described below were used in evaluating an increase in traffic delay for signalized intersections during the project construction phase based on LOS.

Two of the six study intersections are operated and maintained by Caltrans, while the remaining four are operated and maintained by the City of Union City. Caltrans recommend using the corresponding City’s significant impact threshold criteria for the two intersections under their charge. One of the Caltrans intersection falls within the city limits of Hayward and the other is in Union City. For intersection #1 (I-880 northbound ramps / Whipple Road / Industrial Parkway), City of Hayward thresholds have been considered. For the rest of the study intersections, Union City thresholds have been considered.

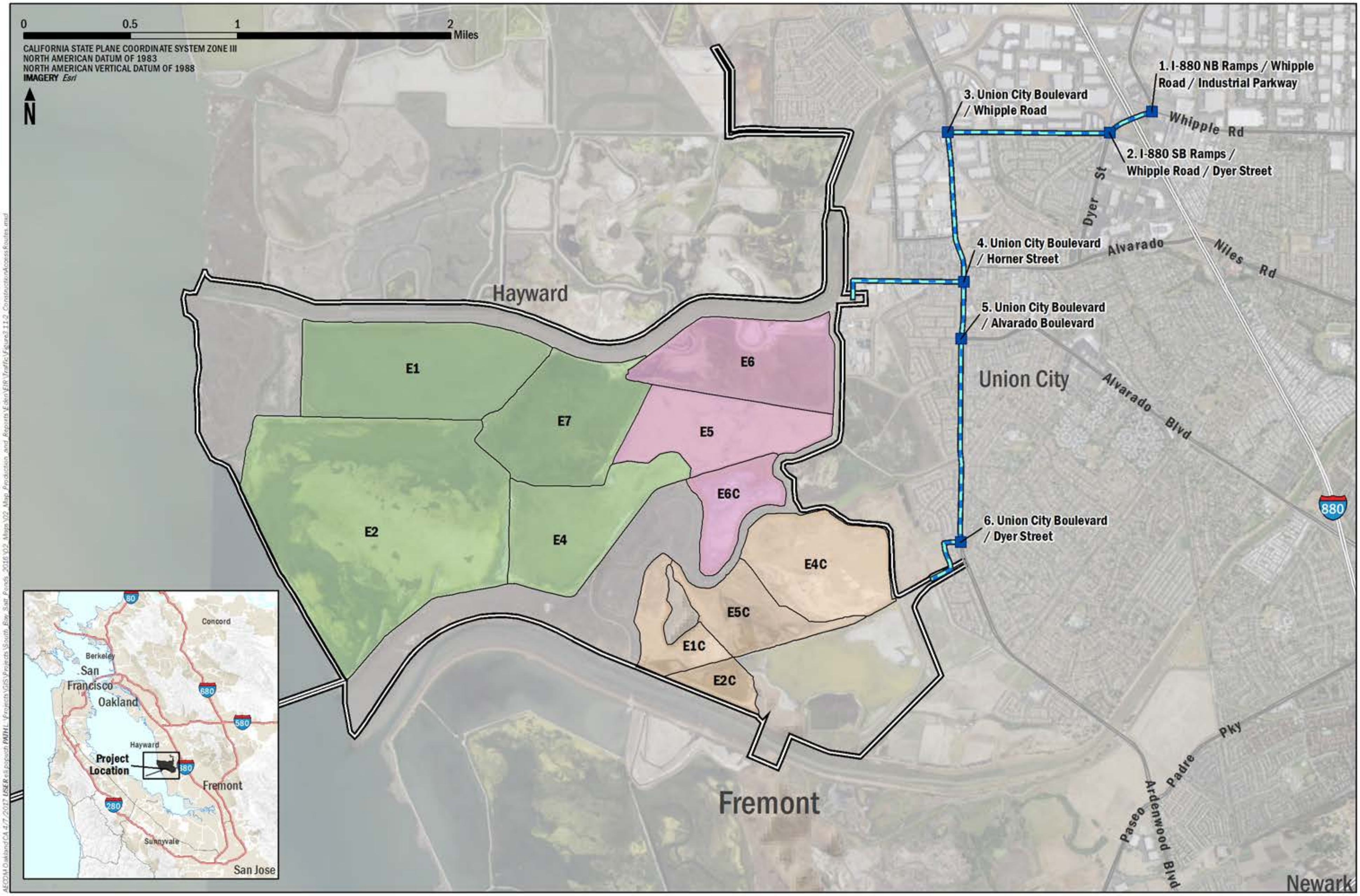
According to the Hayward guidelines for signalized intersections,

- LOS E is treated as an acceptable LOS. If the project causes an intersection operating at LOS E or better to fall below LOS E, then the project is projected to be causing a significant impact.
- For an intersection already operating at unacceptable LOS F, if the project increases the average control delay by 5 seconds or more, the project is projected to be causing a significant impact.

According to the Union City guidelines for signalized intersections,

- LOS D is treated as an acceptable LOS. If the project causes an intersection operating at LOS D or better to fall below LOS D, then the project is projected to be causing a significant impact.

There are two access points to the southern Eden Landing ponds, to be used by trucks carrying upland fill material. The fill material will be transported to the site from I-880 via Whipple Road to Union City Boulevard before accessing the site from Horner Street (North Entrance) and Westport Way (South Entrance). Figure 3.11-2 presents the truck route for transporting material. The estimated project trips using each of the two access points are presented in Table 3.11-4. It is assumed that each truck would carry 11 cubic yards of fill and the number of outbound trips is equal to the number of inbound trips in the same hour. The three Action Alternatives (Alternatives Eden B, C, and D) were then analyzed by comparing the ‘with’ and ‘without’ project intersection delay and LOS to determine if any of those alternatives would cause a significant change.



LEGEND

- Study Intersection
- Construction Access Route
- The Bay Ponds
- The Southern Ponds
- The Inland Ponds

AECOM
South Bay Salt Pond Restoration Project

Figure 3.11-2
Construction Access Route and Study Intersections

Table 3.11-4 Trip Generation by Project Alternative

Alternative	Site Access	Access Usage (%)	Inbound Trips / Days	Inbound Trips / Hours
Eden B	North	48	96	10
Eden B	South	52	104	11*
Eden C	North	30	60	6
Eden C	South	70	140	14
Eden D	North	99	198	20
Eden D	South	1	2	1*

Source: AECOM 2016

*Assumes an additional trip for conservative calculation

Operation

Operation and maintenance (O&M) activities at the southern Eden Landing ponds would continue to follow and be dictated by the CDFW's current practices and policies, applicable ACFCWCD operations, and the AMP. The long-term O&M of the alternatives would require approximately one staff person to travel to the ponds one or two times a week to perform activities such as operating the water control structures and performing and/or tracking the need for predator control, general vegetation control, and vandalism repairs. In addition, AMP monitoring activities would occur, which could require additional workers (e.g., staff, researchers, consultants) to access the ponds and conduct monitoring or other studies. The frequency of visits to conduct AMP monitoring activities would depend on the actual activities and would vary by season (e.g., during the bird breeding season there could be more trips to the site than during the non-breeding season). For the purposes of analysis, it is estimated that 10 one-way trips associated with AMP monitoring activities would occur per week.

Implementation of Alternatives Eden B, C, and D are expected to result in an increase in vehicle trips associated with visitors of the new recreational facilities at southern Eden Landing. Section 3.6, Recreation, and its associated Appendix G, explain the method and data used to develop estimates for the numbers of increased recreational visitors to the ponds.

Program-Level Evaluation Summary

The 2007 Final EIS/R evaluated the potential impacts to the transportation network, including nearby roadways, as a result of three programmatic alternatives. The 2007 Final EIS/R found that with the implementation of Programmatic Alternative C, the preferred alternative, there would be less-than-significant impacts to long-term operations-related traffic, and potentially significant impacts associated with short-term construction-related traffic, construction-related wear and tear to haul routes, and parking capacity at regional facilities. Mitigation measures were developed to reduce these impacts to a less-than-significant level. These mitigation measures have been incorporated into the design of each action alternative and are summarized below:

- Recreation facilities will be designed with sufficient parking spaces to accommodate the projected increase in vehicles that access the site unless adequate off-site parking is available to offset the demand for parking spaces.
- If residential streets are included as part of the designated haul routes, videos of the pre-construction and post-construction roadways will be prepared for the purposes of comparison.

Prior to construction, the pre-construction conditions and post-construction requirements of the roadway rehabilitation program will be documented.

The program-level mitigation measure **SBSP Mitigation Measure 3.12-1: Timing of construction-related truck trips** was also included in the 2007 Final EIS/R. This program-level mitigation measure required the landowner (CDFW) to include in construction plans and specifications the requirement that construction-related truck trips, specifically deliveries of fill and equipment, shall occur outside the weekday a.m. and p.m. peak commute traffic hours. This mitigation measure is not feasible to implement in the Eden Landing Phase 2 actions because of the large amount of upland material that needs to be imported by truck to southern Eden Landing in relatively condensed periods of time.

Finding source projects with sufficient quantities of upland fill material is difficult for several reasons. The excavation must occur in a year and season when the SBSP Restoration Project can accept it. Stockpiling material or moving it more than once is prohibitive and would increase environmental impacts. In addition, to be used in a restoration project, the material must pass a screening to demonstrate its lack of contamination. The source project should also be located close enough to the restoration project that bringing it to the project's location would both have fewer environmental impacts and be less expensive than bringing to a landfill or other destination. The number of suitable source projects is likely to be limited by the difficulty of successfully meeting all these criteria. It would not therefore be feasible to further constrain the source projects and dirt brokers/haulers by limiting the hours of material delivery to the non-peak commute periods. Assuming these entities would be willing to comply, their own costs would increase, and they would pass that on to the SBSP Restoration Project, raising associated costs by an estimated 30 percent at a minimum. Collectively, these barriers make the implementation of the restricted hours under **SBSP MM 3.12-1** infeasible.

For these reasons, the analysis for Chapter 3.11 will not uniformly be implementing this mitigation measure and instead conducted a full analysis of the number of truck trips and the impacts associated with them within the Traffic Impact Analysis for Eden Landing Phase 2 (AECOM 2016), which is presented in Appendix H to this Draft EIS/R.

Project-Level Evaluation

Phase 2 Impact 3.11-1: Potential short-term degradation of traffic operations at intersections and streets due to construction

Alternative Eden A (No Action). Under this alternative, no construction activities would be implemented as part of Phase 2. Southern Eden Landing would continue to be managed through the activities described in the AMP; however, this would be considered part of project operation, not construction. As such, no construction-generated traffic would occur, and there would be no impact.

Alternative Eden A Level of Significance: No Impact

Alternatives Eden B, Eden C, and Eden D. Alternatives Eden B, Eden C, and Eden D would require the import of approximately 92,000, 59,000 and 154,000 cubic yards of upland fill material, respectively, in order to improve levees and create habitat transition zones. Tables 3.11-5 through 3.11-7 present the LOS and delay for Alternatives B, C, and D, respectively. As can be seen from these tables all study intersections, except for I-880 southbound ramps/Whipple Road/Dyer Street, will continue to operate within acceptable levels of service under all three project alternatives. The LOS for the I-880 southbound ramps/Whipple Road/Dyer Street intersection, located in Union City, is currently at an unacceptable

LOS E during the AM peak hours. It is expected to remain at the same LOS under all the project alternatives. The average delay at this intersection is expected to increase by 8.0 seconds in the AM peak hour. Detailed LOS calculation sheets are provided in Appendix H.

An additional delay of 8.0 seconds in the AM peak hour is considered significant. Optimizing the timing at the I-880 southbound ramps/Whipple Road/Dyer Street intersection would mitigate the impact to less than significant. However, this mitigation is not feasible as this intersection is part of a synchronized series of intersections.

Alternatives Eden B, Eden C, and Eden D Level of Significance: Significant and Unavoidable

Table 3.11-5 LOS and Delay for Alternative Eden B

INTERSECTION	PEAK HOUR	No Project (Existing)		With Project Alternative		
		Delay[1] (sec)	LOS	Delay[1] (sec)	LOS	Increase in critical delay[2] (sec)
1. I-880 Northbound Ramps / Whipple Road / Industrial Parkway[3]	AM	55.4	E	56.7	E	n/a
	PM	73.1	E	72.7	E	n/a
2. I-880 Southbound Ramps / Whipple Road / Dyer Street	**AM**	**66.9**	**E**	**74.9**	**E**	**8.0**
	PM	50.7	D	52.1	D	n/a
3. Union City Boulevard / Whipple Road	AM	30.8	C	31.3	C	n/a
	PM	48.1	D	49.0	D	n/a
4. Union City Boulevard / Horner Street	AM	15.3	B	15.8	B	n/a
	PM	22.3	C	22.2	C	n/a
5. Union City Boulevard / Alvarado Boulevard	AM	25.2	C	25.4	C	n/a
	PM	25.2	C	25.5	C	n/a
6. Union City Boulevard / Dyer Street	AM	11.5	B	11.8	B	n/a
	PM	7.6	A	7.8	A	n/a

Source: AECOM 2016

Bold indicates LOS at unacceptable levels

[1] Intersection Control Delay per Highway Capacity Manual 2000 methodology.

[2] Increase in average delay only calculated for intersection at unacceptable level under 'with project' conditions to determine project impact.

[3] Intersection in Hayward; acceptable LOS is E or better.

Table 3.11-6 LOS and Delay for Alternative Eden C

INTERSECTION	PEAK HOUR	No Project (Existing)		With Project Alternative		
		Delay[1] (sec)	LOS	Delay[1] (sec)	LOS	Increase in critical delay[2] (sec)
1. I-880 Northbound Ramps / Whipple Road / Industrial Parkway[3]	AM	55.4	E	56.7	E	n/a
	PM	73.1	E	72.7	E	n/a
2. I-880 Southbound Ramps / Whipple Road / Dyer Street	AM	**66.9**	**E**	**74.9**	**E**	**8.0**
	PM	50.7	D	52.1	D	n/a
3. Union City Boulevard / Whipple Road	AM	30.8	C	31.3	C	n/a
	PM	48.1	D	49.0	D	n/a
4. Union City Boulevard / Horner Street	AM	15.3	B	15.6	B	n/a
	PM	22.3	C	21.9	C	n/a
5. Union City Boulevard / Alvarado Boulevard	AM	25.2	C	25.5	C	n/a
	PM	25.2	C	25.5	C	n/a
6. Union City Boulevard / Dyer Street	AM	11.5	B	11.8	B	n/a
	PM	7.6	A	7.8	A	n/a

Source: AECOM 2016

Bold indicates LOS at unacceptable levels

[1]Intersection Control Delay per Highway Capacity Manual 2000 methodology.

[2]Increase in average delay only calculated for intersection at unacceptable level under ‘with project’ conditions to determine project impact.

[3]Intersection in Hayward; acceptable LOS is E or better.

Table 3.11-7 LOS and Delay for Alternative Eden D

INTERSECTION	PEAK HOUR	No Project (Existing)		With Project Alternative		
		Delay[1] (sec)	LOS	Delay[1] (sec)	LOS	Increase in critical delay[2] (sec)
1. I-880 Northbound Ramps / Whipple Road / Industrial Parkway[3]	AM	55.4	E	56.7	E	n/a
	PM	73.1	E	72.7	E	n/a
2. I-880 Southbound Ramps / Whipple Road / Dyer Street	AM	**66.9**	**E**	**74.9**	**E**	**8.0**
	PM	50.7	D	52.1	D	n/a
3. Union City Boulevard / Whipple Road	AM	30.8	C	31.3	C	n/a
	PM	48.1	D	49.0	D	n/a
4. Union City Boulevard / Horner Street	AM	15.3	B	17.1	B	n/a
	PM	22.3	C	23.1	C	n/a
5. Union City Boulevard / Alvarado Boulevard	AM	25.2	C	25.2	C	n/a
	PM	25.2	C	25.2	C	n/a
6. Union City Boulevard / Dyer Street	AM	11.5	B	11.5	B	n/a
	PM	7.6	A	7.6	A	n/a

Source: AECOM 2016

Bold indicates LOS at unacceptable levels

[1] Intersection Control Delay per Highway Capacity Manual 2000 methodology.

2 Increase in average delay only calculated for intersection at unacceptable level under ‘with project’ conditions to determine project impact.

3 Intersection in Hayward; acceptable LOS is E or better.

Phase 2 Impact 3.11-2: Potential long-term degradation of traffic operations at intersections and streets during operation

Alternative Eden A (No Action). Under this alternative, no new activities would take place under Phase 2. CDFW would maintain and operate the ponds as part of the ELER and as described in the AMP. This alternative would not result in an increase in long-term traffic volumes in the area. Therefore, there would be no impact.

Alternative Eden A Level of Significance: No Impact

Alternatives Eden B, Eden C, and Eden D. O&M activities at southern Eden Landing would include water control structure operations and maintenance, levee maintenance, island maintenance, habitat transition zone maintenance, and maintenance of public access and recreational features. CDFW would lead and be responsible for these activities on its lands. In addition, Pacific Gas and Electric Company (PG&E) and ACFCWCD would continue to operate and maintain their respective properties that are included and analyzed as part of the Action Alternatives in the Phase 2 project area. The increase in traffic volumes associated with the routine maintenance and monitoring activities would be minimal.

Under these Action Alternatives, though the Bay Trail spine would be completed through southern Eden Landing and the portion of northern Eden Landing through which it is currently absent. There would also be one or two new viewing platforms and, depending on the alternative chosen for implementation, there could be an additional spur or loop trail off of the Bay Trail network. All of these have the potential to increase demand for recreational visits to the project area and thus increase traffic on the local roads.

Operation of the new recreational facilities is anticipated to result in an increase of up to 150 visitors a day to southern Eden Landing, as described in the Recreation Resources section of this EIS/R. Based on data of existing recreational use at northern Eden Landing it can be assumed that most of the users (approximately 75 percent) will visit the project area between the hours of 10:00 a.m. and 2:00 p.m. Monday through Friday and on weekends. It can also be assumed that up to 75 percent of users will arrive to the project area via automobile traveling on average with 2 persons per vehicle. This would add approximately 56 vehicles to the project area local roads on average each day. This is not a substantial increase in vehicle traffic relative to the existing traffic volumes of the local network and the vast majority of this traffic would not occur during peak travel periods.

Due to the periodic nature of the operations and maintenance traffic, the limited number of trips generated by workers visiting the ponds, and the minimal increase in recreation visitors, the implementation of any of the Action Alternatives would not result in a substantial increase in traffic volumes compared to the current traffic levels in the area. Therefore, impacts would be less than significant.

Eden Landing Action Alternatives Level of Significance: Less than Significant

Eden Landing Phase 2 Impact 3.11-3: Potential increase in parking demand

Alternative Eden A (No Action). Under this alternative, no new activities would take place under Phase 2. There would be no increase in visitors or parking demand. Therefore, there would be no impact.

Alternative Eden A Level of Significance: No Impact

Alternatives Eden B, Eden C, and Eden D. Under these alternatives, construction staging would be established within the Eden Landing, outside of areas that are open to the public for parking. Therefore, during the construction phase of the project, there would be no impact on parking demand. Under the various Action Alternatives, however, the Bay Trail spine would be completed through southern Eden Landing and the portion of northern Eden Landing through which it is currently absent. There would also be one or two new viewing platforms and, depending on the alternative chosen for implementation, there could be an additional spur or loop trail off of the Bay Trail network. All of these have the potential to increase demand for recreational visits to the project area and thus the demand for parking.

Existing off-street parking that provides access onto the Bay Trail network or the EBRPD Regional Trail are shown in Table 3.11-1. There are approximately two dozen existing parking areas at each of those locations. In addition, on-street parking is available along several nearby streets, particularly on weekends (when recreational use of the recreation facilities is likely to be higher) because much of the surrounding areas are business parks or other commercial uses. The estimated increase in recreational use from Phase 2 implementation that was conducted for the Recreational Resources section of this Draft EIS/R projects up to 150 additional recreational users per day, increasing parking demand by up to 56 vehicles per day. These vehicles will likely not be in the project area all at the same time.

The existing off-street parking spaces and the surrounding street parking are anticipated to provide sufficient capacity for the parking demand resulting from the increase in visitors to Eden Landing. In addition, the program-level SBSP Mitigation Measure 3.12-3: Parking at Recreational Facilities would apply here. It states that, "The landowner (CDFW), in coordination with the cities with jurisdiction over the proposed recreation improvements (where applicable), shall design recreational facilities with sufficient parking spaces to accommodate the projected increase in vehicles that access the site, unless adequate off-site parking is available to meet the demand for parking spaces."

As a result, the impacts from any of the three Action Alternatives for Phase 2 at Eden Landing would be less than significant.

Eden Landing Action Alternatives Level of Significance: Less than Significant

Phase 2 Impact 3.11-4: Potential increase in wear and tear on the designated haul routes during construction

Alternative Eden A (No Action). Under this alternative, no new activities would take place under Phase 2. There would be no potential for increase in wear and tear on the haul routes during construction. Therefore, there would be no impact.

Alternative Eden A Level of Significance: No Impact

Alternatives Eden B, Eden C, and Eden D. Under these alternatives, the use of large trucks to transport equipment and haul material to or from the construction areas may affect the road conditions of the designated haul routes. Arterial and collector streets are designed to accommodate a variety of vehicle types, including heavy trucks. However, residential streets are not designed with a pavement thickness to withstand substantial truck traffic. Almost all of the lengths of the construction vehicle access and the material import haul routes from I-880 into southern Eden Landing are on Union City Boulevard, Whipple Road, Dyer Street, and Industrial Parkway. The portions of these roads that would be used by construction vehicles and for material delivery are all classified as designated truck routes. As such, these roads were designed to withstand substantial truck traffic. Therefore, those portions of construction truck trips would not increase wear and tear on these roads, and the impact would be less than significant. On the smaller, local roads that connect Union City Boulevard to the gated entrances to southern Eden

Landing, Horner Street is a major arterial in a commercial/industrial zone that also would have been designed to withstand truck traffic without damage or significant wear and tear.

Smaller roads in areas zoned for residential include Westport Way and Carmel Way. It is possible, though unlikely, that these roads could experiences wear and tear during construction. However, the program-level SBSP Mitigation Measure 3.12-4: Video Record of Road Conditions would apply here. It states that, "If residential streets are part of the designated haul route for any future phases of the SBSP Restoration Project, the landowners shall prepare a video record of road conditions prior to the start-up of construction for the residential streets affected by the project. The landowner (CDFW) shall prepare a similar video of road conditions after project construction is completed. The pre- and post-construction conditions of haul routes shall be reviewed by staff of the local Public Works Department. An agreement shall be entered into prior to construction that will detail the pre-construction conditions and post-construction requirements of the roadway rehabilitation program."

As a result, the impacts from any of the three Action Alternatives for Phase 2 at Eden Landing would be less than significant.

Eden Landing Action Alternatives Level of Significance: Less than Significant

Impact Summary

Phase 2 impacts and levels of significance are summarized in Table 3.11-8. The levels of significance are those remaining after implementation of program-level mitigation measures, project-level design features, the AMP and other management practices and documents. The traffic analysis revealed that even implementation of a project-level mitigation measure that was used in Phase 2 at the Don Edwards National Wildlife Refuge – **SBSP Phase 2 Mitigation Measure 3.11-1** to modify signal timing at congested intersections – was not sufficient to reduce **SBSP Phase 2 Impact 3.11-1** to a level that was less than significant.

Table 3.11-8 Phase 2 Summary of Impacts – Traffic

IMPACT	ALT. EDEN A	ALT. EDEN B	ALT. EDEN C	ALT. EDEN D
Phase 2 Impact 3.11-1: Potential short-term degradation of traffic operations at intersections and streets due to construction.	NI	SU	SU	SU
Phase 2 Impact 3.11-2: Potential long-term degradation of traffic operations at intersections and streets during operation**.**	NI	LTS	LTS	LTS
Phase 2 Impact 3.11-3: Potential increase in parking demand.	NI	LTS	LTS	LTS
Phase 2 Impact 3.11-4: Potential increase in wear and tear on the designated haul routes during construction.	NI	LTS	LTS	LTS

This page intentionally left blank

3.12 Noise

This section of the Draft Environmental Impact Statement/Report (EIS/R) characterizes the existing noise resources within the Eden Landing Phase 2 project area and analyzes whether implementation of the project would cause a substantial adverse effect on noise quality. The information presented is based on a review of the existing noise resources within the area and pertinent federal, state and local regulations. Using this information as context, an analysis of the noise-quality-related environmental impacts of the project is presented for each alternative. The program-level mitigation measures described in Chapter 2, Alternatives, would be implemented with the project. Therefore, this section only includes additional, project-level mitigation measures as needed.

3.12.1 Physical Setting

Introduction and Methodology

Development of the baseline conditions, significance criteria, and impact analysis in this section is commensurate to and reliant upon the analysis conducted in the 2007 South Bay Salt Pond (SBSP) Restoration Project Final EIS/R (2007 Final EIS/R). It includes a summary of the physical setting, existing noise levels, and the regulatory setting. Applicable regional, state, and local plans and policies concerning noise and vibration were reviewed during preparation of this Draft EIS/R.

Acoustic Fundamentals

Noise is generally defined as sound that is loud, disagreeable, unexpected, or unwanted. Sound, as described in more detail below, is mechanical energy transmitted in the form of a wave because of a disturbance or vibration, and as any pressure variation in air that the human ear can detect. Negative effects of noise exposure include physical damage to the human auditory system, interference, and disease. Exposure to noise may result in physical damage to the auditory system, which may lead to gradual or traumatic hearing loss. Gradual hearing loss is caused by sustained exposure to moderately high noise levels over a period of time; traumatic hearing loss is caused by sudden exposure to extremely high noise levels over a short period. Gradual and traumatic hearing loss may both result in permanent hearing damage. Also, noise may interfere with or interrupt sleep, relaxation, recreation, and communication. Although most interference may be classified as annoying, the inability to hear a warning signal may be dangerous. Noise may also be a contributor to diseases associated with stress, such as hypertension, anxiety, and heart disease. The degree to which noise contributes to such diseases depends on the frequency, bandwidth, and level of the noise, and the exposure time (Caltrans 1998).

Noise Descriptors. Selection of a proper noise descriptor for a specific source is dependent on the spatial and temporal distribution, duration, and fluctuation of the noise. The noise descriptors most often encountered when dealing with traffic, community, and environmental noise are defined below (Caltrans 1998).

- L_{max} (Maximum Noise Level): The maximum instantaneous noise level during a specific period of time. The L_{max} may also be referred to as the peak (noise) level.
- L_{min} (Minimum Noise Level): The minimum instantaneous noise level during a specific period of time.

- L_X (Statistical Descriptor): The noise level exceeded X percent of a specific period of time.
- L_{eq} (Equivalent Noise Level): The energy of the mean (average) noise level. The instantaneous noise levels during a specific period of time in A-weighted decibels (dBA) are converted to relative energy values. From the sum of the relative energy values, an average energy value is calculated, which is then converted back to dBA to determine the L_{eq}. In noise environments determined by major noise events, such as aircraft overflights, the L_{eq} value is heavily influenced by the magnitude and number of single events that produce the high noise levels.
- L_{dn} (Day-Night Noise Level): The 24-hour L_{eq} with a 10 dBA "penalty" for noise events that occur during the noise-sensitive hours between 10 p.m. and 7 a.m. In other words, 10 dBA is "added" to noise events that occur in the nighttime hours, and this generates a higher reported noise level when determining compliance with noise standards. The L_{dn} attempts to account for the fact that noise during this specific period of time is a potential source of disturbance with respect to normal sleeping hours.
- CNEL (Community Noise Equivalent Level): The CNEL is similar to the L_{dn} described above, but with an additional 5 dBA "penalty" added to noise events that occur during the noise sensitive hours between 7 p.m. to 10 p.m., which are typically reserved for relaxation, conversation, reading, and television. If using the same 24-hour noise data, the reported CNEL is typically approximately 0.5 dBA higher than the L_{dn}.
- SENL (Single Event [Impulsive] Noise Level): The SENL describes a receiver's cumulative noise exposure from a single impulsive noise event, which is defined as an acoustical event of short duration that involves a change in sound pressure above some reference value. SENLs typically represent the noise events used to calculate the L_{eq}, L_{dn}, and CNEL.

Community noise is commonly described in terms of the ambient noise level, which is defined as the all-encompassing noise level associated with a given noise environment. A common statistical tool to measure the ambient noise level is the average, or equivalent, noise level L_{eq}, which corresponds to a steady-state A-weighted sound level containing the same total energy as a time-varying signal over a given period (usually 1 hour). The L_{eq} is the foundation of the composite noise descriptors such as L_{dn} and CNEL, as defined above, and shows good correlation with community response to noise.

Vibration

Vibration is the periodic oscillation of a medium or object. The rumbling sound caused by the vibration of room surfaces is called structure-borne noise. Sources of groundborne vibrations include natural phenomena (e.g., earthquakes, volcanic eruptions, sea waves, landslides) or human-made causes (e.g., explosions, machinery, traffic, trains, construction equipment). Vibration sources may be continuous, such as factory machinery, or transient, such as explosions. As is the case with airborne sound, groundborne vibrations may be described by amplitude and frequency. Construction vibrations can be transient, random, or continuous. Transient construction vibrations are generated by blasting, impact pile driving, and wrecking balls. Continuous vibrations result from vibratory pile drivers, large pumps, horizontal directional drilling, and compressors. Random vibration can result from jackhammers, pavement breakers, and heavy construction equipment.

Regional Setting

The communities along San Francisco Bay (or Bay) are primarily urban in character; however, open space and other undeveloped areas (including ecological reserves, wildlife refuges, and parks) fringe the southern portion of the Bay and are scattered in and around the communities.

Noise-Sensitive Uses

Noise-sensitive land uses generally include those uses where exposure to noise would result in adverse effects and uses where quiet is an essential element of their intended purpose. Residential dwellings are of primary concern because of the potential for increased and prolonged exposure of individuals to both interior and exterior noise levels. Other noise-sensitive land uses include schools, hospitals and health-care facilities, parks, places of worship, and other uses where low interior noise levels are essential. Figure 3.12-1 shows the locations of nearby noise-sensitive receptors, including residential areas. The locations of these receptors in relation to the Eden Landing Phase 2 project area pond clusters are discussed below.

Project Setting

As discussed in Section 3.8, Land Use, land uses surrounding the Eden Landing Phase 2 project area consist of urban development (single and multifamily residential, commercial, and industrial uses), open space and recreation areas, tidal mudflats, salt flats, salt marsh, creeks, flood control levees, rural land, and wildlife interpretative areas. The existing noise environment of the Eden Landing pond complex and the locations of sensitive receptors are discussed below. No noise monitoring was conducted within the pond complex to define the actual noise levels from inside the pond complex.

The Eden Landing pond complex is within Hayward, in Alameda County. Union City is to the east and Fremont neighbors Eden Landing across the Alameda Creek Flood Control Channel (ACFCC) to the south. Noise levels in the pond complex area are low and may be somewhat influenced by vehicular traffic on Interstate 800 (I-880), approximately 1.75 miles to the east and State Route (SR) 92, approximately 2 miles to the north. The Hayward General Plan identifies noise contours for major roadways within its jurisdiction. Noise levels within 50 feet of SR 92 range from 75 to 79 L_{dn} (City of Hayward 2011). Other local noise sources are associated with passing trains and airplanes flying overhead. The Union Pacific Railroad line is located approximately 3 miles east of the pond complex. The Hayward Executive Airport is located approximately 5 miles to the north. Currently, no major noise sources occur within the Eden Landing pond complex because salt production operations ceased when the California Department of Fish and Wildlife (CDFW) acquired the property. With the exception of the trails along the ACFCC, the entire southern half of the Eden Landing pond complex is closed to the public. Wildlife-compatible recreational uses (e.g., hiking, kayaking) occur in the northern half of Eden Landing. During duck hunting season, some of the pond areas in Eden Landing are open to permitted hunters. Intermittent noises associated with these activities can be heard in the vicinity of these recreational areas.

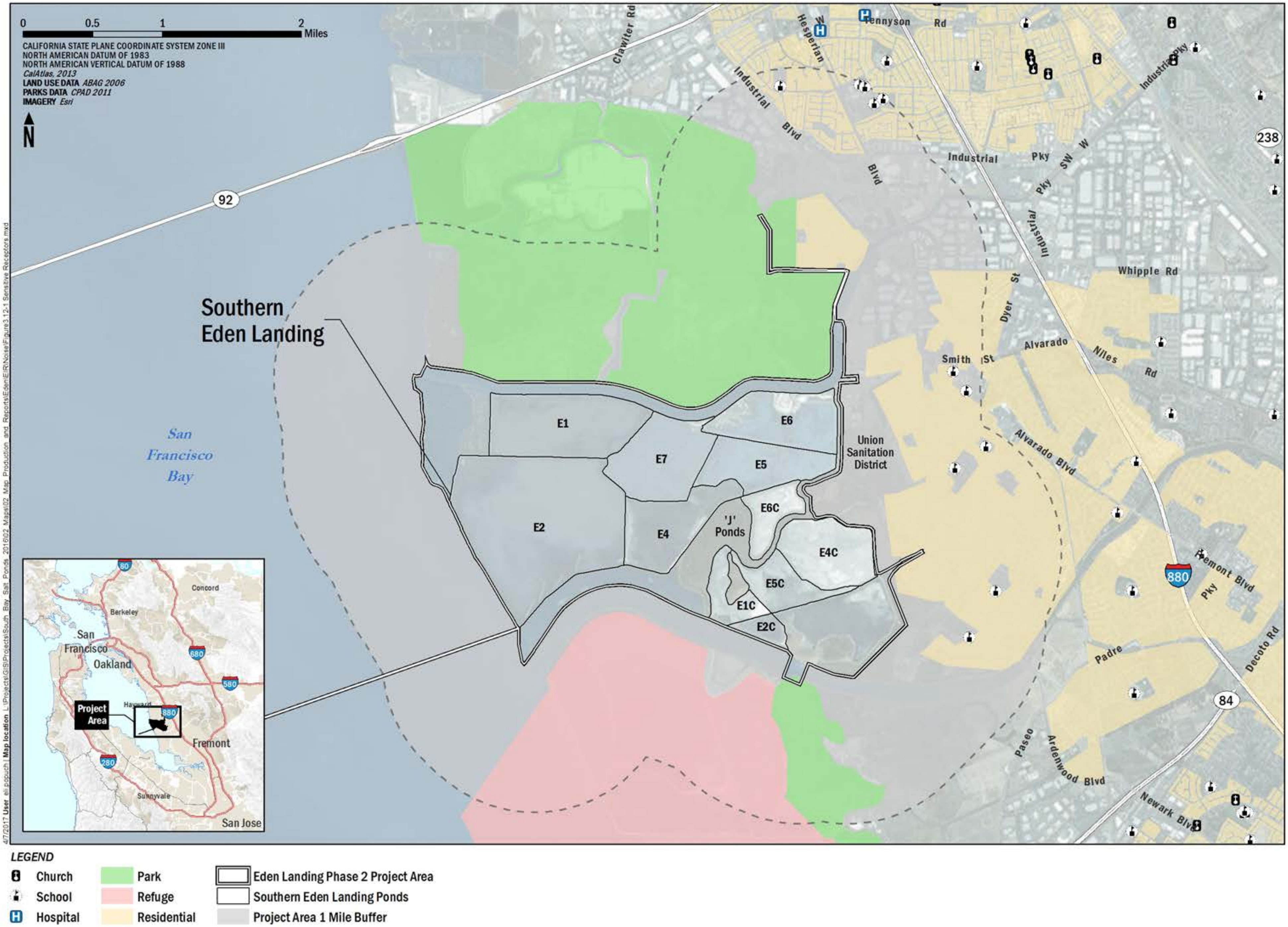


Figure 3.12-1
Sensitive Receptors

No sensitive receptors exist within the Eden Landing pond complex itself, as it is all part of the Eden Landing Ecological Reserve (ELER, or Reserve), which is owned and managed by CDFW. Open space and commercial and industrial uses surround the Reserve to the north, east and south; the San Francisco Bay shoreline is to the west. The nearest sensitive receptors to the major construction activity are residences located approximately 900 feet east of Pond E4C (off Carmel Way in Union City). Also, as part of this project, some trail improvements will occur on top of existing levees north of the Eden Landing Phase 2 project area. One of these levees, along Pond E6A, is approximately 100 feet south of residences along Marshbrook Drive and Baker Circle in Hayward and in the southern part of the pond complex adjacent to Monterey Drive in Union City. Finally, there are several East Bay Regional Park District (EBRPD) facilities nearby. The Alameda Creek Regional Trail is on both sides of the ACFCC, and the Coyote Hills Regional Park is immediately across the ACFCC, just south of Cal Hill.

3.12.2 Regulatory Setting

Noise is regulated in the Eden Landing Phase 2 project area and the regional area through implementation of local general plan policies and noise regulations. Local general plans identify general principles intended to guide and influence development plans, and noise regulations set forth specific standards and procedures for addressing particular noise sources and activities. Generally, the goal of noise regulations is to protect the health and welfare of the public by minimizing excessive, unreasonable, and unnecessary noise. Each jurisdiction defines unacceptable noise levels and, in most cases, noise level standards and work hour limitations, to achieve this goal.

Laws and Regulations

Alameda County

The Alameda General Plan Countywide Noise Element provides background information about evaluating the effects of noise on communities and the current regulatory framework. It also presents baseline information for the existing noise environment in Alameda County, along with goals, policies, and actions for controlling noise in existing and future development (Alameda County 1994). Acceptable noise levels range from 55 to 65 L_{dn} for residential and educational uses to 70 L_{dn} for commercial and to 75 L_{dn} for industrial and open-space recreation and parks uses.

Relevant countywide noise policies include the following goals.

- **Goal #1:** The peace, health, safety, and welfare of the residents of Alameda County require protection from excessive, unnecessary, and unreasonable noises from any and all sources in the cities and unincorporated territory.
- **Goal #2:** Promote the compatibility of land uses with respect to noise generation by legislatively protecting sensitive land uses from noise sources.

Chapter 6.60, Noise, of the Alameda County Code of Ordinances prohibits unnecessary, excessive, and annoying noise to ensure public health, welfare, and safety (Alameda County 1966). This chapter provides maximum exterior noise limits for specific land uses during specified time periods. Permissible noise levels range from 45 to 65 dBA for residential and public area uses and from 60 to 80 dBA for commercial properties during the night (10 p.m. to 7 a.m.). Permissible noise levels range from 50 to 70 dBA for residential and public area uses and from 65 to 85 dBA for commercial properties anytime during the day (7 a.m. to 10 p.m.).

City of Hayward

The Hayward General Plan 2040 identifies and describes the existing noise sources in the City, projects noise levels in the future, and provides policies and strategies to protect the public health, safety and welfare against the adverse effects of excessive noise (City of Hayward 2014).

Goal 8 of the General Plan's Hazards Element specifies noise guidelines for new development (City of Hayward 2014). New development projects must meet acceptable noise level standards established in Goal 8 within the Hazards Element. The *highest* levels of exterior noise exposure that are regarded as "Normally Acceptable" based on land use type are as follows:

- Residential uses (low-density single family, duplex, mobile homes): 60 dBA (L_{dn} or CNEL);
- Residential uses (townhomes and multi-family apartments and condominiums), Lodging (Motels and Hotels): 65 dBA (L_{dn} or CNEL);
- Urban Residential Infill and Mixed-Use Projects: 70 dBA (L_{dn} or CNEL);
- Schools, Libraries, Churches, Hospitals, Nursing Homes: 70 dBA (L_{dn} or CNEL);
- Playgrounds, Neighborhood Parks, Office Buildings (Business, Commercial, and Professional): 70 dBA (L_{dn} or CNEL);
- Golf Courses, Riding Stables, Water Recreation, Cemeteries: 75 dBA (L_{dn} or CNEL);
- Industrial Manufacturing, Utilities, Agriculture: 75 dBA (Ldn or CNEL); and

Auditoriums, Concert Hall, Amphitheaters, Sports Arena, Outdoor Spectator Sports: *Mitigation based on site-specific study* Additional considerations are provided below for residential uses:

1. The maximum acceptable exterior noise level in residential areas is an L_{dn} of 60 dB for single-family development and an L_{dn} of 65 dB for multi-family development.

Along with this list of standards, the Hayward General Plan 2040 Hazards Element has the following policies that are relevant to the SBSP Restoration Project, Eden Landing Phase 2 (City of Hayward 2014):

Haz 8.2 - The City shall require development projects in areas where they may be exposed to major noise sources (e.g. roadways, rail lines, and aircraft or other non-transportation noise sources) to conduct a project level environmental noise analysis. The noise analysis shall determine noise exposure and noise standard compatibility with respect to the noise standards identified in Table HAZ-1 and shall incorporate noise mitigation when located in noise environments that are not compatible with the proposed uses of the project.

Haz 8.17 - The City shall maintain, implement, and enforce a community noise control ordinance to regulate noise levels from public and private properties, vehicles, construction sites, and landscaping activities.

Haz 8.20 - The City may require development projects subject to discretionary approval to assess potential construction noise impacts on nearby sensitive uses and to minimize impacts on those uses, to the extent feasible.

Haz 8.21 - The City shall limit the hours of construction and maintenance activities to the less sensitive hours of the day (7:00am to 7:00pm Monday through Saturday and 10:00am to 6:00 pm on Sundays and holidays).

Haz 8.22 - The City shall require a vibration impact assessment for proposed projects in which heavy-duty construction equipment would be used (e.g. pile driving, bulldozing) within 200 feet of an existing structure or sensitive receptor. If applicable, the City shall require all feasible mitigation measures to be implemented to ensure that no damage or disturbance to structures or sensitive receptors would occur.

The City of Hayward Section 4.1.03 of the Municipal Code Noise states that "it shall be unlawful for any person in the City of Hayward to cause, suffer, permit or allow the repeated or persistent emission of any noise or sound produced by any such person, or by any animal or fowl, or any mechanical means, within his possession, ownership or control, which by reason of its raucous nature shall disturb the peace and quiet of any person or persons in the City of Hayward." Although the Code does not specify noise limitations for stationary sources, Section 4.1.03 of the Municipal Code prohibits construction noise[1] level more than six dB above the local ambient level at any point outside the property plane before 7 am and after 7 pm daily except on Sundays and holidays. On Sundays and holidays the restrictions apply to before 10 am and after 6 pm. (City of Hayward 2011).

In addition, the Code states that "no person shall produce, suffer or allow to be produced by any machine, animal or device, or any combination of same, on or abutting areas zoned or used for residential purposes, a construction noise level more than 6 dBA above the local ambient level at any point outside the property plane before the hour of 7 am and after the hour of 7 pm daily except on Sundays and holidays. On Sundays and holidays the restrictions of this subsection shall apply before 10 am and after 6 pm."

The City Manager or its designee may provide exception permits in cases where the applicants can show that a diligent investigation of available noise abatement techniques indicates that immediate compliance with the requirements would be impractical or unreasonable. However, appropriate conditions to minimize public detriment caused by such exceptions would be required (City of Hayward 2011).

Other Relevant Plans in the Region

City of Union City

The Health and Safety Element of Union City's 2002 General Plan Policy Document discusses the noise environment in the City, provides maximum allowable noise levels based on land uses, and identifies policies and implementation programs to achieve the goal of protecting public health and welfare (City of Union City 2002).

Union City provides the maximum allowable noise exposure by land use. Normally acceptable noise levels for residential uses, including schools, are as follows:

- Residential Uses (low-density single family, duplex, mobile homes): 45 to 60 dBA (Ldn or CNEL); and
- Multi-family residential, group homes, motels/hotels, schools, libraries, churches, hospitals, extended care: 45 to 60 dBA (Ldn or CNEL).

Section 9.40 of the Union City Municipal Code identifies noise limits for various land uses. For residential property, the Code prohibits noise levels more than 10 dBA above the local ambient noise at any point outside of the property plane. The noise limitation is less stringent for commercial and industrial property; the Code permits up to 12 dBA above the local ambient noise level at any point outside of the property line (City of Union City 2002).

Section 9.40.053 identifies noise restrictions associated with construction activities. Construction, alteration, or repair activities are authorized by valid City permit between the hours of 8 am and 8 pm. Monday through Friday, 9 am to 8 pm on Saturday, and 10 am to 6 pm on Sunday and holidays if at least one of the following noise limitations are met: 1) no individual piece of equipment shall produce a noise level exceeding 83 dBA at a distance of 25 ft (8 m), or 2) the noise level at any point outside the property plane of the project shall not exceed 86 dBA. Exception permits are permitted in accordance with Section 9.40.060 as long as appropriate conditions to minimize the public detriment caused by such exceptions are implemented (City of Union City 2002).

City of Fremont

Noise is regulated in Fremont through enforcement of Municipal Code performance standards and implementation of General Plan policies.

Article 19, Section 8-21904 of the Fremont Municipal Code contains noise performance standards for the land uses within the City, at the property line nearest the source of a suspected violation. The maximum noise generated by such use cannot exceed 60 dBA when adjacent uses are residential, park or institutional uses. Less stringent standards apply to adjacent commercial or industrial uses (65 to 70 dBA, respectively). Excluded from these standards are occasional sounds generated by the movement of railroad equipment, temporary construction activities, or warning devices (City of Fremont 2016b).

3.12.3 Environmental Impacts and Mitigation Measures

Approach to Analysis - Construction

The following sections provide an overview of how construction activities may generally influence existing noise conditions in relation to the Eden Landing Phase 2 project area. It describes predicted noise and vibration levels created by certain construction equipment that are used later to prepare the impact assessment according to the stated thresholds of significance. This overview is intended to inform the impact assessment by presenting the key concepts associated with the noise and vibration impact assessments.

Construction activities would occur under the Eden Landing Phase 2 Restoration Project Action Alternatives (Alternatives Eden B, Eden C, and Eden D). They do not apply to the No Action Alternative (Alternative Eden A).

Construction Noise

Noise impacts from construction equipment depend on the type of activity, the equipment used, and the distance from sensitive receptors. A discussion of the typical construction equipment that would be used and their associated noise levels, the distances of the Eden Landing Phase 2 project area from sensitive receptors, and projected noise levels at the sensitive receptors from construction and operation of the project are presented below.

In general, construction activities would include excavation, backfilling, bulldozing and other earthmoving, material transport, and other miscellaneous activities (using both land-based and amphibious equipment). On-site construction equipment may include (but is not limited to) long-reach excavators, amphibious excavators, bulldozers, dump trucks, a compaction roller, a water tanker, refueling tanks, cranes, pile drivers, and pickup vehicles for transportation in and out of a project site. Water-based equipment may include floating barges with pile drivers and cranes, equipment barges, work tugs, pumps, generators, crew/survey boats, and the hydraulic offloader.

According to the Federal Transit Administration's (FTA's) Transit Noise and Vibration Assessment (FTA 2006), noise levels for typical construction equipment (including those listed below) range from 74 to 101 dBA at 50 feet without feasible control measures. Table 3.12-1 provides a summary of typical noise levels generated by construction equipment at a distance of 50 feet with and without feasible noise controls installed. Noise levels could decrease by 1 dBA to as much as 16 dBA with feasible noise-control measures such as intake mufflers, exhaust mufflers, and engine shrouds in accordance with manufacturers' specifications.

Table 3.12-1 Typical Construction-Equipment Noise Levels for Various Types of Equipment

Equipment Type	Noise Level (in dBA) at 50 feet without Feasible Noise Control[1]
Dozer or tractor	85
Excavator	88
Front-end loader	85
Backhoe	80
Vibratory roller	74
Crane	83
Truck	88
Pile driver (impact)	101
Pile driver (sonic)	96
Water pump	76
Dump truck	88
Compaction roller	74
Diesel generator	81

Source: FTA 2006.

[1] Feasible noise controls include the use of intake mufflers, exhaust mufflers, and engine shrouds in accordance with manufacturers' specifications.

Tables 3.12-2 shows the distances of the nearest sensitive receptors from construction activities at the Eden Landing Phase 2 project area and the predicted noise levels at various distances, respectively. Short-term construction activities would include general earthmoving activities using the equipment identified in Table 3.12-1. Table 3.12-2 distinguishes between general construction activities and pile driving activities. General construction activities can occur anywhere within the southern Eden Landing ponds, so the edges of the ponds closest to sensitive receptors were used to determine the approximate distance to the nearest sensitive receptors. Pile driving activities may be required to install bridges, water control structures, or the offloading facility, and the project would likely use the sonic pile driving (vibration) method, where possible. However, for purposes of this analysis and to be conservative, impact pile driving was assumed. These are short-term construction actions that would not be an ongoing part of the construction work and would occur in only a handful of places at southern Eden Landing. During pile driving activities, the project would create a 400-foot exclusion zone surrounding that activity for safety purposes. This would require the temporary closure (during the pile-driving work hours only) of some trails as well as installing temporary fencing in some areas (e.g., Coyote Hills Regional Park).

The existing and proposed water control structures and the locations of the proposed bridges are shown in the Eden Landing Phase 2 Action Alternatives (Figures 2-4 through 2-6) in Chapter 2, Alternatives. As such, the distance from pile driving activities to the nearest sensitive receptors can be better approximated than other general construction activities. The estimates of the distances from work sites form the basis of the analyses presented later in this section.

Table 3.12-2 Predicted Construction Noise Levels at Various Distances

Eden Landing Phase 2 Action Alternatives/ Construction Component[1]	Equipment Used	Closest Distance Between Construction Site and Sensitive Receptors (feet)	Predicted Peak Construction Noise Levels (dBA)
Alternative Eden B			
Trail Construction	Bulldozer	100	79
Levee Improvements/Habitat Transition Zones	Various	900	77
Bridge Construction/Pile Driving	Pile Driver	3,000	66
Alternative Eden C			
Trail Construction	Bulldozer	100	79
Levee Improvements/Habitat Transition Zones	Various	6,000	61
Bridge Construction/Pile Driving	Pile Driver	400	83
Alternative Eden D			
Trail Construction	Bulldozer	100	79
Levee Improvements/Habitat Transition Zones	Various	900	77
Bridge Construction/Pile Driving	Pile Driver	3,000	66

Note: Noise levels are based on attenuation at 6 dBA for doubling of distance.

[1] The nearest sensitive receptors are based on the measurement from the edge of the pond closest to the sensitive receptors to the sensitive receptors.

Table 3.12-2 shows the calculated predicted noise levels at various distances associated with construction activities. It also shows the expected noise levels at sensitive receptors for the Action Alternatives. The noise levels were calculated based on one or both of the following two assumptions (used in the 2007 Final EIS/R and the 2016 Final EIS/R for Phase 2 actions at the Don Edwards San Francisco Bay National Wildlife Refuge [Refuge] and thus reapplied here):

- Combined intermittent noise levels of 102 dBA at 50 feet without feasible noise control, based on the simultaneous use of the three noisiest types of construction equipment shown in Table 3.12-1; and
- A typical noise-attenuation rate of 6 dBA per doubling of distance.

The assumption associated with the simultaneous use of the three noisiest types of construction equipment provides for the most conservative analysis of potential noise levels associated with construction activities at the Eden Landing Phase 2 project area for each Action Alternative. It should be noted that in some cases, pile driving may not be necessary, and the use of a sonic/vibratory driver would further reduce peak noise levels. Also, each pile driving activity would be done in a few hours or a day at most, reducing the duration of that noise. In other cases, construction activities would not occur at the edge of the pond nearest to the sensitive receptors, so noise levels would likely be lower than those reported below. Finally, many construction activities would not only occur at the edge of the pond, but would be distributed throughout all of southern Eden Landing. In those cases, the longer distance between sensitive receptors and the construction work area would further decrease noise levels through distance attenuation.

Construction Traffic-Related Noise

Construction traffic-related noise would be associated with the transport of equipment, material, and workers to and from the Eden Landing Phase 2 project area. The number of vehicle trips needed for construction of restoration, flood risk management, and recreational features would be greater than the number of vehicle trips needed for construction (or decommissioning/destruction) of dredge material infrastructure. Because these phases of the construction would not be concurrent, the analysis of construction traffic-related noise was based on the number of vehicle trips needed during the restoration component of the construction period, to provide estimates commiserate with the highest use during construction.

Upland fill material would be brought to the Eden Landing Phase 2 project area by trucks. Assuming transportation of fill occurs using trucks with a storage capacity of 11 cubic yards per truck, in the Action Alternative requiring the most material import (154,000 cubic yards), there would be 14,000 one-way truck trips to deliver the high-end estimate of total fill required. These truck trips are not actually generated by the Eden Landing Phase 2 project. The material would come from other, unrelated construction projects in nearby communities. So, in the absence of the Eden Landing Phase 2 project, the material would be generated and transported to a landfill or other disposal site. Thus, this analysis only addresses the transportation of the material from the nearest highway or major arterial to the ponds where it would be used. Details of this routing and its related effects on traffic are discussed in Section 3.11 of this Draft EIS/R.

The truck trips to import this material would likely occur over several construction seasons. But as a conservative estimate, the analysis in Section 3.11 – Traffic assumed that all of the material would be imported in the shortest possible time. The analysis thus assumed 200 haul truck trips would be generated to deliver the required fill material to southern Eden Landing. These trips are calculated by alternative in Table 3.12-3.

Table 3.12-3 Construction Fill (CY) and Truck Trips

Alternative	Volume of Fill Imported by Truck (CY)	Truck Trips	Construction Period Involving Hauling Fill (days)	One-Way Max Daily Truck Trips
Eden B	92,000	8,364	42	200
Eden C	59,000	5,362	27	200
Eden D	154,000	14,000	70	200

Construction-Related Vibration

Construction activities would generate vibration. Vibration levels depend on the specific construction equipment used and the operations involved. Vibration generated by construction equipment spreads through the ground and diminishes in magnitude with increased distance. Table 3.12-4 shows the vibration levels generated by typical construction equipment. The California Department of Transportation’s (Caltrans) recommended standard with respect to the prevention of structural building damage is 0.2 inch/second peak particle velocity (PPV) for normal structures, and the FTA’s maximum-acceptable vibration standard is 80 vibration decibels (VdB) (FTA 2006) with respect to human annoyance for residential uses. As shown in Table 3.12-5, the highest vibration associated with construction equipment for all Eden Landing Phase 2 Action Alternatives would be generated from impact pile drivers. Vibration created by pile drivers would exceed both the Caltrans and the FTA standards at a distance of 25 feet. The use of trucks, drilling, and bulldozers would also exceed FTA standards at 25 feet with respect to human annoyance for residential uses. In general, pile driving would be used wherever cofferdams and dewatering would be needed (the sheet piles to form the cofferdams would need to be driven). The two places where this need exists are where the bridges and the water control structures are to be located. Predicted vibration levels at nearby sensitive receptors from construction activities are shown in Table 3.12-5.

Table 3.12-4 Typical Construction Equipment Vibration Levels

Equipment		PPV at 25 feet (inch/second)[1]	Approximate Lv at 25 feet[2]
Pile driver (impact)	Upper range	1.518	112
	Typical	0.644	104
Pile driver (sonic)	Upper range	0.734	105
	Typical	0.170	93
Large bulldozer		0.089	87
Trucks		0.076	86
Jackhammer		0.035	79
Small bulldozer		0.003	58

Source: FTA 2006.

[1] PPV is the peak particle velocity

[2] Lv is the velocity level in decibels (VdB) referenced to 1 inch/second and based on the root mean square (RMS) velocity amplitude.

Table 3.12-5 Predicted Vibration Levels at Nearby Sensitive Receptors from Construction Activities

Eden Landing Phase 2 Action Alternatives/ Construction Component	Equipment Used	Closest Distance to Structures (feet)	PPV (inches/second)	Approximate Lv (VdB)
Alternative Eden B				
Trail Construction	Bulldozer	100	0.0111	68.9
Levee Improvements/Habitat Transition Zones	Bulldozer	900	0.0004	40.3
Bridge Construction/Pile Driving	Pile Driver	3,000	0.0012	49.6
Alternative Eden C				
Trail Construction	Bulldozer	100	0.0111	68.9
Levee Improvements/Habitat Transition Zones	Bulldozer	6,000	0.000024	15.6
Bridge Construction/Pile Driving	Pile Driver	3,000	0.0012	49.6
Alternative Eden D				
Trail Construction	Bulldozer	100	0.0111	68.9
Levee Improvements/Habitat Transition Zones	Bulldozer	900	0.0004	40.3
Bridge Construction/Pile Driving	Pile Driver	3,000	0.0012	49.6

Note: Vibration levels generated by pile driving and/or other construction equipment as designated in the fourth column.

PPV at 25 feet is based on FTA 2006. To calculate PPV at other distances, the following equation (FTA 2006) was used: PPV at distance D = PPV (at 25 ft) * [(25/D)^1.5].

Lv at 25 feet is based on FTA 2006. To calculate Lv at other distances, the following equation (FTA 2006) was used: Lv at distance D = Lv (at 25 ft) – 30log(D/25).

Approach to Analysis – Operations and Maintenance

Under the No Action Alternative (Alternative Eden A), no new activities would occur under Eden Landing Phase 2 and the pond complex would continue to be monitored and managed through the activities described in the Adaptive Management Plan (AMP) and in accordance with CDFW's current practices for management of the Reserve. The existing levees would continue to be maintained and repaired as needed to prevent unplanned breaches and maintain de facto flood protection. Water control structures would be manually opened and closed as needed to manage water levels in the ponds. The currently permitted seasonal hunting would continue unchanged. Ongoing monitoring and studies to track the status of wildlife and vegetation in and around these ponds would be the principal component of the continued operations, as well as implementation of the AMP. Mosquito abatement and control of invasive vegetation species are also possible on an as-needed basis. All of these activities would be reached by pickup trucks and other passenger vehicles driving on levees. Additional details regarding the implementation of the AMP are described in the 2007 Final EIS/R.

Under the Action Alternatives, most operations and maintenance activities would not be substantially different from those performed under the No Action Alternative. There would still be biological monitoring, water control structure operations, seasonal hunting, levee maintenance, mosquito abatement, invasive vegetation control, and so on. The project area would remain open space, consisting of tidal habitat/managed ponds and some recreational facilities. New recreational facilities would be constructed for all Action Alternatives. Under the Action Alternatives, southern Eden Landing would include recreational facilities that permit walking/hiking/biking, birdwatching, kayaking, viewing wildlife and wetlands, seasonal hunting, and learning about the history and uses of the area. No active recreational uses (e.g., ball fields) would be constructed.

Other new activities would include bridge maintenance and additional use of recreational trails. The locations of those activities would differ by alternative, but since none of them would be new or increased noise-generating actions, there would be little meaningful difference in noise in the areas around southern Eden Landing. The anticipated noise levels generated by the passive recreational uses would not substantially alter the ambient noise environment. The low and occasional noise levels generated by recreational users would not be noticeable from off-site locations. Noise generated by area roadways and highways, railroads, and overflights, the dominant noise sources in the area, would in some cases be much higher than any noise generated from passive recreational users.

Significance Criteria

For the purposes of this Draft EIS/R, a significant noise impact would occur if the project resulted in the following:

- Exposure of persons to or generation of noise levels in excess of standards established in the local general plans or noise ordinances or the applicable standards of other agencies;
- Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels;
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;

- A substantial temporary or periodic increase in ambient noise levels in the project vicinity due to construction activities; or
- Exposure of people residing or working in the project area to excessive aircraft-generated noise levels.

The quantitative noise standards depend on the jurisdictions where activities would occur (see Section 3.12.2, Regulatory Setting), and are discussed below in relation to the SBSP Restoration Project.

The SBSP Restoration Project would not expose people residing in (no habitable structures exist within the project area) or working in the Eden Landing Phase 2 project area to excessive aircraft-generated noise levels, because no habitable structures would be located within the pond complex, and the Eden Landing Phase 2 project area is not in an area with excessive aircraft-generated noise levels. Therefore, this significance criterion is not assessed in the project-level evaluation below.

As adopted in the 2007 Final EIS/R, the project is committed to implementing SBSP Mitigation Measure 3.13-2, which ensures that contractors use routes that require trucks to avoid residential areas for haul routes.

As explained in Section 3.1.2, Environmental Setting and Impact Analysis, even though both the Council on Environmental Quality Regulations for Implementing National Environmental Policy Act and the California Environmental Quality Act (CEQA) Guidelines were considered during the impact analysis, impacts identified in this Draft EIS/R are characterized using CEQA terminology. Section 3.1.2 describes the terminology used to explain the severity of the impacts.

Program-Level Evaluation

The 2007 Final EIS/R conducted broad, regional analyses of program-level noise impacts from the types of activities that would be necessary to implement Programmatic Alternative A (the No Action Alternative) and Programmatic Alternatives B and C (the two program-level Action Alternatives). The 2007 Final EIS/R evaluated the potential noise and vibration impacts of three long-term alternatives, which were each determined to have less than significant impacts to persons, ambient noise levels, and the established standards of local plans. The 2007 Final EIS/R found that under each programmatic alternative, noise impacts from construction activities, traffic, water pumping, and Operations and Management (O&M) activities would be less than significant with mitigation incorporated. Furthermore, the 2007 Final EIS/R found that none of the long-term alternatives would result in vibration levels in excess of the Caltrans or FTA standards.

Project-Level Evaluation

Eden Landing Phase 2 Impact 3.12-1: Short-term construction noise effects.

Alternative Eden A (No Action). Under Alternative Eden A, the No Action Alternative, no new activities would be implemented as part of the Phase 2 project. The CDFW would continue maintaining and operating the Eden Landing pond complex in accordance with the *Eden Landing Ecological Reserve System E2 and E2C Operation Plan*, the AMP, and current CDFW practices.

No new recreation or public access features would be added in Alternative Eden A. Under Alternative Eden A, no construction activities would occur within the Eden Landing pond cluster. As such, no short-term construction noise impacts would occur.

Alternative Eden A Level of Significance: No Impact

Alternative Eden B. Alternative Eden B would restore the entirety of southern Eden Landing to tidal marsh in a single project implementation stage by providing sufficient improvements to the eastern, backside levees to provide the necessary degree of flood risk management. Construction activities include: levee breaches, levee lowering, installation of water control structures, excavation of pilot channels, installation of fish habitat channels, construction of habitat islands and habitat transition zones, the construction and decommissioning of dredge material placement infrastructure (including an offloading facility), beneficial reuse of dredged material and/or import of upland fill material, bridges and trail construction, and recreation components such as extension of the Bay Trail and maintenance/ improvement of existing trails surrounding the Eden Landing Phase 2 project area.

Construction would be accomplished using equipment barges, work tugs, generators, crew/survey boats, excavators, bulldozers, dump trucks, a compaction roller, a water tanker, refueling tanks, pile driving equipment, pumps, cranes, paving equipment, and pickup vehicles for transportation in and out of the project site. Trail construction on top of existing levees would primarily be done by bulldozers. As shown in Table 3.12-2, the nearest sensitive receptors (residences) are approximately 100 feet away from some of the trail construction activity and a bulldozer at that distance would generate a noise level of 79 dBA. Constructing levee improvements, breaching levees, lowering levees and creating habitat transition zones would involve several different pieces of equipment operating simultaneously and generate a noise level of 77 dBA at the nearest sensitive receptors, approximately 900 feet away. Bridge construction is likely to involve pile driving, and if an impact pile driver is used it would generate a noise level of 66 dBA at the nearest sensitive receptors, approximately 3,000 feet away. (Mooring the offloading facility would also require pile driving, but the offloader would be much further away from residences.)

As adopted in the 2007 Final EIS/R, the project is committed to implementing SBSP Mitigation Measure 3.13-1**,** which requires that construction activities be limited to the days and hours or noise levels designated for the Hayward, where the work activities would occur, and those designated for the adjacent Union City and Fremont, where the closest sensitive receptors are located. Therefore, construction activities will not occur during noise-sensitive hours. The haul routes used for import of fill material would be almost entirely on designated truck routes in Union City. The exception is the last few blocks leading to the gated entrance into southern Eden Landing, which are not so designated. The project is also committed to implementation of SBSP Mitigation Measure 3.13-2, which limits the hours trucks may deliver fill and requires trucks to minimize residential areas for haul routes. Therefore, noise impacts from short-term construction activities would be less than significant.

Alternative Eden B Level of Significance: Less than Significant

Alternative Eden C. Alternative Eden C would retain the Inland Ponds and the Southern Ponds as managed ponds and add a number of water control structures to allow the depth and salinity of these ponds to be actively managed for a range of different pond-dependent wildlife. The Bay Ponds would be restored to tidal marsh as in Alternative Eden B through the use of a mid-complex levee that would largely be built on top of the existing internal levees.

Construction would be accomplished using equipment barges, work tugs, generators, crew/survey boats, excavators, bulldozers, dump trucks, a compaction roller, a water tanker, refueling tanks, pile driving equipment, pumps, cranes, paving equipment, and pickup vehicles for transportation in and out of the project site. Trail construction on top of existing levees would primarily be done by dozers. As shown in

Table 3.12-2, the nearest sensitive receptors (residences) are approximately 100 feet away from some of the trail construction activity and a bulldozer at that distance would generate a noise level of 79 dBA. Constructing levee improvements, breaching levees, lowering levees and creating habitat transition zones would involve several different pieces of equipment operating simultaneously and generate a noise level of 61 dBA at the nearest sensitive receptors, approximately 6,000 feet away. Bridge and water control structure construction may involve pile driving and if an impact pile drive is used it would generate a noise level of 83 dBA at the nearest sensitive receptor, approximately 400 feet away. Although Coyote Hills Regional Park is less than 400 feet from one of the proposed bridge locations trails temporary fencing would be installed to keep people at least 400 feet away from any pile driving activity for safety purposes. Once construction is completed the fencing would be removed.

As adopted in the 2007 Final EIS/R, the project is committed to implementing SBSP Mitigation Measure 3.13-1**,** which requires that construction activities be limited to the days and hours designated for the City of Hayward, where the work activities would occur. Therefore, construction activities will not occur during noise-sensitive hours. The project is also committed to implementation of SBSP Mitigation Measure 3.13-2, which requires trucks to minimize residential areas for haul routes. Therefore, noise impacts from short-term construction activities would be less than significant.

Alternative Eden C Level of Significance: Less than Significant

Alternative Eden D. Alternative Eden D is a staged implementation of the tidal marsh restoration outlined in Alternative Eden B. It would make use of a mid-complex levee, as in Alternative Eden C, but that levee would be temporary. This separation of the Bay Ponds from the others would allow those large outer ponds to first be restored to tidal marsh, after which, the mid-complex levee would be removed, and the Inland and Southern Ponds then restored to tidal marsh. Water control structures would be added to the Inland and Southern Ponds for use during the years in which they would be operated as managed ponds and then removed to allow tidal flows. The trail and associated viewing platform would be similar to those in Alternative Eden B.

Construction would be accomplished using equipment barges, work tugs, generators, crew/survey boats, excavators, bulldozers, dump trucks, a compaction roller, a water tanker, refueling tanks, pile driving equipment, pumps, cranes, paving equipment, and pickup vehicles for transportation in and out of the project site. Trail construction on top of existing levees would primarily be done by dozers. As shown in Table 3.12-2, the nearest sensitive receptors (residences) are approximately 100 feet away from some of the trail construction activity and a bulldozer at that distance would generate a noise level of 79 dBA. Constructing levee improvements, breaching levees, lowering levees and creating habitat transition zones would involve several different pieces of equipment operating simultaneously and generate a noise level of 77 dBA at the nearest sensitive receptors, approximately 900 feet away. Bridge and water control structure construction may involve pile driving and if an impact pile drive is used it would generate a noise level of 66 dBA at the nearest sensitive receptors, approximately 3,000 feet away.

As adopted in the 2007 Final EIS/R, the project is committed to implementing SBSP Mitigation Measure 3.13-1**,** which requires that construction activities be limited to the days and hours designated for the City of Hayward, where the work activities would occur. Therefore, construction activities will not occur during noise-sensitive hours. The project is also committed to implementation of SBSP Mitigation Measure 3.13-2, which limits the hours trucks may deliver fill and requires trucks to minimize residential areas for haul routes. Therefore, noise impacts from short-term construction activities would be less than significant.

Alternative Eden D Level of Significance: Less than Significant

Eden Landing Phase 2 Impact 3.12-2: Traffic-related noise impacts during construction.

Alternative Eden A (No Action). Under Alternative Eden A, the No Action Alternative, no new activities would be implemented as part of the Phase 2 project. The CDFW would continue maintaining and operating the Eden Landing pond complex in accordance with the Eden Landing Ecological Reserve System “E2 and E2C Operation Plan”, the AMP, and current CDFW practices.

No new recreation or public access features would be added in Alternative Eden A. Under Alternative Eden A, no construction activities would occur within the Eden Landing pond cluster. As such, no construction traffic noise impacts would occur.

Alternative Eden A Level of Significance: No Impact

Alternatives Eden B, Eden C, and Eden D. Construction of Alternatives Eden B, Eden C, and Eden D would require the transport of equipment and the generation of truck trips associated with the delivery of equipment at the beginning and end of the construction period, daily worker vehicles, and from the long-term delivery of upland fill (92,000 cubic yards [cy] for Alternative Eden B, 59,000 cy for Alternative Eden C, and 154,000 cy for Alternative Eden D), requiring 200 daily trips by trucks carrying 11 cy each. Truck trips for the delivery of fill would be concentrated in the shortest duration possible (42 days for Alternative Eden B, 27 days for Alternative Eden C, and 70 days for Alternative Eden D) over portions of three construction seasons.

Typically, an increase in noise levels is perceptible (3 dBA [CNEL/ L_{dn}]) when traffic volumes double along an affected roadway segment. Access to southern Eden Landing will be provided via designated haul routes, as described in Section 3.11, Traffic. Per SBSP Mitigation Measure 3.13-2, trucks would be required to minimize travel through residential areas and, as such, impacts would be less than significant.

Short-term construction traffic would consist of the transportation of the worker crew, which would consist of five to 10 people per day, and other construction truck trips delivering equipment and materials.

A large volume of traffic travels on I-880. According to the Caltrans Traffic and Vehicle Data Systems Unit, traffic volumes in 2014 for I-880 at Whipple Road (which leads to Union City Blvd.) were 14,000 vehicles during the peak hour[1] and 209,000 average daily traffic (ADT) during the peak month (Caltrans 2014).

Per SBSP Mitigation Measure 3.13-2, trucks would be required to minimize travel through residential areas and, as such, impacts would be less than significant.

Alternatives Eden B, Eden C, and Eden D Level of Significance: Less than Significant

[1] Peak hour values indicate the volume in both directions; in urban and suburban areas, the peak hour normally occurs every weekday.

Eden Landing Phase 2 Impact 3.12-3: Traffic-related noise effects during operation.

Alternative Eden A (No Action). Under this alternative, operational activities would not change from existing conditions. There is very little recreational use of the Phase 2 Eden Landing project area which is limited to trail use along the Alameda Creek Regional Trail (the EBRPD trail along both sides of the ACFCC) and limited waterfowl hunting inside the Reserve between November and January. This activity would continue with Alternative Eden A but would not increase from existing conditions. As such, there would be no impact associated with traffic-related noise during operation from this alternative. Noise impacts associated with traffic associated with operation and maintenance activities are discussed below under Impact 3.12-4.

Alternative Eden A Level of Significance: No Impact

Alternatives Eden B, Eden C, and Eden D. Operational traffic from the build alternatives is associated with recreational activity at southern Eden Landing. Under these Action Alternatives, recreational activity at the Phase 2 Eden Landing project area is expected to increase with the addition of new recreational facilities. Under Alternatives Eden B, Eden C, and Eden D, a new section of the Bay Trail spine and a viewing platform would be installed to improve recreation and public access to these ponds. Under Alternative Eden C, there would also be a new pedestrian/bicycle bridge over the ACFCC and another spur trail (as a loop with a bridge or an out and back) along Old Alameda Creek to the site of the Alvarado Salt Works. Operation of these new recreational facilities is anticipated to result in some increases in visitors to the Phase 2 Eden Landing Ponds. These are detailed in Section 3.6 – Recreation of this Draft EIS/R. However, the increased number of visitors is anticipated to result in a minor increase of approximately 56 additional vehicles a day to the local network (see Section 3.11 – Traffic). Further, these vehicles would be almost entirely passenger vehicles, which generate less noise than commercial trucks or construction vehicles.

Due to the minimal increase in recreation visitors, the implementation of any of these alternatives would not result in a substantial increase in traffic volumes compared to the current traffic levels in the area. Therefore, impacts would be less than significant.

Alternatives Eden B, Eden C, and Eden D Level of Significance: Less than Significant

Eden Landing Phase 2 Impact 3.12-4: Potential operational noise effects from O&M activities.

Alternative Eden A (No Action). Under this alternative, Eden Landing would continue to be maintained and operated according to CDFW’s O&M plan, applicable Alameda County operations, and the AMP. Most of these activities are limited to small crews of workers (up to half a dozen people) doing invasive vegetation control, monitoring wildlife, or operating water control structures. On rare occasions, larger crews and construction vehicles may be needed for levee repair.

In sum, Alternative Eden A activities would require limited O&M activities that would generate noise. However, because O&M activities would occur during daytime, non-noise-sensitive hours only, and because such activities would occur intermittently within the 50-year planning period and at large distances from sensitive receptors, noise effects would be less than significant.

Alternative Eden A Level of Significance: Less than Significant

Alternatives Eden B, Eden C, and Eden D. Under Alternatives Eden B, Eden C, and Eden D, the O&M activities at southern Eden Landing would continue to follow and be dictated CDFW's O&M plan, applicable Alameda County operations, and the AMP.

Regular operations and maintenance of the pond infrastructure (primarily the water control structures) would be required following construction, as would the ongoing wildlife monitoring, invasive vegetation control, and so on. This maintenance would require a staff person to travel to the ponds one or two times a week to perform activities such as water structure control operation or vandalism repairs. More periodic O&M activities might include invasive vegetation removal or levee repair. On these rare occasions, larger crews and construction vehicles may be needed. In addition, AMP monitoring activities would occur, which would require additional workers (e.g., staff, consultants) to access the pond clusters. The frequency of visits to southern Eden Landing to conduct AMP monitoring activities would depend on the actual activities and would vary by season (e.g., during the bird-breeding season, there would be more trips to the site than during the non-breeding season).

The O&M activities associated with Alternatives Eden B, Eden C, and Eden D would not significantly increase noise levels to levels greater than those that currently occur under existing conditions or what would occur over time under Alternative Eden A. Noise effects from operation of recreational facilities would be less than significant, as the low and occasional noise levels generated by recreational users would not be noticeable from off-site locations and such noises would be limited to the daytime hours when recreational facilities are open to the public. As such, operation noise impacts would be less than significant.

Alternatives Eden B, Eden C, and Eden D Level of Significance: Less than Significant

Eden Landing Phase 2 Impact 3.12-5: Potential vibration effects during construction and/or operation.

Alternative Eden A (No Action). Under this alternative, no new construction would occur and limited O&M activities would occur. Small crews of workers may be on-site during O&M activities; fewer workers would likely be on-site for O&M activities than for a typical construction worker crew, which would likely be five to 10 people. Alternative Eden A activities would require limited O&M activities that would generate vibration. However, because O&M activities would occur during daytime, non-vibration-sensitive hours only, and because such activities would occur intermittently within the 50-year planning period, vibration effects during construction and/or operation would be less than significant.

Alternative Eden A Level of Significance: Less than Significant

Alternatives Eden B, Eden C, and Eden D. Construction activities under these alternatives have the potential to result in varying degrees of temporary groundborne vibration. Construction of Alternatives Eden B, Eden C, and Eden D may require the use of pile drivers for the construction of bridges and repair or install water control structures. Table 3.12-5 shows the distance between these construction activities and sensitive receptors as well as predicted vibration levels at the sensitive receptors. From the calculated values, operation of construction of Alternatives Eden B, Eden C, or Eden D would not exceed the Caltrans recommended standard of 0.2 in/sec PPV and would not exceed FTA's maximum-acceptable vibration standard of 80 VdB. As such, potential impacts from construction would be less than significant.

As with Alternative Eden A, limited O&M activities that would generate vibration would occur under the build alternatives. Also, because O&M activities would occur during daytime, non-vibration-sensitive hours only, and because such activities would occur intermittently within the 50-year planning period, vibration effects during construction and/or operation would be less than significant

As adopted in the 2007 Final EIS/R, the project is committed to implementing SBSP Mitigation Measure 3.13-1**,** which requires that construction activities be limited to the days and hours or vibration levels designated for the City of Hayward where the work activities would occur. Therefore, construction activities would not occur during vibration-sensitive hours. The project is also committed to implementation of SBSP Mitigation Measure 3.13-2, which requires trucks to avoid residential areas for haul routes. Therefore, vibration impacts from short-term construction activities would be less than significant.

Alternatives Eden B, Eden C, and Eden D Level of Significance: Less than Significant

Impact Summary

Eden Landing Phase 2 noise impacts and levels of significance are summarized in Table 3.12-6. The levels of significance are those remaining after implementation of program-level mitigation measures, project-level design features, and the AMP and other Reserve management practices and documents. The noise analysis required no project-level mitigation measures to reduce the impacts to a level that was less than significant.

Table 3.12-6 Eden Landing Phase 2 Summary of Impacts – Noise

IMPACT	ALTERNATIVE EDEN A	ALTERNATIVE EDEN B	ALTERNATIVE EDEN C	ALTERNATIVE EDEN D
Eden Landing Phase 2 Impact 3.12-1: Short-term construction noise effects.	NI	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.12-2: Traffic-related noise impacts during construction.	NI	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.12-3: Traffic-related noise effects during operation.	NI	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.12-4: Potential operational noise effects from O&M activities.	LTS	LTS	LTS	LTS
Eden Landing Phase 2 Impact 3.12-5: Potential vibration effects during construction and/or operation.	LTS	LTS	LTS	LTS

Note: Alternative Eden A is the No Action Alternative (No Project Alternative under CEQA).

LTS = Less than Significant

NI = No Impact

3.13 Air Quality

This section of the Draft Environmental Impact Statement/Report (EIS/R) describes the existing air quality within the project area for Phase 2 of the South Bay Salt Pond (SBSP) Restoration Project at Eden Landing. It then analyzes whether the project implementation would cause a substantial adverse effect on air quality. The information presented in this section is based on a review of the existing air quality conditions and other pertinent federal, state and local regulations. The analysis of the project's air-quality-related environmental impacts is presented for each alternative. The program-level mitigation measures described in Chapter 2, Alternatives, would be implemented with the project. Therefore, this section only includes additional, project-level mitigation measures as needed.

3.13.1 Physical Setting

Methodology

The methods of analysis and thresholds of significance are based on the Bay Area Air Quality Management District (BAAQMD) 2011 Air Quality Guidelines (BAAQMD 2010, 2011).

Regional Setting

The proposed project is located in Alameda County, within the San Francisco Bay Area Air Basin (SFBAAB). The SFBAAB also comprises all of Contra Costa, Marin, Napa, and San Francisco Counties, the southeast portion of Sonoma County, and the southwest portion of Solano County. The SFBAAB is generally bounded on the west by the Pacific Ocean, on the north by the Coast Ranges, and on the east and south by the Diablo Range.

The ambient concentrations of air pollutants in the SFBAAB are determined by the amount of emissions released by pollutant sources and the atmosphere's ability to transport and dilute such emissions. Natural factors that affect transport and dilution include terrain, wind, atmospheric stability, and the presence of sunlight. Therefore, existing air quality conditions in the area are determined by such natural factors as topography, meteorology, and climate, in addition to the amount of emissions released by existing air pollutant sources.

Topography, Meteorology, and Climate

The climate of the SFBAAB is characterized by mild summers and winters, moderate rainfall, daytime onshore breezes, and moderate humidity. Regional flow patterns affect air quality patterns by directing pollutants downwind of sources. Localized meteorological conditions such as moderate winds disperse pollutants and reduce pollutant concentrations. When a warm layer of air traps cooler air close to the ground, an inversion layer is produced, hampering dispersion and trapping air pollutants near the ground. During summer mornings and afternoons, these inversions are present in the South Bay. The extended daylight hours during the summer also provide plentiful sunshine, which provides the energy needed to fuel photochemical reactions between nitrogen oxides (NO_x) and reactive organic gases (ROGs), which result in ozone formation.

Criteria Air Pollutants

Concentrations of ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), respirable and fine particulate matter (PM_{10} and $PM_{2.5}$, which are particulate matter with diameters of 10 micrometers and 2.5 micrometers, respectively), and lead are used as indicators of ambient air quality conditions. Because these are the most prevalent air pollutants known to be deleterious to human health, they are commonly referred to as “criteria air pollutants.”

O_3 is formed from the interaction of ROGs, NO_x, and sunlight. Ground-level O_3 is the primary component of smog. Motor vehicles, industrial activities, and such consumer products as paints, inks, and adhesives emit ROGs. The combustion of gasoline, coal, and oil emits NO_x. O_3 exposure causes eye irritation and damage to lung tissue in humans. O_3 also harms vegetation, reduces crop yields, and accelerates deterioration of paints, finishes, rubber products, plastics, and fabrics.

CO is an odorless, colorless gas formed by the incomplete combustion of fuels. When inhaled at high concentrations, CO combines with hemoglobin in the blood and reduces the oxygen-carrying capacity of the blood. This results in reduced oxygen reaching the brain, heart, and other body tissues. Exposure to high CO concentrations may result in headaches, dizziness, fatigue, unconsciousness, and even death.

NO_2 is a reddish-brown gas formed during combustion of fuels. Exposure to high concentrations may increase the risk of acute and chronic respiratory disease. NO_2 can also contribute to the formation of ground-level O_3.

SO_2 is a colorless gas emitted from fossil-fuel combustion sources and other industrial processes. SO_2 is linked to a number of adverse respiratory effects.

PM_{10} is particulate matter that is 10 micrometers or less in diameter. PM_{10} may come from a variety of sources and consists of a wide range of solid and liquid particles, including smoke, dust, aerosols, and metallic oxides. It evades the respiratory system’s natural defenses and can lodge deep in the lungs when inhaled, aggravating chronic respiratory diseases. Long-term exposure to PM_{10} at levels exceeding State of California standards can lead to an increase in respiratory and cardiac illness, exacerbation of asthma, and increased death rates.

$PM_{2.5}$, also known as fine particulate matter, is particulate matter that is 2.5 micrometers or less in diameter. $PM_{2.5}$ exposure has been linked to health problems, including asthma, bronchitis, acute and chronic respiratory symptoms (e.g., shortness of breath and painful breathing), and premature death. People with existing heart or lung disease (e.g., asthma, chronic obstructive pulmonary disease, congestive heart disease), children, and the elderly appear to be at greatest risk for these severe health effects. In addition, $PM_{2.5}$ particles are a major source of visibility impairment.

Lead is a toxic metal that can adversely affect the nervous system, immune system, and reproductive and developmental systems. The major sources of lead emissions have historically been from fuels in motor vehicles and industrial sources.

In addition to the criteria pollutants described above, vinyl chloride, hydrogen sulfide (H_2S), sulfates, and visibility reducing particles are considered air pollutants that can adversely affect human health. Vinyl chloride is used to make vinyl products, and high exposure can lead to central nervous system effects and increased cancer risk. H_2S is formed during bacterial decomposition of sulfur-containing organic substances, has a very disagreeable odor, and is highly toxic. Sulfates are the fully oxidized ionic form of sulfur, and can cause adverse respiratory effects, degrade visibility, and harm or damage ecosystems and property. Visibility reducing particles consist of suspended particulate matter (PM), which is a complex mixture of dry, solid fragments; solid cores with liquid coatings; and small droplets of liquid. These particles can severely impair visibility and contribute to regional haze.

Further information about criteria pollutants and the common sources and health effects of criteria pollutants can be found in the BAAQMD 2012 CEQA Air Quality Guidelines (BAAQMD 2012a). Both the federal government and the state government have established air quality standards and goals to protect human health. Areas that meet these standards are designated as “attainment” areas, and areas that do not meet these standards are designated as “nonattainment” areas. Goals are established to improve air quality in nonattainment-designated areas. Additional information regarding attainment and the regulatory environment is provided in Section 3.13.2, Regulatory Setting.

Toxic Air Contaminants

Concentrations of toxic air contaminants (TACs) are also used as indicators of ambient air quality conditions. A TAC is defined as an air pollutant that may cause or contribute to an increase in mortality or in serious illness or that may pose a hazard to human health. TACs are usually present in minute quantities in the ambient air; however, their high toxicity or health impact may pose a threat to public health even at low concentrations. TACs can cause long-term health effects (such as cancer, birth defects, neurological damage, asthma, bronchitis, or genetic damage) or short-term acute affects (such as eye watering, respiratory irritation, runny nose, throat pain, or headaches). The following 10 compounds pose the greatest known ambient risk based on air quality data or, in the case of diesel exhaust, concentration estimates: acetaldehyde, benzene, 1,3-butadiene, carbon tetrachloride, hexavalent chromium, para-dichlorobenzene, formaldehyde, methylene chloride, perchloroethylene, and diesel PM. Naturally occurring asbestos (NOA) in rock and soil may also be of concern during earthmoving activities, as these activities can break NOA down to microscopic fibers that are easily suspended in air. When inhaled, these thin fibers irritate tissues and resist the body's natural defenses.

For evaluation purposes, TACs are separated into carcinogens and non-carcinogens based on the nature of the physiological effects associated with exposure to a particular TAC. Carcinogens are assumed to have no safe threshold below which health impacts would not occur. Cancer risk is typically expressed as excess cancer cases per 1 million exposed individuals, typically over a lifetime exposure or other prolonged duration. For non-carcinogenic substances, there is generally assumed to be a safe level of exposure below which no negative health impact is believed to occur. These levels may vary depending on the specific pollutant. Acute and chronic exposure to non-carcinogens is expressed as a hazard index, which is the ratio of expected exposure levels to an acceptable reference exposure levels.

Odors

Typically, odors are regarded as a nuisance rather than a health hazard. However, manifestations of a person’s reaction to foul odors can range from psychological (e.g., irritation, anger, anxiety) to physiological (e.g., circulatory and respiratory effects, nausea, vomiting, headache). Sources of existing odor in the South Bay include the salt ponds. When algae and other biomass (which grow in the ponds) naturally decompose, H_2S gas can be produced, which generates odors. Also, odors are generated when the ponds dry and the mud bottoms are exposed to air (exposure of algae or brine shrimp).

Project Setting

This section focuses on the air quality conditions in the Eden Landing Phase 2 project area.

The Eden Landing pond complex is in the southwestern Alameda County subregion of the SFBAAB, which encompasses the southeast side of San Francisco Bay from Dublin Canyon to the Alameda County/Santa Clara County border (BAAQMD 1999). The subregion is bordered on the east by the steep flank of the East Bay hills and on the west by San Francisco Bay. During the summer months, average maximum temperatures in the subregion are in the mid-70s. Average maximum winter temperatures are in the high-50s to low-60s.

The pollution potential is considered relatively high in this subregion during the summer and fall (BAAQMD 1999). The nearest air quality monitoring station that provides the most representative ambient air quality at the Eden Landing pond complex is the Hayward-La Mesa Station. Based on the monitoring data shown in Table 3.13-1, pollutant concentrations (shown in bold text) exceeded ambient air quality standards for the past three years for state ozone and federal PM2.5.

There are no sensitive receptors within the Eden Landing pond complex and limited sensitive receptors adjacent to the pond complex. Sensitive residences are located near the pond complex at Pond E4C (off Carmel Way in Union City), approximately 1,000 feet east of the pond boundary. Several schools are located east of the pond complex, including Alvarado Elementary School (approximately 4,000 feet east of Pond E6, in Union City), Alvarado Middle School (approximately 4,000 feet east of Pond E6, in Union City), Refugio M. Cabello Elementary School (4,000 feet east of Pond E6C, in Union City), Delaine Eastin Elementary School (more than 4,000 feet southeast of Pond E4C, in Union City), and Pioneer Elementary School (more than 4,000 feet southeast of Pond E4C, in Union City). Schools are also located in Hayward, more than 5,000 feet east of the site, on the east side of the railroad tracks.

Table 3.13-1 Summary of Ambient Air Quality in the Vicinity of the Eden Landing Pond Complex

POLLUTANT	STANDARD/EXCEEDANCE	Hayward- La Mesa Station		
		2013	2014	2015
Ozone (O_3)	Max. 1-hour concentration (parts per million [ppm])	**0.075**	**0.076**	**0.085**
	Max. 8-hour concentration (ppm)	**0.085**	**0.096**	**0.103**
	# Days > federal 8-hour standard (std.) of > 0.075 ppm	0	0	2
	# Days > California 1-hour std. of > 0.09 ppm	0	1	2
	# Days > California 8-hour std. of > 0.07 ppm	1	4	2
Fine particulate matter ($PM_{2.5}$)**	Max. 24-hour concentration (micrograms per cubic meter [$\mu g/m^3$])	**37.9**	**37.6**	**44.7**
	#Days > fed. 24-hour std. of > 35 $\mu g/m^3$	2	1	1
	Annual average ($\mu g/m^3$)	13	11	11
Respirable particulate matter (PM_{10})	Max. 24-hour concentration ($\mu g/m^3$)	*	*	*
	#Days > fed. 24-hour std. of > 150 $\mu g/m^3$	*	*	*
	#Days > California 24-hour std. of > 50 $\mu g/m^3$	*	*	*
	Annual average (µg/m3)	*	*	*
Nitrogen dioxide (NO_2)**	Max. 1-hour concentration (parts per billion [ppb])	60	82	48
	# Days > California 1-hour std. of > 18 ppb	0	0	0
	Annual average (ppb)	13	11	11

Notes:
Data from Hayward-La Mesa Monitoring Station.
* Indicates there was insufficient data to determine the value.
**Data from next closest monitoring station: Oakland-9925 International Blvd.
Exceedances of federal or state standards are shown in **bold** text.
Source of air quality monitoring data: California Air Resources Board (CARB) 2016a.

3.13.2 Regulatory Setting

Air quality in the San Francisco Bay Area is regulated by the United States Environmental Protection Agency (USEPA), California Air Resources Board (CARB), and the BAAQMD. Each of these agencies develops rules, regulations, policies, and/or goals to attain the directives imposed through legislation. Although USEPA regulations may not be superseded, both state and local regulations may be more stringent.

Federal Laws and Regulations

USEPA has been charged with implementing national air quality programs. USEPA's air quality mandates are drawn primarily from the federal Clean Air Act (CAA), which was enacted in 1970. The most recent major CAA amendments were made by Congress in 1990.

Federal Clean Air Act

The CAA required USEPA to establish national ambient air quality standards (NAAQS). USEPA has established primary and secondary NAAQS for the following criteria air pollutants: O_3, CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and lead. The primary standards protect public health and the secondary standards protect public welfare. The primary standards are shown in Table 3.13-2, along with current attainment designations for the SFBAAB. The CAA also requires each state to prepare an air quality control plan referred to as a State Implementation Plan (SIP). The federal Clean Air Act Amendments of 1990 (CAAA) added requirements for states with nonattainment areas to revise their SIPs to incorporate additional control measures to reduce air pollution. The SIP is periodically modified to reflect the latest emissions inventories, planning documents, and rules and regulations of the air basins, as reported by their jurisdictional agencies.

USEPA has responsibility to review all state SIPs to determine conformity to the mandates of the CAA and the amendments thereof and determine if implementation will achieve air quality goals. If USEPA determines an SIP to be inadequate, a Federal Implementation Plan (FIP) may be prepared for the nonattainment area that imposes additional control measures. Failure to submit an approvable SIP or to implement the plan within the mandated time frame may result in sanctions being applied to transportation funding and stationary air pollution sources in the air basin.

Table 3.13-2 Ambient Air Quality Standards and Designations

Pollutant	Averaging Time	California Standards		Federal Standards	
		Concentration	Attainment Status	Concentration	Attainment Status
Ozone (O_3)	8 Hours	0.070 ppm (137 µg/m^3)	N	0.070 ppm (137 µg/m^3)	N
	1 Hour	0.090 ppm (180 µg/m^3)	N	—	—
Carbon monoxide (CO)	8 Hours	9 ppm (10 milligrams per cubic meter [mg/m^3])	A	9 ppm (10 mg/m^3)	A
	1 Hour	20 ppm (23 mg/m^3)	A	35 ppm (40 mg/m^3)	A

Pollutant	Averaging Time	California Standards		Federal Standards	
		Concentration	Attainment Status	Concentration	Attainment Status
Nitrogen dioxide (NO_2)	1 Hour	0.180 ppm (339 μg/m^3)	A	0.100 ppm (188 μg/m^3)	U
	Annual arithmetic mean	0.030 ppm (57 μg/m^3)	—	0.053 ppm (100 μg/m^3)	A
Sulfur dioxide (SO_2)	24 Hours	0.040 ppm (105 μg/m^3)	A	0.140 ppm (365 μg/m^3)	A
	1 Hour	0.250 ppm (655 μg/m^3)	A	0.075 ppm (196 μg/m^3)	A
	Annual arithmetic mean	—	—	0.030 ppm (80 μg/m^3)	A
Particulate matter (PM_{10})	Annual arithmetic mean	20 μg/m^3	N	—	—
	24 Hours	50 μg/m^3	N	150 μg/m^3	U
Fine particulate matter ($PM_{2.5}$)	Annual arithmetic mean	12 μg/m^3	N	12 μg/m^3	A
	24 Hours	—	—	35 μg/m^3	N
Sulfates	24 Hours	25 μg/m^3	A	—	—
Lead (Pb)	30-Day average	1.500 μg/m^3	A	—	A
	Calendar quarter	—	—	1.500 μg/m^3	A
	Rolling 3-month average	—	—	0.150 μg/m^3	U
Hydrogen sulfide (H_2S)	1 Hour	0.030 ppm (42 μg/m^3)	U	—	—
Vinyl chloride (C_2H_3Cl)	24 Hours	0.010 ppm (26 μg/m^3)	U	—	—
Visibility reducing particles (VRP)	8 Hours	Extinction of 0.230 per kilometer	U	—	—

Notes:

A = Attainment; N = Nonattainment; U = Unclassified

Source of attainment status: BAAQMD 2014

Source of federal and state standards: CARB 2016b.

General Conformity

General conformity analysis is performed to determine if federal actions conform to the current SIP. If an area is designated as a federal nonattainment or maintenance area, general conformity applies for the criteria pollutants that are in nonattainment or maintenance. Within these areas, general conformity applies to any federal action not specifically exempted by the CAA or USEPA regulations. Emissions from construction activities are also included. General conformity does not apply to projects or actions that are covered by the transportation conformity rule. If a federal action falls under the general conformity rule, the federal agency responsible for the action is responsible for making the conformity determination. Applicability analyses to determine conformity are required to quantify short- and long-term emissions of air pollutants from implementation of a proposed project and to determine whether the project would cause or contribute to any new violation of any standard, interfere with maintenance of any standard, increase the frequency or severity of any existing violation of any standard, or delay timely attainment of any standard. The applicability of Eden Landing Phase 2 actions to conformity is addressed in Section 3.13.3, Environmental Impacts and Mitigation Measures.

Federal Hazardous Air Pollutant Programs

USEPA has programs for identifying and regulating Hazardous Air Pollutants (HAPs). Title III of the CAAA directs USEPA to promulgate National Emissions Standards for HAPs (NESHAP). The NESHAP may have different standards for major sources than for area sources of HAPs. Major sources are defined as stationary sources with potential to emit more than 10 tons per year of any HAP or more than 25 tons per year of any combination of HAPs; all other sources are considered area sources. The standards require the application of technology-based emissions standards referred to as Maximum Achievable Control Technology. USEPA completed the emission standards required by Section 112 of the CAA in 2011 (USEPA 2011). The enforcement of these standards is currently supported by USEPA's Air Toxics National Enforcement Initiative.

The CAAA also required USEPA to promulgate vehicle or fuel standards containing reasonable requirements that control toxic emissions, at a minimum to benzene and formaldehyde. Performance criteria were established to limit mobile-source emissions of toxics, including benzene, formaldehyde, and 1,3-butadiene. Also, Section 219 of the CAAA required the use of reformulated gasoline in selected areas with the most severe O_3 nonattainment conditions to further reduce mobile-source emissions.

State Laws and Regulations

California Clean Air Act

CARB is the agency responsible for coordination and oversight of state and local air pollution control programs in California and for implementing the California Clean Air Act (CCAA). The CCAA was adopted in 1988; it requires CARB to establish California Ambient Air Quality Standards (CAAQS) (Table 3.13-2). CARB has established CAAQS for sulfates, H_2S, vinyl chloride, visibility reducing particulate matter, and the above-mentioned federal criteria air pollutants. In most cases, the CAAQS are more stringent than the NAAQS.

Other CARB responsibilities include, but are not limited to, overseeing local air district compliance with California and federal laws; approving local air quality plans; submitting SIPs to USEPA; monitoring air quality; determining and updating area designations and maps; and setting emissions standards for new mobile sources, consumer products, small utility engines, off-road vehicles, and fuels.

In-Use Off-Road Diesel Vehicle Regulation

In 2007, CARB adopted a regulation to reduce diesel particulate matter and NO_x emissions from in-use off-road heavy-duty diesel vehicles in California. The regulation imposes limits on vehicle idling and requires fleets to reduce emissions by retiring, replacing, repowering, or installing exhaust retrofits to older engines. In December 2010, major amendments were made to the regulation, including a delay of the first performance standards compliance date to no earlier than January 1, 2014 (CARB 2010).

State Toxic Air Contaminant Programs

TACs in California are primarily regulated through the Tanner Air Toxics Act (California Assembly Bill [AB] 1807) and the Air Toxics Hot Spots Information and Assessment Act of 1987 (AB 2588) (Hot Spots Act). To date, CARB has identified over 21 TACs, and adopted USEPA's list of HAPs as TACs.

CARB has adopted Airborne Toxics Control Measures for sources that emit a particular TAC. If there is a safe threshold for a substance at which there is no toxic effect, the control measure must reduce exposure below that threshold. If there is no safe threshold, the measure must incorporate Best Available Control Technology to minimize emissions.

CARB adopted a Diesel Risk Reduction Plan, which recommends control measures to achieve a diesel PM reduction of 85 percent by 2020 from year 2000 levels. Recent regulations and programs include the low-sulfur diesel fuel requirement and more stringent emission standards for heavy-duty diesel trucks and off-road in-use diesel equipment. As emissions are reduced, it is expected that the risks associated with exposure to the emissions will also be reduced.

Local Laws and Regulations

Bay Area Air Quality Management District

BAAQMD is the primary agency responsible for ensuring that air quality standards (NAAQS and CAAQS) are attained and maintained in the SFBAAB through a comprehensive program of planning, regulation, enforcement, technical innovation, and promotion of the understanding of air quality issues. BAAQMD prepares plans to attain ambient air quality standards in the SFBAAB. BAAQMD prepares ozone attainment plans for the national ozone standard, clean air plans (CAPs) for the California standard, and particulate matter plans to fulfill federal air quality planning requirements. BAAQMD also inspects stationary sources of air pollution, responds to citizen complaints, monitors ambient air quality and meteorological conditions, and implements programs and regulations required by the CAA, CAAA, and the CCAA.

California Environmental Quality Act Guidelines

BAAQMD developed quantitative thresholds of significance for its California Environmental Quality Act (CEQA) guidelines in 2010, which were also included in its updated 2011 guidelines (BAAQMD 2010, 2011). BAAQMD's adoption of the 2010 thresholds of significance (2010 Thresholds) was later challenged, resulting in a court-ordered ruling issued March 5, 2012, in *California Building Industry Association v. BAAQMD* (Alameda County Superior Court Case No. RGI0548693). The order requires the BAAQMD thresholds to be subject to further environmental review under CEQA. As a result, BAAQMD released updated guidelines in 2012 with references to the CEQA thresholds removed (BAAQMD 2012a). BAAQMD later appealed the ruling, and the judgment was reversed on August 13, 2013, by the Court of Appeals of the State of California, First Appellate District. The Court of Appeals' decision was appealed to the California Supreme Court, which granted limited review and held that the Guidelines were valid in part, and remanded the case to the Court of Appeals. In August 2016, the Court of Appeals issued an opinion limited to the challenged receptor-based thresholds, and found that the thresholds may not be used for the primary purpose envisioned by BAAQMD These thresholds were not found to be entirely invalid. The case was then remanded to the Alameda County Superior Court, where the matter is currently pending.

The claims made in the case concerned the CEQA impacts of adopting the thresholds, and petitioners argued that the thresholds for Health Risk Assessments encompassed issues not addressed by CEQA. The court did not specifically address whether the thresholds were supported by "substantial evidence." At this time, BAAQMD is no longer recommending use of the 2010 Thresholds, and instead recommends that lead agencies determine appropriate air quality thresholds of significance based on substantial evidence in the record.

For this air quality analysis, the 2010 Thresholds were used because they were established based on substantial evidence. The BAAQMD released the "Proposed Thresholds of Significance" in 2009, which listed the proposed thresholds for criteria pollutants, greenhouse gases (GHGs), community risk and hazards, and odors. BAAQMD researched existing and projected sources of air quality contaminants and designed the 2010 Thresholds to comply with state and federal standards. The report "provides the *substantial evidence* in support of the thresholds of significance…" (emphasis added) (BAAQMD 2009). The thresholds for criteria pollutants were developed through a quantitative examination of the efficacy of fugitive dust mitigation measures and a quantitative examination of statewide nonattainment emissions.

The issues identified in the BAAQMD CEQA Air Quality Guidelines' court case are not considered relevant to the scientific soundness of the BAAQMD's analysis of the level at which a pollutant would potentially significantly affect air quality. Therefore, the usage of these 2010 Thresholds is consistent with the BAAQMD's direction that thresholds should be based on substantial evidence.

BAAQMD 2017 Clean Air Plan

BAAQMD adopted the Bay Area Clean Air Plan: *Spare the Air*, *Cool the Climate* (Bay Area CAP) on April 19, 2017 to provide a plan to improve Bay Area air quality and meet public health goals. More specifically, the control strategy described in the Bay Area CAP includes a wide range of control measures and is designed to reduce emissions and decrease ambient concentrations of harmful pollutants, safeguard public health by reducing exposure to air pollutants that pose the greatest health risk, and reduce GHG emissions to protect the climate.

The Bay Area CAP addresses four categories of pollutants: (1) ground-level O_3 and its key precursors, ROG and NO_x; (2) PM, primarily $PM_{2.5}$, and precursors to secondary $PM_{2.5}$; (3) air toxics; and (4) GHGs. The control measures are categorized based upon the economic sector framework including stationary sources, transportation, energy, buildings, agriculture, natural and working lands, waste management and water measures (BAAQMD 2017).

Particulate Matter Plan

To fulfill federal air quality planning requirements, the BAAQMD adopted a $PM_{2.5}$ emissions inventory for year 2010 at a public hearing on November 7, 2012. The Bay Area 2010 CAP also included several measures for reducing PM emissions. On January 9, 2013, USEPA issued a final rule determining that the San Francisco Bay Area has attained the 24-hour $PM_{2.5}$ NAAQS, suspending federal SIP planning requirements for the Bay Area (BAAQMD 2013). The San Francisco Bay Area is currently designated as an attainment maintenance area.

BAAQMD 2001 Ozone Attainment Plan

BAAQMD adopted the Bay Area Ozone Attainment Plan in 2001 in response to USEPA's finding of failure of the Bay Area to attain the national ambient air quality standard for O_3. The plan includes a control strategy for O_3 and its precursors to ensure reduction in emissions from stationary sources, mobile sources, and the transportation sector (BAAQMD 2001).

Plan Bay Area

On July 18, 2013, the Metropolitan Transportation Commission (MTC) and the Association of Bay Area Governments (ABAG) approved the Plan Bay Area. The plan includes the San Francisco Bay Area Sustainable Communities Strategy, in accordance with California Senate Bill (SB) 375, and the 2040 Regional Transportation Plan. The Bay Area Plan includes integrated land use and transportation strategies for the region and was developed through OneBayArea, a joint initiative between ABAG, BAAQMD, MTC, and the San Francisco Bay Conservation and Development Commission. The plan's transportation policies focus on maintaining the extensive existing transportation network and utilizing these systems more efficiently to handle density in Bay Area transportation cores (ABAG and MTC 2013).

Local Toxic Air Contaminant Programs

Under BAAQMD regulations, all stationary sources that possess the potential to emit TACs are required to obtain permits from BAAQMD. Permits may be granted to these operations if they are constructed and operated in accordance with applicable regulations, including new source review standards and air toxics control measures. BAAQMD limits emissions and public exposure to TACs through a number of programs. BAAQMD prioritizes TAC-emitting stationary sources based on the quantity and toxicity of the TAC emissions and the proximity of the facilities to sensitive receptors.

Odors

Because offensive odors rarely cause any physical harm, neither the state nor the federal government has adopted any rules or regulations regarding odors. However, BAAQMD has adopted Regulation 7 (Odorous Substances), which specifically addresses citizen complaints. If 10 or more complaints are received within a 90-day period alleging that a person has caused odors perceived at or beyond the property line of such person and that these odors are deemed to be objectionable by the complainants in the normal course of their work, travel or residence, this regulation becomes applicable. When 10 or more citizen complaints are received, the limits of this regulation become effective and shall remain effective until such time as no citizen complaints have been received by the Air Pollution Control Officer for 1 year. The limits of this regulation shall become applicable again when the Air Pollution Control Officer receives odor complaints from five or more complainants within a 90-day period.

General Plans

Many of the cities and counties near the project area have adopted general plans containing strategies and policies regarding air quality and emissions. Applicable items from these plans include the following:

- Hayward General Plan 2040 (City of Hayward 2014)
    - NR-2.1 Ambient Air Quality Standards. The City shall work with CARB and BAAQMD to meet State and Federal ambient air quality standards in order to protect all residents from the health effects of air pollution.
    - NR-2.2 Emissions Reduction. The City shall require development projects that exceed BAAQMD ROG, NO_x operational thresholds to incorporate design or operational thresholds

to incorporate design or operational features that reduce emissions equal to at least 15 percent below the level that would be produced by an unmitigated project.

- NR-2.7 Coordination with BAAQMD. The City shall coordinate with the BAAQMD to ensure projects incorporate feasible mitigation measures to reduce greenhouse gas emissions and air pollution if not already provided for through project design.
- NR-2.12 Preference for Reduced-Emission Equipment. The City shall give preference to contractors using reduced-emission equipment for City construction projects and contracts for services (e.g., garbage collection), as well as businesses that practice sustainable operations.
- NR-2.14 Air Quality Education. The City shall educate the public about air quality standards, health effects, and efforts they can make to improve air quality and reduce greenhouse gas emissions.
- NR-2.15 Community Risk Reduction Strategy. The City shall maintain and implement the General Plan as Hayward's community risk reduction strategy to reduce health risks associated with TACs and $PM_{2.5}$ in both existing and new development.
- NR-2.16 Sensitive Uses. The City shall minimize exposure of sensitive receptors to TACs, $PM_{2.5}$, and odors to the extent possible, and consider distance, orientation, and wind direction when siting sensitive land uses in proximity to TAC- and PM2.5-emitting sources and odor sources in order to minimize health risk.
- NR-2.17 Source Reduction Measures. The City shall coordinate with and support the efforts of the Bay Area Air Quality Management District, the California Air Resources Board, the U.S. Environmental Protection Agency, and other agencies as appropriate to implement source reduction measures and best management practices that address both existing and new sources of TACs, $PM_{2.5}$, and odors.
- NR-2.19 Exposure Reduction Measures for both Existing and New Receptors. The City shall work with area businesses, residents and partnering organizations to provide information about best management practices that can be implemented on a voluntary basis to reduce exposure of sensitive receptors to TACs and $PM_{2.5}$.

▪ Union City's 2002 General Plan Policy Document (City of Union City 2002)

- HS-D.1.1 The City shall cooperate with the BAAQMD to implement the air quality plan.
- HS-D.1.2 The City shall implement measures to protect air quality that may be required to mitigate the effects of population growth in the planning area.
- HS-D.1.3 The City shall encourage development designs for city circulation systems that conserve air quality and minimize direct and indirect emissions of air pollutants.
- HS-D.1.4 The City shall encourage a reduction in vehicle-trips through Transportation Systems Management, BAAQMD Transportation Congestion Management and the use of non-polluting forms of transportation, including electric hybrid buses, vans, city vehicles, bicycles and walking.

- o HS-D.1.5 The City shall encourage developers of large projects to install fueling stations for alternative energy vehicles.
- o HS-D.1.6 The City shall require all businesses, in particularly fast food and manufacturing, to minimize odors generated by the business so that the odors are not detectable off-site.

3.13.3 Environmental Impacts and Mitigation Measures

Overview

The proposed Eden Landing Phase 2 activities were evaluated to determine whether each alternative conforms to the SIP (as described in Section 3.13.2, Regulatory Setting) and whether each alternative would exceed the thresholds contained in the BAAQMD 2011 Guidelines, as described above (BAAQMD 2012a). Alameda County is currently designated as a marginal nonattainment area with respect to the national 8-hour ozone standard and as a moderate nonattainment area for the 24-hour $PM_{2.5}$ standard. Alameda County is also a maintenance area for CO. General conformity requirements would not apply to actions where the total project-generated direct or indirect emissions would not be equal to or exceed the applicable emissions levels, known as the *de minimis* thresholds, and would be less than 10 percent of the area’s annual emissions budget, known as regionally significant thresholds. The *de minimis* thresholds applicable to the SFBAAB are 50 tons per year for ROGs and 100 tons per year for $PM_{2.5}$, NO_x, and CO.

Significance Criteria

For the purpose of this analysis, the project would result in a significant air quality impact if it would:

- Conflict with or obstruct implementation of the applicable air quality plan;
- Violate any air quality standard or contribute substantially to an existing or projected air quality violation;
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standard;
- Expose sensitive receptors to substantial pollutant concentrations; or
- Create objectionable odors affecting a substantial number of people.

As stated in Appendix G of the CEQA Guidelines (AEP 2016), the significance standards established by the applicable air quality management or air pollution control district may be used to evaluate impacts. Impacts related to the first three significance criteria are discussed in the short term under Phase 2 Impact 3.13-1 and in the long term under Phase 2 Impact 3.13-2. Impacts to sensitive receptors from exposure to substantial pollutant concentrations, including TACs, are discussed in Phase 2 Impact 3.13-3. Impacts from objectionable odors are discussed in Phase 2 Impact 3.13-4. Also note that the impacts and the thresholds of significance in this Draft EIS/R are similar to those evaluated in the 2007 Final EIS/R with the updated significance criteria from Appendix G of the CEQA Guidelines (AEP 2016).

As discussed in the Section 3.13.2, Regulatory Setting, this analysis follows the thresholds and methodology contained in the BAAQMD 2011 Guidelines. According to these Guidelines, if average daily emissions of construction-related criteria air pollutants or precursors would exceed any applicable threshold of significance listed in Table 3.13-3, the project would result in a significant impact.

Table 3.13-3 Thresholds of Significance for Construction-Related Activities

Pollutant	Average Daily Emissions (lbs/day)
ROG	54
NO_x	54
PM_{10} (exhaust only)	82
$PM_{2.5}$ (exhaust only)	54
PM_{10}/$PM_{2.5}$ (fugitive dust)	Best Management Practices

Source: BAAQMD 2011.

If average daily emissions of operational-related criteria air pollutants or precursors would exceed any applicable threshold of significance listed in Table 3.13-4, the project would result in a significant impact. According to the BAAQMD 2011 Guidelines, projects that would not result in significant impacts may be considered consistent with the applicable air quality plan. By its very nature, air pollution is largely a cumulative impact. If a project's contribution to the cumulative impact is considerable, then the project's impact on air quality would be considered significant. The thresholds of significance set forth by BAAQMD are considered the emission levels for which a project's individual emissions would be cumulatively considerable.

Table 3.13-4 Thresholds of Significance for Operations-Related Activities

Pollutant	Average Daily Emissions (lbs/day)
ROG	54
NO_x	54
PM_{10}	82
$PM_{2.5}$	54

Source: BAAQMD 2011.

The BAAQMD defines sensitive receptors as facilities or land uses that include members of the population that are particularly sensitive to the effects of air pollutants, such as children, the elderly, and people with illnesses. Examples of these types of land uses include schools, hospitals, and residential areas. The BAAQMD 2011 Guidelines recommend a phased approach to estimating community risks and hazards. A site screening should be conducted to determine if the project would result in receptors being within 1,000 feet of a PM or TAC source. A project would be considered to have a significant impact on sensitive receptors if it would result in release of toxic air contaminants (diesel particulate matter and volatile organic compounds) that would increase cancer risk by 10 in 1,000,000, non-cancer chronic risk by 1.0 Hazard Index, or increase $PM_{2.5}$ concentrations above 0.3 micrograms per cubic meter ($\mu g/m^3$) on an annual average basis within a zone of influence that includes a 1,000-foot radius around the project property lines.

Odors would be considered significant if the project would result in a frequent exposure of members of the public to objectionable odors or five or more confirmed complaints per year averaged over 3 years. According to the BAAQMD, typical uses that may result in significant odor impacts include wastewater treatment plants, sanitary landfills, transfer stations, composting facilities, petroleum refineries, asphalt batch plants, chemical manufacturing, fiberglass manufacturing, painting/coating operations, rendering plants, and coffee roasters.

As explained in Section 3.1.2, Environmental Setting and Impact Analysis, although both the Council on Environmental Quality (CEQ) Regulations for Implementing NEPA (CEQ 2015) and the CEQA Guidelines were considered during the impact analysis, the impacts identified in this Draft EIS/R are generally characterized using CEQA terminology; exceptions are noted where they occur. Please refer to Section 3.1.2 for a description of the terminology used.

Program-Level Evaluation Summary

On a programmatic level, the determination was made in the 2007 SBSP Restoration Project Programmatic Final EIS/R (2007 Final EIS/R) that under the implementation of Programmatic Alternative C, the alternative selected for implementation, there would be less-than-significant impacts as a result of long-term emissions and odors. Short-term emissions and TAC impacts for this alternative were less than significant with mitigation. Program-level mitigation measures were developed to minimize construction-generated fugitive dust emissions and to minimize the potential effects of TAC emissions to sensitive receptors. These mitigation measures, updated to match BAAQMD's 2012 CEQA Guidelines (BAAQMD 2012a), have been incorporated into the project design of all Action Alternatives. Because Eden Landing Phase 2 of the SBSP Restoration Project is a relatively early phase of the overall SBSP Restoration Project, its implemented actions meet the objectives of Programmatic Alternative B as well as Programmatic Alternative C. The impacts and mitigation measures for Programmatic Alternative B were the same as those for Alternative C, summarized above.

Project-Level Evaluation

The following paragraphs summarize common definitions and methodological approaches that were used in conducting all of the project-level impacts for the construction phase and the operations phase of the Eden Landing Phase 2 Project.

As described in Chapter 2, Alternatives, each Action Alternative includes dredged material placement and import from a project-constructed offloading facility. The offloading facility and booster pumps may be powered by diesel fuel or electricity. If diesel were to power the construction equipment during dredge material pumping and placement, a large diesel generator barge would be moored near the offloading facility in the deep-water channel. Booster pumps and onshore equipment would have individual diesel generators that would be maintained by land- and water-based crews. If electricity were to power construction equipment during dredge material pumping and placement, the electrical infrastructure necessary to bring power to the offloading facility and booster pumps would include a substation, overhead transmission line, and submarine power cables. Because air quality emissions would differ if the dredged material placement equipment was primarily powered by diesel fuel or electricity, the Action Alternatives were further subdivided and labeled Alternative Eden B1, C1, and D1 for diesel and Eden B2, D2, and D2 for electric.

Construction

Construction activities associated with the Action Alternatives may generate direct emissions from the temporary use of off-road equipment, earthmoving activities (for fugitive dust), and exhaust emissions from construction worker commutes would result in temporary emissions of ROG, NO_X, PM_{10}, and $PM_{2.5}$. Emissions of ROG and NO_X are associated primarily with exhaust from construction equipment and vehicle activity. Construction emissions were modeled using the California Emissions Estimator Model Version 2013.2.2. Project-specific equipment types, equipment activities, and construction phasing and durations were used in the analysis. For parameters where this project-specific information was not available, California Emissions Estimator Model default values were used. It should be noted that California Emissions Estimator Model default assumptions are typically conservative to avoid underestimating emissions when project-specific information is unknown. As discussed in Chapter 2, Alternatives, the fill material used for construction would be surplus fill material originating from local off-site resources. Emissions associated with the transport of material from off-site locations to landfills are reflected in the total emissions presented under each Alternative. As described in Section 3.11, Traffic, the Eden Landing Phase 2 construction would result in these haul truck trips being diverted from their original landfill destinations to the applicable Eden Landing Phase 2 project areas. Portions of the truck trip lengths to the Eden Landing Phase 2 project area were considered to be generated by Eden Landing Phase 2 project activities to provide a conservative estimate of construction emissions. The material-hauling truck trip lengths were estimated using the distance from freeway exits to the project sites; transport from the source project(s) onto I-880 and to the relevant exit for the Eden Landing Phase 2 Project are assumed to be covered by the NEPA/CEQA document for those source project(s), as that material would need to be transported to a disposal site regardless of the Eden Landing Phase 2 Project.

The analysis also includes the emissions associated with dredged material placement and import from an offloading facility. This phase of the construction would not be concurrent with the construction of the restoration, flood risk management, and recreational components of the project. Emission estimates for the dredging component were estimated using emission factors from the CARB OFFROAD and Emission Factors (EMFAC) 2011 inventory models (CARB 2011). Construction emissions from the operation of diesel-fueled off-road equipment were estimated by multiplying daily usage (i.e., hours per day) and total days of construction by OFFROAD equipment-specific factors. Emissions from on-road motor vehicles were estimated using vehicle trips, vehicle miles traveled, and EMFAC 2011 mobile source factors. The emission factors represent the fleet-wide average emission factors within Alameda County. Criteria pollutant emissions associated with tugboat and barge operations were estimated using emission factors from CARB's Harbor Craft Emissions Inventory Database. The offloading facility and booster pumps required for the dredged material movement and placement may be powered by diesel fuel or electricity; thus, both scenarios were identified and analyzed for each of the Action Alternatives (labeled Alternative B1, C1, and D1 for diesel and B2, C2, and D2 for electric). During material placement, pump operations could occur up to 24 hours per day.

Detailed modeling input assumptions and output results are provided in Appendix I.

Construction emissions for the Eden Landing Phase 2 pond complex and alternatives are presented in Phase 2 Impact 3.13-1.

Operations

Operations at Eden Landing under all No Action[1] and Action Alternatives may generate direct emissions from equipment usage and on-road vehicle trips during the operations and maintenance (O&M) activities described in Chapter 2, Alternatives. These activities include levee inspections and maintenance, maintenance and use of recreational trails, and biological surveys. The No Action and Action Alternatives

[1] "No Action Alternative" is the NEPA term. It corresponds to the CEQA term "No Project Alternative." This Draft EIS/R uses No Action throughout.

are not expected to substantially increase the level of operational activities at southern Eden Landing. Therefore, operational activities and emissions at the pond complex would be similar to existing conditions under the No Action and Action Alternatives. Operational emissions for the pond complex and alternatives are presentation in Phase 2 Impact 3.13-2.

Phase 2 Impact 3.13-1: Short-term construction-generated air pollutant emissions.

Alternative Eden A (No Action). Under Alternative Eden A (No Action Alternative), no construction activities would occur within southern Eden Landing. Although O&M activities would be ongoing, they are considered part of project operation, not project construction. As such, no construction-generated emissions would occur.

Alternative Eden A Level of Significance: No Impact

Alternative Eden B1. Alternative Eden B1 has the capacity to support beneficial reuse of up to 6 MCY of dredged material. As described in the Preliminary Design Memorandum of Dredged Material Placement at Southern Eden Landing (Appendix E), the average annual rate of dredged sediment delivery to the Bay and Inland Ponds is expected to range from 0.9 to 1.8 MCY per year. The analysis for Alternative Eden B1 assumes that hydraulic offloader and two booster pumps would be diesel powered. Implementation of Alternative Eden B1 would also involve excavation of pilot channels, creation of habitat islands and habitat transition zones, trail construction, and levee modifications including raising, breaching, and lowering which would typically occur after dredge material placement is complete. Earthmoving activity would occur under this alternative. Material from cut activities would be reused on-site, and some off-site hauling trips for imported material would be required. Construction activities would result in emissions from earthmoving activities, exhaust from off-road equipment and worker commute activity, and other miscellaneous construction-related activities. Table 3.13-5 shows the projected construction-generated average daily criteria pollutant emissions.

Table 3.13-5 Alternative Eden B1 Construction Emissions Summary

Emissions	ROG	CO	NO_x	PM_{10} (exhaust)	$PM_{2.5}$ (exhaust)	PM_{10} (total)	$PM_{2.5}$ (total)
Dredge Material Placement (lbs/day)	48.08	218.93	629.91	15.55	15.35	15.55	15.35
Subsequent Construction (lbs/day)	2.89	25.98	29.36	1.29	1.19	14.62	5.84
BAAQMD thresholds (lbs/day)	54	—	54	82	54	BMPs	BMPs
Exceeds BAAQMD threshold?	No	—	Yes	No	No	—	—

BMPs = Best Management Practices

See Appendix I for modeling input assumptions and output results.

Earthmoving activities would result in temporary construction fugitive dust emissions that have the potential to represent a significant impact with respect to air quality. Furthermore, the project would implement several BMPs, developed by the State Coastal Conservancy, as project design features to be implemented as feasible, that would reduce fugitive dust emissions during construction. See Chapter 2, Alternatives, for the Basic Construction Mitigation Measures and for SBSP Mitigation Measures 3.14-1, 3.14-3a, and 3.14-3b, which are incorporated into the Eden Landing Phase 2 project. The project design features include a number of fugitive dust control measures that would meet the BAAQMD's Basic

Construction Mitigation Measures Recommended for All Proposed Projects from the 2011 Guidelines (BAAQMD 2011).

As shown in Table 3.13-5, construction-generated average daily NO_x emissions would exceed the applicable regional significance thresholds during dredge material placement. Therefore, construction emissions could violate an ambient air quality standard or contribute substantially to an existing violation. Implementation of Mitigation Measures AQ-A and AQ-B would be required during dredge material placement to reduce criteria air pollutant emissions.

- Mitigation Measure AQ-A. Construction Equipment. The construction contractor shall use off-road construction diesel engines with horsepower (hp) ratings between 50 hp and 750 hp that meet, at a minimum, the Tier 4 California Emissions Standards, unless such an engine is not available for a particular item of equipment. Tier 3 engines will be allowed on a case by case basis when the contractor has documented that no Tier 4 equipment, or emissions equivalent retrofit equipment is available for a particular equipment type that must be used to complete construction. Documentation shall consist of signed written statements from at least two construction equipment rental firms.
- Mitigation Measure AQ-B. Harbor craft with a Category 1 or 2 marine engine, such as tugboats, shall meet, at a minimum, USEPA Tier 2 marine engine emission standards.

The OFFROAD model used in the analysis contains ranges of tier engines and uses average fleet data to develop emission factors for a given calendar year. Emission standards for diesel off-road equipment are based on the engine model year. Implementation of these standards, referred to as Tier 1 emission standards, became effective in 1996. The more stringent Tier 2 and Tier 3 emission standards became effective between 2001 and 2008, with the effective date dependent on engine horsepower. Tier 4 interim standard became effective between 2008 and 2012, and Tier 4 final standards became effective in 2014 and 2015.

Based on the improvements in emissions standards required by CARB, the analysis assumes that using off-road construction equipment with Tier 4 engines would result in an additional reduction in VOC, NO_X and PM_{10} emissions from the assumptions in the OFFROAD model. Implementation of Mitigation Measures AQ-A and AQ-B during dredge material placement would ensure construction activities associated with the construction of the Alternative Eden B1 would minimize criteria pollutant emissions. Table 3.13-6 shows the mitigated emissions for construction activities.

Table 3.13-6 Alternative Eden B1 Mitigated Construction Emissions Summary

Emissions	ROG	CO	NO_x	PM_{10} (exhaust)	$PM_{2.5}$ (exhaust)	PM_{10} (total)	$PM_{2.5}$ (total)
Dredge Material Placement (lbs/day)	46.31	213.91	610.56	14.57	14.44	14.57	14.44
Subsequent Construction (lbs/day)	2.89	25.98	29.36	1.29	1.19	14.62	5.84
BAAQMD thresholds (lbs/day)	54	—	54	82	54	BMPs	BMPs
Exceeds BAAQMD threshold?	No	—	Yes	No	No	—	—

BMPs = Best Management Practices

See Appendix I for modeling input assumptions and output results.

As shown in Table 3.13-6, incorporation of Mitigation Measures AQ-A through AQ-B would reduce NO_x emissions to the greatest extent feasible, but would still exceed the threshold of significance. Therefore, construction-related emissions for Alternative Eden B1 would result in a significant and unavoidable impact.

The General Conformity applicability and NEPA analyses are based on estimates of the total direct and indirect net emissions from construction of the project. Dredged material could potentially be received year-around, and the Bay and Inland Ponds may receive dredged material between 3 to 7 years, depending on the rate of the dredged material delivery to the southern Eden Landing ponds. As shown in Table 2-2, the expected duration for the dredge material component of Alternative Eden B1 is approximately 53 to 93 months (includes construction and decommissioning of the dredge material infrastructure). Therefore, annual criteria pollutant emissions were assumed to occur over 53 months, which is the more conservative estimate for construction activities. Table 3.13-7 summarizes the projected annual emissions associated with construction of the Alternative Eden B1.

Table 3.13-7 Alternative Eden B1 Construction-Related NEPA/General Conformity Applicability Analysis

Emissions	ROG	CO	NO_x	PM_{10} (exhaust)	$PM_{2.5}$ (exhaust)	PM_{10} (total)	$PM_{2.5}$ (total)
Dredge Material Placement (tons/year)	2.55	11.78	33.62	0.80	0.80	0.80	0.80
Subsequent Construction (total tons)	0.60	5.43	6.14	0.27	0.25	3.06	1.22
Subsequent Construction (tons/year)	0.38	3.43	3.88	0.17	0.16	1.93	0.77
General conformity *de minimis* thresholds (tons/year)	50	100	100	—	—	—	100
Exceeds general conformity *de minimis* threshold?	No	No	No	—	—	—	No

See Appendix I for modeling input assumptions and output results.

The annual emissions estimates shown in Table 3.13-7 include emission reductions associated with the mitigation measures discussed above. The federal agency can take measures to reduce emissions, and the changes must be state or federally enforceable to guarantee that emissions would be below *de minimis* levels. Based on CEQA provisions in 14 California Code of Regulations Section 15091(a)(1), mitigation measures must be incorporated into the project. For the purposes of the NEPA and General Conformity applicability analysis, mitigation measures required by CEQA are considered design features of the project. This is not considered “mitigation” under the General Conformity Rule. The project assumes that mitigation measures would be implemented to meet CEQA requirements. Additional details are included in Appendix I.

As shown in Table 3.13-7, the estimated annual emissions associated with the Alternative Eden B1 would be less than the General Conformity *de minimis* thresholds. Therefore, construction-generated emissions associated with Alternative Eden B1 would conform to the SIP, and a formal conformity analysis would not be required. No substantial adverse direct or indirect effects would occur under NEPA.

Alternative Eden B1 Level of Significance: Significant and Unavoidable (CEQA); Less than Significant with Mitigation (NEPA)

Alternative Eden B2. Implementation of Alternative Eden B2 would be similar to Alternative Eden B1. However, the analysis for Alternative Eden B2 assumes that hydraulic offloader and two booster pumps would be powered by electricity. Alternative Eden B2 would also include construction activities associated with the installation of electrical infrastructure (i.e., a substation, overhead transmission line, and submarine power cables). Table 3.13-8 shows the projected construction-generated average daily criteria pollutant emissions for Alternative Eden B2.

Table 3.13-8 Alternative Eden B2 Construction Emissions Summary

Emissions	ROG	CO	NO_x	PM_{10} (exhaust)	$PM_{2.5}$ (exhaust)	PM_{10} (total)	$PM_{2.5}$ (total)
Dredge Material Placement (lbs/day)	8.60	57.54	68.66	2.68	2.48	2.68	2.48
Subsequent Construction (lbs/day)	2.89	25.98	29.36	1.29	1.19	14.62	5.84
BAAQMD thresholds (lbs/day)	54	—	54	82	54	BMPs	BMPs
Exceeds BAAQMD threshold?	No	—	Yes	No	No	—	—

BMPs = Best Management Practices

See Appendix I for modeling input assumptions and output results.

As shown in Table 3.13-8, construction-generated average daily NO_x emissions for Alternative Eden B2 would exceed the applicable regional significance thresholds during dredge material placement. Therefore, construction emissions could violate an ambient air quality standard or contribute substantially to an existing violation. Implementation of Mitigation Measures AQ-A and AQ-B would be required during dredge material placement to reduce criteria air pollutant emissions. Table 3.13-9 shows the mitigated emissions for construction activities for Alternative Eden B2.

Table 3.13-9 Alternative Eden B2 Mitigated Construction Emissions Summary

Emissions	ROG	CO	NO_x	PM_{10} (exhaust)	$PM_{2.5}$ (exhaust)	PM_{10} (total)	$PM_{2.5}$ (total)
Dredge Material Placement (lbs/day)	6.76	52.74	48.41	1.66	1.53	1.66	1.53
Subsequent Construction (lbs/day)	2.89	25.98	29.36	1.29	1.19	14.62	5.84
BAAQMD thresholds (lbs/day)	54	—	54	82	54	BMPs	BMPs
Exceeds BAAQMD threshold?	No	—	No	No	No	—	—

BMPs = Best Management Practices

See Appendix I for modeling input assumptions and output results.

As shown in Table 3.13-9, construction activities would result in emissions that would not exceed a significance threshold after mitigation. Incorporation of Mitigation Measures AQ-A and AQ-B would reduce NOx emissions to a less than significant level. Therefore, construction-generated air pollutant emissions associated with Alternative Eden B2 would be less than significant with mitigation.

The General Conformity applicability and NEPA analyses are based on estimates of the total direct and indirect net emissions from construction of the project. As discussed with Alternative Eden B1, the expected duration for the dredge material component of Alternative Eden B2 is approximately 53 to 93 months. Therefore, the criteria pollutant emissions were assumed to occur over 53 months, which is the more conservative estimate for construction activities. Table 3.13-10 summarizes the projected annual emissions associated with construction of the Alternative Eden B2. The annual emissions estimates shown in Table 3.13-10 include emission reductions associated with the mitigation measures discussed above. The project assumes that mitigation measures would be implemented to meet CEQA requirements. Additional details are included in Appendix I.

Table 3.13-10 Alternative Eden B2 Construction-Related NEPA/General Conformity Applicability Analysis

Emissions	ROG	CO	NO_x	PM_{10} (exhaust)	$PM_{2.5}$ (exhaust)	PM_{10} (total)	$PM_{2.5}$ (total)
Dredge Material Placement (tons/year)	0.37	2.67	2.90	0.09	0.08	0.09	0.08
Subsequent Construction (total tons)	0.60	5.43	6.14	0.27	0.25	3.06	1.22
Subsequent Construction (tons/year)	0.38	3.43	3.88	0.17	0.16	1.93	0.77
General conformity *de minimis* thresholds (tons/year)	50	100	100	—	—	—	100
Exceeds general conformity *de minimis* threshold?	No	No	No	—	—	—	No

See Appendix I for modeling input assumptions and output results.

As shown in Table 3.13-10, the estimated emissions associated with the Alternative Eden B2 would be less than the General Conformity *de minimis* thresholds. Therefore, construction-related emissions associated with the Alternative Eden B2 would conform to the SIP, and a formal conformity analysis would not be required. No substantial adverse direct or indirect effects would occur under NEPA.

Alternative Eden B2 Level of Significance: Less than Significant with Mitigation

Alternative Eden C1. Alternative Eden C1 has the capacity to support beneficial reuse of up to 5 MCY of dredged material. The analysis for Alternative Eden C1 assumes that hydraulic offloader and two booster pumps would be diesel powered. Implementation of Alternative Eden C1 would also involve excavation of pilot channels, creation of habitat islands and habitat transition zones, trail construction, and levee modifications including raising, breaching, and lowering. Earthmoving activity would occur under this alternative. Dredged material movement and placement would occur under this alternative using diesel-powered offloading facility and pumps. Material from cut activities would be reused on-site, and some off-site hauling trips for imported material would be required. Construction activities would result in emissions from earthmoving activities, exhaust from off-road equipment and worker commute activity, and other miscellaneous construction-related activities. Table 3.13-11 shows the projected construction-generated daily criteria pollutant emissions.

Table 3.13-11 Alternative Eden C1 Construction Emissions Summary

Emissions	ROG	CO	NO_x	PM_{10} (exhaust)	$PM_{2.5}$ (exhaust)	PM_{10} (total)	$PM_{2.5}$ (total)
Dredge Material Placement (lbs/day)	46.33	210.92	602.38	14.91	14.71	14.91	14.71
Subsequent Construction (lbs/day)	2.89	25.98	29.36	1.29	1.19	14.62	5.84
BAAQMD thresholds (lbs/day)	54	—	54	82	54	BMPs	BMPs
Exceeds BAAQMD threshold?	No	—	Yes	No	No	—	—

BMPs = Best Management Practices

See Appendix I for modeling input assumptions and output results.

As shown in Table 3.13-11, the projected construction-generated average daily NO_x, emissions would exceed the applicable regional significance thresholds during dredge material placement. Therefore, construction emissions for Alternative Eden C1 could violate an ambient air quality standard or contribute substantially to an existing violation. Implementation of Mitigation Measures AQ-A and AQ-B during dredge material placement would be required to reduce criteria air pollutant emissions. Table 3.13-12 shows the mitigated emissions for construction activities.

Table 3.13-12 Alternative Eden C1 Mitigated Construction Emissions Summary

Emissions	ROG	CO	NO_x	PM_{10} (exhaust)	$PM_{2.5}$ (exhaust)	PM_{10} (total)	$PM_{2.5}$ (total)
Dredge Material Placement (lbs/day)	44.75	206.97	585.12	14.03	13.89	14.03	13.89
Subsequent Construction (lbs/day)	2.89	25.98	29.36	1.29	1.19	14.62	5.84
BAAQMD thresholds (lbs/day)	54	—	54	82	54	BMPs	BMPs
Exceeds BAAQMD threshold?	No	—	Yes	No	No	—	—

BMPs = Best Management Practices

See Appendix I for modeling input assumptions and output results.

As shown in Table 3.13-12, incorporation of Mitigation Measures AQ-A through AQ-B would reduce NO_x emissions to the greatest extent feasible, but would still exceed the threshold of significance. Therefore, construction emissions associated with Alternative Eden C1 would result in a significant and unavoidable impact.

The General Conformity applicability and NEPA analyses are based on estimates of the total direct and indirect net emissions from construction of the project. Dredged material could potentially be received year-around, and the Bay and Inland Ponds may receive dredged material between 3 to 7 years, depending on the rate of the dredged material delivery to the southern Eden Landing ponds. The expected duration for the dredge material component of Alternative Eden C1 is approximately 42 to 74 months (includes construction and decommissioning of the dredge material infrastructure). Therefore, the criteria pollutant emissions were assumed to occur over 42 months. Table 3.13-13 summarizes the projected annual emissions associated with construction of the Alternative Eden C1. Additional details are included in Appendix I.

Table 3.13-13 Alternative Eden C1 Construction-Related NEPA/General Conformity Applicability Analysis

Emissions	ROG	CO	NO_x	PM_{10} (exhaust)	$PM_{2.5}$ (exhaust)	PM_{10} (total)	$PM_{2.5}$ (total)
Dredge Material Placement (tons/year)	2.58	11.91	33.68	0.81	0.80	0.81	0.80
Subsequent Construction (total tons)	0.60	5.43	6.14	0.27	0.25	3.06	1.22
Subsequent Construction (tons/year)	0.38	3.43	3.88	0.17	0.16	1.93	0.77
General conformity *de minimis* thresholds (tons/year)	50	100	100	—	—	—	100
Exceeds general conformity *de minimis* threshold?	No	No	No	—	—	—	No

See Appendix I for modeling input assumptions and output results.

As shown in Table 3.13-13, the estimated emissions associated with the Alternative Eden C1 would be less than the General Conformity *de minimis* thresholds. Therefore, construction-generated emissions associated with Alternative Eden C1 would conform to the SIP, and a formal conformity analysis would not be required. No substantial adverse direct or indirect effects would occur under NEPA.

Alternative Eden C1 Level of Significance: Significant and Unavoidable (CEQA); Less than Significant with Mitigation (NEPA)

Alternative Eden C2. Implementation of Alternative Eden C2 would be similar to Alternative Eden C1. However, the analysis for Alternative Eden C2 assumes that hydraulic offloader and two booster pumps would be powered by electricity. Alternative Eden C2 would also include construction activities associated with the installation of electrical infrastructure (i.e., a substation, overhead transmission line, and submarine power cables). Table 3.13-14 shows the projected construction-generated daily criteria pollutant emissions for Alternative Eden C2.

Table 3.13-14 Alternative Eden C2 Construction Emissions Summary

Emissions	ROG	CO	NO_x	PM_{10} (exhaust)	$PM_{2.5}$ (exhaust)	PM_{10} (total)	$PM_{2.5}$ (total)
Dredge Material Placement (lbs/day)	8.94	58.12	70.51	2.72	2.51	2.72	2.51
Subsequent Construction (lbs/day)	2.89	25.98	29.36	1.29	1.19	14.62	5.84
BAAQMD thresholds (lbs/day)	54	—	54	82	54	BMPs	BMPs
Exceeds BAAQMD threshold?	No	—	Yes	No	No	—	—

BMPs = Best Management Practices

See Appendix I for modeling input assumptions and output results.

As shown in Table 3.13-14, construction-generated daily NO_x emissions for Alternative Eden C2 would exceed the applicable regional significance thresholds during dredge material placement. Therefore, construction emissions could violate an ambient air quality standard or contribute substantially to an existing violation. Implementation of Mitigation Measures AQ-A and AQ-B during dredge material placement would be required to reduce criteria air pollutant emissions. Table 3.13-15 shows the mitigated emissions for construction activities for Alternative Eden C2.

Table 3.13-15 Alternative Eden C2 Mitigated Construction Emissions Summary

Emissions	ROG	CO	NO_x	PM_{10} (exhaust)	$PM_{2.5}$ (exhaust)	PM_{10} (total)	$PM_{2.5}$ (total)
Dredge Material Placement (lbs/day)	7.27	54.43	52.15	1.80	1.66	1.80	1.66
Subsequent Construction (lbs/day)	2.89	25.98	29.36	1.29	1.19	14.62	5.84
BAAQMD thresholds (lbs/day)	54	—	54	82	54	BMPs	BMPs
Exceeds BAAQMD threshold?	No	—	No	No	No	—	—

BMPs = Best Management Practices

See Appendix I for modeling input assumptions and output results.

As shown in Table 3.13-15, construction activities would result in emissions that would not exceed a significance threshold after mitigation. Incorporation of Mitigation Measures AQ-A and AQ-B would reduce NOx emissions to a less than significant level. Therefore, construction-generated air pollutant emissions associated with Alternative Eden C2 would be less than significant with mitigation.

The General Conformity applicability and NEPA analyses are based on estimates of the total direct and indirect net emissions from construction of the project. As discussed with Alternative Eden C1, the expected duration for the dredge material component of Alternative Eden C2 is approximately 42 to 74 months. Therefore, the criteria pollutant emissions were assumed to occur over 42 months. Table 3.13-16 summarizes the projected annual emissions associated with construction of the Alternative Eden C2. The annual emissions estimates shown in Table 3.13-16 include emission reductions associated with the mitigation measures discussed above. The project assumes that mitigation measures would be implemented to meet CEQA requirements. Additional details are included in Appendix I.

Table 3.13-16 Alternative Eden C2 Construction-Related NEPA/General Conformity Applicability Analysis

Emissions	ROG	CO	NO_x	PM_{10} (exhaust)	$PM_{2.5}$ (exhaust)	PM_{10} (total)	$PM_{2.5}$ (total)
Dredge Material Placement (tons/year)	0.42	3.13	3.00	0.10	0.10	0.10	0.10
Subsequent Construction (total tons)	0.60	5.43	6.14	0.27	0.25	3.06	1.22
Subsequent Construction (tons/year)	0.38	3.43	3.88	0.17	0.16	1.93	0.77
General conformity *de minimis* thresholds (tons/year)	50	100	100	—	—	—	100
Exceeds general conformity *de minimis* threshold?	No	No	No	—	—	—	No

See Appendix I for modeling input assumptions and output results.

As shown in Table 3.13-16, the estimated emissions associated with the Alternative Eden C2 would be less than the General Conformity *de minimis* thresholds. The annual emissions would not exceed any *de minimis* levels. Therefore, temporary emissions associated with the Alternative Eden C2 would conform to the SIP, and a formal conformity analysis would not be required. No substantial adverse direct or indirect effects would occur under NEPA.

Alternative Eden C2 Level of Significance: Less than Significant with Mitigation

Alternative Eden D1. Alternative Eden D1 has the capacity to support beneficial reuse of up to 6 MCY of dredged material. The analysis for Alternative Eden D1 assumes that hydraulic offloader and two booster pumps would be diesel powered. Implementation of Alternative Eden D1 would also involve excavation of pilot channels, creation of habitat islands and habitat transition zones, trail construction, and levee modifications including raising, breaching, and lowering. Earthmoving activity would occur under this alternative. Dredged material movement and placement would occur under this alternative using diesel-powered offloading facility and pumps. Material from cut activities would be reused on-site, and some off-site hauling trips for imported material would be required. Construction activities would result in emissions from earthmoving activities, exhaust from off-road equipment and worker commute activity, and other miscellaneous construction-related activities. Table 3.13-17 shows the projected construction-generated daily criteria pollutant emissions.

Table 3.13-17 Alternative Eden D1 Construction Emissions Summary

Emissions	ROG	CO	NO_x	PM_{10} (exhaust)	$PM_{2.5}$ (exhaust)	PM_{10} (total)	$PM_{2.5}$ (total)
Dredge Material Placement (lbs/day)	48.13	214.15	631.35	15.61	15.41	15.61	15.41
Subsequent Construction (lbs/day)	2.89	25.98	29.36	1.29	1.19	14.62	5.84
BAAQMD thresholds (lbs/day)	54	—	54	82	54	BMPs	BMPs
Exceeds BAAQMD threshold?	No	—	Yes	No	No	—	—

BMPs = Best Management Practices

See Appendix I for modeling input assumptions and output results.

As shown in Table 3.13-17, the projected construction-generated average daily NO_x, emissions would exceed the applicable regional significance thresholds during dredge material placement. Therefore, construction emissions for Alternative Eden D1 could violate an ambient air quality standard or contribute substantially to an existing violation. Implementation of Mitigation Measures AQ-A and AQ-B during dredge material placement would be required to reduce criteria air pollutant emissions. Table 3.13-18 shows the mitigated emissions for construction activities.

Table 3.13-18 Alternative Eden D1 Mitigated Construction Emissions Summary

Emissions	ROG	CO	NO_x	PM_{10} (exhaust)	$PM_{2.5}$ (exhaust)	PM_{10} (total)	$PM_{2.5}$ (total)
Dredge Material Placement (lbs/day)	46.27	208.96	610.83	14.58	14.46	14.58	14.46
Subsequent Construction (lbs/day)	2.89	25.98	29.36	1.29	1.19	14.62	5.84
BAAQMD thresholds (lbs/day)	54	—	54	82	54	BMPs	BMPs
Exceeds BAAQMD threshold?	No	—	Yes	No	No	—	—

BMPs = Best Management Practices

See Appendix I for modeling input assumptions and output results.

As shown in Table 3.13-18, incorporation of Mitigation Measures AQ-A through AQ-B would reduce NO_x emissions to the greatest extent feasible, but would still exceed the threshold of significance. Therefore, construction emissions associated with Alternative Eden D1 would result in a significant and unavoidable impact.

The General Conformity applicability and NEPA analyses are based on estimates of the total direct and indirect net emissions from construction of the project. Dredged material could potentially be received year-around, and the Bay and Inland Ponds may receive dredged material between 3 to 7 years, depending on the rate of the dredged material delivery to the southern Eden Landing ponds. The expected duration for the dredge material component of Alternative Eden D1 is approximately 53 to 93 months (includes construction and decommissioning of the dredge material infrastructure). Therefore, the criteria pollutant emissions were conservatively assumed to occur over 53 months. Table 3.13-19 summarizes the projected annual emissions associated with construction of the Alternative Eden D1. Additional details are included in Appendix I.

Table 3.13-19 Alternative Eden D1 Construction-Related NEPA/General Conformity Applicability Analysis

Emissions	ROG	CO	NO_x	PM_{10} (exhaust)	$PM_{2.5}$ (exhaust)	PM_{10} (total)	$PM_{2.5}$ (total)
Dredge Material Placement (tons/year)	2.55	11.52	33.66	0.80	0.80	0.80	0.80
Subsequent Construction (total tons)	0.60	5.43	6.14	0.27	0.25	3.06	1.22
Subsequent Construction (tons/year)	0.38	3.43	3.88	0.17	0.16	1.93	0.77
General conformity *de minimis* thresholds (tons/year)	50	100	100	—	—	—	100
Exceeds general conformity *de minimis* threshold?	No	No	No	—	—	—	No

See Appendix I for modeling input assumptions and output results.

As shown in Table 3.13-19, the estimated annual emissions associated with the Alternative Eden D1 would be less than the General Conformity *de minimis* thresholds. Therefore, construction-generated emissions associated with the project would conform to the SIP, and a formal conformity analysis would not be required. No substantial adverse direct or indirect effects would occur under NEPA.

Alternative Eden D1 Level of Significance: Significant and Unavoidable (CEQA); Less than Significant with Mitigation (NEPA)

Alternative Eden D2. Implementation of Alternative Eden D2 would be similar to Alternative Eden D1. However, the analysis for Alternative Eden D2 assumes that hydraulic offloader and two booster pumps would be powered by electricity. Alternative Eden D2 would also include construction activities associated with the installation of electrical infrastructure (i.e., a substation, overhead transmission line, and submarine power cables). Table 3.13-20 shows the projected construction-generated daily criteria pollutant emissions for Alternative Eden D2.

Table 3.13-20 Alternative Eden D2 Construction Emissions Summary

Emissions	ROG	CO	NO_x	PM_{10} (exhaust)	$PM_{2.5}$ (exhaust)	PM_{10} (total)	$PM_{2.5}$ (total)
Dredge Material Placement (lbs/day)	8.59	52.50	69.26	2.72	2.51	2.72	2.51
Subsequent Construction (lbs/day)	2.89	25.98	29.36	1.29	1.19	14.62	5.84
BAAQMD thresholds (lbs/day)	54	—	54	82	54	BMPs	BMPs
Exceeds BAAQMD threshold?	No	—	Yes	No	No	—	—

BMPs = Best Management Practices

See Appendix I for modeling input assumptions and output results.

As shown in Table 3.13-20, construction-generated average daily NO_x emissions for Alternative Eden D2 would exceed the applicable regional significance thresholds during dredge material placement. Therefore, construction emissions could violate an ambient air quality standard or contribute substantially to an existing violation. Implementation of Mitigation Measures AQ-A and AQ-B during dredge material placement would be required to reduce criteria air pollutant emissions. Table 3.13-21 shows the mitigated emissions for construction activities for Alternative Eden D2.

Table 3.13-21 Alternative Eden D2 Mitigated Construction Emissions Summary

Emissions	ROG	CO	NO_x	PM_{10} (exhaust)	$PM_{2.5}$ (exhaust)	PM_{10} (total)	$PM_{2.5}$ (total)
Dredge Material Placement (lbs/day)	6.65	47.52	47.84	1.66	1.53	1.66	1.53
Subsequent Construction (lbs/day)	2.89	25.98	29.36	1.29	1.19	14.62	5.84
BAAQMD thresholds (lbs/day)	54	—	54	82	54	BMPs	BMPs
Exceeds BAAQMD threshold?	No	—	No	No	No	—	—

BMPs = Best Management Practices

See Appendix I for modeling input assumptions and output results.

As shown in Table 3.13-21, construction activities would result in emissions that would not exceed a significance threshold after mitigation. Incorporation of Mitigation Measures AQ-A and AQ-B would reduce NOx emissions to a less than significant level. Therefore, construction-generated air pollutant emissions associated with Alternative Eden D2 would be less than significant with mitigation.

The General Conformity applicability and NEPA analyses are based on estimates of the total direct and indirect net emissions from construction of the project. As discussed with Alternative Eden D1, the expected duration for the dredge material component of Alternative Eden D2 is approximately 53 to 93 months. Therefore, the criteria pollutant emissions were conservatively assumed to occur over 53 months. Table 3.13-22 summarizes the projected annual emissions associated with construction of the Alternative Eden D2. The annual emissions estimates shown in Table 3.13-22 include emission reductions associated with the mitigation measures discussed above. The project assumes that mitigation measures would be implemented to meet CEQA requirements. Additional details are included in Appendix I.

Table 3.13-22 Alternative Eden D2 Construction-Related NEPA/General Conformity Applicability Analysis

Emissions	ROG	CO	NO_x	PM_{10} (exhaust)	$PM_{2.5}$ (exhaust)	PM_{10} (total)	$PM_{2.5}$ (total)
Dredge Material Placement (tons/year)	0.37	2.62	2.64	0.09	0.08	0.09	0.08
Subsequent Construction (total tons)	0.60	5.43	6.14	0.27	0.25	3.06	1.22
Subsequent Construction (tons/year)	0.38	3.43	3.88	0.17	0.16	1.93	0.77
General conformity *de minimis* thresholds (tons/year)	50	100	100	—	—	—	100
Exceeds general conformity *de minimis* threshold?	No	No	No	—	—	—	No

BMPs = Best Management Practices

See Appendix I for modeling input assumptions and output results.

As shown in Table 3.13-22, the estimated emissions associated with the Alternative Eden D2 would be less than the General Conformity *de minimis* thresholds. Therefore, temporary emissions associated with the Alternative Eden D2 would conform to the SIP, and a formal conformity analysis would not be required. No substantial adverse direct or indirect effects would occur under NEPA.

Alternative Eden D2 Level of Significance: Less than Significant with Mitigation

Phase 2 Impact 3.13-2: Potential long-term operational air pollutant emissions.

Alternative Eden A (No Action). Alternative Eden A (No Action Alternative) would involve no new activities. Southern Eden Landing would continue to be monitored and managed through the activities described in the AMP and in accordance with current California Department of Fish and Wildlife (CDFW) practices, as well as those of Alameda County Flood Control and Water Conservation District (ACFCWCD) on its parcels. The level of activity would be extremely similar to the activities occurring under existing conditions and would not result in a change in emissions. Therefore, the impact from long-term operational emissions would be less than significant.

According to the BAAQMD 2011 Guidelines, projects that would not result in significant impacts may be considered consistent with the applicable air quality plan. Because operational emissions would be less than significant, Alternative Eden A would not conflict with the applicable air quality plan.

Alternative Eden A Level of Significance: Less than Significant

Alternatives Eden B1/B2, Eden C1/C2, and Eden D1/D2. The following discussion addresses the three Action Alternatives (Alternatives ***Eden B1/B2, Eden C1/C2, and Eden D1/D2***). In terms of air quality emissions, the operations under the Action Alternatives would be quite similar to the current operations and those that would take place over time under Alternative Eden A. The opening and closing of water control structures is done by hand, and those structures would continue to be reached by regular passenger vehicles (primarily a pick-up truck). All three Action Alternatives include removing the existing pump between Old Alameda Creek and Pond E1, which could reduce emissions somewhat. All three also feature addition of recreational trails. Although these new recreational trails may generate emissions as a result of vehicle trips, this activity is not anticipated to result in a substantial increase in emissions compared to the environmental baseline. While there would be some ongoing maintenance of levees and the additional need to maintain trails in all Action Alternatives, there would also be breaching and removal of large areas of levee that would no longer need to be maintained.

Similarly, the habitat transition zones, islands, and other habitat features would need to be maintained and there would be ongoing mosquito abatement, biological monitoring and research, but this would largely be limited to occasional visits in passenger vehicles to remove weeds, perform abatement, or conduct surveys. These activities would have a negligible increase in local air quality emissions.

Overall, therefore, the level of operational activity would not be anticipated to be substantially different compared to existing conditions, and would not result in a substantial increase in emissions compared to existing operational activities. Based on the above discussion, the level of operational activity would be similar to existing conditions and would not result in a change in emissions. Therefore, the impact from long-term operational emissions would be less than significant.

According to the BAAQMD 2011 Guidelines, projects that would not result in significant impacts may be considered consistent with the applicable air quality plan. Because operational emissions would be less than significant, none of the Action Alternatives would conflict with the applicable air quality plan.

Alternatives Eden B1/B2, Eden C1/C2, and Eden D1/D2Level of Significance: Less than Significant

Phase 2 Impact 3.13-3: Potential exposure of sensitive receptors to TAC emissions.

Alternative Eden A (No Action). Alternative Eden A (No Action Alternative) would not require construction activities within southern Eden Landing. O&M activities could require the use of diesel-powered equipment and vehicles that have the potential to generate TAC emissions. However, the use of this equipment would be limited in extent and occur intermittently over the lifetime of the project. As such, the potential for exposure of sensitive receptors to TAC emissions from use of diesel-powered equipment and vehicles would be less than significant.

Alternative Eden A Level of Significance: Less than Significant

Alternatives Eden B1/B2, Eden C1/C2, and Eden D1/D2. Under Alternatives Eden B, Eden C, and Eden D (the Action Alternatives), construction would result in short-term diesel exhaust emissions from on-site heavy-duty equipment. There are no sensitive receptors within the Eden Landing pond complex or southern Eden Landing in particular. However, there are sensitive receptors in the areas around the pond complex, as mentioned in Section 3.13.1, Physical Setting. Because of the distance of the sensitive receptors and the temporary use of off-road construction equipment, short-term construction activities would not expose sensitive receptors to substantial TAC emissions. Soil disturbance during construction activities (including mass grading and excavation) may result in airborne entrainment of toxic contaminants in fugitive dust, and as such may expose workers and nearby sensitive receptors to potentially toxic air emissions, although the concentrations of these contaminants in fugitive dust emissions are not anticipated to reach levels that may present significant risks. Project design features would include requirements for the preparation of a Health and Safety Plan to reduce the potential for workers and nearby residents to be exposed to airborne TACs.

O&M activities could require the use of diesel-powered equipment and vehicles that have the potential to generate TAC emissions. However, the use of this equipment would be limited in extent and occur intermittently over the lifetime of the project. Further, sensitive receptors are located at least 1,000 feet from the site and would not be in the immediate vicinity of the project. As such, potential exposure of sensitive receptors to TAC emissions during operations would be limited. Because of the distance to sensitive receptors, the limited duration of construction activities, the preparation of a Health and Safety Plan, and the intermittent nature of operational activities, impacts to sensitive receptors under any of the Action Alternatives would be less than significant.

Alternatives Eden B1/B2, Eden C1/C2, and Eden D1/D2 Level of Significance: Less than Significant

Phase 2 Impact 3.13-4: Potential odor emissions.

Odors can occur in the existing ponds in two ways. First, algae and other biomass that naturally grow in seasonal or managed ponds can accumulate in certain areas of the ponds. As the algae naturally decompose, H_2S gas can be produced, generating odors. Warm weather and lack of wind can accelerate the decomposition in the ponds and aggravate the odorous condition. Second, odors can develop as the ponds dry and the mud bottoms are exposed to air, especially in hot weather. These odors are caused by the exposure of algae or brine shrimp that are found in some of the salt ponds.

The occurrence of an odor depends to a large part on the number of degree-cooling days that occur in summer months. The potential for odor-related impacts is also dependent on prevailing winds and the proximity and location of downwind receptors. Although offensive odors rarely cause any physical harm, they still can be very unpleasant, leading to considerable distress and often generating citizen complaints to local governments and regulatory agencies.

Alternative Eden A (No Action). Under Alternative Eden A (No Action Alternative), no construction activities would occur and O&M activities would be limited. This alternative would be a continuation of existing conditions—that is, no new activities would occur at southern Eden Landing. The ponds would remain in the mix of managed ponds that they currently are. This is not anticipated to substantially change pond conditions that affect the potential for odors. As such, the potential for odors under this alternative would not change from that under existing conditions and would result in a less-than-significant impact.

Alternative Eden A Level of Significance: Less than Significant

Alternatives Eden B1/B2. Construction under Alternative Eden B would result in diesel emissions from the exhaust of on-site equipment, which may be odorous. Those emissions would be intermittent and would dissipate rapidly from the source. Also, mobile diesel-powered equipment would only be present on-site temporarily during construction activities. The great distance to occupied areas would prevent this from being a significant impact. As such, construction would not create objectionable odors affecting a substantial number or people. This impact would be less than significant.

Under Alternative Eden B, all of southern Eden Landing would be opened to tidal flows and expected to transition toward tidal marsh. This is anticipated to increase circulation and thus reduce the pond conditions (i.e. stagnant water in managed ponds or dry conditions in seasonal ponds) that affect the potential for odors. The potential for odors is not expected to create new odors affecting a substantial number of people and would thus result in a less than significant impact.

Alternatives Eden B1/B2 Level of Significance: Less than Significant

Alternatives Eden C1/C2. With regard to construction-related odors, Alternative Eden C is similar to Alternative Eden B, and the diesel-fueled construction equipment would not be expected to cause a significant odor-related impact.

Under Alternative Eden C, the Bay Ponds would be breached and expected to transition to tidal marsh as in Alternative Eden B, which again would not be anticipated to cause odors. However, the Inland Ponds and the Southern Ponds would be retained as managed ponds and enhanced with eleven new water control structures that would improve the ability of CDFW to increase circulation and pond depths as needed to address water quality conditions before they generate odors. Therefore, Alternative Eden C would substantially improve the ability to avoid pond conditions that could generate odors. Thus, Alternative Eden C would result in a less-than-significant impact.

Alternatives Eden C1/C2 Level of Significance: Less than Significant

Alternatives Eden D1/D2. Alternative Eden D is similar to Alternative Eden C in the initial pond restoration activities. That is, the Bay Ponds would be opened to full tidal flows and transition to tidal marsh, and the Inland Ponds and Southern Ponds would be enhanced managed ponds. In the long-run (a decade or more), however, those enhanced managed ponds would either be kept in that condition or opened to fully tidal flows. In either of those cases, the result would be a restoration project that either directly reduced odors by increasing flows or substantially improved the ability to manage pond conditions so as to avoid the potential for odors. Thus Alternative Eden D would result in a less-than-significant impact.

Alternatives Eden D1/D2 Level of Significance: Less than Significant

Impact Summary

Phase 2 impacts and levels of significance are summarized in Table 3.13-23. The levels of significance are those remaining after implementation of program-level mitigation measures, project-level design features, the AMP, and other CDFW management practices and documents. The air quality analysis required no project-level mitigation measures to reduce the impacts to a level that was less than significant.

Table 3.13-23 Phase 2 Summary of Impacts – Air Quality

IMPACT	Alt. Eden A	Alt. Eden B1	Alt. Eden B2	Alt. Eden C1	Alt. Eden C2	Alt. Eden D1	Alt. Eden D2
Phase 2 Impact 3.13-1: Short-term construction-generated air pollutant emissions.	NI	SU/LTSM	LTSM	SU/LTSM	LTSM	SU/LTSM	LTSM
Phase 2 Impact 3.13-2: Potential long-term operational air pollutant emissions.	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Phase 2 Impact 3.13-3: Potential exposure of sensitive receptors to TAC emissions.	LTS	LTS	LTS	LTS	LTS	LTS	LTS
Phase 2 Impact 3.13-4: Potential odor emissions.	LTS	LTS	LTS	LTS	LTS	LTS	LTS

Notes:

Alternative Eden A is the No Action Alternative (No Project Alternative under CEQA).

LTS = Less than Significant

LTSM = Less Than Significant with Mitigation

SU – Significant and Unavoidable

NI = No Impact

3.14 Public Services

This section of the Draft Environmental Impact Statement/Report (EIS/R) describes the existing public services within the Eden Landing Phase 2 area of the South Bay Salt Pond (SBSP) Restoration Project and analyzes whether implementation of the project would cause a substantial adverse effect on public services. The information presented is based on a review of existing public services within the area and on other pertinent state and local regulations, which are presented in the regulatory setting section. Using this information as context, an analysis of environmental impacts of the project related to public services is presented for each alternative. The program-level mitigation measures described in Chapter 2, Alternatives, would be implemented as part of this project. Therefore, this section only includes additional mitigation measures as needed.

3.14.1 Physical Setting

Methodology

This section presents information on public services and utilities in the Eden Landing Phase 2 area of the SBSP Restoration Project. Public services include police, fire, and emergency services. Schools and solid waste services are also discussed. Background information was drawn from applicable regional and local general plans and policies as well as from public service and utility representatives.

Regional Setting

In the South Bay, public services such as police, fire, and emergency services are primarily provided by each local jurisdiction. These services are described below. Emergency response staffing and ratios are provided but are for informative purposes only and should not be used to determine adequacy of service. In most jurisdictions, adequacy of service is determined by response time, with an ideal response time set at around 4 minutes. Jurisdictions strive to maintain appropriate staffing levels to achieve this goal.

Project Setting

The Eden Landing pond complex as a whole is bordered on the east by the cities of Hayward, Union City, and Fremont in Alameda County; on the north by State Route (SR) 92; and on the south (across the Alameda Creek Flood Control Channel [ACFCC]) by Coyote Hills Regional Park and portions of Fremont. Eden Landing itself is actually within Hayward’s city limits. The Phase 2 project is limited to the southern half of Eden Landing, which is adjacent to Union City on the east.

Alameda County

Police Services. The Alameda County Sheriff’s Office has a main administration office at 1401 Lakeside Drive in Oakland; the Eden Township substation is located at 15001 Foothill Boulevard in San Leandro. The Sheriff’s Department provides police services to the unincorporated areas of Alameda County.

There are several specialized units and teams within the Sheriff's Office. These include Animal Control, the Coroner’s Bureau, Court Services, Crime Labs, and Homeland Security and Emergency Services. The Sheriff's Office hosts or participates in several joint-agency task forces (Alameda County 2016).

Fire Protection and Emergency Services. The Alameda County Fire Department Station Number 30, located at 35000 Eastin Court, is the closest station to the Eden Landing Phase 2 area of the SBSP Restoration Project.

Schools. Alameda County does not have its own school district but consists of school districts that are located within incorporated cities (e.g., Oakland, Union City, and Fremont). Please refer to the discussions below for the City of Fremont.

Solid Waste. The Altamont Landfill and Resource Recovery Facility in Livermore provides garbage collection and disposal.

City of Hayward

Police Services. The Hayward Police Department provides police protection services to Hayward, including the SBSP Restoration Project Area. The Hayward Police Department is headquartered at 300 West Winton Avenue in Hayward. The police force has an authorized strength of 193 sworn officers (Hayward Police Department 2016) In 2015, the Hayward Police Department's average response time for Priority 1 and 2 emergency calls (the highest priority call types) was 5 minutes 35 seconds (City of Hayward 2016a).

Fire Protection and Emergency Services. The Hayward Fire Department provides service to the entire city, including the Eden Landing Phase 2 area of the SBSP Restoration Project, and to the Fairview Fire Protection District on a contract basis. There are seven fire stations within Hayward, and two stations within the jurisdiction of the Fairview Fire Protection District (City of Hayward 2016b). Station Number 4, located at 27836 Loyola Avenue in Hayward, is the closest station to the Eden Landing Phase 2 area of the SBSP Restoration Project and would be the first to respond in the case of an emergency call within this area. Hayward has a population of 158,289 (U.S. Census Bureau Population Estimates Program July 2015). According to the City's Fiscal Year 2017 budget, the Hayward Fire Department has 136.5 full-time equivalent budgeted positions (107 firefighting positions, three Battalion Chiefs, and the remaining positions in Fire Administration, Operations and Special Operations.) The service ratio with those data is one firefighter per 1,479 residents.

The Hayward Fire Department response time is less than five minutes, 91.71 percent of the time (City of Hayward 2016c). However, the northern portion of the Eden Landing pond complex, just south of SR 92, is beyond a five-minute response time for Hayward's emergency, medical and fire response.

Schools. The Hayward Unified School District provides public education in the City for Kindergarten through 12th grade (Hayward Unified School District 2016). The southern portion of Hayward is served by the New Haven Unified School District (see the Union City discussion, below). The Hayward Unified School District has 21 elementary schools, five middle schools, and three high schools located throughout the city. No schools are within the actual Eden Landing SBSP Restoration Project area.

Solid Waste. Waste Management of Alameda County provides solid waste collection and disposal services and coordinates recycling and source reduction programs for residential and commercial uses within Hayward.

City of Union City

Police Services. The Union City Police Department is headquartered at 34009 Alvarado-Niles Road in Union City. From January-October 2016, Union City Police Department's median response time for

Priority 1 calls was 5 minutes 35 seconds (Union City Police Department 2016a). The current staffing level is 1.1 sworn officer per 1,000 residents (Union City Police Department 2016b).

Fire Protection and Emergency Services. Fire and Emergency Services in Union City are provided by the Alameda County Fire Department. There are four fire stations located in Union City (Union City Fire Department 2016).

Station Number 30, located at 35000 Eastin Court is the closest station to the Eden Landing Phase 2 area of the SBSP Restoration Project and would provide fire protection services in the case of an emergency (City of Union City 2016).

Schools. The New Haven Unified School District provides public school education in Union City for levels kindergarten to 12th grade (New Haven Unified School District 2016). The New Haven Unified School District has seven elementary schools, two middle schools, and four high and adult schools within the City. No schools are within the Eden Landing Phase 2 area of the SBSP Restoration Project Area.

Solid Waste. Union City's Manager's Office administers a contract with Republic Services and Tri-City Economic Development Corporation Community Recycling for the collection and disposal of residential and commercial waste and recycling services.

City of Fremont

Police Services. The Fremont Police Department provides police protection service within Fremont and includes areas immediately south of the Eden Landing Phase 2 area of the SBSP Restoration Project. Fremont's Police Department is headquartered at 2000 Stevenson Boulevard in Fremont. Currently, the police force consists of 306.5 authorized full-time equivalent positions; the service ratio is 0.84 sworn officers per 1,000 residents (City of Fremont 2016a).

Fire Protection and Emergency Services. The Fremont Fire Department provides fire, medical, rescue, and life safety emergency services to Fremont including the areas immediately surrounding the Eden Landing Phase 2 area of the SBSP Restoration Project. The Fremont Fire Department Administration Offices are located at 3300 Capitol Avenue in Fremont. With a service area of 92 square miles and a service population of approximately 226,551 people, the Fremont Fire Department currently maintains 11 stations located in Fremont, and employs a staff of 158 trained firefighters (Fremont Fire Department 2016). Station Number 10, located at 5001 Deep Creek Road in Fremont, is the closest to the Eden Landing pond complex and would respond in the case of an emergency there.

Schools. The Fremont Unified School District provides public education in the City for levels kindergarten to 12th grade (Fremont Unified School District 2016). The Fremont Unified School District has 28 elementary schools, five middle schools, and six high schools, as well as one adult school in the city. No schools are located within the SBSP Restoration Project Area.

Solid Waste. The City of Fremont administers a contract with Republic Services for the collection and disposal of residential and commercial waste and recycling.

3.14.2 Regulatory Setting

This section provides the regulatory background necessary to analyze the effects on public services associated with areas in and around the ponds in the Eden Landing Phase 2 area of the SBSP Restoration

Project. Applicable local and regional plans and policies were reviewed for information on existing land uses and policies.

Alameda County. The Alameda Countywide Safety Element (County of Alameda 2013) provides guidance to minimize human injury, loss of life, property damage, and economic and social dislocation due to natural and man-made hazards. Goal #6 of the Safety Element identifies the need to prepare and keep current Alameda County emergency procedures in the event of a potential natural or man-made disaster.

City of Hayward. The Hayward General Plan 2040 (City of Hayward 2014) includes the following relevant public services strategies, policies, and implementation measures:

- Disaster Preparedness, Response and Recovery. Goal 5: Prepare the Hayward community for future emergencies and disasters to minimize property damage protect and save lives, and recover as a resilient community.
- Public Facilities/Natural Resources. Goal PFS-1: Ensure the provision of adequate and efficient facilities and services that maintain service levels, are adequately funded, accessible, reliable, and strategically allocated. PSF-4.6: The City shall strive to adopt innovative and efficient wastewater treatment technologies that are environmentally-sound. Goal NR-3: Preserve, enhance, and expand natural baylands, wetlands, marshes, hillsides, and unique ecosystems within the Planning Area in order to protect their natural ecology, establish the physical setting of the city, provide recreational opportunities, and assist with improved air quality and carbon dioxide sequestration.

City of Union City. Union City's 2002 General Plan Policy Document (City of Union City 2002) includes the following relevant public services strategies, policies, and implementation measures:

- PF-B.1.4: Where some services are provided by other public entities, such as the Alameda County Water District (ACWD) and the Union Sanitary District (USD), the City shall coordinate construction efforts with these agencies to provide appropriate levels of service and minimize redundant construction costs.
- PF-J.1.4: The City shall locate fire stations as needed to maintain acceptable response times that meet the service level expected by the community.
- PF-J.1.9: The City shall strive to provide ambulance service to the community through the Fire Department staff and in conjunction with the Alameda County Emergency Medical Services Plan.
- PF-K.1.3: The City's land use planning should be coordinated with the planning of school facilities and should involve the school district during the early stages of the land use planning process.
- PF-L.1.3: The City's land use planning should be coordinated with the planning of library facilities that can be easily accessed by pedestrian and bicycle users, as well as by transit or motor vehicle, in order to enhance neighborhoods, minimize transportation requirements and costs, and minimize safety problems.

City of Fremont. The City of Fremont General Plan (City of Fremont 2011) includes the following relevant public services strategies, policies, and implementation measures:

- Water, Flood, and Sanitary Sewer Services. Implementation 7-2.1.A: Require proposed projects near riparian areas to protect the aesthetic, recreational and biological benefits consistent with flood control and recharge objectives.

3.14.3 Environmental Impacts and Mitigation Measures

Significance Criteria

For the purposes of this Draft EIS/R, a significant impact on public services would occur if the project would:

- Result in substantial adverse physical impacts associated with the need for provision of new or physically altered government facilities, the construction of which could cause a reduction in acceptable service ratios, response times, or other performance objectives for the following: parks, fire and police protection, public facilities, and schools;
- Generate a large volume of waste materials that could exceed the capacity of the local landfill(s);
- Breach federal, state, and local statutes and regulations related to solid waste.

As explained in Section 3.1.2, while both Council on Environmental Quality Regulations for implementing National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA) Guidelines were considered during the impact analysis, impacts identified in this Draft EIS/R are characterized using CEQA terminology. Please refer to Section 3.1.2 for a description of the terminology used to explain the severity of the impacts.

Impact evaluations for the Action Alternatives are assessed based on the existing conditions described in Section 3.14.1 and not on the proposed conditions that would occur under the No Action Alternative.[1] This approach mimics what was done for the 2007 SBSP Restoration Project Final EIS/R (2007 Final EIS/R) and the Final EIS/R for Phase 2 at the Don Edwards San Francisco Bay National Wildlife Refuge. In this case, the No Action Alternative represents no change from current management direction or level of management intensity provided in the Adaptive Management Plan (AMP) and other California Department of Fish and Wildlife (CDFW) Eden Landing Ecological Reserve management documents and practices.

The Phase 2 Project at Eden Landing does not propose and would not require the construction of new or altered schools or public facilities; therefore, no impacts to these facilities or reduction in performance objectives would occur. Increased demand for fire and police protection services is discussed below in the Eden Landing Phase 2 Impact 3.14-1. In addition, the project would not require substantial disposal of spoils that would exceed the capacity of local landfills. As described in Chapter 2, Alternatives, no construction would occur and only limited operations and maintenance activities would be required for the No Action Alternative at southern Eden Landing.

---

[1] No Action Alternative" is the NEPA term. It corresponds to the CEQA term "No Project Alternative." This Draft EIS/R uses No Action throughout.

Under the various Action Alternatives, a combined total of up to 200,000 cubic yards of dirt and soil could be imported on trucks to the project site on-site to improve or raise the proposed levees that provide flood risk management or to construct habitat transition zones, habitat islands, or other features. Under the Eden Landing Phase 2 actions, all materials generated from cut activities associated with project construction would be reused on-site. No off-site disposal of soils is expected. On the contrary, the project intends to be a recipient of clean dirt and other upland fill material from off-site construction projects. As such, the project is not expected to reduce local landfill capacity, and it may even slow the rate of background capacity loss. Further, the Eden Landing Phase 2 project would not break federal, state, and local statutes and regulations related to solid waste under any of the alternatives.

Program-Level Evaluation

The 2007 Final EIS/R evaluated the potential impact to public services of three long-term alternatives, which were each determined to have less-than-significant impacts to public services, including a potential increase in the demand for fire and police protection services. Three programmatic-level alternatives were considered and evaluated in the 2007 Final EIS/R: (Programmatic Alternative A) the No Action Alternative, (Programmatic Alternative B) the Managed Pond Emphasis, and (Programmatic Alternative C) the Tidal Habitat Emphasis. At the program level, the decision was made to select Programmatic Alternative C and implement Phase 1 actions. Programmatic Alternative C, when implemented on the Phase 2 project-level, would form a large part of the impact of Alternative Eden A (the No Action Alternative) in this Draft EIS/R, as it represents the continuation of existing conditions that would occur absent the implementation of one of the Phase Action Alternatives.

Project-Level Evaluation

Phase 2 Impact 3.14-1: Increased demand for fire and police protection services.

Alternative Eden A (No Action). Under Alternative Eden A, the No Action (No-Project) Alternative, no new activities would be implemented as part of the Phase 2 project. The CDFW would continue maintaining and operating the ponds as part of the ELER and according to the *Eden Landing Ecological Reserve System E2 and E2C Operation Plan* and the activities described in the AMP and in accordance with current CDFW practices. No new recreation or public access features would be added in Alternative Eden A. However, the existing trail along the ACFCC would continue to be maintained, as would the trails and other access features in northern Eden Landing. No substantial increase in visitor use resulting from the implementation of this alternative is expected that would in turn increase demand for fire and police protection services. Consequently, there would be no impact.

Alternative Eden A Level of Significance: No Impact

Alternative Eden B. Alternative Eden B would restore the entirety of southern Eden Landing to tidal marsh in a single project implementation stage by providing sufficient improvements to the eastern, backside levees to provide the necessary degree of flood risk management. There would then be habitat enhancements including raising bottom elevations in the Bay and Inland Ponds, constructing habitat transition zones and islands made from remnant levees, channel excavation, and levee lowering. Two sections of internal levee improvements would also be made along the J-ponds (storm water detention ponds) and other Alameda County Flood Control and Water Conservation District (ACFCWCD)-owned channels. The Bay Trail spine would be completed through southern Eden Landing on one of a number of routes, one of which would be on the improved internal levees above. There would be one viewing platform added.

Although public access would be increased in Alternative Eden B, the relatively minor additional recreational activities in the area would not require additional public services. Consequently, the impacts would be less than significant.

Alternative Eden B Level of Significance: Less than Significant

Alternative Eden C. Alternative Eden C would retain the Inland Ponds and the Southern Ponds as managed ponds and add a number of water control structures to allow the depth and salinity of these ponds to be actively managed for a range of different pond-dependent wildlife. Bottom elevations would be raised in the Bay Ponds, and the Bay Ponds would be restored to tidal marsh as in Alternative Eden B. Flood risk management would be provided through the use of a mid-complex levee that would largely be built on top of the existing internal levees. This alternative would feature a similar range of habitat enhancements at Eden B but in different locations. The same Bay Trail routes through the area would be assessed, but so too would a set of trails on either side of the Old Alameda Creek (OAC) and a bridge over the OAC to connect them. These trails would form a spur trail to the site of the Alvarado Salt Works, and a viewing platform there. Another large bridge would be built over the ACFCC to extend the Bay Trail spine further and beyond the ELER boundary itself.

As in Alternative Eden B, although public access would be increased in Alternative Eden C, the additional recreational activities would be minor and would not require additional public services. Consequently, the impacts would be less than significant.

Alternative Eden C Level of Significance: Less than Significant

Alternative Eden D. Alternative Eden D is a staged implementation of the tidal marsh restoration outlined in Alternative Eden B. It would make use of a mid-complex levee, as in Alternative Eden C, but that levee would be temporary. Bottom elevations would be raised in the Bay and Inland Ponds, and the separation of the Bay Ponds from the Inland Ponds would allow those large outer ponds to first be restored to tidal marsh habitat, after which, the mid-complex levee would be removed, and the Inland and Southern Ponds then restored to tidal marsh. Water control structures would be added to the Inland and Southern Ponds for use during the years in which they would be operated as managed ponds and then potentially removed to allow tidal flows. The trail and associated viewing platform would be similar to those in Alternative Eden B.

As in Alternative Eden B and Alternative Eden C, the additional recreational activities in Alternative Eden D would be minor and would not require additional public services. Consequently, the impacts would be less than significant.

Alternative Eden D Level of Significance: Less than Significant

Impact Summary

Phase 2 impacts and levels of significance are summarized in Table 3.14-1. The levels of significance are those remaining after implementation of program-level mitigation measures, project-level design features, and the AMP and other CDFW management documents and practices for the Reserve. The public services analysis required no project-level mitigation measures in order to reduce the impacts to a level that was less than significant.

Table 3.14-1 Phase 2 Summary of Impacts – Public Services

IMPACT	ALTERNATIVE EDEN A	ALTERNATIVE EDEN B	ALTERNATIVE EDEN C	ALTERNATIVE EDEN D
Phase 2 Impact 3.14-1: Increased demand for fire and police protection services.	NI	LTS	LTS	LTS

Notes:

Alternative A is the No Action Alternative (No Project Alternative under CEQA).

LTS = Less than Significant

NI = No Impact

3.15 Utilities

This section of the Draft Environmental Impact Statement/Report (EIS/R) describes the existing utilities within the Eden Landing Phase 2 project area and analyzes whether implementation of the project would cause a substantial adverse effect on utilities. The information presented is based on review of existing utility resources within the area, presented in Section 3.15.1, Physical Setting, and other pertinent state and local regulations, presented in Section 3.15.2, Regulatory Setting. Using this information as context, an analysis of the utility-resources-related environmental impacts of the project is presented for each alternative in Section 3.15.3, Environmental Impacts and Mitigation Measures. The program-level mitigation measures described in Chapter 2, Alternatives, would be implemented as part of this project. Therefore, this section only includes additional mitigation measures as needed.

3.15.1 Physical Setting

Methodology

The development of the baseline conditions, significance criteria, and impact analysis in this section is commensurate to and reliant on the analysis conducted in the 2007 South Bay Salt Pond (SBSP) Restoration Project Final EIS/R (2007 Final EIS/R). The baseline condition specific to the Eden Landing Phase 2 pond complex is based on the current condition of these areas. Background information was drawn from applicable regional and local general plans and policies as well as from utility representatives.

Regional Setting

Gas and electricity are provided by Pacific Gas and Electric Company (PG&E) to all cities in the South Bay except the cities of Palo Alto and Santa Clara, neither of which are near Eden Landing. PG&E owns and maintains a network of overhead transmission lines, power distribution lines, and substations.

PG&E overhead power transmission lines traverse the SBSP Restoration Project area. In some places, power distribution lines that service pumps, storm water lift stations, and more localized areas are present but are separate from the power transmission lines. For example, power distribution lines are present along the northern levees of Ponds E1, E7, and E6 and on the southern levee of Pond E6A. The purpose of these lines is to operate pumps formerly used in salt production; they are now used by the California Department of Fish and Wildlife (CDFW) for water management in the ponds; they do not serve any general utility user. Ground towers which provide access to overhead transmission and distribution lines are located at intervals along the lines and require water or land based vehicular access via levees for routine inspections, repairs and emergency maintenance.

Water and wastewater utilities are provided on both citywide and regional levels. The facilities and infrastructure supporting the services are maintained by the service providers. Water and wastewater infrastructure includes water and wastewater pipelines, wastewater treatment plants and discharge facilities, and storm drainage facilities. Water and wastewater pipelines are generally underneath city streets. There is no wastewater force main under the Phase 2 project area at Southern Eden Landing, though one (discussed in detail below) is nearby to the east. With regard to stormwater conveyance, in the lower reaches of the watersheds, runoff from developed areas is carried through pipes and discharged to tidal sloughs or stream channels by gravity-driven flow or lift stations. In the Phase 2 project at Eden Landing, these streams and sloughs include Old Alameda Creek (OAC) and the Alameda Creek Flood Control Channel (ACFCC), as detailed below. Stormwater discharged by lift stations is relatively unaffected by slight variations in tide. An extensive inventory of stormwater facilities is provided in previous project reports (Moffatt & Nichol 2005). At present, not all storm outfalls to the restoration area have been located in the field. Data such as pipe invert information and system capacity have not been determined.

The entities responsible for and the specific locations of the utility infrastructure within the SBSP Restoration Project's Phase 2 work at Eden Landing are discussed below.

Project Setting

This section outlines the existing utilities that are in each of the Eden Landing Phase 2 area pond complex.

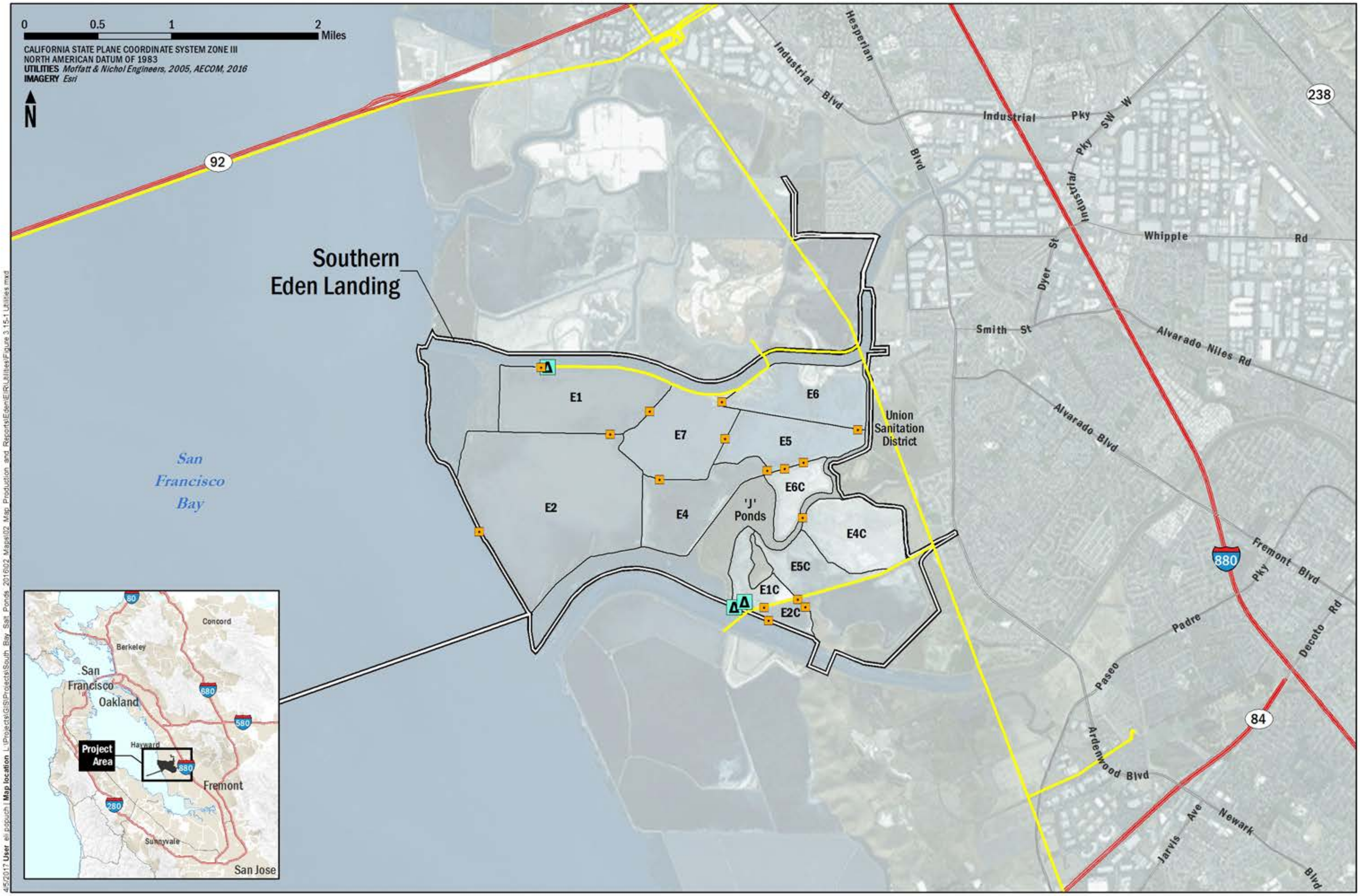
The Eden Landing pond complex is within Hayward's city limits and bordered by Hayward on the north, Union City on the east, and the ACFCC to the south. The City of Fremont is across the ACFCC. All of these cities are in Alameda County. Existing infrastructure within the Eden Landing pond complex is shown in Figure 3.15-1.

Gas and Electricity. A PG&E overhead power transmission line enters the northeast corner of the overall Eden Landing pond complex, north of the Phase 2 project area that would be limited to southern Eden Landing. After crossing the Bay parallel to the San Mateo Bridge, another PG&E overhead transmission line also crosses northern Eden Landing's Pond E10 and E11 before continuing east. These lines are shown on Figure 3.15-1.

The Phase 2 project area contains two PG&E power distribution lines. The first distribution line runs along the northern levee of Ponds E1, E7, and E6, and on the southern levee of Pond E6A. This line operates pumps formerly used in salt production, but is now used by CDFW for water management in the ponds. It does not serve any other customers. The second line runs along the southern levee of Ponds E5C and E4C and bisects Ponds E1C and E2C before crossing the ACFCC and serving other customers. These two transmission lines are supported by wooden poles located at intervals along the pond levees described above. PG&E maintenance crews require water or land based vehicular access via levees for routine inspections, repairs and emergency maintenance.

Water and Wastewater. Water services are provided to Hayward by the City's Utilities Division (City of Hayward 2014) and to Union City, Fremont, and Newark by the Alameda County Water District (ACWD). Wastewater services are provided to Hayward by the City's Utilities Division and to Union City, Fremont and Newark by the Union Sanitary District (USD). The East Bay Dischargers Authority (EBDA), a joint powers agency, manages wastewater disposal for the City of San Leandro, Oro Loma Sanitary District, Castro Valley Sanitary District, City of Hayward and USD.

A pipeline serving as part of the EBDA effluent disposal system passes just to the north of the northeast corner of Pond E6, and is within the temporary impact area associated with construction of the Phase 2 project at Eden Landing. It transports treated effluent from the USD northward towards the EBDA Bay outfall. Additionally, there are three storm water lift stations located at the ends of spurs of the power distribution line along OAC. Storm water outfalls discharging via gravity flow in the Eden Landing pond complex drain to OAC and the ACFCC.



LEGEND

- Water Control Structure
- Pump Station
- Overhead Power Line
- Eden Landing Phase 2 Project Area
- Southern Eden Landing Ponds

AECOM
South Bay Salt Pond Restoration Project

Figure 3.15-1
Utilities in the Vicinity of the Phase 2 Project Area

Geodetic Control Monuments. The majority of National Geodetic Survey (NGS) geodetic control monuments within the Eden Landing pond complex were last located and surveyed in 1977. It is unknown whether any of these monuments still exist, particularly the one along OAC. One NGS monument in the vicinity of the Eden Landing pond complex was located and resurveyed in 2002 (PID HT2353) near the intersection of Hesperian Boulevard and OAC. This monument is outside of the project area and would not be affected by the Project. Additional geodetic control is maintained by Alameda County and the East Bay Regional Parks District.

3.15.2 Regulatory Setting

This section provides the regulatory background necessary to analyze the effects on utilities associated with the Eden Landing Phase 2 of the SBSP Restoration Project. Applicable local and regional plans and policies are reviewed for information on existing land uses and policies.

Overhead Electrical Transmission Lines

General Order 95 from the California Public Utilities Commission (California Public Utilities Commission 2012) includes rules governing line clearance for overhead electrical transmission lines. It states the following:

- Rule 11. Water areas not suitable for sailboating must have a line clearance of at least 25 feet (8 meters) above high water.
- Rule 12. Water areas suitable for sailboating, with a surface area over 2,000 acres, must have a line clearance of at least 47 feet (14 meters) above high water.

General Order 95 states that Rule 11 can be applied to areas where sailboating is prohibited and where other boating activities are allowed. Once ponds are breached and made tidal, they become part of the Bay, so these rules are relevant to several different ponds that would be so modified in Eden Landing Phase 2.

Alameda County

Alameda County has several different General Plans, depending on the different geographic areas within the county. The Eden Area General Plan (County of Alameda 2010) applies here. There are also several county-wide elements of the General Plan. The Eden Area General plan has a Public Facilities and Services Element that includes water service, wastewater, and stormwater. That element has the following relevant goals:

- Goal PF-10: Encourage the collection, treatment and disposal of wastewater in a safe, sanitary and environmentally acceptable manner.
- Goal PF-11: Collect, store and dispose of stormwater in ways that are safe, sanitary and environmentally acceptable.

City of Hayward

The Hayward General Plan 2040 (City of Hayward 2014) includes the following relevant public service goals, policies, and implementation measures:

- Goal PFS-1: Ensure the provision of adequate and efficient facilities and services that maintain service levels, are adequately funded, accessible, reliable, and strategically allocated.
- Goal PFS-3: Maintain a level of service in the City's water system that meets the needs of existing and future development while improving water system efficiency.
- Goal PFS-4: Maintain a level of service in the City's wastewater collection and disposal system to meet the needs of existing and future development.
- Goal PFS-5: Maintain an adequate level of service in the City's storm drainage system to accommodate runoff from existing and future development, prevent property damage due to flooding, and improve environmental quality.
- Goal PFS-6: Maintain flood control infrastructure to adequately protect life and property from flooding.
- Goal PFS-8: Ensure the provision of adequate gas and electric services to Hayward residents and businesses, and ensure energy facilities are constructed in a fashion that minimizes their impacts on surrounding development and maximizes efficiency.

City of Union City

Union City’s 2002 General Plan Policy Document (City of Union City 2002) includes the following relevant policy:

- PF-B.1.4: Where some services are provided by other public entities, such as the ACWD and the USD, the City shall coordinate construction efforts with these agencies to provide appropriate levels of service and minimize redundant construction costs.

City of Fremont

The City of Fremont General Plan (City of Fremont 2011) includes the following relevant policy:

- <u>Policy 9-3.1:Water, Flood, and Sanitary Sewer Services</u>

  Work with the ACWD, USD, and Alameda County Flood Control and Water Conservation District (ACFCWCD) to encourage their long range plans are consistent with the Fremont General Plan.

3.15.3 Environmental Impacts and Mitigation Measures

Overview

The SBSP Restoration Project would restore a substantial portion of the approximately 15,100-acre SBSP Restoration Project area to tidal marsh and would therefore contribute to changes in water levels, tidal flows and sedimentation patterns in the South Bay, the tidal sloughs, and the ponds over the 50-year planning horizon. These changes would potentially affect the operation and management of existing utilities (e.g., electrical transmission lines and substations, gas pipelines, storm drains, pump stations, and wastewater treatment plant outfalls) within the SBSP Restoration Project area. Impact evaluations for the Action Alternatives are based on the existing conditions described in Section 3.15.1, Physical Setting, and not the proposed conditions that would occur under the No Action Alternative.[1] This approach mimics what was done for the 2007 Final EIS/R and for the Phase 2 EIS/R that was specific to the Don Edwards San Francisco Bay National Wildlife Refuge (Refuge). In this case, the No Action Alternative represents no change from current management direction or level of management intensity provided in the Adaptive Management Plan (AMP) and other management documents and practices for the Reserve, though those programs would continue as they do now.

Significance Criteria

For the purposes of this Draft EIS/R, the project would have a significant impact if it would:

- Substantially reduce the ability to access PG&E towers, stations, or electrical transmission lines;
- Reduce clearance between waterways and electrical transmission lines such that navigation of watercraft or regulatory compliance was affected;
- Reduce the integrity of PG&E's utility infrastructure;
- Change water level, tidal flow, or sedimentation such that drainage of storm drains, operation of pumping facilities, or discharge of sewer force mains were substantially affected;
- Disrupt rail service due to project activities such as construction or operations and maintenance;
- Reduce access to sewer force mains due to levee construction, or
- Place a substantial demand on regional energy supply or require or cause a substantial increase in peak and base period electricity demand.

As explained in Section 3.1.2, Environmental Setting and Impact Analysis, although both Council on Environmental Quality (CEQ) Regulations for Implementing NEPA (CEQ 2015) and the CEQA Guidelines (AEP 2016) were considered during the impact analysis, impacts identified in this Draft EIS/R are characterized using CEQA terminology. Please refer to Section 3.1.2 for a description of the terminology used to explain the severity of the impacts. Also note that the impacts and the thresholds of significance in this Draft EIS/R are similar to those evaluated in the 2007 Final EIS/R with the additional discussion of electrical demand.

Program-Level Evaluation

The 2007 Final EIS/R conducted broad, regional analyses of program-level utility impacts from the types of activities that would be necessary to implement Programmatic Alternative A (the No Action Alternative) and Programmatic Alternatives B and C (the two program-level Action Alternatives) and the outcomes of their implementation. The 2007 Final EIS/R evaluated the potential utility impacts of these three long-term alternatives against nine program-level impacts, most of which were each determined to have less-than-significant impacts to utilities. The exceptions were potentially significant impacts on PG&E tower structural integrity resulting from Programmatic Alternative A (the No Action Alternative)

[1] "No Action Alternative" is the National Environmental Policy Act (NEPA) term. It corresponds to the California Environmental Quality Act (CEQA) term "No Project Alternative." This Draft EIS/R uses No Action throughout.

and on rail service due to construction of coastal flood levees and tidal marsh restoration under both Action Alternatives (Programmatic Alternatives B and C).

Project-Level Evaluation

Phase 2 Impact 3.15-1: Reduced ability to access PG&E towers, stations or electrical transmission lines.

Alternative Eden A (No Action). Southern Eden Landing does not contain PG&E transmission lines that traverse the ponds, nor are there substations on the levees. Neither the existing local power distribution line and towers on the northern levee of Ponds E1, E7, and E6, nor the line that runs through the Southern Ponds would be affected in the No Action Alternative. Therefore, Alternative Eden A would not impede or affect access to PG&E transmission facilities, and there would be no impact.

Alternative Eden A Level of Significance: No Impact

Alternative Eden B. Alternative Eden B actions would primarily occur in areas that do not contain PG&E power transmission lines or substations. The existing power distribution line on the northern levees of Ponds E1, E7, and E6 serves only CDFW. This infrastructure would become obsolete with implementation of Alternative Eden B, and therefore the line poles would be removed. The existing power distribution line and poles that run through the Southern Ponds would be retained, and the levees that provide PG&E access to those towers and the line would be maintained and/or modified, as needed, to continue to allow PG&E access. Therefore, Alternative Eden B would not impede access to PG&E transmission facilities, and there would be no impact.

Alternative Eden B Level of Significance: No Impact

Alternative Eden C. Alternative Eden C actions would primarily occur in areas that do not contain PG&E power transmission lines or substations. The existing power distribution line on the northern levees of Ponds E1, E7, and E6 serves only CDFW. This infrastructure would become obsolete with implementation of Alternative Eden C, and therefore the line poles would be removed. The existing power distribution line and poles that run through the Southern Ponds would be retained, and the levees that provide PG&E access to those towers and the line would be maintained and/or modified, as needed, to continue to allow PG&E access. Therefore, Alternative Eden C would not impede access to PG&E transmission facilities, and there would be no impact.

Alternative Eden C Level of Significance: No Impact

Alternative Eden D. Alternative Eden D actions would primarily occur in areas that do not contain PG&E power transmission lines or substations. The existing power distribution line on the northern levees of Ponds E1, E7, and E6 serves only CDFW. This infrastructure would become obsolete with implementation of Alternative Eden D, and therefore the line poles would be removed. The existing power distribution line and poles that run through the Southern Ponds would be retained, and the levees that provide PG&E access to those towers and the line would be maintained and/or modified, as needed, to continue to allow PG&E access. Therefore, Alternative Eden D would not impede access to PG&E transmission facilities, and there would be no impact.

Alternative Eden D Level of Significance: No Impact

Phase 2 Impact 3.15-2: Reduced clearance between waterways and PG&E electrical transmission lines.

Alternative Eden A (No Action). Southern Eden Landing does not contain PG&E transmission lines that traverse the ponds, nor are there substations on the levees. Neither the existing local power distribution line and poles on the northern levee of Ponds E1, E7, and E6, nor the line that runs through the Southern Ponds would be affected in the No Action Alternative. Therefore, Alternative Eden A would not reduce clearance between waterways and PG&E electrical transmission lines, and there would be no impact.

Alternative Eden A Level of Significance: No Impact

Alternative Eden B. Alternative Eden B actions would primarily occur in areas that do not contain PG&E power transmission lines or substations. The existing power distribution line and wood poles on the northern levees of Ponds E1, E7, and E6 serves only CDFW. This infrastructure would become obsolete with implementation of Alternative Eden B, and therefore the line poles would no longer be necessary. The line and associated wood poles on the northern levees of Ponds E1, E7, and E6 and over OAC would be removed. The existing power distribution line and poles that run through the Southern Ponds would be retained, and the levees that provide PG&E access to those towers and the line would be maintained and/or modified as needed to continue to allow PG&E access. Therefore, the height of the distribution line crossing ACFCC would not change. Alternative Eden B would not reduce clearance between waterways and PG&E electrical lines, and there would be no impact.

Alternative Eden B Level of Significance: No Impact

Alternative Eden C. Alternative Eden C actions would primarily occur in areas that do not contain PG&E power transmission lines or substations. The existing power distribution line on the northern levees of Ponds E1, E7, and E6 serves only CDFW. This infrastructure would become obsolete with implementation of Alternative Eden C, and therefore the line poles would no longer be necessary. The line and associated wood poles on the northern levees of Ponds E1, E7, and E6 and over OAC would be removed. The existing power distribution line and poles that run through the Southern Ponds would be retained, and the levees that provide PG&E access to those towers and the line would be maintained and/or modified as needed to continue to allow PG&E access. Therefore, the height of the distribution line crossing ACFCC would not change. Alternative Eden C would not reduce clearance between waterways and PG&E electrical lines, and there would be no impact.

Alternative Eden C Level of Significance: No Impact

Alternative Eden D. Alternative Eden D actions would primarily occur in areas that do not contain PG&E power transmission lines or substations. The existing power distribution line on the northern levees of Ponds E1, E7, and E6 serves only CDFW. This infrastructure would become obsolete with implementation of Alternative Eden D, and therefore the line poles would no longer be necessary. The line and associated wood poles on the northern levees of Ponds E1, E7, and E6 and over OAC would be removed. The existing power distribution line and poles that run through the Southern Ponds would be retained, and the levees that provide PG&E access to those towers and the line would be maintained and/or modified as needed to continue to allow PG&E access. Therefore, the height of the distribution line crossing ACFCC would not change. Alternative Eden D would not reduce clearance between waterways and PG&E electrical lines, and there would be no impact.

Alternative Eden D Level of Significance: No Impact

Phase 2 Impact 3.15-3: Reduced structural integrity of PG&E towers.

Alternative Eden A (No Action). Under the No Action Alternative (Alternative Eden A), no new activities would occur in the project area. Thus, neither the existing local power distribution line and towers on the northern levee of Ponds E1, E7, and E6, nor the line that runs through the Southern Ponds would be affected in the No Action Alternative. Therefore, Alternative Eden A would not reduce the structural integrity of PG&E towers, and there would be no impact.

Alternative Eden A Level of Significance: No Impact

Alternative Eden B. Under Alternative Eden B, actions would occur on pond levees that contain existing power distribution lines on the northern levees of Ponds E1, E7, and E6 and on levees that run through the Southern Ponds. The former line and wood poles on the northern levees of Ponds E1, E7, and E6 serve only CDFW and would no longer be necessary. They would be removed as part of this alternative. The distribution line within the Southern Ponds would be retained, and the foundations of the wood poles on this line would be modified as needed, to maintain the poles and preserve their structural integrity. Therefore, Alternative Eden B would have less than significant impacts on PG&E poles.

Alternative Eden B Level of Significance: Less than Significant

Alternative Eden C. Under Alternative Eden C, actions would occur on pond levees that contain existing power distribution lines on the northern levees of Ponds E1, E7, and E6 and that run through the Southern Ponds. The former line and poles serve only CDFW and would no longer be necessary. They would be removed as part of this alternative. The distribution line within the Southern Ponds would be retained, and the poles on this line would be modified, as needed, to maintain the poles and preserve their structural integrity. Therefore, Alternative Eden C would have less than significant impacts on PG&E poles.

Alternative Eden C Level of Significance: Less than Significant

Alternative Eden D. Under Alternative Eden D, actions would occur on pond levees that contain existing power distribution lines on the northern levees of Ponds E1, E7, and E6 and that run through the Southern Ponds. The former line and towers serve only CDFW and would no longer be necessary. They would be removed as part of this alternative. The distribution line within the Southern Ponds would be retained, and the poles on this line would be modified, as needed, to maintain the poles and preserve their structural integrity. Therefore, Alternative Eden D would have less than significant impacts on PG&E poles.

Alternative Eden D Level of Significance: Less than Significant

Phase 2 Impact 3.15-4: Changes in water level, tidal flow and sedimentation near storm drain systems.

Stormwater facilities collect rainfall runoff from upland areas and discharge via gravity flow and/or pumping into the SBSP Restoration Project area. These flows typically discharge to channels and sloughs leading to the Bay. Most drainage channels collect stormwater from at least one outfall that discharges via gravity when water levels in the slough are lower than the outfall (at low tide). The following discussion addresses potential impacts to gravity-driven storm drainage. Potential impacts to storm drain systems that rely on pumping are addressed in Phase 2 Impact 3.15-5, below.

The potential for impacts depends on the change to low-tide elevations, amount of channel sedimentation near the outfall, the capacity of the storm drain system, and the ability of the structure to function properly with higher low-tide elevations of the receiving water. In storm drain systems that do not have the capacity to accommodate higher low-tide elevations or sedimentation near the outfall, reduced conveyance through the structures could potentially result in ponding of stormwater in developed areas. Storm water outfalls discharging via gravity flow in the Eden Landing pond complex drain to OAC and the ACFCC; the closest of these are along the northern levee of Pond E1 and at the northeast corner of Pond E6. There is also an ACFCWCD stormwater detention basin – known as the J-Ponds – on County-owned lands within southern Eden Landing.

Alternative Eden A (No Action). Under Alternative Eden A, no new activities would occur in the project area. Thus, there would be no project-related changes in water level, tidal flow, or sedimentation near storm drain systems. Unplanned levee breaches could temporarily affect water level, tidal flow, and sedimentation along the OAC and ACFCC are possible but unlikely and would not be expected to change water surface elevations during high tide. Over time, sea-level rise could change water levels and tidal flows and thereby affect storm drains. However, these potential impacts are expected to be minimal within the foreseeable future. Therefore, Alternative Eden A would have less than significant impacts.

Alternative Eden A Level of Significance: Less than Significant

Alternative Eden B. Alternative Eden B would raise bottom elevations in the Bay and Inland Ponds and open all of the southern Eden Landing ponds to tidal flows. The potential impacts to stormwater outfalls would be slightly greater in Alternative Eden B than under Alternative Eden A, due to the restoration of ponds connected to the OAC and ACFCC. However, restoration actions at the these ponds would be designed to minimize impacts to the upstream storm drain systems, and the discharge pipes would be improved or relocated, as necessary and in coordination with the operating agencies. Although Alternative Eden B would modify the tidal flux in the ponds, modifications would not cause substantial changes in tidal levels, long-term increases in sedimentation, or substantial changes to stormwater management in upstream areas. Overall, the impacts of Alternative Eden B would be less than significant.

Alternative Eden B Level of Significance: Less than Significant

Alternative Eden C. Alternative Eden C would raise bottom elevations in the Bay Ponds, open the Bay Ponds to tidal flows, and maintain controlled flows through water control structures in the Inland Ponds and Southern Ponds. The potential impacts to stormwater outfalls would be slightly greater in Alternative Eden C than under Alternative Eden A, due to the restoration of ponds connected to the OAC and ACFCC. The potential impacts would be less than Alternative Eden B, however, because the changes in tidal flux would be relatively smaller. However, restoration actions at the these ponds would be designed to minimize impacts to the upstream storm drain systems, and the discharge pipes would be improved or relocated as necessary in coordination with the operating agencies. Although Alternative Eden C would modify the tidal flux in the ponds, modifications would not cause substantial changes in tidal levels, long-term increases in sedimentation, or substantial changes to stormwater management in upstream areas. Overall, the impacts of Alternative Eden C would be less than significant.

Alternative Eden C Level of Significance: Less than Significant

Alternative Eden D. Alternative Eden D would raise bottom elevations in the Bay and Inland Ponds, open the Bay Ponds to tidal flows, and maintain controlled flows through water control structures in the Inland Ponds and Southern Ponds until marsh habitat had formed in the Bay Ponds, after which fully tidal flows would be introduced there. The potential impacts to stormwater outfalls would be slightly greater in Alternative Eden D than under Alternative Eden A, due to the restoration of ponds connected to the OAC and ACFCC. The potential impacts would initially be less than Alternative Eden B, because the changes in tidal flux would be relatively smaller. However, long-term potential effects would more closely resemble Alternative Eden B. The restoration actions at the these ponds would be designed to minimize impacts to the upstream storm drain systems, and the discharge pipes would be improved or relocated as necessary in coordination with the operating agencies. Although Alternative Eden D would modify the tidal flux in the ponds, modifications would not cause substantial changes in tidal levels, long-term increases in sedimentation, or substantial changes to stormwater management in upstream areas. Overall, the impacts of Alternative Eden D would be less than significant.

Alternative Eden D Level of Significance: Less than Significant

Phase 2 Impact 3.15-5: Changes in water level, tidal flow and sedimentation near pumping facilities.

Urban areas adjacent to the Eden Landing Phase 2 project area contain several stormwater lift stations that would discharge to sloughs upstream of the levee breaches (Moffatt & Nichol 2005). Lift stations are connected to discharge pipes that extend from the lift station to the adjacent slough where the discharge occurs. During storm events, stormwater runoff from the surrounding developed areas flows through storm drain systems toward the Bay. In areas where discharge to the tidal sloughs via gravity flow is not possible, the stormwater is pumped, or “lifted,” and discharged into the adjacent sloughs.

Changes to water levels or sedimentation patterns generally do not substantially affect pumping facilities, unless water surface elevations during high tide are substantially raised or sediment accumulation at discharge locations blocks outfall structures.

Alternative Eden A (No Action). Under Alternative Eden A, no new activities would occur in the project area. Thus, there would be no project-related changes in water level, tidal flow, or sedimentation near pumping facilities. Unplanned levee breaches could temporarily affect water level, tidal flow, and sedimentation along the OAC and ACFCC are possible but unlikely and would not be expected to change water surface elevations during high tide. Over time, sea-level rise could change water levels and tidal flows and thereby affect pumping facilities. However, these potential impacts are expected to be minimal within the foreseeable future and therefore, Alternative Eden A would have less than significant impacts.

Alternative Eden A Level of Significance: Less than Significant

Alternative Eden B. Tidal restoration under Alternative Eden B would potentially alter water levels during large storm events in tidally influenced sloughs near Eden Landing, although these changes in water level are not expected to affect the ability to operate existing pumping facilities. Decreased velocities upstream of levee breaches would potentially increase sedimentation; however, changes in sedimentation patterns would not be expected to substantially affect the operation of pumping facilities. Alternative Eden B would result in the restoration of ponds that would drain or otherwise connect to OAC and ACFCC. The lift station at the northwest corner of Pond E6 would be upstream of planned breaches or other connections. It would be largely unaffected by changes in flows. The lift station in the OAC north of Pond E1 is immediately adjacent to a planned levee lowering and the removal of a pump into this pond. This lift station may be removed, as it will no longer be needed. Impacts resulting from changes in water level, tidal flow, and sedimentation near pumping facilities would be less than significant.

Alternative Eden B Level of Significance: Less than Significant

Alternative Eden C. Tidal restoration and managed pond enhancement under Alternative Eden C would potentially alter water levels during large storm events in tidal sloughs near Eden Landing, although these changes in water level are not expected to affect the ability to operate existing pumping facilities. Decreased velocities upstream of levee breaches would potentially increase sedimentation; however, changes in sedimentation patterns would not be expected to substantially affect the operation of pumping facilities. Alternative Eden C would result in the restoration of ponds that would drain or otherwise connect to OAC and ACFCC. The lift station at the northwest corner of Pond E6 would be upstream of planned breaches or other connections. It would be largely unaffected by changes in flows. The lift station in the OAC north of Pond E1 is immediately adjacent to a planned levee lowering and the removal of a pump into this pond. This lift station may be removed, as it will no longer be needed. Impacts resulting from changes in water level, tidal flow, and sedimentation near pumping facilities would be less than significant.

Alternative Eden C Level of Significance: Less than Significant

Alternative Eden D. Tidal restoration and managed pond enhancement under Alternative Eden D would potentially alter water levels during large storm events in tidal sloughs near Eden Landing, although these changes in water level are not expected to affect the ability to operate existing pumping facilities. Decreased velocities upstream of levee breaches would potentially increase sedimentation; however, changes in sedimentation patterns would not be expected to substantially affect the operation of pumping facilities. Alternative Eden D would result in the restoration of ponds that would drain or otherwise connect to OAC and ACFCC. The lift station at the northwest corner of Pond E6 would be upstream of planned breaches or other connections. It would be largely unaffected by changes in flows. The lift station in the OAC north of Pond E1 is immediately adjacent to a planned levee lowering and the removal of a pump into this pond. This lift station may be removed, as it will no longer be needed. Impacts resulting from changes in water level, tidal flow, and sedimentation near pumping facilities would be less than significant.

Alternative Eden D Level of Significance: Less than Significant

Phase 2 Impact 3.15-6: Changes in water level, tidal flow and sedimentation near sewer force mains and outfalls.

A pipeline serving as part of the EBDA effluent disposal system traverses the northeastern corner of northern Eden Landing. It transports treated effluent from the USD northward towards the EBDA Bay outfall, a deep water discharge located south of the Oakland airport. All discharges from the USD facility and this pipeline occur outside the Eden Landing Phase 2 project area.

Alternative Eden A (No Action). There are no outfalls for sewer force mains in close proximity to the Phase 2 project area at Eden Landing. Therefore, under Alternative Eden A, there would be no potential for changes in water level, tidal flow, and sedimentation near sewer force mains or outfalls.

Alternative Eden A Level of Significance: No Impact

Alternative Eden B. There are no outfalls for sewer force mains in close proximity to the Phase 2 project area at Eden Landing. Under Alternative Eden B, a treated wastewater force main for the EBDA Bay outfall would be connected to the Phase 2 project ponds to allow use of treated water to irrigate vegetation on the proposed habitat transition zone in the Inland Ponds. The addition of this connection would not affect the outfall for the force mains. Therefore, under Alternative Eden B, there would be no potential for changes in water level, tidal flow, and sedimentation near sewer force mains or outfalls.

Alternative Eden B Level of Significance: No Impact

Alternative Eden C. There are no outfalls for sewer force mains in close proximity to the Phase 2 project area at Eden Landing. Therefore, under Alternative Eden C, there would be no potential for changes in water level, tidal flow, and sedimentation near sewer force mains or outfalls.

Alternative Eden C Level of Significance: No Impact

Alternative Eden D. There are no outfalls for sewer force mains in close proximity to the Phase 2 project area at Eden Landing. Therefore, under Alternative Eden D, there would be no potential for changes in water level, tidal flow, and sedimentation near sewer force mains or outfalls.

Alternative Eden D Level of Significance: No Impact

Phase 2 Impact 3.15-7: Disrupt Hetch Hetchy Aqueduct service so as to create a public health hazard or extended service disruption.

The following discussion evaluates potential impacts to service disruption of the Hetch Hetchy Aqueduct due to levee construction and habitat restoration at the Eden Landing Phase 2 locations. Hetch Hetchy Aqueduct-related infrastructure is not located within or in close proximity to the Eden Landing Phase 2 project area.

Alternative Eden A (No Action). Southern Eden Landing is not in close proximity to the Hetch Hetchy Aqueduct. Therefore, under Alternative Eden A, there would be no potential to disrupt Hetch Hetchy Aqueduct service so as to create a public health hazard or extended service disruption. There would be no impact.

Alternative Eden A Level of Significance: No Impact

Alternative Eden B. Alternative Eden B actions would occur within ponds that are not in close proximity to the Hetch Hetchy Aqueduct. Therefore, under Alternative Eden B, there would be no potential to disrupt Hetch Hetchy Aqueduct service so as to create a public health hazard or extended service disruption, and there would be no impact.

Alternative Eden B Level of Significance: No Impact

Alternative Eden C. Alternative Eden C actions would occur within ponds that are not in close proximity to the Hetch Hetchy Aqueduct. Therefore, under Alternative Eden C, there would be no potential to disrupt Hetch Hetchy Aqueduct service so as to create a public health hazard or extended service disruption, and there would be no impact.

Alternative Eden C Level of Significance: No Impact

Alternative Eden D. Alternative Eden D actions would occur within ponds that are not in close proximity to the Hetch Hetchy Aqueduct. Therefore, under Alternative Eden D, there would be no potential to disrupt Hetch Hetchy Aqueduct service so as to create a public health hazard or extended service disruption, and there would be no impact.

Alternative Eden D Level of Significance: No Impact

Phase 2 Impact 3.15-8: Disruption of rail service due to construction of coastal flood levees and tidal habitat restoration.

Alternative Eden A (No Action). Southern Eden Landing is not in close proximity to any active rail lines. Therefore, under Alternative Eden A, there would be no potential to disrupt rail service, and there would be no impact.

Alternative Eden A Level of Significance: No Impact

Alternative Eden B. Alternative Eden B actions would occur within ponds that are not in close proximity to any active rail lines. Therefore, under Alternative Eden B, there would be no potential to disrupt rail service, and there would be no impact.

Alternative Eden B Level of Significance: No Impact

Alternative Eden C. Alternative Eden C actions would occur within ponds that are not in close proximity to any active rail lines. Therefore, under Alternative Eden C, there would be no potential to disrupt rail service, and there would be no impact.

Alternative Eden C Level of Significance: No Impact

Alternative Eden D. Alternative Eden D actions would occur within ponds that are not in close proximity to any active rail lines. Therefore, under Alternative Eden D, there would be no potential to disrupt rail service, and there would be no impact.

Alternative Eden D Level of Significance: No Impact

Phase 2 Impact 3.15-9: Reduced access to sewer force mains due to levee construction.

The 2007 Final EIS/R showed no buried sewer force mains within the Phase 2 project area (Figure 3.16-1 of that document).

Alternative Eden A (No Action). There are no buried sewer force mains within the Eden Landing Phase 2 project area. Also, under Alternative Eden A, there would be no levee construction. Therefore, there is no potential for reduced access to sewer force mains and no impact.

Alternative Eden A Level of Significance: No Impact

Alternative Eden B. There are no buried sewer force mains within the Eden Landing Phase 2 project area. The EDBA pipeline and USD facility are immediately adjacent to the northeastern corner of the Phase 2 project area, but all levee improvement work and other project activities would be coordinated with these facilities to retain necessary access to that infrastructure. There would be a less than significant impact.

Alternative Eden B Level of Significance: Less than Significant

Alternative Eden C. There are no buried sewer force mains within the Eden Landing Phase 2 project area. The EDBA pipeline and USD facility are immediately adjacent to the northeastern corner of the Phase 2 project area, but all levee improvement work and other project activities would be coordinated with these facilities to retain necessary access to that infrastructure. There would be a less than significant impact.

Alternative Eden C Level of Significance: Less than Significant

Alternative Eden D. There are no buried sewer force mains within the Eden Landing Phase 2 project area. The EDBA pipeline and USD facility are immediately adjacent to the northeastern corner of the Phase 2 project area, but all levee improvement work and other project activities would be coordinated with these facilities to retain necessary access to that infrastructure. There would be a less than significant impact.

Alternative Eden D Level of Significance: Less than Significant

Phase 2 Impact 3.15-10: Increased demands on regional energy supply or substantial increase in peak and base period electricity demand.

Alternative Eden A (No Action). Under Alternative Eden A, no construction activities would occur in the southern Eden Landing ponds; there would be no project-related changes in energy demands, including regional peak and base period electricity demand, and no impacts.

Alternative Eden A Level of Significance: No Impact

Alternative Eden B. During construction, energy would be needed to produce and transport construction materials and for operating and maintaining construction equipment. Although measurable, the energy used during construction activities would not require substantial additional capacity nor substantially increase peak- or base-period demands for electricity. A potential exception would be an electric-powered dredge material hydraulic offloader and booster pumps.

There are two ways to measure electricity demand: consumption and peak demand. Electricity consumption is the amount of electricity used by consumers. According to the California Energy Commission (CEC), total statewide electricity consumption was 281,000 gigawatt hours (GWh) in 2015 (CEC 2017), and minor increases are expected in future years. An electric-powered offloader and booster pumps would use approximately 30 GWh of electricity over the 3 to 7 years needed for dredge material placement; this is a very small increase (0.002 to 0.004 percent) compared to the overall demand.

The highest electric power requirement during a specified period is known as the peak demand and is measured as the amount of electricity consumed at any given moment, usually integrated over a 1-hour period. Peak demand is often used to evaluate system reliability and identify congestion points on the electrical grid. California's peak demand typically occurs in August, between 3 p.m. and 5 p.m. In summer 2016, the peak demand in California was 60,500 MW (CEC 2017) and the peak demand in the Northern California balancing zone was 20,400 MW (California Independent System Operator [CAISO] 2017). Operating reserve margins are projections of supply margins over projected hourly demands. The target planning reserve margin for CAISO is 15 percent above projected summer peak demands every year, and the best available estimate for summer 2017 electricity reserves (1-in-2 forecasts) in Northern California is 19.8 percent. If electrically powered, the offloader and booster pumps would require 9 MW of additional peak capacity; this increase in peak demand from the project is not anticipated to exceed existing reserve amounts. The project's effect to total electricity consumption and peak electricity demand would be less than significant.

Alternative Eden B Level of Significance: Less than Significant

Alternative Eden C. If electrically powered, the hydraulic offloader and booster pumps would increase electricity consumption and peak demand. However, as discussed in Alternative Eden B, the potential increase in electrical consumption and peak demand would be small and would not exceed existing reserve amounts. There would be a less than significant impact.

Alternative Eden C Level of Significance: Less than Significant

Alternative Eden D. If electrically powered, the hydraulic offloader and booster pumps would increase electricity consumption and peak demand. However, as discussed in Alternative Eden B, the potential increase in electrical consumption and peak demand would be small and would not exceed existing reserve amounts. There would be a less than significant impact.

Alternative Eden D Level of Significance: Less than Significant

Impact Summary

Phase 2 impacts to utilities and the levels of significance are summarized in Table 3.15-1. The levels of significance are those remaining after implementation of program-level mitigation measures, project-level design features, and the AMP and other Reserve management documents and practices. The utilities analysis required no project-level mitigation measures to reduce the impacts to a level that was less than significant.

Table 3.15-1 Phase 2 Summary of Impacts – Utilities

IMPACT	ALT. EDEN A	ALT. EDEN B	ALT. EDEN C	ALT. EDEN D
Phase 2 Impact 3.15-1: Reduced ability to access PG&E towers, stations or electrical transmission lines.	NI	NI	NI	NI
Phase 2 Impact 3.15-2: Reduced clearance between waterways and PG&E electrical transmission lines.	NI	NI	NI	NI
Phase 2 Impact 3.15-3: Reduced structural integrity of PG&E towers.	NI	LTS	LTS	LTS
Phase 2 Impact 3.15-4: Changes in water level, tidal flow and sedimentation near storm drain systems.	LTS	LTS	LTS	LTS
Phase 2 Impact 3.15-5: Changes in water level, tidal flow and sedimentation near pumping facilities.	LTS	LTS	LTS	LTS
Phase 2 Impact 3.15-6: Changes in water level, tidal flow and sedimentation near sewer force mains and outfalls.	NI	NI	NI	NI
Phase 2 Impact 3.15-7: Disrupt Hetch Hetchy Aqueduct service so as to create a public health hazard or extended service disruption.	NI	NI	NI	NI
Phase 2 Impact 3.15-8: Disruption of rail service due to construction of coastal flood levees and tidal habitat restoration.	NI	NI	NI	NI
Phase 2 Impact 3.15-9: Reduced access to sewer force mains due to levee construction.	NI	LTS	LTS	LTS
Phase 2 Impact 3.15-10: Increased demands on regional energy supply or substantial increase in peak and base period electricity demand.	NI	LTS	LTS	LTS

Notes:
Alternative Eden A is the No Action Alternative (the No Project Alternative under CEQA).
LTS = Less than Significant
NI = No Impact

3.16 Visual Resources

This section of the Draft Environmental Impact Statement/Environmental Impact Report (referred to throughout as the Draft EIS/R) describes existing visual resources within the project area for Eden Landing Phase 2 of the South Bay Salt Pond (SBSP) Restoration Project. It then analyzes whether the project implementation would cause a substantial adverse effect on visual resources. The information presented is based on a review of existing visual and aesthetic resources within the area and other pertinent federal, state and local regulations. Potential impacts to visual resources associated with each alternative are assessed. The program-level mitigation measures described in Chapter 2, Alternatives, would be implemented as part of this project which influence the overall approach to design and construction for this phase of the project, however as a result, this section only includes additional mitigation measures as needed.

3.16.1 Physical Setting

Methodology

The development of the baseline visual conditions, significance criteria, and impact analysis for Eden Landing Phase 2 is informed by the programmatic and Phase 1 project-level analyses presented in the 2007 SBSP Restoration Project Final EIS/R (2007 Final EIS/R). The assessment of existing visual conditions is also based on site specific reconnaissance to gather baseline information on the existing visual character within and surrounding the Phase 2 project area at the Eden Landing pond complex (AECOM 2016).

This section presents a qualitative inventory of existing visual and aesthetic conditions and provides an assessment of the potential impacts of each of the project alternatives. The impact assessment considers changes to individual views and the visual character/visual quality of the project area that could result from each of the proposed Action Alternatives. This analysis is commensurate with the level of detail and assessment for findings produced for Phase 1 at northern Eden Landing, and for Phase 2 at the Refuge Ponds. Accordingly, no visual simulations were produced as part of this particular analysis.

Regional Setting

The greater Bay Area is within in the Coast Ranges Physiographic Province, which spans 400 miles of the California coast region from Humboldt County in the north to Santa Barbara County in the south. The San Francisco Bay region is characterized as having a Mediterranean climate, with Coast Redwood forest and chaparral and woodlands among the dominant the most recognizable habitat types. The San Francisco Bay Area is largely urbanized; however, views toward the open water, and upland open space areas are common. Views toward the Bay typically feature attributes such as tidal marsh and/or salt ponds.

The Eden Landing Phase 2 project area is situated along the southeast shoreline of San Francisco Bay just west of Union City and within the limits of the City of Hayward. Prominent landscape features visible from within the Eden Landing phase 2 project area include the San Francisco Bay (or Bay) to the west, the East Bay hills to the east, the Santa Cruz Mountains to the southwest, the Coyote Hills Regional Park (operated by East Bay Regional Park District) to the south, and restored tidal wetlands and enhanced managed ponds within the Phase 1 portion of Eden Landing just to the north.

Dominant man-made features visible from the Phase 2 project area include the San Mateo Bridge (State Route [SR] 92), high voltage transmission lines, the Bay Bridge, the skyline of downtown San Francisco, and Sutro Tower. The visual setting of the project area transitions from light industrial (Union Sanitary District [USD]) and commercial, to single-family residences, and again to commercial. Views to the west include rolling hills, open space, baylands, tidal marsh and salt ponds.

The Phase 2 project area is visible from surrounding areas including from recreational, transit, and residential uses including: Coyote Hills Regional Park, the San Mateo Bridge, and incoming planes to regional airports. Viewers from these and other elevated vantage points have the unique angle of observation that allows greater perspective of how the Phase 2 project area forms a transitional barrier between the open water of the bay, and the upland edge of the true shoreline.

Project Setting

Each of the Phase 2 project area ponds is bounded by a low-lying berm-like levee. These upland areas visually delineate the boundaries of each pond and break up distant views of what is otherwise shallow, open water, as a remnant of the former use for production of salt. These berm-like levees form the upland barrier surrounding both the Eden Landing complex and the Phase 2 project area, and allow vehicular and pedestrian access between the individual ponds. These berm separations between ponds range from curvilinear to straight lined upland features that add a sense of geometry and order to the landscape. The pond boundaries are levees/berms that create a visual limit or termination to each pond, and the greater Phase 2 project area and the narrow band of upland material, consisting of shades of brown and green, provides harmonious contrast to the blues and greens associated with the salt ponds and open water. Long-range views from the project area include the East Bay hills, Santa Cruz Mountains, developed cities on the peninsula, Pacific Gas and Electric (PG&E) transmission lines, and levees.

The Phase 2 project area includes 11 ponds that are described in three groups. Groups are based on their location within the complex along with their proximity and similarity to one another.

- The Bay Ponds: Ponds E1, E2, E4, and E7 are the four large ponds closest to San Francisco Bay.
- The Inland Ponds: Ponds E5, E6, and E6C are somewhat smaller ponds in the northeast portion of the complex.
- The Southern Ponds (or C-Ponds): Ponds E1C, E2C, E4C, and E5C are in the southeastern portion of the complex.

The following subsections provide a brief overview of the existing visual character of the project area as exemplified in photographic images taken from within each of the three pond groups and of the Phase 2 project area. Note, however, that southern Eden Landing is not generally open to the public. Licensed hunters are allowed access to portions of southern Eden Landing during duck hunting season, and there is a public access trail on the north levee of the Alameda Creek Flood Control Channel (ACFCC), which forms the southern boundary of the Phase 2 project area. The proposed Phase 2 Action Alternatives would increase this public access by adding trails, bridges, and at least one viewing platform. The locations of these features would vary by alternative, as discussed elsewhere.

Bay Ponds

The Bay Ponds (Ponds E1, E2, E4, and E7) make up the four large ponds closest to San Francisco Bay. Of the Bay Ponds, Pond E2 is the largest (by area) and forms the boundary of the Southern Eden Landing area with the outward edge of the Bay.

Figure 3.16-1 was taken at the north side of Pond E7, just west of its border with Pond E6 on the existing spur of the Bay Trail that runs through the project area. The image faces south toward the open water of Ponds E7 and E4. As demonstrated in the figure, Turk Island and Coyote Hills Regional Park are prominent upland landscape features that bring distant sense of sequence and contrasting convex form to what is an otherwise horizontal and flat landscape. The mid to foreground areas visible from the north side of the Bay Ponds is dominated by open water. Views toward the remnant location of the Old Alvarado Salt Works add contrasting structural development to an otherwise undeveloped landscape. The stumpy and irregularly shaped wooden piles of the remnant structure create a small stippled texture within the otherwise smooth or uniform nature of the open water in the pond. Additional information on the historical Old Alvarado Salt Works is located in Section 3.7 Cultural Resources. The Old Alvarado Salt Works is not a publicly accessible area, though one Action Alternative would provide a Bay Trail spur or loop trail to this destination. So this feature of the landscape may someday be opened to recreational viewers.

Views from the Bay Ponds to the south, west, and north are also characterized by open, undeveloped space that is also characterized by a simple, flat, and horizontal fore to midground distantly enclosed by the convex and vertical form of the Santa Cruz Mountains and Marin Headlands. Views to the east are also dominantly open space in the foreground, but commercial and urbanized areas of Union City, Fremont, and Hayward are sandwiched between the East Bay Hills and the Bay. Because southern Eden Landing is not open to most types of public access (current recreational use is limited to in-season hunting in certain pond areas by licensed hunters), the typical viewer groups are limited numbers of hunters, researchers, and California Department of Fish and Wildlife (CDFW) employees. As noted in many other sections of this document, however, the Phase 2 Action Alternatives would add trails, viewing platforms, and pedestrian/bicycle bridges in several different parts of Eden Landing.

Figure 3.16-1. View of Pond E7 and Turk Island, Facing South

Inland Ponds

The Inland Ponds are situated in the northeast corner of the Phase 2 project area and are just east of the Bay Ponds. The Inland Ponds include Ponds E5, E6, and E6C, and are each smaller than the Bay Ponds.

Figure 3.16-2 was taken from the southeastern corner of Pond E6C along the eastern boundary of the project and faces west northwest. There are no designated trails currently in this area of the Inland Ponds. As demonstrated in the image, views to the west of the Inland Ponds and Bay Ponds are distantly enclosed by the Santa Cruz Mountains located on the west side of the Bay on the peninsula. Views from the Inland Ponds toward the west and north are panoramic and unobstructed. Foreground to midground views are characterized by a mix of open water and upland berm areas that separate the Ponds. The upland areas associated with these berms draw the viewers eye as they create contrasting form, line, color, and texture with the dominant non-linear nature of the open water that occupies most views toward individual Ponds. Currently only the upland berm areas separating the ponds are vegetated, and therefore the sinuous to geometric form these berms follow appear course to smooth in texture with muted rounded to form dominated by natural shades of light to dark brown and pale greens which complement the typically bright blue nature of the open water within the salt ponds.

Figure 3.16-2. View of Pond E6C, Facing West

Southern Ponds

The Southern Ponds include Ponds E1C, E2C, E4C, and E5C are located in the southeastern portion of the complex. The Southern Ponds surround a natural hill known as Turk Island that is a private inholding. Turk Island is prominently visible in views throughout the project area, but particularly from the ACFCC trail and in west-facing views from the Southern Ponds.

Figure 3.16-3 was taken along the southern boundary of Pond E5C facing east toward Hayward. The PG&E distribution line and remnant structures associated with salt production are among the few visible structural and vertical elements in existing views from this area. As discussed above, the East Bay Hills distantly enclose easterly views from the project, and add a sense of rounded topography that contrasts with the open space of the project area that occupies the fore to midground of most easterly views from within the project area. Natural shades of brown, pale green, and blue dominate the landscape. Vegetation is sparse, and limited to areas surrounding access roads and levees. Where present, the vegetation adds a medium to fine grained texture to the composition of views, which contrasts with the otherwise smooth and glassy nature of calm conditions within the ponds.

Figure 3.16-3. View from Levee Separating Ponds E5C and CP3C, Facing East

3.16.2 Regulatory Setting

This section describes the regulatory goals of the jurisdictions surrounding the Phase 2 project area with regard to visual resources in the salt pond area. These goals are defined in city and county general plans and regional planning documents.

Eden Landing Land Management Plan

Section 1019 of the California Fish and Wildlife Code requires the CDFW to draft and adopt Land Management Plans for any property wholly under its jurisdiction and that was purchased after January 1, 2002. While the plan makes no specific recommendations pertaining to scenic views or visual resources, the plan does include permit mechanisms to allow duck hunting and other recreation activities within the project area[1] (CDFW 2015).

[1] Section 550, General Regulations for Public Use on All Department of Fish and Wildlife Lands, describes access and use restrictions associated with wildlife viewing, hiking, and waterfowl hunting on CDFW managed lands.

Alameda County

The Alameda County General Plan designates salt ponds as open space, and among its objectives is providing "a continuous system of open space for the preservation, enhancement, and protection of natural scenic features and preservation and protection of watershed and wildlife areas and agricultural areas" (County of Alameda 1973).

City of Hayward

The City of Hayward identifies the Bay shoreline as a significant regional open space, ecological, and aesthetic resource. The Hayward General Plan 2040 provides polices and strategies to protect the shoreline as well as other resources that provide similar functions (City of Hayward 2014). Policies concerning protection of scenic resources are identified under the Natural Resources Element, as described below. Goal NR-8 strives to "enhance, preserve, and increase the aesthetic qualities of Hayward's undisturbed natural hillsides and shoreline, and designated scenic transportation corridors."

Other Relevant Plans in the Region

The City of Fremont borders the southern portion of the project area, and Union City borders the eastern project boundary. As such, views toward the project area from within these jurisdictions are possible, and relevant goals, policies, and strategies associated with visual resources germane to each are described below.

City of Fremont

The City of Fremont General Plan (2011) provides policy guidance on the protection of Bayland resources. Fremont abuts the southern boundary of the project area to the south of ACFCC.

The policy relevant to the proposed SBSP Restoration Project in protecting the City's visual resources includes:

- Policy 2-6.3: Baylands: Manage Fremont's Baylands as permanent open space. The habitat and ecological value of these areas should be conserved and restored to the greatest extent possible. This may include specific land management prescriptions not only for the baylands but for adjoining upland properties that may impact wetland or bay habitat value. Planning for the baylands should consider the effects of climate change and sea level rise. Much of the Baylands acreage is in public ownership and is subject to regulation by agencies such as the US Department of Fish and Wildlife, California Department of Fish and Game, and Army Corps of Engineers. The acreage also includes ponds used for commercial salt production. These areas are generally designated for Resource Conservation on the Land Use Map.

City of Union City

Union City is adjacent to the Phase 2 project area and views from the project area to the City are possible. Union City's 2002 General Plan Policy Document (City of Union City 2002) identifies the goals and policies relating to visual resources within the City's jurisdiction, so the following do not directly apply to the project, however would influence the surrounding visual character of views from the project area toward development within Union City:

- Goal CD-E.2: To provide visual and physical access to the bay marsh edge

- Policy CD-E.2.1: The City shall provide access to vies of the salt marshes
- Policy CD-E.2.2: The City shall minimize the visual impact of marsh-edge development through the use of buffers such as pedestrian trails, linear parks, and landscaped rights of way.
- Policy CD-E.2.3: The City shall ensure that new development respects its natural setting by maintaining visual harmony with the wetlands area.

San Francisco Bay Plan

The Appearance, Design, and Scenic Views section of the San Francisco Bay Plan provides the findings and policies related to the visual effects of development on the shoreline (Bay Conservation and Development Commission [BCDC] 2012). Specific policies relevant to the SBSP Restoration Project include the following numbered items (irrelevant items not included in this list):

3. In some areas, a small amount of fill may be allowed if the fill is necessary—and is the minimum absolutely required—to develop the project in accordance with the Commission’s design recommendations.

4. Structures and facilities that do not take advantage of or visually complement the Bay should be located and designed so as not to impact visually on the Bay and shoreline. In particular, parking areas should be located away from the shoreline. However, some small parking areas for fishing access and Bay viewing may be allowed in exposed locations.

8. Shoreline developments should be built in clusters, leaving open area around them to permit more frequent views of the Bay. Developments along the shores of tributary waterways should be Bay-related and should be designed to preserve and enhance views along the waterway, so as to provide maximum visual contact with the Bay.

9. “Unnatural” debris should be removed from sloughs, marshes, and mudflats that are retained as part of the ecological system. Sloughs, marshes, and mudflats should be restored to their former natural state if they have been despoiled by human activities.

10. Towers, bridges, or other structures near or over the Bay should be designed as landmarks that suggest the location of the waterfront when it is not visible, especially in flat areas. But such landmarks should be low enough to assure the continued visual dominance of the hills around the Bay.

12. In order to achieve a high level of design quality, the Commission’s Design Review Board, composed of design and planning professionals, should review, evaluate, and advise the Commission on the proposed design of developments that affect the appearance of the Bay in accordance with the San Francisco Bay Plan findings and policies on Public Access; Appearance, Design, and Scenic Views; and the Public Access Design Guidelines. City, county, regional, state, and federal agencies should be guided in their evaluation of bayfront projects by the above guidelines.

14. Views of the Bay from vista points and from roads should be maintained by appropriate arrangements and heights of all developments and landscaping between the view areas and the water. In this regard, particular attention should be given to all waterfront locations, areas below

vista points, and areas along roads that provide good views of the Bay for travelers, particularly areas below roads coming over ridges and providing a “first view” of the Bay (shown in San Francisco Bay Plan Map No. 8, Natural Resources of the Bay).

15. Vista points should be provided in the general locations indicated in the [San Francisco Bay Plan] maps. Access to vista points should be provided by walkways, trails, or other appropriate means to connect to the nearest public thoroughfare where parking or public transportation is available. In some cases, exhibits, museums, or markers would be desirable at vista points to explain the value or importance of the areas being viewed.

The proposed Phase 2 project components would be consistent with the San Francisco Bay Plan.

3.16.3 Environmental Impacts and Mitigation Measures

Significance Criteria

The significance criteria for visual resources are drawn from those adopted for the 2007 Final EIS/R. The 2007 Final EIS/R defined the project as having a significant impact on visual resources if it would:

- Have a substantial, demonstrable negative aesthetic effect on a scenic vista;
- Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway;
- Substantially degrade the existing visual character or quality of the site and its surroundings; or
- Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area.

The Phase 2 project area does not contain any designated scenic vistas and is not within the viewshed of a state scenic highway. Furthermore, the Phase 2 project does not include lighting or contain materials that would generate substantial light or glare. Therefore, the Phase 2 project was not evaluated against these significance criteria, and this Draft EIS/R does not evaluate the impacts associated with them. The two other significance criteria listed above are included in Impact 3.16-1, which addresses altering the view and visual character of the Phase 2 project ponds.

Although both the Council on Environmental Quality Regulations for Implementing the National Environmental Policy Act and the California Environmental Quality Act (CEQA) Guidelines (AEP 2016) were considered during the impact analysis, the impacts identified in this Draft EIS/R are characterized using CEQA terminology.

Program-Level Evaluation

The 2007 Final EIS/R evaluated the potential visual impact of three long-term, program-level alternatives, each of which were determined to have less-than-significant impacts to visual resources, scenic resources, and scenic character. The 2007 Final EIS/R found that under each programmatic alternative, the historic salt production remnants (e.g., piers, Archimedes’ screws) would continue to remain in place, therefore limiting changes to visual character in terms of structural development. Furthermore, the 2007 Final EIS/R found that none of the programmatic alternatives would include lighting components or materials that would generate substantial light and glare.

Project-Level Evaluation

Phase 2 Impact 3.16-1: Alter views of the SBSP Restoration Project area and vicinity.

Alternative Eden A (No Action). Under Alternative Eden A, no new activities would be implemented as part of the Eden Landing Phase 2 project. The CDFW would continue maintaining and operating the ponds as part of the ELER in accordance with the *Eden Landing Ecological Reserve System E2 and E2C Operation Plan* (Operations Plan), the activities described in the Adaptive Management Plan (AMP), and current CDFW practices. The levees around the ponds are high priority levees to be maintained for inland flood risk management. Under collaboration with the Alameda County Flood Control and Water Conservation District (ACFCWCD), these outboard levees would be maintained (or repaired upon failure). The ACFCWCD would continue to direct the highest stormwater runoff flows into and out of the J-ponds and associated channels as needed. The existing PG&E distribution lines (running along the north side of the E1, E7 and E6, along with the distribution line bisecting E2C and running along the south side of E5C and E4C) would remain active and be unaffected by long-term operation of the Reserve. No new recreation or public access features would be added in Alternative Eden A. However, the existing trail along the ACFCC would continue to be maintained.

Under Alternative Eden A, all non-priority levees within the Phase 2 project area would be allowed to settle over time, and due to wave action, unintentional breeching, and levee overtopping, these levees would become increasingly prone to failure. However, because high priority flood risk management levees and utility access points and maintenance rights-of-way would be maintained, the overall existing character as isolated managed ponds would continue to exist. Ongoing operations and maintenance of the high priority levees would cause the ponds to retain their isolation from the Bay and keep them as managed ponds. Existing views would remain largely intact and unaltered except for the slow dissolution of the berms that currently separate the ponds. Since the area would not be opened to public access, these extremely slow and minor changes to the existing visual character of the landscape would not be seen by viewers. Therefore, implementation of Alternative Eden A would result in no impacts to existing views.

Alternative Eden A Level of Significance: No Impact

Alternative Eden B. Alternative Eden B would restore the entirety of southern Eden Landing to tidal marsh in a single project implementation stage. Dredge material would be brought in to raise pond bottom elevations in the Bay and Inland Ponds and to build habitat transition zones. The eastern, backside levees would be improved to provide the necessary degree of flood risk management. Habitat enhancements including transition zones, islands made from remnant levees, channel excavation, and breaching and lowering of portions of internal and external levees would be implemented. Two sections of internal levee improvements would also be made along the J-ponds and other ACFCWCD-owned channels. Alternative Eden B features the inclusion of treated water from USD and brackish water from groundwater wells, and the placement of root wads and logs outside of Pond E2 to help trap sediment and form beach-like areas while providing some erosion protection. The Southern Ponds would become connected to the ACFCC through a pair of water control structures and an additional structure within them. The Bay Trail spine would be completed through southern Eden Landing on one of a number of routes, one of which would be on the improved internal levees above. There would be one viewing platform added.

Alternative Eden B has the potential to result in construction-related impacts to visual resources from public viewing points near the southern Eden Landing ponds, on a periodic basis as the construction schedule dictates. General construction activities would include excavation, earth movement, levee enhancements, levee lowering, and the installation, use, and demobilization of dredge material placement infrastructure. The presence and movement of heavy construction equipment and potential construction-related generation of dust could temporarily degrade visual resources in the area.

As previously discussed, public access and public viewing points near the southern Eden Landing ponds are currently limited – licensed hunters are allowed access to portions of southern Eden Landing during duck hunting season, and there is a public access trail on the north levee of the ACFCC (the Alameda Creek Regional Trail). During construction, hunting access would be curtailed in areas and at times where those activities could cause safety issues, but public access to the trail on the north levee of the ACFCC would generally be unaffected, with the exception of temporary closures for construction or modification of water control structures and other features at and near the ACFCC. During dredge material placement, views from the Alameda Creek Regional Trail would include the booster pump and/or substation at the southwest corner of Pond E2, pipelines on Pond E2 and E4 levees, and potentially views of the pipeline and offloading facility in the Bay. Views of the offloading facility would be similar in nature to many other barges and construction vessels that are seen around the Bay. Although it would not be seen from the Alameda Creek Regional Trail at night, the offloading facility and associated equipment would have navigation lighting, as per United States Coast Guard guidelines, and be lit at night and in periods of restricted visibility. Once dredge material placement was complete, the offloading facility, pipelines, booster pumps, and substations would be decommissioned and removed, and would no longer affect views from the Alameda Creek Regional Trail. Over the long-term, views of the project area would change due to increased tidal action and the activity/motion created by increased flow between and within the ponds through added breaches. Additionally, the Southern Ponds would be internally breached to allow greater flow between one another and a water control structure added to allow greater connectivity to ACFCC. Greater public access would be achieved through the completion of the Bay Trail spine allowing greater numbers of users to access new portions of the project area in a safe and reliable manner. The ponds would gradual change color over time becoming tidal marsh and increasing the presence of vegetation in areas previously maintained as open water. The immediate addition of a habitat transition zone on the backside levee of the Inland and Southern Ponds would introduce a similar change in color and texture, but the change would be more abrupt, because the habitat transition zone would be constructed purposefully over a specified period, whereas the tidal mudflat throughout the currently open water areas of the ponds would develop more gradually over time.

Under Alternative Eden B, the views and visual character of the Phase 2 project area would be gradually altered over a decade or more to a more natural character indicative of tidal marsh and would provide new recreational opportunities for user experience. Therefore alternation of existing views and potential impacts associated with the actions described above would be less than significant.

Alternative Eden B Level of Significance: Less than Significant

Alternative Eden C. Implementation of Alternative Eden C would retain the Inland Ponds and the Southern Ponds as managed ponds and add a number of water control structures to allow the depth and salinity of these ponds to be actively managed for a range of different pond-dependent wildlife. Bottom elevations would be raised in the Bay Ponds, and the Bay Ponds would be restored to tidal marsh, as in Alternative Eden B, through the use of a mid-complex levee that would largely be built on top of the existing internal levees. This alternative would feature a similar range of habitat enhancements as Alternative Eden B but in different locations. The Bay Trail is planned for the same routes as Alternative Eden B, but Alternative Eden C would add an additional set of trails on either side of the Old Alameda

Creek (OAC) and a bridge over the OAC to connect them. These trails would form a spur trail to the site of the Alvarado Salt Works, and a viewing platform there. Another large bridge would be built over the ACFCC to extend the Bay Trail spine further and beyond the ELER boundary itself.

As with Alternative Eden B, views of the southern Eden Landing ponds would change during construction and views of the Bay Ponds would also change over the long-term due to increased tidal action and the activity/motion created by increased flow between the Bay Ponds and OAC. The Inland and Southern Ponds would retain their existing aesthetic as they would function as managed ponds, but with added controlled connectivity between and among them. The Bay Ponds would gradually change color over time becoming tidal marsh and increasing the presence of vegetation in areas previously maintained as open water. The immediate addition of a habitat transition zone on the mid-complex levee separating the Bay Ponds and the Inland Ponds would introduce a similar change in color and texture, but the change would be more abrupt, because the habitat transition zone would be constructed purposefully over a specified period, whereas the tidal mudflat throughout the currently open water areas of the ponds would develop more gradually over time.

Under Alternative Eden C, the views and visual character of the Bay Pond area of the project area would be gradually altered to a more natural character indicative of tidal marsh, while the Southern and Inland Ponds would appear much the same as they do now, but with greater access to natural tidal flux. Alternative Eden C would provide even more new recreational opportunities for user experience compared to Alternative Eden B. Therefore alternation of existing views and potential impacts associated with the actions described above would be less than significant.

Alternative Eden C Level of Significance: Less than Significant

Alternative Eden D. Alternative Eden D is a staged implementation of the tidal marsh restoration outlined in Alternative Eden B. Bottom elevations would be raised in the Bay and Inland Ponds. A mid-complex levee would be used for habitat separation, as in Alternative Eden C, but that levee would be temporary. This separation of the Bay Ponds from the others would allow those large outer ponds to first be restored to tidal marsh, after which, the mid-complex levee would be removed, and the Inland and Southern Ponds then restored to tidal marsh. Water control structures would be added to the Inland and Southern Ponds for use during the years in which they would be operated as managed ponds and then removed to allow tidal flows. The trail options and the associated viewing platform would be similar to those in Alternative Eden B.

As with Alternative Eden B and Alternative Eden C, views of the southern Eden Landing ponds would change during construction and views of the Bay Ponds would also change over the long-term due to increased tidal action and the activity/motion created by increased connectivity between the Bay Ponds and OAC. The Inland and Southern Ponds would retain their existing aesthetic as they would function as managed ponds, but with added controlled connectivity between and among them. The Bay Ponds would gradually change color over time becoming tidal marsh and increasing the presence of vegetation in areas previously maintained as open water. The immediate addition of a habitat transition zone on the mid-complex levee separating the Bay Ponds and the Inland Ponds would introduce a similar change in color and texture, but the change would be more abrupt, because the habitat transition zone would be constructed purposefully over a specified period, whereas the tidal mudflat throughout the currently open water areas of the ponds would develop more gradually over time.

Under Alternative Eden D, the Inland Ponds and Southern Ponds would eventually transition tidal marsh similar to Alternative B. In this respect, the long term change to the existing visual character would be most similar between Alternatives B and D. Views toward and of the Bay Pond, Southern Ponds, and Inland Ponds would collectively over time become similar as they returned to their natural character indicative of tidal marsh. As with Alternative C, Alternative Eden D would provide the same increased opportunities and features for recreational opportunities and user experience. Based on the short term function of the Inland Ponds and Southern Ponds functioning as enhanced managed ponds, and the transition of the Bay Ponds in the shorter term to tidal marsh, the first a continuation of existing conditions and the second a transition to natural habitat, the impact of the actions associated with Alternative D would be less than significant.

Alternative Eden D Level of Significance: Less than Significant

Impact Summary

Phase 2 impacts and levels of significance for visual resources are summarized in Table 3.16-1. The levels of significance are those remaining after implementation of program-level mitigation measures, project-level design features, and the AMP and other Refuge management documents and practices. The visual resources analysis required no project-level mitigation measures to reduce the impacts to a level that was less than significant.

Table 3.16-1 Phase 2 Summary of Impacts – Visual Resources

IMPACT	ALT. EDEN A	ALT. EDEN B	ALT. EDEN C	ALT. EDEN D
Phase 2 Impact 3.16-1: Alter views of the SBSP Restoration Project areas.	NI	LTS	LTS	LTS

Notes:
Alternative Eden A is the No Action Alternative (No Project Alternative under CEQA).
LTS = Less than Significant
NI = No Impact

This page intentionally left blank

3.17 Greenhouse Gas Emissions

This section of the Draft Environmental Impact Statement/Report (EIS/R) describes the existing greenhouse gas (GHG) emissions within the project area for Eden Landing Phase 2 of the South Bay Salt Pond (SBSP) Restoration Project. It then analyzes whether the project implementation would cause a substantial adverse effect on GHG emissions. The information presented is based on a review of existing GHG emissions and climate change within the area and other pertinent federal, state and local regulations. The analysis of the project's GHG-related environmental impacts is presented for each alternative. The program-level mitigation measures described in Chapter 2, Alternatives, would be implemented with the project. Therefore, this section only includes additional, project-level mitigation measures as needed.

3.17.1 Physical Setting

Methodology

This Eden Landing Phase 2 document generally tiers off the 2007 SBSP Restoration Project Final EIS/R (2007 Final EIS/R), which did not evaluate GHG emissions. California Senate Bill (SB) 97, enacted in 2007, addressed the need to analyze GHG emissions as a part of the California Environmental Quality Act (CEQA) process. As directed by SB 97, the Office of Planning and Research (OPR) prepared and developed amendments to the CEQA Guidelines for GHG emissions. These amendments were subsequently adopted by the California Natural Resources Agency on December 30, 2009. The amendments became effective on March 18, 2010. In the CEQA Guidelines Amendments, thresholds of significance for GHG emissions were not specified; nor were assessment methodologies or specific mitigation measures prescribed. Instead, the amendments encourage lead agencies to consider many factors in performing a CEQA analysis, but rely on the lead agencies to make their own determinations based on substantial evidence. The CEQA amendments also encourage public agencies to make use of programmatic mitigation plans and programs from which to tier when they perform individual project analyses. This section supplements the 2007 Final EIS/R. This section provides a brief summary of the basis for climate change and impacts based on scientific studies published by various federal, state, and international agencies and organizations. The methods of analysis and thresholds of significance are based on the Bay Area Air Quality Management District's (BAAQMD's) 2011 Air Quality Guidelines (BAAQMD 2010a, 2011).

This section describes the climate change impacts associated with project GHG emissions. Because no single project is large enough to result in a measurable increase in global concentrations of GHG emissions, the global warming impacts of a project are considered on a cumulative basis. Because climate change issues are global in nature, this section will provide a discussion of national, statewide, and global GHG emission sources and inventories to provide context on a larger scale.

Regional Setting

Climate Change and Global Warming

Radiation from the sun is the primary source of energy keeping the earth warm enough for life. As solar radiation enters the earth's atmosphere, a portion of the radiation passes through the atmosphere and is absorbed by the earth's surface (this is primarily radiation in the visible portion of the electromagnetic spectrum), a portion is reflected back toward space, and a portion is absorbed by the upper atmosphere. The radiation absorbed by the earth heats the earth's surface, which then emits infrared radiation. Because the earth has a much lower temperature than the sun, it emits longer-wavelength radiation.[1] Certain gases in the earth's atmosphere, classified as GHGs, play a critical role in determining the earth's surface temperature. GHGs have strong absorption properties at wavelengths that are emitted by the earth. As a result, radiation that otherwise would have escaped back into space is instead "trapped," resulting in a warming of the atmosphere. This phenomenon, known as the "greenhouse effect," is responsible for maintaining a habitable climate on Earth.

Anthropogenic emissions of GHGs are widely accepted in the scientific community as contributing to global climate change. The Intergovernmental Panel on Climate Change (IPCC) was commissioned by the World Meteorological Organization and United Nations Environment Program to assess scientific, technical, and socioeconomic information relevant to the understanding of climate change, its potential impacts, and options for adaptation and mitigation. According to *Climate Change, 2007: The Physical Science Basis, Summary for Policymakers* (IPCC 2007), there is no doubt that the climate is warming. Global average air and ocean temperatures and global average sea level are rising. The period from 1995 through 2006 ranked as among the warmest on record since 1850. Although some of the increase is explained by natural occurrences, IPCC 2007 asserts that the increase in temperature is very likely (greater than a 90 percent probability) caused by human activity, most notably from the burning of fossil fuels.

Climate change is a global problem, and GHGs are global pollutants, unlike criteria air pollutants (such as ozone precursors) and toxic air contaminants, which are pollutants of regional and local concern. GHGs include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and other pollutants. Emissions of CO_2 and N_2O are byproducts of fossil fuel combustion, among other sources. Methane, a highly potent GHG, results from off-gassing associated with agricultural practices and landfills, among other sources. The impacts from each of these other GHGs besides CO_2 are often converted to carbon dioxide equivalent (CO_2e) by multiplying the mass of a GHG by its Global Warming Potential (GWP) to measure how much global warming a given type and mass of a particular GHG may cause using the equivalent mass of CO_2. [2] Global sinks of CO_2 include uptake by vegetation and dissolution into the ocean (IPCC 2007).

For California, projected effects from climate change are described in *Our Changing Climate: Vulnerability and Adaptation to the Increasing Risks from Climate Change* (California Climate Change Center 2012). Projections using climate modeling indicate that temperatures in California are expected to rise between 4.1 and 8.6 degrees Fahrenheit by the end of the century, depending on how much California and the rest of the globe's emitters are able to reduce GHG emissions. These temperature increases will negatively affect public health, water supply, agriculture, plant and animal species, and the coastline (California Climate Change Center 2012).

[1] The wavelength at which a body emits radiation is proportional to the temperature of the body.

[2] CO_2e is a measurement used to account for the fact that different GHGs have different potential to retain infrared radiation in the atmosphere and contribute to the greenhouse effect. This potential, known as the GWP of a GHG, is dependent on the lifetime, or persistence, of the gas molecule in the atmosphere. For example, as described in the General Reporting Protocol 2.0 of The Climate Registry (TCR 2014), 1 metric ton of methane has the same contribution to the greenhouse effect as approximately 25 metric tons of carbon dioxide, so its GWP is 25. Therefore, methane is a much more potent GHG than carbon dioxide. Expressing emissions in CO_2e takes the contributions of all GHG emissions to the greenhouse effect and converts them to a single unit equivalent to the effect that would occur if only carbon dioxide were being emitted. The GWP for nitrous oxide is 298, making it an even more potent GHG than methane.

To determine the projected changes in California, well-established climate models were used to project the future climate. The changes in the future climate were found to affect the natural environment in California in the following general ways (California Climate Change Center 2012):

- More frequent, hotter, and longer heat waves, with fewer extremely cold nights;
- Greater numbers of large wildfires burning larger areas;
- Reduced snow pack and stream flow from the Sierra Nevada, affecting winter recreation and water supply;
- Public health impacts from heat waves, including higher temperatures, which will increase ground-level ozone levels;
- Increased electricity demand for cooling in the summer and reduced energy supply from hydropower;
- Accelerated sea-level rise threatening coastal infrastructure and increasing the risk of coastal flooding to vulnerable populations;
- Changes in growing season conditions that may affect agriculture, causing variations in crop quality and yield; and/or
- Changes in distribution of plant and wildlife species because of changes in temperature, competition from colonizing species, changes in hydrologic cycles, changes in sea levels, and other climate-related effects.

These changes in California's climate and ecosystems are occurring at a time when California's population is expected to increase from 37 million to 50 million by 2050 (California Department of Finance 2013). Therefore, the number of people potentially affected by climate change—and the amount of anthropogenic GHG emissions anticipated under a "business as usual" scenario—is expected to increase. Similar changes as those noted above for California are also expected occur in other parts of the world, with regional variations in resources affected and vulnerability to adverse effects.

Anticipated impacts from climate change affecting the San Francisco Bay Area include sea-level rise (threatening coastal areas, San Francisco Bay [Bay] and its associated shoreline habitats, and the Sacramento–San Joaquin River Delta as well as key infrastructure), reduced Sierra snowpack (a main component of the Bay Area's water supply), an increased number of high-heat days and wildfires, and higher levels of air pollution (BAAQMD 2010b). These changes could result in diminished water supply availability and quality, reduced agricultural production, risks to coastal wetland ecosystems, and public health impacts (CEC 2012).

One of the major goals of the Eden Landing Phase 2 Project is to maintain or improve current levels of flood risk management. To that end, the project designs include a number of features intended to address flood risk management. Most of these issues are addressed in Section 3.2, Hydrology, but it is worth noting here that protection from flooding associated with future sea-level rise (and thus with GHG emissions and climate change) is added by the establishment of tidal marshes and habitat transition zones, both of which are central features of the project. Thus, the Eden Landing Phase 2 Project is expected to be part of the long-term adaptation to climate change-related issues in the South Bay.

Greenhouse Gas Emissions

Whereas the effects of traditional air quality pollutants and toxic air contaminants are local, the impacts of GHGs are largely global. The quantity of GHGs that it takes to cause a change in climate is not precisely known; however, the quantity is enormous, and no single project alone would be expected to measurably contribute to a noticeable incremental change in the global average temperature or to global, local, or microclimate changes. The estimated global annual emission of anthropogenic GHGs was 49 billion metric tons in 2004. Of this, agriculture was estimated to contribute 13.5 percent (IPCC 2007). This compares with the estimated emissions from California of 0.484 billion metric tons in 2004 or 0.99 percent of the global emissions.

Emissions of GHGs contributing to global climate change are attributable in large part to human activities associated with the burning of fossil fuels in the industrial/manufacturing, utility, transportation, residential, and agricultural sectors (CEC 2006). Emissions of carbon dioxide are predominantly byproducts of fossil fuel combustion. Methane is a highly potent GHG that results from off-gassing (the release of chemicals from nonmetallic substances under ambient or greater pressure conditions) largely associated with agricultural practices and landfills. Carbon dioxide sinks, or reservoirs, include vegetative growth (which converts carbon dioxide to biomass) and the ocean, which absorbs carbon dioxide through photosynthesis by phytoplankton and dissolution, respectively, two of the most common processes of carbon dioxide sequestration (IPCC 2007).

California produced 441.5 million metric tons of CO_2e in 2014 (CARB 2016). Combustion of fossil fuel in the transportation sector was the single largest source of California's GHG emissions, accounting for 37 percent of total GHG emissions in the state.

Project Setting

This section focuses on GHG emissions from the Eden Landing Phase 2 activities.

Existing Conditions

The existing project area consists of salt ponds and adjacent habitats. There have been many studies on the GHG impacts of wetlands and tidal salt marshes, particularly regarding their potential to produce methane and their ability to sequester carbon (Trulio et al. 2007). GHG emissions and sequestration associated with these land use changes are difficult to quantify, because these effects are somewhat speculative for wetland areas and can vary greatly, depending on the specific time frame of interest, the characteristics of the wetland, geology, climate, and other factors. The emissions and sequestration are typically addressed in a qualitative manner, discussing some of the anticipated outcomes based on evolving scientific studies.

Later in this section, however, the GHG emissions from Eden Landing Phase 2 project implementation are estimated and related to larger regional emissions, and the carbon sequestration potential of the tidal marsh wetlands that would be added under different Eden Landing Phase 2 actions is also estimated. The potential for methane emissions are not quantified.

The Eden Landing Phase 2 project area is comprised of 11 individual ponds and encompasses roughly 2,300 acres of former salt ponds within the southern area of the Eden Landing Ecological Reserve. The Eden Landing Phase 2 project area is generally bounded by San Francisco Bay on the west, Old Alameda Creek (OAC) on the north, the federal Alameda Creek Flood Control Channel (ACFCC) on the south, and to the east – a mix of suburban/urban communities, the Union Sanitary District Treatment Plant, a county-owned landfill, a Cargill-owned pond (CP3C), and miscellaneous detention basins and drainage channels. The project areas are indirect sources of mobile GHG emissions from recreational users accessing the site. Mobile emissions may also be generated by California Department of Fish and Wildlife (CDFW) staff and others (e.g., contractors) accessing the project areas to perform Adaptive Management Plan (AMP) monitoring, research, and operations and maintenance (O&M) activities of facilities within and near the pond clusters. These O&M activities typically involve the replacement and/or repairs of water control structures, limited levee maintenance and inspection, and trail maintenance.

3.17.2 Regulatory Setting

GHG emissions and sources in the San Francisco Bay Area are regulated by the United States Environmental Protection Agency (USEPA), the California Air Resources Board (CARB), and BAAQMD. Each of these agencies develops rules, regulations, policies, and/or goals to attain the directives imposed through legislation. Although USEPA regulations may not be superseded, both state and local regulations may be more stringent.

Federal Laws and Regulations

At the federal level, USEPA implements national programs related to GHG emissions and climate change under the federal Clean Air Act (CAA) and Clean Air Act Amendments.

Federal Clean Air Act

In 2007, in *Massachusetts v. The Environmental Protection Agency*, the United States Supreme Court ruled that GHGs are air pollutants that are covered under the CAA. The court found that USEPA has a mandatory duty to enact rules regulating mobile GHG emissions pursuant to the federal CAA. The court held that GHGs fit the definition of an air pollutant that causes and contributes to air pollution and may reasonably be anticipated to endanger public health or welfare. In 2009, the USEPA Administrator found that the current and projected concentrations of GHGs threaten public health and welfare of current and future generations and that combined emissions from new motor vehicles contribute to GHG pollution. USEPA's endangerment finding covers emissions of six key GHGs: CO_2, CH_4, N_2O, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride.

Mobile Source Regulations

On August 9, 2011, USEPA and the National Highway Traffic Safety Administration (NHTSA) announced standards to reduce GHG emissions and improve fuel efficiency for heavy-duty trucks and buses. On October 15, 2012, USEPA and NHTSA established a program to reduce GHG emissions and improve fuel economy standards for new cars and light trucks through 2025 (USEPA 2012a).

Stationary Source Regulations

On May 13, 2010, Clean Air Act permitting programs were tailored to cover the nation's largest GHG emitters: power plants, refineries, and cement production facilities. On March 27, 2012, the USEPA proposed a Carbon Pollution Standard for new power plants that would, for the first time, set limits on the amount of carbon pollution emitted by power plants (USEPA 2012b). On September 20, 2013, this proposal was withdrawn, and a new proposal was issued with a revised approach that would set separate standards for natural-gas-fired turbines and coal-fired units.

Council on Environmental Quality Guidance

In response to President Trump's Executive Order (EO) 13783, the Council on Environmental Quality (CEQ) withdrew its "Final Guidance for Federal Departments and Agencies on Consideration of GHG emissions and Effects of Climate Change in NEPA Reviews" on April 5, 2017. Withdrawing this guidance did not change any previously established law, regulation, or legally binding requirements.

The prior guidance (released in 2016) superseded the draft GHG and climate change guidance released by CEQ in 2010 and 2014. The previous guidance applied to all proposed federal agency actions, including land and resource management actions, and instructed agencies to consider both the potential effects of a proposed action on climate change, as indicated by its estimated GHG emissions, and the implications of climate change for the environmental effects of a proposed action. The prior guidance recommended that agencies quantify a proposed agency action's projected direct and indirect GHG emissions, taking into account available data and GHG quantification tools that are suitable for the proposed agency action (CEQ 2016).

On June 4, 2012, CEQ finalized an Update to the 2010 Guidance on Federal GHG Accounting and Reporting (CEQ 2012). The guidance establishes requirements for federal agencies in calculating and reporting GHG emissions associated with agency operations under Executive Order 13514, Federal Leadership in Environmental, Energy, and Economic Performance. Under the authority of Executive Order 13514, the United States Fish and Wildlife Service (USFWS) has developed a climate change strategy and included sustainability practices within the USFWS Service Manual to reduce and offset GHG emissions and move toward carbon-neutral practices. The USFWS Climate Change Strategic Plan includes Mitigation Goal 5, which aims to change business practices to achieve carbon neutrality by the year 2020. The plan lists objectives to assess and reduce the carbon footprint of the USFWS's facilities, vehicles, workforce, and operations; assess and reduce the USFWS's land management carbon footprint, and offset the remaining carbon balance (USFWS 2010).

State Laws and Regulations

California Air Resources Board

CARB is the agency responsible for coordination and oversight of state and local GHG programs in California. The legal framework for GHG emission reductions in California has come about through Executive Orders, legislation, regulations, and court decisions. Some of the major components of these programs and legislation are highlighted below.

California Global Warming Solutions Act (AB 32)

CARB is the lead agency for implementing Assembly Bill (AB) 32, the California Global Warming Solutions Act, adopted by the California Legislature in 2006. AB 32 set statewide targets to reduce GHG emissions to 1990 levels by 2020. AB 32 also requires CARB to prepare a scoping plan containing the main strategies that will be used to achieve reductions in GHG emissions in California.

CARB recommends for each emissions sector of the State's GHG inventory, but does not directly discuss GHG emissions generated by construction activities. Key elements of the Scoping Plan include the following recommendations:

1. Expanding and strengthening existing energy-efficiency programs and building and appliance standards;

2. Achieving a statewide renewables energy mix of 33 percent;
3. Developing a California cap-and-trade program that links with other Western Climate Initiative partner programs to create a regional market system;
4. Establishing targets for transportation-related GHG emissions for regions throughout California and pursuing policies and incentives to achieve those targets;
5. Adopting and implementing measures pursuant to existing state laws and policies, including California's clean car standards, goods movement measures, and the Low Carbon Fuel Standard; and
6. Creating targeted fees, including a public goods charge on water use, fees on high-GWP gases, and a fee to fund the administrative costs of the state's long-term commitment to AB 32 implementation.

CARB has not yet determined what amount of GHG reductions it recommends from local government operations; however, the Scoping Plan does state that land use planning and urban growth decisions will play an important role in the state's GHG reductions because local governments have primary authority to plan, zone, approve, and permit how land is developed to accommodate population growth and the changing needs of their jurisdictions. CARB further acknowledges that decisions on how land is used will have large impacts on the GHG emissions that will result from the transportation, housing, industry, forestry, water, agriculture, electricity, and natural gas emissions sectors. However, in general, this acknowledgement is more relevant to development projects that would change a land use and thus alter emissions from the listed economic sectors than to a restoration project within an area already set aside as a wildlife refuge.

CARB published the First Update to the AB 32 Scoping Plan on May 16, 2014. The update identifies opportunities to leverage existing and new funds to further drive GHG emissions reductions through strategic planning and targeted low-carbon investments. CARB released the proposed 2017 Scoping Plan update for public review on January 21, 2017. The updates define CARB's climate change priorities for the next 5 years and sets the groundwork to reach long-term goals set forth in California Executive Orders S-03-05 and B-16-2012. CARB identified six key focus areas in the update: energy, transportation, agriculture, water, waste management, and natural and working lands. In the natural and working lands focus area, the following actions were identified as important to reducing future GHG emissions through wetland restoration:

- Develop funding mechanisms to support efforts to restore, conserve, and protect wetlands.
- Restore, conserve, and maintain existing wetlands in addition to creating new areas that were not previously sequestering carbon.
- Avoid wetland degradation and conversion that could potentially reduce sequestration benefits and increase emissions.
- Develop actionable policies and measures that conserve wetland resources that provide high sequestration benefit.
- Pursue research related to measuring carbon sequestration potential that will inform and support management actions that maximize sequestration longevity.

Senate Bill 97

In August 2007, the California Legislature adopted SB 97, requiring OPR to prepare and transmit new CEQA guidelines for the mitigation of GHG emissions or the effects of GHG emissions to the Resources Agency by July 1, 2009. OPR submitted its proposed guidelines to the Secretary for Natural Resources on April 13, 2009. The Natural Resources Agency undertook the formal rulemaking process to certify and adopt the amendments as part of the state regulations implementing CEQA and adopted the CEQA Guidelines Amendments on December 30, 2009. The amendments became effective on March 18, 2010. In the CEQA Guidelines Amendments, thresholds of significance for GHG emissions was not specified; nor are assessment methodologies or specific mitigation measures prescribed. Instead, the amendments encourage lead agencies to consider many factors in performing a CEQA analysis, but rely on the lead agencies to make their own determinations based on substantial evidence. The CEQA amendments also encourage public agencies to make use of programmatic mitigation plans and programs from which to tier when they perform individual project analyses.

Executive Orders S-03-05 and B-16-2012

In 2005, Governor Schwarzenegger issued Executive Order S-03-05, calling for statewide GHG reductions to 2000 levels by 2010, to 1990 levels by 2020, and to 80 percent below 1990 levels by 2050. Executive Order S-03-05 also called for a coordinated interagency effort to report on progress made toward meeting the GHG emissions targets and on the impacts of global warming on California. These reports are required biannually,[3] with the latest summary report published in July 2012 (CEC 2012). In March 2012, Governor Brown signed Executive Order B-16-2012, which affirmed the long-range climate goal for California to reduce GHG emissions to 80 percent below 1990 levels by 2050.

Senate Bill 375

SB 375, the Sustainable Communities and Climate Protection Act of 2008 enhances California's ability to reach its AB 32 goals by promoting good land use and transportation planning, with the goal of more sustainable communities. Sustainable communities require CARB to develop regional GHG emissions reduction targets for 2020 and 2035 for each region covered by one of the state's 18 metropolitan planning organizations. The adopted targets for the San Francisco Bay Area metropolitan planning organization, the Metropolitan Transportation Commission (MTC), are 7 percent below 2005 per capita levels by 2020 and 15 percent below 2005 per capita levels by 2035, as set by Executive Order G-11-024.

Assembly Bill 1493

With the passage of AB 1493 in 2002, California launched an innovative and proactive approach for dealing with GHG emissions and climate change at the state level. AB 1493 requires CARB to develop and implement regulations to reduce automobile and light truck GHG emissions. These stricter emissions standards apply to automobiles and light trucks beginning with the 2009 model year. Although litigation was filed challenging these regulations and USEPA initially denied California's related request for a waiver, a waiver has since been granted (CARB 2013).

---

[3] Although the language in the EO requiring these reports states that they should be issued "biannually," the language in these reports refers to "biennial" reports, and the reports have been issued as such (every 2 years) (http://resources.ca.gov/climate/fourth/).

Low Carbon Fuel Standard

Executive Order S-01-07, the Low Carbon Fuel Standard, was issued in January 2007. The order calls for a reduction of at least 10 percent in the carbon intensity of California's transportation fuels by 2020. The Low Carbon Fuel Standard was approved by CARB in 2009 and became effective on April 15, 2010. The regulation establishes annual performance standards for fuel producers and importers and applies to all fuels used for transportation in California (CARB 2011).

2009 California Climate Adaptation Strategy

The State of California published the 2009 California Climate Adaptation Strategy, which summarizes climate change impacts and provides recommendations on strategies to adapt to its effects. The strategies cover seven sectors, which include public health, biodiversity and habitat, oceans and coastal resources, water, agriculture, forestry, and transportation and energy. In 2014, the California Natural Resources Agency published an update to this plan called Safeguarding California: Reducing Climate Risk. This document provides policy guidance on the preparation, prevention, and response to the effects of climate change within the state of California.

Senate Bill 350

The 2015 Clean Energy and Pollution Reduction Act (SB 350) was signed into law on October 10, 2015, and requires that the amount of electricity generated and sold to retail customers from renewable energy resources be increased to 50 percent by December 31, 2030. A doubling of statewide energy efficiency savings in electricity and natural gas by retail customers must also be achieved by January 1, 2030.

Executive Order B-30-15

In April 2015, Governor Brown signed Executive Order B-30-2015, which established a new interim statewide GHG emission reduction target to reduce GHG emissions to 40 percent below 1990 levels by 2030 in order to ensure California meets its target of reducing GHG emissions to 80 percent below 1990 levels by 2050. It additionally directed all state agencies with jurisdiction over sources of GHG emissions to implement measures, pursuant to statutory authority, to achieve GHG emissions reductions to meet the 2030 and 2050 targets.

Senate Bill 32 and Assembly Bill 197

In September 2016, California Governor Brown signed SB 32 (Chapter 249, Statutes of 2016) and AB 197 (Chapter 250, Statutes of 2016), which require the state to reduce GHG emissions to at least 40 percent below 1990 levels by 2030 and invest in communities most impacted by climate change. SB 32 codifies the 2030 GHG emissions reduction goal established by Executive Order B-30-15, issued by Governor Brown in 2015. AB 197 establishes a legislative committee on climate change policies to help continue the state's activities to reduce greenhouse gas emissions.

Local Laws and Regulations

Bay Area Air Quality Management District

In 1999, BAAQMD released the BAAQMD CEQA Guidelines (BAAQMD 1999). This advisory document provided thresholds for air quality emissions, but did not provide thresholds for GHG emissions. In 2010, BAAQMD adopted air quality guidance that included quantitative thresholds of significance and recommended Best Management Practices (BMPs) and mitigation measures for GHG emissions, among other pollutants (BAAQMD 2010a).

The thresholds were developed using a “gap-based” threshold, to cover the perceived shortfall between the GHG reductions achieved with the AB 32 Scoping Plan measures and the AB 32 GHG emissions targets. The thresholds were developed based on BAAQMD’s expertise and the best-available GHG emissions data and incorporated conservative assumptions for the amount of emissions reductions from legislation to cover the gap (BAAQMD 2009).

The BAAQMD CEQA guidelines did not adopt any significance thresholds for construction-related GHG emissions. Rather, BAAQMD recommended lead agencies to quantify and disclose GHG emissions that would occur during construction and to make a determination on the significance of those emission impacts in relation to meeting the AB 32 GHG reduction goals. BAAQMD also encouraged lead agencies to incorporate BMPs to reduce GHG emissions during construction, as applicable. The BAAQMD CEQA Guidelines included operations-related thresholds of significance for two types of projects: land use development and stationary source projects. For land use development projects, including residential, commercial, industrial, and public land uses and facilities, the threshold was compliance with a qualified GHG reduction strategy or annual emissions of less than 1,100 metric tons of CO_2e or efficiency performance criteria based on service population. For stationary source projects, such as land uses with equipment that emits GHG emissions and would require a BAAQMD permit to operate, the threshold was 10,000 metric tons per year of CO_2e (BAAQMD 2010a).

As discussed for air pollutant thresholds of significance developed by the BAAQMD in Section 3.13, Air Quality, BAAQMD’s adoption of the 2010 Thresholds was challenged in court. A court-ordered ruling in the case (*California Building Industry Association v. BAAQMD*, Alameda County Superior Court Case No. RGI0548693) required the BAAQMD thresholds to be subject to further environmental review under CEQA. As a result, the BAAQMD released updated CEQA Guidelines in 2012 (BAAQMD 2012) that removed references to CEQA thresholds. BAAQMD appealed the ruling, and the judgment was reversed on August 13, 2013, by the Court of Appeals of the State of California, First Appellate District. The Court of Appeals’ decision was appealed to the California Supreme Court, which granted limited review and held that the Guidelines were valid in part, and remanded the case to the Court of Appeals. In August 2016, the Court of Appeals issued an opinion limited to the challenged receptor-based thresholds, and found that the thresholds may not be used for the primary purpose envisioned by BAAQMD. The case was then remanded to the Alameda County Superior Court, where the matter is currently pending.

The claims made in the case concerned the CEQA impacts of adopting the thresholds, and the court ruling did not specifically address whether the thresholds were supported by “substantial evidence.” At this time, the BAAQMD is no longer recommending the use of the 2010 GHG thresholds and instead recommends that lead agencies determine appropriate GHG thresholds of significance based on substantial evidence in the record.

For this GHG analysis and in the absence of other thresholds adopted by the BAAQMD, the 2010 thresholds were used because they were established based on substantial evidence. The BAAQMD released the “Proposed Thresholds of Significance” in 2009, which “provides the *substantial evidence* in support of the thresholds of significance…” (emphasis added) (BAAQMD 2009). Those thresholds for GHG emissions were developed by relying on reasonable, environmentally conservative assumptions on growth in the land use sector, predicted emissions reductions from statewide regulatory measures and the resulting emissions inventories, and the efficacy of GHG mitigation measures.

The issues identified in the BAAQMD CEQA Air Quality Guidelines' court case are not considered relevant to the scientific soundness of the BAAQMD's analysis of the level at which GHG emissions would potentially have a significant impact. Therefore, the usage of these 2010 thresholds is consistent with the BAAQMD's direction that thresholds should be based on substantial evidence.

2017 Bay Area Clean Air Plan

The latest Clean Air Plan was adopted in April 2017 (BAAQMD 2017). The 2017 Clean Air Plan includes a comprehensive strategy designed to reduce ozone, particulate matter, air toxics, and GHGs from stationary, mobile, and transportation sources. Consistent with the CARB GHG reduction goals, the Clean Air Plan's performance objectives are to reduce GHG emissions to 40 percent below 1990 levels by 2035 and 80 percent below 1990 levels by 2050. The plan includes control measures that will directly reduce GHG emissions and many other measures that will reduce GHGs as a co-benefit. Applicable measures include offering retrofit incentives (MSM-B2) for medium- and heavy-duty on-road vehicles, encouraging alternative fuel use for both light- and medium-duty vehicles (MSM-A1) and off-road equipment (MSM-B1 and MSM C-1).

Plan Bay Area

On July 18, 2013, MTC and the Association of Bay Area Governments (ABAG) approved the Plan Bay Area. The plan includes the Sustainable Communities Strategy for the Bay Area, in accordance with SB 375 and the 2040 Regional Transportation Plan. The plan includes integrated land use and transportation strategies for the region. The plan was developed through OneBayArea, a joint initiative between ABAG, BAAQMD, MTC, and the Bay Conservation and Development Commission. The plan's transportation policies focus on maintaining the extensive existing transportation network and utilizing these systems more efficiently to handle density in Bay Area transportation cores (ABAG and MTC 2013).

Many nearby Bay Area counties and cities have adopted GHG policies and climate action plans that contain strategies to reduce GHG emissions. Applicable items from these plans include the following:

- *City of Hayward Climate Action Plan (CAP).* Hayward's original CAP was adopted by the City Council on July 28, 2009, and then incorporated into the City's General Plan in 2014. Hayward's GHG reduction goals include:
    - 20 percent below 2005 baseline emissions levels by 2020
    - 62.7 percent below 2005 baseline emissions levels by 2040
    - 82.5 percent below 2005 baseline emissions levels by 2050
- *Union City CAP.* Union City's CAP was adopted by City Council in October 2010. This plan was developed using a baseline GHG inventory from 2005. The CAP presents a strategy to achieve the City Council's goal of reducing GHG emissions 20 percent below 2005 baseline emissions levels by 2020.
- *County of Alameda Community CAP.* The County Board of Supervisors adopted a comprehensive community CAP for the unincorporated areas within Alameda County on February 4, 2014. This plan includes a series of 37 local programs and policy measures related to transportation, land use, building energy, water, waste, and green infrastructure. This plan, if implemented, could reduce community-wide emissions by more than 15 percent by the year 2020.

3.17.3 Environmental Impacts and Mitigation Measures

Approach to Analysis

The assumptions presented in Sections 3.13, Air Quality, and 3.12, Noise, regarding the types and durations of use of construction equipment and equipment used following construction also apply to this GHG and climate change impact analysis.

Significance Criteria

For the purpose of this analysis, the project would have a significant GHG or climate change impact if it were to:

- Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment; or
- Conflict with an agency's applicable plan, policy, or regulation designed to reduce GHG emissions.

As stated in Appendix G of the CEQA Guidelines (AEP 2016), the significance standards established by the applicable air quality management or air pollution control district may be used to evaluate impacts.

According to the BAAQMD CEQA guidelines (BAAQMD 2010a), there are thresholds for evaluating GHG emissions from projects and plans and developed guidelines for assessing these impacts for direct and indirect operational emissions. These thresholds include:

1. A bright line emissions threshold of 1,100 metric tons of CO_2e per year;
2. An emissions efficiency metric of 4.6 tons of CO_2e per year per service population; [4] or
3. Consistency with a qualified GHG Reduction Strategy.

The BAAQMD has not adopted any thresholds for evaluating GHG emissions from construction activities. However, other districts, including the South Coast Air Quality Management District and the San Luis Obispo County Air Pollution Control District, have recommended that GHG emissions from construction and short-term sources be amortized over the lifetime of the project for comparison with significance thresholds (SCAQMD 2008; SLOAPCD 2012). For the analysis in this EIS/R, the construction GHG emissions will be amortized over the lifetime of the project (assuming a 50-year project life) and compared to the bright line emissions threshold of 1,100 metric tons of CO_2e per year, in addition to construction-related BMPs, to evaluate the significance of these emissions. Impact evaluations for the Action Alternatives are assessed based on the existing conditions described in Section 3.17.2, Regulatory Setting, above, and not the conditions that would occur under the No Action Alternative. This approach mimics the evaluation contained in the 2007 Final EIS/R. In this case, the No Action Alternative represents no change from current management direction or level of management intensity provided in the AMP.

As explained in Section 3.1.2, Environmental Setting and Impact Analysis, although both the CEQ Regulations for Implementing NEPA and the CEQA Guidelines were considered during the impact

[4] Service population is the sum of new residents and full time workers.

analysis, impacts identified in this EIS/R are characterized using CEQA terminology. Please refer to Section 3.1.2 for a description of the terminology used to explain the severity of the impacts.

Program-Level Evaluation Summary

The 2007 Final EIS/R evaluated the program-level impacts of the project. Following the analytical standards of the time (2007), impacts related to climate change and GHG emissions were not evaluated.

Project-Level Evaluation

Overview

GHG emissions from construction and operational activities were evaluated for all alternatives. As described in Chapter 2, Alternatives, each Action Alternative includes dredged material placement and import from a project-constructed offloading facility. The offloading facility and booster pumps may be powered by diesel fuel or electricity. If diesel fuel were to power the construction equipment during dredge material placement, a large diesel generator barge would be moored near the offloading facility in the deep-water channel. Booster pumps and onshore equipment would have individual diesel generators that would be maintained by land- and water-based crews. If electricity were to power construction equipment during dredge material placement, the electrical infrastructure necessary to bring power to the offloading facility and booster pumps would include a substation, overhead transmission line, and submarine power cables. Because GHG emissions would differ if the dredged material placement equipment was primarily powered by diesel fuel or electricity, the Action Alternatives were further subdivided and labeled Alternative Eden B1, C1, and D1 for diesel and Eden B2, C2, and D2 for electric.

Construction

Construction GHG emissions were calculated using the methodologies and assumptions described in Section 3.13, Air Quality. The project may use a diesel or electric engine; therefore, GHG emissions associated with each engine type are evaluated. Electricity-related emissions were estimated using PG&E emission factors for 2015. Detailed modeling input assumptions and output results are provided in Appendix I. Construction GHG emissions for each of the Eden Landing Phase 2 alternatives, including options 1 (diesel pumps) and 2 (electric pumps), are shown in Table 3.17-1.

Table 3.17-1 Eden Landing Pond Complex Construction Emissions Summary

Alternative	CO_2e Emissions (Metric Tons)
Alternative A (No Action)	
Construction emissions	—
Amortized construction emissions (metric tons/year)	—
Alternative B1	
Dredge material placement (diesel pump)	22,677
Construction emissions (other)	666
Total construction emissions	23,343
Amortized construction emissions (metric tons/year)	467
Alternative B2	
Dredge material placement (electric pump)	11,485
Construction emissions (other)	666
Total construction emissions	12,151
Amortized construction emissions (metric tons/year)	243

Alternative	CO_2e Emissions (Metric Tons)
Alternative C1	
Dredge material placement (diesel pump)	17,960
Construction emissions (other)	635
Total construction emissions (metric tons)	18,595
Amortized construction emissions (metric tons/year)	372
Alternative C2	
Dredge material placement (electric pump)	9,179
Construction emissions (other)	635
Total construction emissions	9,814
Amortized construction emissions (metric tons/year)	196
Alternative D1	
Dredge material placement (diesel pump)	22,211
Construction emissions (other)	694
Total construction emissions	22,905
Amortized construction emissions (metric tons/year)	458
Alternative D2	
Dredge material placement (electric pump)	10,992
Construction emissions (other)	635
Total construction emissions	11,627
Amortized construction emissions (metric tons/year)	233
Note: Amortized emissions assume a 50-year project lifetime.	

Operations

As discussed in Section 3.13, Air Quality, operations at the project area under the No Action Alternative and the three Action Alternatives would involve off-road equipment usage and on-road vehicle activity during O&M and adaptive management activities. These activities would generate GHG emissions; however, neither the No Action Alternatives nor the Action Alternatives are expected to substantially increase the level of operational activity at southern Eden Landing because the overall approach to O&M would remain unchanged and would largely consist of passenger vehicle use and manual operation of water control structures. Therefore, operational activities and operational GHG emissions at the project area would be similar to existing conditions under the No Action and the Action Alternatives.

As discussed in the project settings section above, the existing project area consists of former salt ponds and adjacent habitats that have the potential to produce methane and to sequester carbon if they are restored to tidal marsh. Quantification of methane emissions would be largely speculative and were therefore not included. However, the potential for restored tidal marshes to sequester carbon was estimated; the results are presented in Impact 3.17-2.

Phase 2 Impact 3.17-1: Construction-Generated GHG Emissions

Alternative Eden A (No Action). Under this alternative, no construction activities would occur within the southern Eden Landing ponds. Although limited O&M activities would be ongoing, they are considered part of baseline operations and not construction. As such, no construction-generated GHG emissions would occur. Long-term operational GHG emissions for this alternative are evaluated in Phase 2 Impact 3.17-2, below.

Alternative Eden A Level of Significance: No Impact

Alternative Eden B1 and B2. Implementation of this alternative would involve excavation of pilot channels, creation of habitat islands and habitat transition zones, trail construction, and levee modifications including raising, breaching, and lowering. Earthmoving activity would occur under this alternative. Material from cut activities would be used reused on-site, and some off-site hauling trips for imported material would be required. Dredged material movement and placement would occur under this alternative using a diesel- or electric-powered offloading facility and pumps. Construction activities would result in the generation of GHG emissions from exhaust from off-road equipment and vehicle activity.

The total construction-related GHG emissions under Alternatives Eden B1 and B2 were calculated and amortized over the lifetime of the project (assumed to be 50 years). Construction emissions using diesel pumps for Alternative Eden B1 would total 23,343 metric tons of CO_2e over the entire construction period, and the amortized emissions were estimated to be 467 metric tons of CO_2e per year. With electric pumps, construction emissions for Alternative Eden B2 would total 12,151 metric tons of CO_2e over the construction period, and the amortized emissions were estimated to be 196 metric tons of CO_2e per year.

As shown in Table 3.17-1, and discussed above, amortized construction GHG emissions would not exceed the bright line emissions threshold of 1,100 metric tons of CO_2e per year. Furthermore, the project would implement several BMPs, developed by the State Coastal Conservancy (SCC), a key project partner, which would be implemented as feasible, that would reduce GHG emissions during construction. These BMPs include incorporation of low-carbon fuels and alternative fuels in construction equipment and vehicles, use of newer engines in off-road equipment, enforcement of equipment idling limits, electrification of equipment, and reduction of vehicle miles traveled (VMT) for worker trips and hauling trips through implementation of VMT reduction plans (SCC 2011). For these reasons, this impact would be less than significant.

Alternatives Eden B1 and B2 Level of Significance: Less than Significant

Alternative Eden C1 and C2. Implementation of this alternative would involve excavation of pilot channels, creation of habitat islands and habitat transition zones, trail construction, and levee modifications including raising, breaching, and lowering. Earthmoving activity would occur under this alternative. Material from cut activities would be reused on-site, and some off-site hauling trips for imported material would be required. Dredged material movement and placement would occur under this alternative using a diesel- or electric-powered offloading facility and pumps. Construction activities would result in the generation of GHG emissions from exhaust from off-road equipment and vehicle activity.

The total construction-related GHG emissions under Alternatives Eden C1 and C2 were calculated and amortized over the lifetime of the project (assumed to be 50 years). Construction emissions using diesel pumps for Alternative Eden C1 would total 22,905 metric tons of CO_2e over the entire construction period, and the amortized emissions were estimated to be 485 metric tons of CO_2e per year. With electric pumps, construction emissions for Alternative Eden C2 would total 11,627 metric tons of CO_2e over the construction period, and the amortized emissions were estimated to be 233 metric tons of CO_2e per year.

As shown in Table 3.17-1, and discussed above, amortized construction GHG emissions would not exceed the bright line emissions threshold of 1,100 metric tons of CO_2e per year. As discussed for Alternative Eden B, the project would also implement SCC-developed BMPs to the extent they are feasible that would further reduce construction GHG emissions. For these reasons, this impact would be less than significant.

Alternatives Eden C1 and C2 Level of Significance: Less than Significant

Alternative Eden D1 and D2. Implementation of this alternative would involve excavation of pilot channels, creation of habitat islands and habitat transition zones, trail construction, and raising, breaching, and lowering of levees. Earthmoving activity would occur under this alternative. Materials would be used on-site, and some off-site hauling trips for imported material would be required. Dredged material movement and placement would occur under this alternative using a diesel- or electric-powered offloading facility and pumps. Construction activities would result in the generation of GHG emissions from exhaust from off-road equipment and vehicle activity.

The total construction-related GHG emissions under Alternative Eden D1 were calculated and amortized over the lifetime of the project (assumed to be 50 years). Construction emissions using diesel pumps for Alternative Eden D1 would total 23,343 metric tons of CO_2e over the entire construction period, and the amortized emissions were estimated to be 467 metric tons of CO_2e per year. With electric pumps, construction emissions for Alternative Eden D2 would total 12,151 metric tons of CO_2e over the construction period, and the amortized emissions were estimated to be 243 metric tons of CO_2e per year.

As shown in Table 3.17-1, and discussed above, amortized construction GHG emissions would not exceed the bright line emissions threshold of 1,100 metric tons of CO_2e per year. As discussed for Alternative Eden B1, the project would also implement SCC-developed BMPs to the extent they are feasible that would further reduce construction GHG emissions. For these reasons, this impact would be less than significant.

Alternatives Eden D1 and D2 Level of Significance: Less than Significant

Phase 2 Impact 3.17-2: Operational GHG Emissions

Alternative Eden A (No Action). Operations under Alternative Eden A (No Action) would involve limited O&M activities, such as levee repair, trail maintenance, and biological surveys. These activities would occur intermittently over the lifetime of the project. O&M activities would generate GHG emissions associated with the use of vehicles and other equipment. However, the level of activity would be similar to the O&M activities occurring under existing conditions and would not result in a substantial increase in GHG emissions compared to existing operational activities. Therefore, potential impacts from long-term operational GHG emissions would be less than significant.

Alternative Eden A Level of Significance: Less than Significant

Alternatives Eden B1/B2, Eden C1/C2, and Eden D1/D2. The following discussion addresses the three Action Alternatives (Alternatives Eden B, Eden C, and Eden D). In terms of GHG emissions, the operations under the Action Alternatives would be quite similar to the current operations and those that would take place over time under Alternative Eden A. The opening and closing of water control structures is done by hand, and those structures would continue to be reached by regular passenger vehicles (primarily a pick-up truck). All three Action Alternatives include removing the existing pump between the OAC and Pond E1, which could reduce emissions somewhat. All three also feature addition of recreational trails. Although these new recreational trails may generate emissions as a result of vehicle trips, this activity is not anticipated to result in a substantial increase in GHG emissions compared to the environmental baseline. While there would be some ongoing maintenance of levees and the additional need to maintain trails in all Action Alternatives, there would also be breaching and removal of large areas of levee that would no longer need to be maintained.

Similarly, the habitat transition zones, islands, and other habitat features would need to be maintained and there would be ongoing mosquito abatement, biological monitoring and research, but this would largely be limited to occasional visits in passenger vehicles to remove weeds, perform abatement, or conduct surveys. These activities would have a negligible increase in GHG emissions. Overall, the level of operational activity would not be anticipated to be substantially different compared to existing conditions, and would not result in a substantial increase in GHG emissions compared to existing operational activities.

The project would be expected to increase carbon sequestration in southern Eden Landing over the lifetime of the project. Using natural wetlands' carbon sequestration rates (Callaway et al. 2012) and Verified Carbon Standard's Methodology for Tidal Wetland and Seagrass Restoration (Silverstrum and Crooks 2013), successful tidal marsh establishment under Alternative B would result in 2,270 acres of vegetation that could sequester approximately 800 tons of carbon per year. Tidal marsh establishment in the Bay Ponds under Alternative Eden C would result in 1,375 acres of vegetation that could sequester approximately 485 tons of carbon per year. Under Alternative Eden D, tidal marsh would be established in the Bay Ponds, with the potential to also restore marsh in the remaining ponds later in the project. Tidal marsh establishment in the Bay Ponds under Alternative Eden D would result in 1,375 acres of vegetation that could sequester approximately 485 tons of carbon per year. If the tidal marsh is also established in the remaining ponds, tidal marsh establishment under Alternative Eden D would result in 2,270 acres of vegetation that could sequester approximately 800 tons of carbon per year.

Based on the above discussion, potential impacts from long-term operational emissions would be less than significant.

Alternatives Eden B, Eden C and Eden D Level of Significance: Less than Significant

Phase 2 Impact 3.17-3: Conflicts with Applicable GHG Emissions Reduction Plan, Policy, or Regulation *California Climate Change Center*

Alternative Eden A (No Action). As discussed in Impacts 3.17-1 and 3.17-2, Alternative Eden A (No Action) would not generate construction GHG emissions and would not result in a substantial net increase in operational GHG emissions. The alternative would not conflict with regulations or applicable CAP policies designed to reduce GHG emissions. Impacts would be less than significant.

Alternative Eden A Level of Significance: Less than Significant

Alternatives Eden B1/B2, Eden C1/C2, and Eden D1/D2. As discussed in Impacts 3.17-1 and 3.17-2, the Action Alternatives would generate construction GHG emissions that are less than significant and would not result in substantial net increases in operational GHG emissions.

As discussed in Section 3.17.2, Regulatory Setting, AB 32 set a statewide target to reduce GHG emissions to 1990 levels by 2020, and the AB 32 Scoping Plan outlines the main strategies that will be used to achieve reductions in GHG emissions in California. These reduction strategies focus on building energy-efficiency programs, expanding California's renewable energy portfolio, implementing the California cap-and-trade program for facilities, establishing targets for transportation-related GHG emissions for California regions, and implementing measures pursuant to existing state laws and policies (including California's clean car standards, goods movement measures, and the Low Carbon Fuel Standard). These measures are not directly applicable to the project, and as such, the project does not conflict with the AB 32 Scoping Plan.

As discussed in Section 3.17.2, Regulatory Setting, Hayward and Union City have adopted or drafted CAPs containing GHG emission-reduction policies. Applicable policies from these CAPs include reduction of vehicle and equipment idling, use of low-carbon fuels, use of cleaner engines and technology, and reduction or diversion of waste during construction. These are generally similar to and included in the SCC-developed BMPs discussed under Impact 3.17-1, above. The Phase 2 project at southern Eden Landing would implement these BMPs to the extent they are feasible to reduce GHG emissions during construction. The SCC BMPs require the incorporation of low-carbon fuels and alternative fuels in construction equipment and vehicles, use of newer engines in off-road equipment, enforcement of equipment idling limits, electrification of equipment, and reduction of VMT for worker trips and hauling trips through implementation of VMT reduction plans (SCC 2011). These BMPs would be consistent with applicable CAP policies, and the project would therefore not conflict with the CAPs and applicable CAP policies.

None of the three Action Alternatives would conflict with regulations or applicable CAP policies designed to reduce GHG emissions. Impacts would be less than significant.

Alternatives Eden B1/B2, Eden C1/C2, and Eden D1/D2 Level of Significance: Less than Significant

Impact Summary

Phase 2 impacts and levels of significance are summarized in Table 3.17-2. The levels of significance are those remaining after implementation of program-level mitigation measures, project-level design features, the AMP and other CDFW management practices and documents. The GHG analysis required no project-level mitigation measures to reduce the impacts to a level that is less than significant.

Table 3.17-2 Phase 2 Summary of Impacts – GHG Emissions

IMPACT	Alternative Eden A	Alternative Eden B1/B2	Alternative Eden C1/C2	Alternative Eden D1/D2
Phase 2 Impact 3.17-1: Construction- generated GHG emissions.	NI	LTS	LTS	LTS
Phase 2 Impact 3.17-2: Operational GHG emissions.	LTS	LTS	LTS	LTS
Phase 2 Impact 3.17-3: Conflicts with applicable GHG emissions reduction plan, policy, or regulation.	LTS	LTS	LTS	LTS

Note:

Alternative Eden A is the No Action Alternative (No Project Alternative under CEQA).

LTS = Less than Significant
NI = No Impact

4. CUMULATIVE IMPACTS

4.1 Introduction

National Environmental Policy Act (NEPA) regulations (40 Code of Federal Regulations [CFR] 1508.7) define a cumulative impact as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions. Cumulative impacts can result from individually minor collectively significant actions taking place over a period of time." The California Environmental Quality Act (CEQA) provides a similar definition of cumulative impacts. For the purposes of this Draft Environmental Impact Statement/Report (EIS/R), cumulative effects would be significant if the incremental effect of Phase 2 of the South Bay Salt Pond (SBSP) Restoration Project at Eden Landing, though individually limited, is cumulatively considerable when viewed in connection with the effects of past, current, and probable future projects (CEQA Guidelines 15064[h][1]).

This Draft EIS/R provides a project-level evaluation and analysis of the SBSP Restoration Project, Phase 2 at the southern Eden Landing ponds. The 2007 SBSP Restoration Project Final EIS/R (2007 Final EIS/R), which was both a programmatic and a Phase 1 level document, analyzed the larger, program-wide details of the SBSP Restoration Project. Where feasible and appropriate, this Draft EIS/R uses information and analysis from the 2007 Final EIS/R for analysis of the project-level impacts of Eden Landing Phase 2.

The 2007 Final EIS/R evaluated a program-level No Action Alternative[1] and two program-level Action Alternatives for restoring or enhancing the former salt ponds in the SBSP Restoration Project area. The two Action Alternatives established a set of "bookends" for the long-term project goals. Under these bookends, Programmatic Alternative B would work toward a gradual restoration of 50 percent of the total project acreage being restored to tidal marsh. The other 50 percent would be maintained or improved to enhanced managed ponds. Programmatic Alternative C would continue past the 50 percent tidal marsh goal and end in 90 percent of the total project area being restored to tidal marsh, leaving only 10 percent in enhanced managed ponds. Programmatic Alternative A is the alternative under which no actions would have been taken (the No Action Alternative).

The 2007 Final EIS/R evaluated the environmental impacts of these programmatic alternatives and found that Programmatic Alternative A would not meet the project purpose and need of restoring tidal marshes in South San Francisco Bay (South Bay). The 2007 Final EIS/R selected Programmatic Alternative C, because the SBSP Restoration Project would need many years and multiple project-level phases to even approach the 50 percent tidal marsh goal of Programmatic Alternative B. As that level of tidal marsh restoration was being approached, the Project Management Team and other stakeholders would use the findings of the Adaptive Management Plan (AMP) and the directed scientific research questions to determine whether to stop at the 50 percent tidal marsh goal or continue progress toward the 90 percent goal or some other percentage between those bookends.

The Eden Landing Phase 2 project alternatives evaluated in this Draft EIS/R would advance the program-level goals of both Programmatic Alternatives B and C. Completing Phase 2 would move the larger

[1] "No Action Alternative" is the NEPA term. It corresponds to the CEQA term "No Project Alternative." This Draft EIS/R uses No Action throughout.

project closer to the 50 percent tidal marsh/50 percent managed ponds goal of Alternative B, but it would not reach it. Thus, completing Phase 2 would still allow the project to cease restoration activities at some point between the bookends of Programmatic Alternatives B and C.

4.2 Cumulative Setting

The 2007 Final EIS/R analysis of cumulative impacts was prepared from a list of past, current, and probable future projects that could result in similar impacts and benefits as those of the SBSP Restoration Project. Regional plans were also reviewed to characterize development trends and growth projections in the South Bay over the long-term planning period, which the 2007 Final EIS/R set at 50 years. These projects are considered in the cumulative impact discussion, together with the SBSP Restoration Project, to determine if the combined effects of all of the projects would be cumulatively considerable and thus would result in significant cumulative impacts. This Draft EIS/R expands on that cumulative setting by reviewing additional general and regional plans and considering other reasonably foreseeable projects envisioned since the 2007 Final EIS/R was adopted.

4.2.1 General and Regional Plans

Plan Bay Area

Plan Bay Area is a long-range integrated transportation and land-use/housing strategy through 2040 for the San Francisco Bay (or Bay) Area. On July 18, 2013, the plan was jointly approved by the Association of Bay Area Governments Executive Board and the Metropolitan Transportation Commission (MTC). The plan includes the region’s Sustainable Communities Strategy and the 2040 Regional Transportation Plan and represents the next iteration of a planning process that has been in place for decades.

Plan Bay Area marks the nine-county region’s first long-range plan to meet the requirements of California’s landmark 2008 Senate Bill 375, which calls on each of the state’s 18 metropolitan areas to develop a Sustainable Communities Strategy to accommodate future population growth and reduce greenhouse gas (GHG) emissions from cars and light trucks. Working in collaboration with cities and counties, the Plan Bay Area advances initiatives to expand housing and transportation choices, create healthier communities, and build a stronger regional economy.

San Francisco Bay Plan—San Francisco Bay Conservation and Development Commission

The McAteer-Petris Act (Cal. Govt. Code Sections 66600–66694) is the California state law that established the San Francisco Bay Conservation and Development Commission (BCDC) as a state agency; prescribes BCDC’s powers, responsibilities, and structure; and describes the broad policies BCDC must use to determine whether permits can be issued for activities in and along the shoreline of San Francisco Bay. BCDC’s jurisdiction, regulations, and plans are described in Section 3.5, Biological Resources; Section 3.6, Recreation Resources; and Section 3.16, Visual Resources.

Alameda County General Plan

The Eden Landing Phase 2 project area is designated as Open Space in the Alameda County General Plan. The Alameda County General Plan, adopted in 1973, does not include a Land Use Element, and instead incorporates land use elements from each city General Plans and unincorporated area specific plans.

However, policies applicable to the Salt Ponds are discussed in the May 4, 1995 Amended Open Space Element and are described as follows:

Shoreline and Bay Open Space - Principles for Shoreline and Bay Open Space

- Preserve Natural Ecological Habitats in Shoreline Areas: Outstanding natural ecological habitats in shoreline areas of the County should be designated for protection and maintenance as wildlife preserves as a means of protecting marine and wildlife and to permit ecological studies; and
- Provide for Orderly Transition of Phased out Salt Extraction Areas to Uses Compatible with the Open Space Plan: Salt extraction areas, which will be operative through the plan period, should be designated as permanent open space. Areas that will not be active through the plan period should be phased out according to a planned program in such a manner as to maintain salt production cycles. Phased out areas should be converted to uses permitted within waterfront open spaces such as wildlife refuges or recreation areas. No filling of salt extraction areas should be permitted except for recreation purposes in selected areas as indicated on adopted local or regional plans (Alameda County 1995).

City of Fremont General Plan

The City of Fremont General Plan was adopted in December 2011. The City is divided into planning areas, one of which is the Baylands Planning Area which includes lands under the Bay, salt ponds, wetlands, seasonal wetlands, and other uses associated with the Bay and wildlife habitat.

The goals, policies and implementation measures contained in the Open Space Element related to salt ponds include the following (City of Fremont 2011):

- Goal 2-6: Open Space. An open space “frame” around Fremont, complemented by local parks and natural areas, which together protect the City’s natural resources, provide opportunities for recreation, enhance visual beauty, and shape the City’s character.

Policy 2-6.3: Baylands. Manage Fremont’s Baylands as permanent open space. The habitat and ecological value of these areas should be conserved and restored to the greatest extent possible… Planning for the baylands should consider the effects of climate change and sea level rise.

City of Hayward General Plan

The Hayward 2040 General Plan was adopted on July 1, 2014 (City of Hayward 2014). No land use policies make specific reference to the SBSPs; however, the Land Use element of the General Plan recognizes that Baylands (*e.g.,* Marshes and Salt Ponds) comprise nine square miles within Hayward. The Hayward 2040 General Plan Land Use Diagram identifies the pond complex as Baylands (City of Hayward 2014).

The Natural Resources Element of the Hayward 2040 General Plan includes the following goal concerning the baylands (*e.g.* Marshes and Salt Ponds) (City of Hayward 2014):

- Goal NR-3: Preserve, enhance, and expand natural baylands, wetlands, marshes, hillsides, and unique ecosystems within the Planning Area in order to protect their natural ecology, establish the physical setting of the city, provide recreational opportunities, and assist with improved air quality and carbon dioxide sequestration.

Union City General Plan

The 2002 General Plan Policy Document was adopted in 2002 (City of Union City 2002). No land use policies make specific reference to the SBSP Restoration Project or the Reserve.

The eastern edge of the Eden Landing pond complex is directly adjacent to Union City. The majority of the land within the Union City limits is zoned for Open Space. The Open Space designation is described as follows in the Union City General Plan Land Use Element:

- The purpose of this [Open Space] designation is to conserve lands that should remain as open space for passive and active recreation uses, resource management, flood control management and public safety. Uses that would typically be appropriate in this land use designation include but are not limited to public parks, playgrounds, golf courses and driving ranges, parkways, vista areas, wetlands, wildlife habitats and outdoor nature laboratories; stormwater management facilities; and buffer zones separating urban development and ecologically sensitive resources (p. LU-7) (City of Union City 2002).

However, some land abutting the complex is zoned Civic Facility and Special Industrial. The Civic Facility designation is applied to:

- …the City's major public buildings and facilities owned by City, County, state, federal or other public agencies that serve the general public. Uses include but are not limited to wastewater treatment facilities, water tanks, electrical substations, public educational facilities, community centers, libraries, museums, government offices and courts (*e.g.*, Civic Center), transit facilities and stations, and public safety facilities (*e.g.*, police and fire stations) (p. LU-7).

The Special Industrial designation provides:

- (s)pace for the lightest industrial operations and non-manufacturing uses that support nearby manufacturing that exhibit virtually no nuisance characteristics. Non-manufacturing uses include educational, administrative, sales and service activities. This designation provides for a smaller scale of uses, on smaller sites than would typically be found in Light Industrial designated areas. In Special Industrial designated areas, nuisance characteristics of noise, odor, traffic generation, unsightliness or hazardous materials storage or handling are avoided, and almost all uses will be conducted entirely within enclosed buildings (p. LU-6).

The Special Industrial designation typically includes small scale, high quality industrial park developments and is often applied as a buffer adjacent to major thoroughfares where large landscaped setbacks are provided and as a transition area between higher intensity industrial uses and other lower intensity uses. Performance standards are applied to eliminate, or minimize to the extent reasonably possible, any potential for adverse effects (City of Union City 2002).

4.2.2 Cumulative Projects

Table 4-1 lists recently completed past projects, projects currently under construction, and probable future projects that would overlap with project construction and/or operation and that could impact the same resources. This table provides a brief description of the projects included in the cumulative impact analysis, their locations, their estimated construction schedules, related major roadways and waterways, and the potential cumulative impacts that could occur in combination with those of the proposed project.

Table 4-1 Projects Considered in Cumulative Impacts Analysis for the South Bay Salt Pond Restoration Project

PROJECT	PROJECT DESCRIPTION	LOCATION	PROJECT PHASE	RELATED MAJOR ACCESS ROADS	RELATED WATERWAYS	POTENTIAL CUMULATIVE IMPACT ISSUES	CUMULATIVE IMPACT CONTRIBUTION
Ongoing Mosquito Abatement Projects							
Alameda County Mosquito Control	The county's mosquito control agency treats tidal pools and salt marshes during high tide with a larvacide to reduce mosquito populations.	Alameda County	Ongoing	I-880	Coyote Creek, Alviso Slough	Public health and vector management	No considerable contribution; project is considered in baseline analysis
Restoration Projects							
San Francisco Estuary Invasive Spartina Project	The Invasive Spartina Project has been implementing a coordinated, region-wide eradication program comprising a number of on-the-ground treatment techniques to stave off the invasion of non-native invasive cordgrasses (Spartina alterniflora and its hybrids and S. densiflora, S. patens, and S. anglica). The project is focused within the nearly 40,000 acres of tidal marsh and 29,000 acres of tidal flats that constitute the shoreline areas of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, Sonoma, and Sacramento Counties.	Bay Area	Ongoing	Not applicable (NA)	San Francisco Bay	Hydrology, flood management, and infrastructure; water quality and sediment; biological resources; cultural resources	No considerable contribution; project is considered in baseline analysis
Shoreline Study	The study assesses the need for flood protection in the South Bay, extends along South Bay and includes the three pond complexes within the SBSP Restoration Project area as well as shoreline and floodplain areas in Alameda, San Mateo, and Santa Clara Counties.	South Bay	Ongoing	I-880, SR 237, U.S. 101	Coyote Creek; Mud, Alviso, and Guadalupe Sloughs	Hydrology, flood management, and infrastructure; water quality and sediment; geology, soils, and seismicity; biological resources; recreation resources; cultural resources	No considerable contribution; project is considered in baseline analysis
Final Damage Assessment and Restoration Plan for the November 7, 2007 Cosco Busan Oil Spill	Under the Oil Pollution Act of 1990, the Natural Resource Trustees prepared the Damage Assessment and Restoration Plan/Environmental Assessment (DARP/EA) to assess injuries and evaluate restoration alternatives for natural resources injured by the Cosco Busan Oil Spill. The DARP/EA describes multiple restoration actions to benefit natural resources and compensate for loss of recreation services, including wildlife habitat projects, eelgrass restoration, sandy beach and salt marsh/mudflat habitat restoration, and recreation/human use projects.	San Francisco Bay Area	Ongoing	NA	San Francisco Bay Area, all ponds	Hydrology, flood management, and infrastructure; water quality and sediment; biological resources; recreation resources	Project could contribute to cumulative impacts
Joint Lower Alameda Creek Fish Passage Improvements	Alameda County Water District's (ACWD) and Alameda County Flood Control and Water Conservation District's (ACFCWCD) Joint Lower Alameda Creek Fish Passage Improvements include (1) the construction of a new fishway at ACWD's Rubber Dam 1 and ACFCWCD's drop structure; (2) the construction of a new fishway at ACWD's Rubber Dam 3 and the replacement of existing Rubber Dam 3 material, equipment and controls with new materials; (3) the replacement of existing Rubber Dam 1 equipment and controls with new materials; and (4) construction of new Shinn diversion and fish screening facility and decommissioning the existing unscreened diversion pipelines.	City of Fremont	Planning	SR-238	Alameda Creek	Hydrology, flood management, and infrastructure; water quality and sediment; biological resources	Project could contribute to cumulative impacts
Kaiser Fish Screen Project	The project involves construction of a new diversion pipeline and cylindrical fish screen to abandon the existing unscreened pipeline. The replacement facility will be constructed about 530 feet downstream of the existing diversion pipe and 2,400 feet upstream of Alameda County Water District's (ACWD's) Rubber Dam 1, where the Union Pacific Railroad (UPRR) and San Francisco Bay Area Rapid Transit District (BART) bridges cross over Alameda Creek.	City of Fremont	Completed	I-880	Alameda Creek	Hydrology, flood management, and infrastructure; water quality and sediment; biological resources; cultural resources	No considerable contribution; project is completed

Table 4-1 Projects Considered in Cumulative Impacts Analysis for the South Bay Salt Pond Restoration Project

PROJECT	PROJECT DESCRIPTION	LOCATION	PROJECT PHASE	RELATED MAJOR ACCESS ROADS	RELATED WATERWAYS	POTENTIAL CUMULATIVE IMPACT ISSUES	CUMULATIVE IMPACT CONTRIBUTION
Water Resources Projects							
Maintenance Dredging of the Federal Navigation Channels in San Francisco Bay, Fiscal Years 2015–2024	Operation and maintenance dredging to remove sediment to authorized depths to fulfill the USACE's Navigation Mission to provide safe, reliable, and efficient waterborne transportation systems (channels, harbors, and waterways) for the movement of commerce, national security needs, and recreation.	San Francisco Bay Area	Ongoing	NA	San Francisco Bay	Hydrology, flood management, and infrastructure; water quality and sediment; biological resources; recreation resources	Project could contribute to cumulative impacts
Old Canyon Road Bridge Foundation Protection Repair Project	This project would remove grouted rock rip-rap and install rock riprap and cobble in the creek channel to stabilize the bridge footings.	City of Fremont	Planning	SR-84	Alameda Creek	Hydrology, water quality, and flood management	Project could contribute to cumulative impacts
San Francisco Public Utilities Commission's (SFPUC) Water System Improvement Project (WSIP)	The SFPUC proposes to adopt and implement WSIP to increase the reliability of the regional water system, which provides drinking water to 2.4 million people in San Francisco, San Mateo, Santa Clara, Alameda, and Tuolumne Counties. The WSIP is a program to implement the service goals and system performance objectives established by the SFPUC for the regional water system in the areas of water quality, seismic reliability, delivery reliability, and water supply through the year 2030.	San Francisco Bay	Ongoing	NA	San Francisco Bay	Water quality and sediment; geology, soils, and seismicity; utilities	Project could contribute to cumulative impacts
South Bay Advanced Recycled Water Treatment Facility (ARWTF) Project	The ARWTF treats up to 10 million gallons per day of secondary effluent from the San Jose/Santa Clara Water Pollution Control Plant (WPCP) with advanced tertiary treatment and blends the high-purity effluent with tertiary effluent from the San Jose/Santa Clara WPCP for use in the South Bay Water Recycling system.	City of San Jose	Ongoing	SR 237	San Francisco Bay, Coyote Creek, Guadalupe Creek	Hydrology, flood management, and infrastructure; water quality and sediment; biological resources; utilities	Project could contribute to cumulative impacts
City of Hayward Recycled Water Project	The project would install a new recycled water facility at the city's treatment plant. The new recycled water facility would deliver 290 acre feet per year of recycled water to 22 customers for irrigation and industrial use. The project also includes construction of a 1 million gallon storage tank, pump station, and 10 miles of pipelines including installation of customer connections to distribute tertiary treated recycled water to irrigation and industrial customers.	City of Hayward	Planning	I-580	NA	Water resources, effects to the City's storm drain system	Project could contribute to cumulative impacts
Development Projects							
Turk Island Landfill Consolidation and Residential Subdivision	The project proposes removal of landfill debris from the 6.3 acre site at Westport Way and Carmel Way in Union City and depositing of debris onto the adjacent Turk Island Landfill followed by backfill of clean soil onto the site and development of a 33 unit single family detached residential subdivision. Improvements to the adjacent Sea Breeze Park are also proposed as a part of the project.	City of Union City	Planning	I-880. SR-84, Carmel Way, and Westport Way	San Francisco Bay, Alameda Creek	Hydrology, water quality, flood management, and recreation resources	Project could contribute to cumulative impacts
Lincoln Landing	Project is a large-scale mixed-use development consisting of 476 multi-family residential units above 80,500 square feet of commercial uses with a combination of surface and structured. The existing 335,000-square-foot office building and 5,310-square-foot commercial building would be demolished to accommodate the project.	City of Hayward	Planning	I-238, I-880, I-580	San Lorenzo Creek	Traffic, effects to the City's storm drain system and San Lorenzo Creek	Project could contribute to cumulative impacts
Maple & Main Mixed-use Residential Project	The applicant proposes to demolish all buildings on the project site except the medical office building on the corner of Maple Court and McKeever Avenue, and construct a residential building. The new residential building would include 240 rental apartments, ground floor retail and a leasing office.	City of Hayward	Planning	I-238, I-880, I-580	San Lorenzo Creek	Traffic, effects to the City's storm drain system and San Lorenzo Creek	Project could contribute to cumulative impacts

Table 4-1 Projects Considered in Cumulative Impacts Analysis for the South Bay Salt Pond Restoration Project

PROJECT	PROJECT DESCRIPTION	LOCATION	PROJECT PHASE	RELATED MAJOR ACCESS ROADS	RELATED WATERWAYS	POTENTIAL CUMULATIVE IMPACT ISSUES	CUMULATIVE IMPACT CONTRIBUTION
Fairview Orchards & Fairview Meadows Residential Subdivision	Project proposes to subdivide two parcels equaling 9.78 acres into 31 single family residential lots.	City of Hayward	Planning	I-580, SR-238	San Lorenzo Creek	Effects to the City's storm drain system and San Lorenzo Creek	Project could contribute to cumulative impacts
Niles Mixed-Use Project	The project applicant (Valley Oak Partners, LLC) is proposing to develop 98 dwelling units and 3,620 square feet of non-residential uses	City of Fremont	Planning	SR-84	Alameda Creek	Effects to the City's storm drain system and Alameda Creek	Project could contribute to cumulative impacts
Industrial Projects							
U.S. Pipe and Foundry Retention Basin Project	U.S. Pipe and Foundry Company, LLC, is proposing to develop a stormwater retention basin on its industrial property at 1295 Whipple Road, an iron smelting facility and ductile iron pipe manufacturing plant. The purpose of the retention basin is to capture and retain stormwater runoff from the plant property so as to reduce or prevent the discharge of pollutants via stormwater into downstream waters.	City of Union City	Planning	I-880, SR-258	Alameda Creek	Water quality	Project could contribute to cumulative impacts
Transportation Projects							
Transportation 2035 Plan for the San Francisco Bay Area	The proposed Transportation 2035 Plan is the Bay Area's long-range regional transportation plan; it lays out the transportation policies and projects to address the mobility, accessibility, and performance needs of the region through the 2035 planning horizon.	San Francisco Bay Area	Ongoing	NA	None	Recreation resources, traffic, air quality, greenhouse gas emissions	Project could contribute to cumulative impacts
Route 262/Warren Avenue/I-880 Interchange Reconstruction and I-880 Widening	Improve the interchange at SR 84 and Palomares Road, and realign the intersection. Roadway improvements, including bridge replacement and High Occupancy Vehicle lanes in each direction on a portion of I-880 and SR 262 in and near the cities of Milpitas and Fremont.	City of Fremont	Ongoing	I-880	Coyote Creek	Traffic, air quality, greenhouse gas emissions	Project could contribute to cumulative impacts
Pacific Gas and Electric Company (PG&E) NERC Compliance Efforts	The Federal Energy Regulatory Commission grants the North American Electric Reliability Corporation (NERC) the legal authority to establish and enforce reliability standards for the bulk-power system. PG&E's efforts to comply with NERC have included the upgrading of many of PG&E's overhead transmission systems to meet the requirements of NERC.	San Francisco Bay	Ongoing	NA	NA	Hydrology, flood management, and infrastructure; water quality and sediment; geology, soils, and seismicity; biological resources; cultural resources; visual resources	Project could contribute to cumulative impacts
Recreation Projects							
San Francisco Bay Area Water Trail Plan	The plan provides recommendations and guidance for a network of landing and launching sites at various locations on the margins of San Francisco Bay and its tributaries. Water Trail access is being considered for at least 112 locations. The plan would also increase use of San Francisco Bay by non-motorized small boats.	San Francisco Bay	Ongoing	NA	None	Recreation resources	Project could contribute to cumulative impacts

This page intentionally left blank

For future projects, the analysis was based on estimated construction schedules. Where construction schedules were unavailable, it was conservatively assumed that construction periods would overlap with the project, which would be constructed during the dry season over 3 years from 2016 to 2019.

To gather relevant projects, projects and plans for the cities of Fremont, Hayward and Union City and the county plan for Alameda. Only those projects or plans far enough along in the development stage to assess their potential contribution to cumulative impacts were included in this analysis.

4.3 Cumulative Impacts and Mitigation Measures

This section evaluates the potential environmental impacts of the proposed project when considered together with other projects. The analysis addresses only the types of impacts that could occur as a result of project construction and operation, based on the significance criteria provided for each resource discussion in Chapter 3, Environmental Setting, Impacts, and Mitigation Measures.

The project's potential to adversely contribute to cumulative air quality, greenhouse gas emissions, traffic, noise, and recreation resources impacts would occur primarily during construction. Operational cumulative impacts could occur to biological resources; hydrology, flood management, and infrastructure; water quality and sediment; and public health and vector control.

The analysis of cumulative impacts followed a multi-step approach. First, an evaluation was made as to whether a significant cumulative impact existed within each relevant study area for the impact under consideration. This evaluation was made by reviewing the conclusions of the No Action Alternative in the "Cumulative Impacts" section of the 2007 Final EIS/R. Then those conclusions were re-examined based on the updated cumulative project information presented in Table 4-1. Next, the Eden Landing Phase 2 project impacts were evaluated as to whether they, in combination with impacts from the other projects, would create a new significant cumulative impact. If so, then a potentially significant impact was found, and mitigation measures from Chapter 3, Environmental Setting, Impacts, and Mitigation Measures, were identified and recommended to reduce this impact to a less-than-significant level. In cases where a significant cumulative impact already exists, even without the SBSP Restoration Project, the Eden Landing Phase 2 project's impacts were examined to determine if they would make a considerable contribution to that impact. If it was determined that the Eden Landing Phase 2 project impacts would not make a considerable contribution to a significant cumulative impact, the impacts were determined to be less than significant.

If an Eden Landing Phase 2 project impact were to have a considerable contribution to a cumulative impact, then mitigation from the project impact analysis in Chapter 3 would be recommended to reduce the project's contribution to cumulative impacts to a level that is less than considerable. However, no considerable contributions to a cumulative impact were found. In contrast to this approach, the 2007 Final EIS/R determined that if a significant cumulative impact existed even without the project, the project cumulative impact was deemed significant regardless of the project's contribution to that impact.

Hydrology, Flood Management, and Infrastructure

The geographic scope for the cumulative impacts analysis for hydrology, flood management, and related infrastructure encompasses the creeks, sloughs, and other waterways within the project area that feed into South Bay. These waterways include Old Alameda Creek (OAC) and the Alameda Creek Flood Control Channel (ACFCC), and to a lesser extent the southern end of North Creek at its confluence with OAC, which is just outside of Pond E1.

The types of projects listed in Table 4-1 that could contribute to cumulative impacts associated with hydrology, flood management, and infrastructure include restoration projects, flood risk management projects, and some transportation projects (e.g., bridge replacements). Review of the 2007 Final EIS/R and the cumulative projects listed in Table 4-1 indicates that less-than-significant or beneficial cumulative impacts exist in the study area associated with hydrology, flood management, and infrastructure in the project area.

Cumulative Impacts of No Action Alternative

No new activities would occur under the Eden Landing Phase 2 No Action Alternative and southern Eden Landing would continue to be monitored and managed through the activities described in the AMP and in accordance with current California Department of Fish and Wildlife (CDFW) practices.

Under the No Action Alternative, some of the levees around the Eden Landing Phase 2 project area are high-priority levees, to be maintained for inland de facto flood protection. These levees would be maintained (or repaired after unexpected failure) by CDFW and/or by the Alameda County Flood Control and Water Conservation District (ACFCWCD), depending on the levees in questions. Because the existing levels of de facto flood protection would be maintained and adaptive management would be used to actively monitor and assess flood risk management measures, impacts to flood risk management under the No Action Alternative would be less than significant.

The existing pond operations and filling-and-draining patterns would be maintained. Some ponds would be operated to allow extremely muted tidal exchange; others would be managed to be seasonally dried for different wildlife species. The potential for erosion from water circulating within the ponds and accretion rates within the ponds would be minimal because some ponds are not operated to receive tidal flows and because flows are mediated through tide gates or other engineered water control structures. The Eden Landing Phase 2 project area currently contains few navigable sloughs and waterways—the major sloughs have silted in over a period of decades, reducing navigability. At low tide, navigation into or out of shallow sloughs can be problematic. Small craft (e.g., kayaks) are more amenable to the shallow water environments and are more likely to navigate tidal sloughs.

Under the No Action Alternative, no new improvements to existing levees would occur. Some existing levees would be maintained. As such, no additional maintenance (beyond that described above) to repair or improve portions of levees for increased performance during a tsunami and/or seiche would occur under. However, because no habitable structures would be constructed and warning systems would allow for evacuation of the shoreline in such an event, inundation by tsunamis or seiches would not expose people to potential injury or death.

As discussed above, no significant cumulative impacts associated with hydrology, flood management, and infrastructure exist in the project area. The Eden Landing Phase 2 No Action Alternative would cause less than significant hydrology impacts. Existing levels of de facto flood protection would be maintained and adaptive management would be used to actively monitor and assess flood risk management measures. No habitable structures would be constructed and warning systems would allow for evacuation of the shoreline during a tsunami. There would not be a significant cumulative hydrology impact caused by the Eden Landing Phase 2 No Action Alternative.

Cumulative Impacts of Eden Landing Phase 2 Action Alternatives

Under the Eden Landing Phase 2 Action Alternatives, some or all of the ponds at southern Eden Landing would be breached or otherwise connected to tidal flows to enable sediment accretion, support hydraulic connectivity, alter circulation patterns, and increase habitat complexity. Increases in sediment accumulation and/or sediment distribution in the ponds could help achieve a future flood risk management goal of ensuring that the rate of sediment accretion and marsh development keeps pace with expected future sea-level rise.

More specifically, at the Bay Ponds in all Action Alternatives and at the Inland Ponds and Southern Ponds in Alternative Eden B, tidal flows would be introduced through new breaches. In Alternatives Eden C and Eden D, water control structures would instead allow controlled flows to the Inland Ponds and the Southern Ponds. Sediment accretion would begin after breaching, and some erosion of the adjacent mudflats would be expected, though observations of changes in mudflats following the Phase 1 actions indicate that mudflat losses have been less than initially expected and that mudflats area has increased in some locations.

All of these changes would require at least some levee improvements to ensure that the existing levels of de facto flood protection are retained or improved. The Eden Landing Phase 2 designs include several improvements to existing levees and berms to maintain or enhance the levels of flood risk management currently provided by the former salt ponds and other flood risk management infrastructure. Monitoring and adaptive management would be used at all areas to verify that the Phase 2 actions are performing as intended and to modify or correct those that aren’t. Changes to coastal and fluvial flood risk would be minimal for the above-mentioned reasons, and therefore the impacts would be less than significant.

Habitat transition zones would be constructed in all of the Eden Landing Phase 2 Action Alternatives, but the location of the zone would vary by alternative. These habitat transition zones would perform several functions: adding some flood risk management, buffering against sea-level rise, and adding transitional wildlife habitat. Because adaptive management would be used to actively monitor and assess flood risk management measures and existing levels of de facto flood protection would be maintained, impacts to flood risk management would be less than significant.

Under the Eden Landing Phase 2 Action Alternatives, drainage patterns within some ponds would change because they would be breached and because pilot channels would be created to make the filling and draining more efficient and complete within each tidal cycle. Sediment would accrete, and marsh channels in portions of the ponds would develop, increasing habitat complexity. The new breaches and the marsh channels would be affected by tidal scour. Levee breaches would increase tidal flows in the sloughs downstream of the breaches, widening and deepening the sloughs over time. Slough width and depths upstream of the breaches would be less affected by levee breaching.

The long-term regional sediment supply in the far South Bay has been studied by Shellenbarger et al. (2013) for the SBSP Restoration Project area. It is estimated that between 29 and 45 million cubic meters of sediment would be required to raise all of the SBSP Restoration Project area to mean tidal level. Sediment influx from the South Bay (north of the Dumbarton Bridge) would supply this amount of sediment in about 90 to 600 years.[2] This estimate reflects the long-term regional sediment supply

[2] These data are based on using water year 2009 and 2010 sediment budget results. Also, Programmatic Alterative C, analyzed in the 2007 Final EIS/R, had an upper range of 90 percent tidal restoration, not 100 percent tidal restoration.

assuming that there is no net loss of mudflats and marshes in the area and that the volume of sediment needed in the ponds does not change due to sea-level rise or construction. However, some of the subsided ponds would be maintained as managed ponds and not restored to tidal action and the bottom elevations of some ponds would be raised through beneficial reuse of dredge materials, so the SBSP Restoration Project as a whole, and Eden Landing Phase 2 in particular, would require less sediment than the estimate provided here. Furthermore, to meet the sediment deficit without overly scouring mudflats, restoration is being phased over many decades to match sediment demand with the rate at which sediment naturally enters the far South Bay, and ponds may be partially filled with clean dredged sediments and/or upland material to reduce their demand.

The Eden Landing Phase 2 Action Alternatives would not result in significant adverse impacts to navigation. Over a period of years, some sloughs are expected to scour, increasing channel dimensions. Larger channel cross-sectional areas would reduce the short-term velocity increases associated with the breaches and provide improved navigation in the long term.

The Eden Landing Phase 2 Action Alternatives would not include construction of habitable structures. Also, existing warning systems (e.g., the National Weather Service) would allow for evacuation of the shoreline during a tsunami or seiche, so inundation by tsunamis or seiches would not expose people to potential injury or death.

As discussed above, no significant cumulative impacts associated with hydrology, flood management, and infrastructure exist in the project area. The Eden Landing Phase 2 Action Alternatives would cause less than significant hydrology impacts. Changes to coastal and fluvial flood risk would be minimal and existing levels of de facto flood protection would be maintained. Minor tidal scour and mudflat erosion could occur from breaching of levees but these effects would be monitored through the AMP and corrective actions would be implemented if performance metrics are not met. The magnitude of the impacts is so small relative to the background dynamics in the existing environment that there would not be a significant cumulative hydrology impact caused by the Eden Landing Phase 2 Action Alternatives.

Water Quality

The former salt ponds are at the interface between the urban environment and San Francisco Bay. The geographic scope for water quality cumulative impacts includes the South Bay itself, the SBSP Restoration Project pond complexes, and the lower, adjacent portions of upland watershed areas.

The types of projects listed in Table 4-1 that could contribute to cumulative impacts associated with water quality include restoration projects, flood protection projects, and development projects. Review of the 2007 Final EIS/R and the cumulative projects listed in Table 4-1 indicates that potentially significant cumulative impacts relative to water quality exist in the study region. Restoration of salt ponds to tidal marsh habitat has the potential to increase phytoplankton (algae) abundance and composition as levees are breached. Phytoplankton abundance could increase as a result of biostimulation due to increased light penetration as sediment accretion creates localized areas of low turbidity outside of breached levees. Other cumulative tidal habitat restoration projects have the potential to cause similar impacts. Risk factors that could cause increased algal abundance are biostimulation due to excessive nutrients or increased water transparency. One risk factor that could cause changes in phytoplankton composition is the opening of new breaches between ponds and Bay waters, thereby introducing new or exotic algal species. Another risk factor is the release of substances toxic to algae from urban runoff, herbicide application, and other sources, thereby selecting for species more resistant to toxicants. Project activities (proposed by the SBSP

Restoration Project or by the cumulative projects) that are likely to cause one or more of these risk factors would result in a potentially significant impact.

Some of the cumulative projects would have potentially significant impacts when considering the long-term cumulative impacts of discharge of biological oxygen demand and/or chemical oxygen demand into the Bay, because they would involve opening breaches between ponds and the Bay. Without appropriate adaptive management, it is assumed that other cumulative projects would have potentially significant impacts.

Mobilization and transport of mercury-contaminated sediments is a regional issue that is regulated by the Bay Total Maximum Daily Load (TMDL) requirement to drive down the inventory of mercury in the actively resuspended sediment layer. The risk factors for mobilization and transport of mercury-contaminated sediments would come from projects that would involve substantial earthmoving and dredging activities or that would enhance tidal scour and that are near known or suspected sources of mercury-contaminated sediments. Some of the cumulative projects would have impacts when considering the long-term cumulative impacts of mobilization and transport of mercury-contaminated sediments and do not as yet have well-defined AMPs and therefore have potentially significant impacts. On balance, the cumulative impacts of other cumulative projects would be potentially significant.

Some cumulative projects would result in a potential increase in net methylmercury production and bioaccumulation and were deemed to have potentially significant impacts because they do not include an AMP, or the monitoring tools and adaptive management actions for those projects have not yet been defined. For the purposes of this analysis, it is assumed that the other cumulative projects would have potentially significant impacts.

Because it is not known whether other cumulative projects would implement policies and regulations that are required, and there is uncertainty about the scope and timing of regulations to manage particle-associated contaminants such as polychlorinated biphenyls (PCBs) and legacy pesticides, it is assumed that other cumulative projects would result in potentially significant water quality impacts from other contaminants.

Cumulative Impacts of No Action Alternative

Under the Eden Landing Phase 2 No Action Alternative, no new breaches or other connections to the Bay would be made at southern Eden Landing. The existing gated connections would be left in place, and the managed and muted exchange would remain the dominant hydrology. The ponds would persist as the seasonally managed ponds (Inland Ponds and Southern Ponds) or deep-water managed ponds (Bay Ponds) they are now. In all of these cases, adaptive management would be used to address adverse changes in algal species abundance and composition. If triggers are exceeded as a result of high risk factors, then adaptive management actions would be implemented to convert high-risk factors to low-risk factors. The Inland Ponds and Southern Ponds would continue to be operated with limited directional circulation. Maintaining adequate dissolved oxygen levels is an occasional water quality challenge, as is not violating the salinity requirements for discharge water to the Bay. Adaptive management practices have been implemented to successfully address these potential issues. Under the No Action Alternative, these adaptive management measures would be implemented during low dissolved oxygen conditions (e.g., changing residence times and/or water depths). Because of monitoring and implementation of adaptive management measures, all of these potential impacts would be less than significant.

Sediment mercury concentrations in the ponds are expected to be similar to concentrations found in suspended sediments in the overall South Bay but lower than those in the far South Bay (near the Alviso pond complex). Ponds in that part of the Bay have elevated mercury concentrations in sediments due to deposition of mercury-laden sediments from the Guadalupe River watershed. Long-term mercury concentrations in the sediment of the far South Bay are greater than the target concentration of 0.2 milligram per kilogram (mg/kg), but similar to other areas of the Bay. Managed ponds could have higher rates of net methylmercury production than fully tidal systems. The large pool of easily degraded organic matter in managed ponds (from algal production) could lead to higher methylmercury concentrations in sediment, water, and biota. Labile organic matter fuels the bacteria that methylate inorganic mercury. Ponds that experience very high rates of primary production would likely benefit (in terms of lowering current methylmercury concentrations) from tidal flushing (Grenier et al. 2010). Adaptive management would continue to be used to monitor effects from managed ponds. Adaptive management monitoring could include methylmercury concentrations in water and sediments and special studies of methylmercury production, degradation, transport, and changes in food web indicators and sentinel species. Adaptive management actions would be triggered when the mercury concentrations of sentinel species increase substantially, regardless of whether they are over or under desirable levels. If triggers are exceeded, then adaptive management actions would be implemented.

Although construction activities would not occur under the No Action Alternative, hazards could result from the routine maintenance activities required for managed ponds, which may include levee repair, small-scale construction, and general cleaning. Hazardous materials that could lead to water or sediment quality impairments if spilled would primarily include spills and leaks of liquids (fuels and oils) from maintenance vehicles and equipment. Project proponents would implement control measures specified in the project’s waste discharge permit (Water Quality Order No. R2-2008-0078, as revised by R2-2012-0014, or current version). Provisions include specifications for repair, replacement, and servicing of existing facilities; dredging and placement of dredge and/or imported fill material on existing levees; placement of riprap; and general maintenance activities. Implementations of control measures for Operations and Management (O&M) activities would ensure that impacts would be less than significant.

There are potentially significant cumulative impacts relative to water quality in the study region. Other cumulative tidal habitat restoration projects have the potential to increase phytoplankton (algae) abundance and composition as levees are breached. Some of the cumulative projects would have potentially significant impacts when considering the long-term cumulative impacts of discharge of biological oxygen demand and/or chemical oxygen demand into the Bay. Some of the cumulative projects would have impacts when considering the long-term cumulative impacts of mobilization and transport of mercury-contaminated sediments and do not as yet have well-defined AMPs and therefore have potentially significant impacts.

However, the contribution of the Eden Landing Phase 2 No Action Alternative to these cumulative impacts would not be considerable. As discussed above, all impacts to water quality from the Eden Landing Phase 2 No Action Alternative are less than significant. Adaptive management measures would be used to address harmful changes in the abundance and composition of algal species. Adaptive management measures (e.g., changing residence times and/or water depths) also would be implemented to reduce the potential for the adverse conditions associated with high salinity, low dissolved oxygen, or substantial methylmercury levels. Because adaptive management measures would be implemented for the Eden Landing Phase 2 No Action Alternative, their contribution to a significant cumulative water quality impact would not be considerable relative to the existing environment.

Cumulative Impacts of Eden Landing Phase 2 Action Alternatives

Under the Eden Landing Phase 2 Action Alternatives, breaches and other connections between the Bay and the ponds at southern Eden Landing would introduce full tidal inundation, gated tidal exchange, or managed intermittent filling and draining of the ponds. The exact mix of these different mechanisms varies by Action Alternative.

Tidal flows would bring slough water through the openings, near which suspended sediments would settle out from the water prior to ebb flows. Areas near these new levee breaches would have increased accretion. Accretion in the ponds would decrease suspended sediment supply in the surrounding sloughs and the open waters of the Bay, potentially resulting in increased light penetration and algal abundance outside of the ponds. Fully tidal systems (both tidal ponds and sloughs) have relatively short retention times, are well mixed by tidal flows, and are often subject to wind and wave action. In general, Phase 2 actions would increase both the amount and the spatial distribution of tidal mixing, and in no cases would these actions reduce this mixing. Therefore, risk factors are low and potential changes in algal abundance are likely to be minimal. Furthermore, monitoring and implementation of adaptive management measures would be used to address harmful changes in the abundance and composition of algal species. Therefore, impacts would be less than significant.

In Alternative Eden C and Eden D, some of the southern Eden Landing ponds (the Inland Ponds and the Southern Ponds) would not be opened to fully tidal flows but would instead be enhanced as managed ponds with controlled flows through water control structures. If not well managed, these ponds could become stagnant and rich in nutrients, and therefore would have higher risk factors for changes to algal abundance. However, these alternatives include several new water control structures to provide increased and improved control over directional circulation and other management activities to minimize adverse effects. Should managed ponds cause adverse changes to algal abundance and composition, adaptive management measures would be implemented to reduce potential impacts (e.g., manipulating hydraulic residence time or altering the depths of the managed ponds). In all of these cases, adaptive management would be address adverse changes in algal species abundance and composition. If triggers are exceeded as a result of high risk factors, then adaptive management actions would be implemented to convert high-risk factors to low-risk factors. Because of monitoring and implementation of adaptive management measures, all of these potential impacts would be less than significant.

Initial breaching, channel excavation, or other project implementation actions at the ponds may temporarily increase the amount of biological oxygen demand in ebb flows, but tidal currents would also provide mixing, improve reaeration, and dilute nutrients, and the shallow water environment would allow dissolved oxygen from surface reaeration to rapidly become vertically well mixed. Some ponds – thespecific ones would again depend on the alternative – would continue to have limited tidal mixing and the residence time in the ponds could be on the order of hours to days. If residence times were long, water in the managed ponds would likely be stagnant and rich in nutrients, particularly in summer months, and therefore dissolved oxygen concentrations may be low. Adaptive management measures (e.g., changing residence times and/or water depths) would be implemented during low dissolved oxygen conditions to reduce the potential for the adverse conditions associated with low dissolved oxygen levels, such as mortality of aquatic or benthic organisms, odors that cause nuisance, or degraded habitat. Because of monitoring, active management, and the implementation of adaptive management measures, these impacts would be less than significant.

The increasing tidal flows in the Bay Ponds (and also in the Inland and Southern Ponds in Alternative Eden B) resulting from the breaching levees would allow full tidal inundation to these ponds and increase tidal flows and scour in adjacent sloughs. Although wetting and drying cycles could enhance methylmercury production, the conversion of deep or stagnant ponds to fully tidal marsh would likely lessen the risk of a mercury problem within the pond. The restored tidal marsh would produce less labile organic matter than what is produced in the managed pond, providing less fuel for methylating bacteria and leading to less methylmercury production. There is a potential risk associated with the remobilization of mercury-laden sediment in sloughs downstream of breaches due to scour from the increased tidal prism following reconnection of ponds to full tidal flows. This scour could increase the amount of inorganic mercury that is available for methylmercury production and uptake into the food web, at least in the short term. However, the remobilized sediment would mix with other sediment, be dispersed by the tides, and proceed through various fates of deposition, burial or further transport (Grenier et al. 2010). Adaptive management would be used to monitor effects from tidal marsh restoration and could include methylmercury concentrations in water and sediments and special studies of methylmercury production, degradation, transport, and changes in food web indicators and sentinel species. Adaptive management actions would be triggered when the mercury concentrations of sentinel species increase substantially, regardless of whether they are over or under desirable levels. If triggers are exceeded, then adaptive management actions would be implemented to avoid significant impacts. Examples of such actions include capping with clean fill, removing mercury-contaminated sediments, or manipulating other factors such as dissolved oxygen concentrations, light penetration, or encouraging development of favorable plant species. Because adaptive management would be used to minimize adverse effects, impacts would be less than significant.

Construction-related activities could lead to short-term, transient adverse water quality impacts during or shortly after the period of construction. Construction activities that could affect water and sediment quality include the placement of dredge materials, placement and grading of levee fill, placement of fill material for habitat transition zones, breaching levees, and construction of hardened crossings, all of which could result in short-term increases in turbidity. Construction activities would also increase the possibility of exposure to or release of hazardous materials and waste associated with construction, such as fuels or oils, as a result of accidents or equipment malfunction or maintenance. Hazards could also result from the routine maintenance activities required for the ponds and public access facilities; such activities may include levee repair, dredging, small-scale construction, and general cleaning. Hazardous materials that could lead to water or sediment quality impairments if spilled would primarily include spills and leaks of liquids (fuels and oils) from the offloading facility and pumps and from maintenance vehicles and equipment. Potential effects to water quality from contaminants other than mercury, methylmercury, and dissolved oxygen could occur. With proper management and oversight, impacts associated with construction activities should not result in exceedances of any thresholds of significant impact. Also, it is unlikely that the impacts associated with mobilization and transport of contaminated sediment would be of a sufficient magnitude or extent as to cause exceedances of the thresholds identified after mitigation. Programmatic mitigation measure **SBSP Mitigation Measure 3.3-4a: Storm Water Pollution Prevention Plan**, would be implemented to further reduce this impact to less than significant.

There are potentially significant cumulative impacts relative to water quality in the study region. Other cumulative tidal habitat restoration projects have the potential to increase phytoplankton (algae) abundance and composition as levees are breached. Some of the cumulative projects would have potentially significant impacts when considering the long-term cumulative impacts of discharge of waters with biological oxygen demand and/or chemical oxygen demand into the Bay. Some of the cumulative projects would have impacts when considering the long-term cumulative impacts of mobilization and transport of mercury-contaminated sediments and do not as yet have well-defined AMPs and therefore have potentially significant impacts. As discussed above, all impacts to water quality from the Eden Landing Phase 2 Action Alternatives are less than significant. Many of the Eden Landing Phase 2 Action Alternatives would actually improve water quality conditions or reduce a water quality management hurdles by increasing tidal flows and/or by improving the degree of special and temporal control over water levels, temperatures, and salinities in the ponds. Adaptive management measures would be used to address harmful changes in the abundance and composition of algal species. Adaptive management measures (e.g., changing residence times and/or water depths) also would be implemented to reduce the potential for the adverse conditions associated with low dissolved oxygen levels and substantial methylmercury levels. Because adaptive management measures would be implemented for all Eden Landing Phase 2 Action Alternatives, their contribution to a significant cumulative water quality impact would not be considerable relative to the existing environment.

Geology, Soils, and Seismicity

The geographic scope of potential cumulative geology, soils, and seismicity impacts is limited to the vicinity of the Eden Landing Phase 2 project. The NEPA- and CEQA-related impacts associated with geological hazards are generally site-specific and depend on localized geologic and soil conditions. As a result, they are not typically additive or cumulative in nature.

Due to the nature of impacts associated with geology, soils, and seismicity, only projects in close proximity to the southern Eden Landing ponds are considered in the cumulative analysis. Cumulative projects considered in the 2007 Final EIS/R and those listed in Table 4-1would consider local ongoing and future settlement and subsidence from consolidation of bay mud and liquefaction as part of their design and construction. Review of the 2007 Final EIS/R and the cumulative projects listed in Table 4-1 indicates that less-than-significant cumulative impacts are associated with geology, soils, and seismicity in the study region.

Cumulative Impacts of No Action Alternative

Under the Eden Landing Phase 2 No Action Alternative, the existing southern Eden Landing pond levees would be allowed to continue to degrade, and no new structures or weight would be added that could expedite any already occurring rates of subsidence or increase the risks associated with liquefaction or fault rupture. Therefore, implementation of the No Action Alternative would not increase the risk of any of these hazards. This impact would be less than significant.

No significant cumulative impacts associated with geology, soils, and seismicity exist in the project area, and the contribution of the Eden Landing Phase 2 No Action Alternative to cumulative impacts related geology, soils, and seismicity would not be considerable and would not trigger a significant cumulative impact.

Cumulative Impacts of Eden Landing Phase 2 Action Alternatives

Under the Eden Landing Phase 2 Action Alternatives, raising or improving levees, building habitat islands, or constructing habitat transition zones would add additional weight to some areas underlain by bay mud, thereby potentially increasing the existing rate of settlement. However, the levees and other improvements would be designed and constructed to compensate for settlement and consolidation that would prevent tidal overtopping and be intended to prevent flooding. Also, the levees and other features would be improved and designed to withstand seismic events to the extent practicable. These features would not be placed so as to create new impacts or worsen existing potential impacts on people or property. The long-term settlement of improved levees and other structures resulting from increased weight would be offset by required maintenance to ensure minimum elevations are achieved and potential effects on people and property would be less than significant. The nearby associated infrastructure (roads, railways, bridges, utility access structures, etc.) would continue to be maintained as needed. As such, potential effects from settlement due to consolidation of bay mud would be less than significant.

The Eden Landing Phase 2 Action Alternatives would not cause habitable structures to be constructed within the project areas and would not create new opportunities to expose people to damages resulting from liquefaction, lateral spreading, or fault rupture.

No significant cumulative impacts associated with geology, soils, and seismicity exist in the project area. As discussed above, the Eden Landing Phase 2 Action Alternatives would create less than significant geology impacts. The long-term settlement of improved levees resulting from increased weight would be offset by required maintenance to ensure minimum elevations are achieved. Any failures of upland flood control levees caused by liquefaction or lateral spreading would be repaired similar to what would occur under the management strategy of the AMP. Improved levees would be constructed to withstand failure from fault rupture to the extent practicable. Also, given the site-specific nature of geology impacts under CEQA or NEPA, the Eden Landing Phase 2 Action Alternatives contribution to cumulative impacts would not trigger a significant cumulative impact.

Biological Resources

The geographic scope for the biological resources cumulative impact analysis encompasses areas (including wetlands, intertidal areas, sensitive habitats, streams, and riparian habitats) that could be affected by the proposed project and the projects identified in Table 4-1. This region is appropriate because the habitats and wildlife species that would be affected by the project are part of a broader ecosystem, and the potential disturbance of individual areas has repercussions for a wider region than the immediate project vicinity.

The cumulative impact projects with the greatest potential to affect these are the restoration projects, water treatment plant projects, port enhancements or dredging projects, and flood protection projects because those projects have the greatest potential to have effects to biological resources in the estuarine environment. Review of the 2007 Final EIS/R and the updated cumulative projects listed in Table 4-1 indicates that potentially significant cumulative impacts relative to biology exist in the study region. Additional tidal restoration efforts that are underway or proposed in San Francisco Bay could reduce the availability of high-tide habitat for small shorebirds to some degree. High-tide roosting habitat is unlikely to limit populations, however, because pond levees, islands, and other alternative habitats can support high densities of roosting birds. However, conversion of existing ponds to tidal habitats would reduce the numbers of sites where shorebirds can congregate at high tide, potentially resulting in increased predation, crowding effects (possibly including increased susceptibility to disease), and increased disturbance (and associated increases in energy expenditure) by predators and humans. The effects of restoration projects in other parts of the Bay on high-tide foraging habitat are expected to be fairly minor, because the highest numbers of shorebirds using salt ponds in the Bay Area occur in the South Bay.

Tidal wetland restoration projects are expected to influence mudflat habitat acreage and productivity, whereas other cumulative projects are expected to have minimal effect on mudflat habitat acreage or productivity. Approximately 2,500 acres of tidal wetlands have been restored or are planned to be restored in the South Bay in addition to the SBSP Restoration Project. Additional current pond habitat is planned to be opened to the tides and begin accreting sediment to form tidal wetlands. The sediment demand associated with the cumulative amount of tidal wetland restoration in San Francisco Bay, and the South Bay in particular, in light of sea-level rise would potentially result in a loss of mudflat area. Furthermore, some mudflat loss may be offset by increases in mudflat productivity due to marsh restoration and the transport of organic material from restored marshes to mudflats. Therefore, the extent to which mudflat loss would result in a decline in mudflat-associated wildlife species is uncertain. Nevertheless, because of the potential loss of mudflats as a result of sea-level rise and the cumulative tidal wetland restoration projects, a potentially significant cumulative impact would occur. The potential loss of mudflats as a result of cumulative tidal wetland restoration projects and sea-level rise is expected to reduce the area of mudflat foraging habitat for small shorebirds. As a result of this potential mudflat loss, coupled with the conversion of high-tide foraging habitat in managed ponds to tidal habitats, other tidal restoration projects and sea-level rise could potentially result in a significant cumulative impact to small shorebird numbers and the populations of other mudflat-dependent species in the South Bay.

Cumulative Impacts of No Action Alternative

This section first summarizes the discussions of significance determinations in Section 3.5, Biological Resources, for each of the 25 numbered impacts at southern Eden Landing under the No Action Alternative. The discussion generally follows the order of those numbered impacts. It then discusses whether the Eden Landing Phase 2 No Action Alternative makes a considerable contribution to any existing or newly identified cumulatively significant impacts.

Under the Eden Landing Phase 2 No Action Alternative, there would either be less-than-significant impacts or no impacts to biological resources, depending on the ponds and impacts in question. Under the No Action Alternative, no new construction activities would occur. The CDFW would continue to operate and maintain the ponds in accordance with ongoing management practices that have been in place since the implementation of Initial Stewardship Plan actions and the adoption of the AMP and the 2007 Final EIS/R, as well as CDFW-specific operations plans for the Reserve. In general, small shorebird habitat would remain relatively unaffected, resulting in less-than-significant impacts to small shorebirds. There would be no change to intertidal mudflat habitat and less-than-significant or no impacts to wildlife species in the South Bay.

Several species of small shorebirds (examples of common species include semipalmated plover, western sandpiper, least sandpiper, dunlin, short-billed dowitcher, and long-billed dowitcher) occur in the San Francisco Bay Area, primarily during migration and in winter (roughly July through April). San Francisco Bay is one of the most important stopover and wintering areas on the west coast for these species. Within San Francisco Bay, the majority of these birds are typically found in the South Bay. There are potentially significant cumulative impacts to small shorebirds in the project area. However, the Eden Landing Phase 2 No Action Alternative would cause no impacts to shorebirds. Therefore, the Eden Landing Phase 2 No Action Alternative would not have a considerable contribution to a cumulative impact.

Western snowy plovers have found suitable habitat conditions in some former salt ponds that are now seasonally wet ponds. At southern Eden Landing, several of the Inland Ponds and Southern Ponds presently provide western snowy plover habitat. Under the No Action Alternative, there would be no change in impacts to snowy plover habitat at these ponds. Also, CDFW continues to manage portions of northern Eden Landing specifically and successfully for western snowy plover. Further, the United States

Fish and Wildlife Service (USFWS) Refuge is planning and implementing a number of habitat enhancements and other management techniques to increase western snowy plover populations. These techniques may include treating the nesting substrates with shells and other surfaces to increase camouflage and thus nesting success. These treatments include constructing habitat islands to provide isolated nesting areas at Eden Landing Ponds E12 and E13 and Refuge Pond SF2, conducting social attraction experiments such as those currently underway at Pond SF2, and harassing predator species. Portions of both Eden Landing and the Refuge will continue to be actively monitored and managed for western snowy plover, and the results of those experiments will continue to be adapted and reapplied to implement appropriate actions to maintain western snowy plover populations and protect their habitat.

American avocets, black-necked stilts, Forster’s terns, and Caspian terns are colonial waterbirds that nest and forage within portions of the SBSP Restoration Project area. These birds nest on islands within ponds and, in the case of stilts and avocets, on salt pond levees; in dry salt panne habitat; in marshes on higher ground around marsh ponds; and in other bayside habitats. There would be no changes in available nesting, roosting, and foraging habitat for pond-associated waterbirds over time under the No Action Alternative, and no changes to the baseline populations are expected.

Diving ducks, such as lesser and greater scaup, bufflehead, canvasbacks, and other species, occur in the South Bay primarily during the nonbreeding season. No construction activities or actions would be conducted under the No Action Alternative, so there would be no changes over time to the baseline foraging habitat of diving ducks. The southern Eden Landing ponds would be maintained in their current condition and would generally continue to provide the same habitat functions as they do now. These operations are not expected to produce substantial declines in flyway-level populations or reduce the population of diving ducks 20 percent below baseline levels.

Although small numbers of ruddy ducks breed in the South Bay, this species occurs in the project area primarily during their winter migration. In contrast with most of the diving ducks addressed above, ruddy ducks are diving ducks that, in the South Bay, forage primarily in salt ponds, with relatively few individuals using tidal habitats in the South Bay. Currently, a small number of ruddy ducks use the ponds and adjacent sloughs at southern Eden Landing for foraging. These ponds would be maintained in their current condition and would continue to provide suitable ruddy duck foraging habitat. However, open water habitat for ruddy ducks is present elsewhere in the South Bay. Neither substantial declines in flyway-level populations nor a 15 percent reduction in population is expected under the No Action Alternative.

Dabbling ducks forage in a variety of habitats in the South Bay, including mudflats, shallow subtidal habitats, tidal sloughs and marsh channels, marsh ponds, managed and muted tidal marsh, seasonal wetlands, managed ponds, and water treatment plants. There would be no impacts to dabbling ducks in the Eden Landing Phase 2 No Action Alternative.

The California least tern uses levees in the South Bay as post-breeding roosting sites. After breeding (primarily at Central Bay sites), adult California least terns bring their juvenile offspring to the South Bay to forage before migration. The No Action Alternative would have less-than-significant impacts on the California least tern at the southern Eden Landing because of the ample substitute forage and roosting habitat available to this species.

No changes would occur to pickleweed-dominated tidal salt marsh at southern Eden Landing under the Eden Landing Phase 2 No Action Alternative, though small losses of pickleweed-dominated tidal marsh may occur if uncontrolled levee breaching occurs due to erosion and scour. Because such breaches would be unintentional, the locations and extent of habitat loss would not be controlled at all, and thus salt marsh harvest mouse and wandering shrew dispersal in any given area may be adversely affected in the short term.

In the South Bay, managed ponds support lower diversity of native fishes than tidal habitats do. Conversely, many of the fish recorded in the South Bay use tidal channels and mudflats at high tide, when they are inundated. These tidal habitats are particularly important as nursery habitat for juvenile fish. These habitats are present in the sloughs and channels around southern Eden Landing, and the ACFCC is a known steelhead run. There would be no impacts to steelhead or estuarine fish in the Eden Landing Phase 2 No Action Alternative.

The piscivorous birds (e.g., pelicans, cormorants, grebes) of the South Bay forage in a variety of habitats and locations where prey fish are available. The low-salinity salt ponds that support fish, tidal sloughs and channels, edges of intertidal mudflats, non-tidal ponds and channels, and artificial lakes provide the highest-quality foraging areas. The ponds at southern Eden Landing currently large areas provide foraging opportunities for piscivorous birds. There would be no impacts to piscivorous birds at Eden Landing under the No Action Alternative.

Pacific harbor seals are currently the only marine mammals that are permanent residents of San Francisco Bay. Harbor seals forage in nearshore marine habitats on a variety of fishes and invertebrates. The No Action Alternative would have no impacts on harbor seals at southern Eden Landing. Also, under the No Action Alternative, no increased recreation access would be provided, and no new impacts to sensitive species and their habitats would occur from recreation-orientated activities.

Currently, no threatened or endangered plants species are known to occur in the Eden Landing Phase 2 project area, but several other special-status species have some potential to occur. Because there would be no actions implemented under the No Action Alternative, there would be no impact to any of these plant species under the No Action Alternative.

Regarding invasive cordgrass (*Spartina alternaflora*), the potential uncontrolled nature of levee breaching or failure under the No Action Alternative could lead to locations and timing of tidal restoration that temporarily increase colonizable land in areas where control is difficult due to access. However, in general, Spartina colonization is expected to be controlled by the Invasive Spartina Project. Monitoring and management of changes in abundance of smooth cordgrass and its hybrids in the SBSP Restoration Project area are described in the AMP. With the AMP, which would be implemented under all alternatives, and in collaboration with the Invasive Spartina Project, Spartina would be monitored and controlled to reduce impacts to a less than significant level. Large stands of Lepidium are present along channels to the south of Eden Landing (shown on Figure 3.5-5), but there is not an existing cumulative impact. Nothing in the Eden Landing Phase 2 No Action Alternative would increase the chance of further establishment of this species.

Of the wildlife diseases that could potentially affect species in the South Bay, those affecting birds are of greatest concern because of the ease with which they may be transmitted (due to birds' mobility) and the large numbers of individuals that can potentially be exposed to diseases in flocks or colonies. Avian botulism, the avian disease with the greatest potential to affect large numbers of birds, is caused by a toxin produced by the bacterium *Clostridium botulinum*. Under the No Action Alternative, CDFW would continue to maintain the managed low-salinity Bay Ponds and the seasonally managed Inland Ponds and

Southern Ponds in their current states. Under the No Action Alternative, there would be no increase in exposure of wildlife to avian botulism and other diseases.

The epifaunal invertebrate community in the South Bay is dominated by several species of shrimps and crabs. Two native caridean shrimps, the California bay shrimp and the blacktail bay shrimp, are common in tidal sloughs and in the Bay itself. Bay shrimp may utilize tidal sloughs within the marsh as nurseries. Under the No Action Alternatives, there would be no change in the discharges compared to baseline. Bay shrimp and other invertebrates would not be affected by the continued management and operation of the ponds at southern Eden Landing.

Jurisdictional wetlands and non-wetland waters of the United States occur at southern Eden Landing. Under the No Action Alternative, there would be no changes in the area of waters or wetlands other than the current slow dynamics of fringing marshes in the surrounding waterways. Impacts to existing jurisdictional wetlands or waters would be less than significant.

Potentially significant cumulative impacts associated with biological resources are present in the Eden Landing Phase 2 project area. There is a potential loss of mudflats as a result of sea-level rise and the cumulative tidal wetland restoration projects. As a result of this potential mudflat loss, coupled with the conversion of high-tide foraging habitat in managed ponds to tidal habitats, other tidal restoration projects and sea-level rise could potentially result in a significant cumulative impact to small shorebird numbers and the populations of other mudflat-dependent species in the South Bay. Under the Eden Landing Phase 2 No Action Alternative small shorebird habitat would remain relatively unaffected. As stated above, impacts of the Eden Landing Phase 2 No Action Alternative to biological resources would either be less than significant or have no impact. The less than significant impacts are relatively minor and would not trigger a significant cumulative impact when combined with the impacts of other cumulative projects.

Cumulative Impacts of Eden Landing Phase 2 Action Alternatives

As discussed in Section 3.5, Biological Resources, under the Eden Landing Phase 2 Action Alternatives, there would be less-than-significant impacts or no impacts to biological resources under all of the Eden Landing Phase 2 Action Alternatives. Also, as expected under a restoration project, many of the individual impacts on biological resources would be beneficial under NEPA.

Under the Eden Landing Phase 2 Action Alternatives, levees would be breached and/or lowered or removed to introduce tidal flows to some or all (depending on the alternative selected) of the former salt production ponds to either begin their transition to tidal marsh habitat. The Action Alternatives also include habitat improvements such as islands, habitat transition zones, and pilot channels. In all alternatives, though the locations would vary, levee raising and other improvements would be made to maintain or improve the existing levels of flood protection. The Eden Landing Phase 2 Action Alternatives' habitat enhancements and public access features would include trails and one or more viewing platforms. There would also be new water control structures and other hydraulic connections to surrounding waterways that would allow connectivity of the ponds with flows from the ACFCC in all Action Alternatives and into the OAC in some of them. These structures would allow enhanced managed ponds to would provide CDFW with improved control over water levels, quality, and timing in these ponds to allow a different type of managed pond habitat, depending on the Action Alternative selected. The various Action Alternatives present variations in the number, location, and size of these breaches; other levee and pond modifications; habitat enhancements; water control structures; and public access features.

All of these Action Alternative changes are discussed in detail in Chapter 2, Alternatives. The expected effects of 25 individually numbered impacts were analyzed for each Action Alternative and presented in depth in Section 3.5, Biological Resources. To simplify the cumulative impacts analysis, this section describes the significance determination of those impacts in a high-level/overview fashion that is intended to identify the types of changes that could have potential to cause a new cumulative adverse impact or to make a considerable contribution to an existing cumulative impact.

The Eden Landing Phase 2 Action Alternatives were found to have the potential to affect biological resources in a number of ways:

- Habitat conversion or loss;
- Import and placement of material;
- Disturbance from recreational use of public access features;
- Construction-related effects;
- Increased crowding or susceptibility of wildlife species to predation or disease;
- Creating conditions that are suitable for establishment of invasive plant species; or
- Loss of jurisdictional wetlands and waters of the United States.

As Section 3.5, Biological Resources, explains in detail, most of these changes are expected to be beneficial or neutral to most of the specific biological resources or types/categories of them included in the 2007 Final EIS/R. Program-level avoidance and minimization measures, implementation of the AMP and other standard management practices used by CDFW, ongoing collaboration with the adjacent county agencies (ACFCWCD), and continued implementation of monitoring and control programs such as the Invasive Spartina Project are expected to be effective in reducing impacts to levels that are less than significant, even on a cumulative basis.

Thus, in almost all cases, the potential for cumulative adverse impacts on biological resources is minimal; most of the effects of the SBSP Restoration Project would be beneficial to at least some of these resources. In the cases where small and short-term adverse impacts are expected and planned for—for example, excavating a channel through an existing fringing tidal marsh to connect a pond to the Bay—the long-term benefits are expected to be much greater: the acreage of the restored tidal marsh in the former pond would be several orders of magnitude larger than that lost in the excavated channel. Further, many of the cumulative impact projects listed in Table 4-1 are similarly oriented toward some form of habitat restoration, meaning that many of the cumulative impacts are themselves beneficial when taken in the aggregate.

The exceptions to this general statement were found to be limited to those biological resources that utilize the existing former salt ponds and/or their surrounding levees in their current configuration. Some wildlife species or guilds—most notably, birds that use shallow or deep-water ponds or dry salt pannes and their surroundings for nesting, roosting, and/or foraging—would see an overall reduction in the quantities of those habitats. However, with the exception of dry salt pannes, these habitat types are not in short supply in the South Bay. As discussed in Section 3.5, Biological Resources, in most cases the affected species do not wholly depend on these particular habitats or features, and Section 3.5 concluded that affected species would be able to gradually relocate to other, similar habitats in the vicinity without losses of individuals in high enough numbers to trigger a significance impact. Nevertheless, the Eden Landing Phase 2 Action Alternatives do include islands and other habitat enhancements intended to help minimize the adverse effects of restoring tidal flows to those ponds by increasing the quality of certain habitats even as the absolute quantities of them are diminished.

Western snowy plover have in recent years made limited use of the dry salt panne habitat provided by seasonal pond operations at the Inland Ponds and Southern Ponds for nesting, and they forage in adjacent waters. This habitat would be reduced in Alternative Eden B. In Alternatives Eden C, the plover habitat enhancements recently completed at northern Eden Landing were seen as effective enough to offset these adverse impacts to a less-than-significant level.

Several species of small shorebirds (examples of common species include semipalmated plover, western sandpiper, least sandpiper, dunlin, short-billed dowitcher, and long-billed dowitcher) occur in the San Francisco Bay Area, primarily during migration and in winter (roughly July through April). Restoration of former salt ponds to tidal habitats is expected to increase the availability of intertidal mudflat foraging area at low tide in the short term, as some of the breached ponds would provide intertidal mudflat habitat for some time before accreting enough sediment to become vegetated. However, in the long term, sedimentation patterns of the South Bay are expected to result in a loss of intertidal mudflat.

The Eden Landing Phase 2 Action Alternatives could potentially affect numbers of diving ducks in the South Bay in several ways. By converting ponds that currently provide foraging habitat for diving ducks to tidal habitats or enhanced managed ponds with a different hydrological regime, the Phase 2 actions would result in an overall loss of managed pond habitat relative to the baseline. This conversion is expected to adversely affect habitat for bufflehead, which occur in the South Bay primarily in managed ponds and make relatively little use of tidal waters. However, subtidal habitat in sloughs and larger channels within restored ponds would provide foraging habitat for species such as canvasbacks and scaup, potentially offsetting the effects of the loss of managed pond habitat. Because there is so little existing forage habitat for diving ducks at Eden Landing now, the Phase 2 activities are unlikely to affect enough individuals to cause a population decline of 20 percent below baseline level or substantially reduce flyway-level populations. Also, open water habitat for diving ducks is present elsewhere in the South Bay.

Although small numbers of ruddy ducks breed in the South Bay, this species occurs in the project area primarily during winter-spring and their migration. Because ruddy ducks in the South Bay make little use of tidal waters, the Eden Landing Phase 2 Action Alternatives would likely result in declines in ruddy duck numbers within the South Bay due to conversion of managed ponds to tidal habitats. These changes are not expected to produce substantial declines in flyway-level populations or reduce the population of ruddy ducks 15 percent below baseline levels. Compared to the habitat present for ruddy ducks in the South Bay, the changes to habitat would be small and less than significant.

The tidal marshes that develop under the Eden Landing Phase 2 Action Alternatives are expected to provide roosting and foraging habitat for dabbling ducks. There would be less-than-significant impacts or no impacts to dabbling ducks with any of the Eden Landing Phase 2 Action Alternatives.

During the transition to tidal marsh following breaching of the southern Eden Landing levees, Lepidium could become established, particularly along the margins of new channels that develop within the ponds. The AMP, as discussed in the 2007 Final EIS/R, addresses monitoring and control of Lepidium colonization. The implementation of the AMP would reduce this impact to less than significant in itself and would not contribute to a cumulative impact. Similar logic applies to invasive Spartina, for which no cumulative impact currently exists because of the successful implementation of the Invasive Spartina Project.

Increased recreational access resulting from Eden Landing Phase 2 Action Alternatives may impact sensitive species and their habitats. However, such disturbance would likely be limited to relatively narrow corridors along the edges of the ponds where trails get added or improved. Further, these effects would be monitored and managed, and implementation of the AMP would ensure that impacts do not reach significant levels. Public access has considerable potential to result in long-term benefits to sensitive species in the South Bay by improving public education concerning the importance of the SBSP Restoration Project and habitat restoration and South Bay conservation in general. With monitoring and implementation of the AMP, impacts of recreation would be less than significant, and there would be no new cumulative impact associated with it.

In sum, the ongoing balancing of SBSP Restoration Project impacts across many locations as part of the AMP allows minor losses or conversions of some area of one type of habitat in one location can be offset with enhancement of that same type of habitat in that same location or elsewhere. Such enhancements would allow smaller areas of habitat to be equally valuable and beneficial to that particular species or other biological resources.

Because of the less-than-significant impacts or the lack of adverse impacts summarized above most types of cumulative impacts were ruled out categorically. The remaining ones are potential effects to western snowy plover, small shorebirds, and ducks. The effects on these resources were considered in combinations with the expected impacts of the cumulative impact projects listed in Table 4-1. In other cases where potential impacts were identified but concluded to be less than significant, the magnitude of the impacts is so small relative to the background dynamics in the existing environment that there would not be a considerable contribution to any significant cumulative impact that may exist. The impacts of construction-related noise on wildlife species is an example.

Recreation Resources

The geographic scope for cumulative impacts on recreational resources includes the cities and other communities where the proposed project and cumulative projects would be located (the cities of Hayward, Fremont, and Union City and portions of unincorporated Alameda County). This geographic scope is appropriate for this analysis because the displacement of recreational uses from one area can result in the increased use of recreational facilities in another.

The types of projects listed in Table 4-1 that could contribute to cumulative impacts associated with recreation resources include restoration projects, flood protection projects, development projects, and recreation projects. Review of the 2007 Final EIS/R and the cumulative projects listed in Table 4-1 indicates no significant cumulative impacts associated with the provision of new public access and recreation facilities in the study region. Recreation-related projects (e.g., construction of trails and viewing platforms) identified in the planned project lists of local jurisdictions and other cumulative restoration and flood risk management projects would provide new recreation opportunities (both active and passive) through the development of public access, trails, or other recreation features. Also, it is possible that some of these cumulative trail projects would fill the gaps of the regional Bay Trail network. Other cumulative projects (e.g., residential or commercial development projects) may also require the installation of recreational components.

Cumulative Impacts of No Action Alternative

Under the Eden Landing Phase 2 No Action Alternative, no new recreation activities would occur, and no new facilities would be provided. The ponds at southern Eden Landing would continue to be monitored and managed by CDFW according to its plans and policies and other activities described in the AMP. Existing recreation use near southern Eden Landing would continue to be similar to that under existing conditions and would not change in the long term.

No significant cumulative impacts associated with recreation resources exist in the project area, and the contribution of the Eden Landing Phase 2 No Action Alternative to cumulative impacts related to recreation resources would not be considerable and would not trigger a significant cumulative impact.

Cumulative Impacts of Eden Landing Phase 2 Action Alternatives

In general, the Eden Landing Phase 2 Action Alternatives would increase the availability and quality of public access and recreation opportunities in the communities surrounding the alternatives. The Eden Landing Phase 2 Action Alternatives are not expected to cause any significant adverse environmental effects on recreational facilities or to affect long-term recreational use of the study area except for temporary closures of certain parks, parking areas, or trails associated with the actual construction of some of the Action Alternatives. When considered in conjunction with the projects listed in the 2007 Final EIS/R and Table 4-1 and the ongoing uses of the study region, the effects of the Eden Landing Phase 2 Action Alternatives on recreational resources are not expected to cause or contribute to cumulatively significant short-term interruptions of recreational use of regional facilities such as the Bay Trail; short-term or long-term losses of recreational opportunities (trails and boating); or short-term or long-term needs for construction of new recreational facilities.

The Eden Landing Phase 2 Action Alternatives generally provide greater recreational benefits than currently exist and have less than significant impacts to recreation resources. Restoration of the former salt production ponds to tidal marsh habitat and/or enhanced managed ponds involves activities that would cause changes to the existing trail system in the form of new Bay Trail spine and spur trails and improved connectivity. New trail segments would be constructed as part of the Eden Landing Phase 2 project. With these improvements, the contribution of the Eden Landing Phase 2 Action Alternatives to cumulative impacts to the recreational trail network is not considerable.

Urban infill and increased public access at refuges and reserves in the Bay Area have caused conflicts with hunting. These trends are expected to continue, causing even greater limitations to hunting opportunities in the Bay Area. For the purposes of this analysis, it is assumed that past and current practices, as well as other cumulative projects, would cause a significant cumulative impact (lost hunting opportunities) regardless of actions taken within the Eden Landing Phase 2 project area.

Hunting opportunities would be constrained in the southern Eden Landing ponds during project construction, particularly at the Bay and Inland Ponds with the placement of dredge material, and during post-construction due to public use of some trail segments. These impacts are considered less than significant because nearby alternative locations would be available for hunting in the northern Eden Landing managed ponds. Therefore, the lost hunting opportunities associated with Eden Landing Phase 2 Action Alternatives would not provide a cumulatively considerable incremental contribution to the significant cumulative impact.

Cultural Resources

The geographic scope for cultural resources cumulative impacts includes all areas that would be disturbed by the projects identified in the 2007 Final EIS/R and those listed in Table 4-1. This scope is appropriate because it is large enough to encompass a representative sample of prehistoric and historic populations that once occupied the region.

The cumulative projects that involve ground disturbance or that would generate groundborne vibration could affect cultural resources by uncovering previously undiscovered archaeological or paleontological resources or by damaging historic structures, potentially resulting in additional cumulative impacts on these resources. The past, present, and reasonably foreseeable future actions considered by this cumulative impacts analysis are residential and non-residential development in the cumulative study area that could affect cultural resources.

All of the types of projects listed in Table 4-1 that would cause ground-disturbing activities could contribute to cumulative impacts associated with cultural resources. Review of the 2007 Final EIS/R and the cumulative projects listed in Table 4-1 indicates that no significant cumulative impacts to cultural resources occur in the study region. By law, all projects are required to take appropriate actions in the event of a find of cultural resources, as stated in **SBSP Mitigation Measure 3.8-1** of the SBSP Restoration Project (see Section 3.8, Cultural Resources, of the 2007 Final EIS/R). These required actions include stopping work, having a qualified archaeologist examine and determine the significance of the find, determining measures for treatment of the cultural resources, and contacting a Native American most likely descendant. Because such measures are required to address the potential for disturbance to cultural resources, the impacts associated with cumulative projects would be less than significant.

There is a wide range of known and unknown cultural resources that may be disturbed by some aspect of individual restoration activities. Because so many of these resources are probably obscured, they may only be encountered during project-related earthmoving activities. Accidental discoveries made during construction may be unavoidable; however, as emphasized in the National Historic Preservation Act, CEQA, and local plans and policies, wherever practicable, preservation of cultural resources is preferred over additional damage and/or data recovery.

Cumulative Impacts of No Action Alternative

Under the Eden Landing Phase 2 No Action Alternative, the southern Eden Landing ponds and their surroundings would continue to be monitored and managed through the activities described in the AMP. No new activities would occur and no cultural resources would be adversely affected.

No significant cumulative impacts associated with cultural resources exist in the project area, and the contribution of the Eden Landing Phase 2 No Action Alternative to cumulative impacts related to cultural resources would not be considerable and would not trigger a significant cumulative impact.

Cumulative Impacts of Eden Landing Phase 2 Action Alternatives

Under the Eden Landing Phase 2 Action Alternatives, there is the potential that previously undocumented cultural resources are present below the surface and could be affected by project activities. However, implementation of **SBSP Mitigation Measure 3.8-1** and **Mitigation Measure 3.8-2** (described in Chapter 2, Alternatives) would reduce project-related impacts to recorded or unrecorded cultural resources to less-than-significant levels.

No significant cumulative impacts associated with cultural resources exist in the project area. As discussed above, the Eden Landing Phase 2 Action Alternatives would create less than significant impacts to cultural resources since **SBSP Mitigation Measure 3.8-1** and **SBSP Mitigation Measure 3.8-2** would be implemented as part of the project. Therefore, the contribution of the Eden Landing Phase 2 Action Alternatives to cumulative impacts would not be considerable and would not trigger a significant cumulative impact.

Land Use

The geographic scope for cumulative impacts on land use includes the cities and communities where the proposed project and cumulative projects would be located (the cities of Fremont, Hayward and Union City and portions of unincorporated Alameda County).

Review of the 2007 Final EIS/R and the cumulative projects listed in Table 4-1 indicates that no significant cumulative impacts on land use and planning resources occur in the study region. Most cumulative projects (especially residential, commercial, and industrial development) are required to conform to the designated uses of general plans and the zoning ordinances of affected jurisdictions before approval. These projects include the cumulative projects listed in the 2007 Final EIS/R and those listed in Table 4-1. Development projects, in particular, must go through the affected jurisdiction's review process to determine conformity with designated uses, and if required, applicants must apply for a land use zoning amendment for the proposed development parcel before obtaining project approval and construction. Some cumulative public projects may not conform to designated land uses or zoning, but proposed uses are typically compatible with surrounding land uses (e.g., water-related projects within residential areas). Because all projects need to either conform to the appropriate land use designations or be compatible with surrounding land uses, cumulative land use impacts associated with other cumulative projects would be less than significant.

Cumulative Impacts of No Action Alternative

Under the No Action Alternative, the southern Eden Landing ponds would continue to be monitored and managed according to the *Eden Landing Ecological Reserve (Baumberg Tract) Restoration and Management Plan* (1999) and the *Eden Landing Ecological Reserve System E2 and E2C Operation Plan* (Operations Plan), which implemented the Initial Stewardship Plan and describes the current pond management activities that are carried out to meet the goals and objectives for managed ponds within the Eden Landing Phase 2 project area. No new activities would occur.

No significant cumulative impacts associated with land use exist in the project area, and the contribution of the Eden Landing Phase 2 No Action Alternative to cumulative impacts related to land use would not be considerable and would not trigger a significant cumulative impact.

Cumulative Impacts of Eden Landing Phase 2 Action Alternatives

None of the activities that would occur under the Eden Landing Phase 2 Action Alternatives would create a land use incompatibility. The preservation of open space areas, protection of wildlife habitat, and provision of new recreation facilities would result in a beneficial impact and would be consistent with land use plans and other plans adopted for the purposes of avoiding or mitigating an environmental impact. Therefore, the Eden Landing Phase 2 Action Alternatives would not introduce land uses that would be incompatible with surrounding uses.

Because all projects need to either conform to the appropriate land use designations or be compatible with surrounding land uses, no significant cumulative impacts associated with land use exist in the project area. As stated above, all Eden Landing Phase 2 Action Alternatives would have less than significant land use impacts. The contribution of the Eden Landing Phase 2 Action Alternatives to cumulative impacts related to land use would not be considerable and would not trigger a significant cumulative impact.

Public Health and Vector Management

The geographic scope for public health and vector management includes the Alameda County Mosquito Abatement District. The district uses source reduction, source prevention, larvicide programs, fish programs, mosquito monitoring, vectorborne disease monitoring, and other tools to avoid, reduce, and manage mosquito problems. The district sprays larvicide into the salt marshes and other waterways at various times, as needed, and contributes to the cumulative condition for public health vector management.

The ongoing mosquito abatement project listed in Table 4-1 could contribute to avoiding cumulative impacts associated with public health and vector management. Review of the 2007 Final EIS/R and the cumulative projects listed in Table 4-1 indicates that no significant cumulative impacts regarding public health vector management exist in the study region. In other parts of the Bay, ongoing and proposed tidal restoration projects are expected to reduce the extent and quality of mosquito breeding habitat, thus reducing the need for vector management. Such reductions would result from the conversion of impounded and diked habitats, which often contain standing water with vegetation, to well-drained tidal marshes that are less suitable for use by breeding mosquitoes. Other cumulative projects listed in the 2007 Final EIS/R and in Table 4-1 (e.g., development and transportation or flood protection projects) are not expected to increase or decrease mosquito populations. Cumulative projects would result in a less-than-significant cumulative impact associated with increases in mosquito populations.

Cumulative Impacts of No Action Alternative

Under the No Action Alternatives, the southern Eden Landing ponds would continue to be monitored and managed through the activities described in the AMP. No new activities would occur.

No significant cumulative impacts associated with public health and vector management exist in the project area, and the contribution of the Eden Landing Phase 2 No Action Alternative to cumulative impacts related to public health and vector management would not be considerable and would not trigger a significant cumulative impact.

Cumulative Impacts of Eden Landing Phase 2 Action Alternatives

The Eden Landing Phase 2 Action Alternatives, for the most part, would likely result in an overall decrease in potential mosquito breeding habitat for the salt-marsh-dwelling mosquito species by providing more thorough tidal flushing. However, in some instances, opening ponds to tidal flows could result in an increase in mosquito habitat relative to the existing conditions. Tidal marshes (once they are established) are suitable habitat for some mosquito species, while the currently large salt ponds with vigorous wind action provide minimal habitat. Thus, there could be an increase the potential habitat for some types of salt marsh mosquito species. Also, the planned habitat transition zones could result in an overall increase in potential mosquito breeding habitat if they are not designed, constructed, and maintained so that water does not pool in them and allow mosquito breeding. Mosquito and vector management would continue to follow the general O&M procedures of the abatement districts and the Refuge and use the AMP for vector control. By design, the implementation of the AMP management actions would occur early enough, due to the established AMP management triggers, to avoid substantial increases in the need for vector management activities while minimizing potential increases in mosquito populations.

No significant cumulative impacts associated with public health and vector management exist in the project area. For the Eden Landing Phase 2 Action Alternatives mosquito and vector management would continue to follow the general O&M procedures of the abatement districts and the Reserve and use the AMP for vector control minimizing potential increases in mosquito populations. The contribution of the Eden Landing Phase 2 Action Alternatives to cumulative impacts related to public health and vector management would not be considerable and would not trigger a significant cumulative impact.

Socioeconomics and Environmental Justice

The study area for the socioeconomics and environmental justice cumulative impacts analysis includes the cities of Fremont, Hayward, and Union City in the vicinity of the southern Eden Landing ponds.

Review of the 2007 Final EIS/R and the cumulative projects listed in Table 4-1 indicates that less-than-significant cumulative impacts regarding socioeconomics exist in the study area. Cumulative projects would likely have substantial effects on the local economy by increasing the number of residents, jobs, and commerce. For example, the increase in new residential, commercial, and industrial uses could increase the tax base of the affected jurisdictions, which in turn would lead to improved public services (including police, fire, and recreation services). Recreation-related cumulative projects would increase recreation opportunities in the region, which in turn would increase commerce for businesses that cater to recreational users.

The 2007 Final EIS/R concluded that the extent to which the cumulative projects would disproportionately affect minority and low-income communities (environmental justice) over the 50-year planning period cannot be determined. For example, industrial or utilities projects could be constructed near minority or low-income communities, which would result in a disproportionate land use compatibility effects such as air quality, traffic, and noise impacts. Because specific information is not available, it cannot be assumed that cumulative impacts of other cumulative projects would be less than significant. Therefore, it is assumed that the other cumulative projects would have a potentially significant cumulative impact on minority and low-income populations.

Cumulative Impacts of No Action Alternative

Under the No Action Alternative at the southern Eden Landing ponds, no new activities would occur as part of the SBSP Restoration Project. The ponds would continue to be monitored and managed through the activities described in the AMP and in accordance with current USFWS practices. Recreation activities would remain similar to those under existing conditions and would not be expected to change business conditions in the long term. Therefore, no impact to area businesses would occur and the communities would remain similar to existing conditions.

No significant cumulative impacts associated with socioeconomics exist in the project area. Since no impact to area businesses would occur and the communities would remain similar to existing conditions, the contribution of the Eden Landing Phase 2 No Action Alternative to cumulative impacts related to socioeconomics would not be considerable and would not trigger a significant cumulative impact.

Although there are potentially significant cumulative impacts relative to environmental justice in the study region (because specific information is not available, it cannot be assumed that cumulative impacts of other cumulative projects would be less than significant), the Eden Landing Phase 2 No Action Alternative would have no disproportionate effects on low income or minority populations and would not contribute to Environmental Justice cumulative impacts.

Cumulative Impacts of Eden Landing Phase 2 Action Alternatives

The Eden Landing Phase 2 Action Alternatives propose the construction of a range of new recreational and public access facilities at the southern Eden Landing ponds as well as restoration activities. An increase in use of the additional recreational and public access facilities may incrementally increase activity at businesses associated with recreational users. Construction of the Eden Landing Phase 2 Action Alternatives would result in some new recreation facilities. These facilities would primarily be extensions of existing services (e.g., viewing platforms, interpretative stations, and some new trails) and are not expected to substantially increase the recreational uses of the facilities. Business activity at surrounding businesses that cater to these recreational users could expect a slight increase in their business revenues. Further, the planned restoration activities are generally a long-term environmental benefit to surrounding communities in terms of improving water or air quality, maintaining or improving flood protection, and so on.

No significant cumulative socioeconomic impacts exist in the project area. Socioeconomic impacts under the Eden Landing Phase 2 Action Alternatives would generally be beneficial. The contribution of the completed Eden Landing Phase 2 project activities to cumulative impacts regarding socioeconomics would not be considerable and would not trigger a significant cumulative socioeconomic impact.

The Eden Landing Phase 2 Action Alternatives would involve earthmoving activities at the southern Eden Landing ponds that may cause short-term construction disturbance impacts (e.g., noise from construction equipment, increase in dust, and truck traffic). These activities would also occur at some distance from residents and be similarly experienced by non-residents in the nearby business parks and on public roads and trails. Users of these facilities are drawn from the general population. Construction activities would be temporary and generally would not occur exclusively in areas where the minority population is a greater percentage than that of the surrounding cities’ populations.

There are potentially significant cumulative impacts relative to environmental justice in the study region (because specific information is not available, it cannot be assumed that cumulative impacts of other cumulative projects would be less than significant). However, the Eden Landing Phase 2 Action Alternatives would have no disproportionate effect on minority or low income communities. Therefore, the contribution of the Eden Landing Phase 2 Action Alternatives to cumulative impacts related to environmental justice would not be considerable.

Traffic

The geographic scope for cumulative traffic impacts includes the South Bay area in the vicinity of Hayward, Union City, and Fremont, as well as surrounding portions of other cities and unincorporated areas within Alameda County. Areas farther away than this from Eden Landing would not experience cumulative traffic impacts from this project. The transportation network in and around the Eden Landing Phase 2 project area at Eden Landing consists of highways, surface streets, bicycle routes, public transit, railways, and air transportation facilities.

Review of the 2007 Final EIS/R and the cumulative projects listed in Table 4-1 indicates that potentially significant cumulative impacts regarding construction-related traffic exist in the study region. The development of future cumulative projects, specifically large-scale residential, commercial, and industrial development as well as restoration and flood control projects, would require construction activities that necessitate the transportation of equipment, machinery, soils, and workers to and from the work sites. Construction-related traffic would be expected to increase on the local and regional transportation network if these projects were to occur simultaneously. Specifically, if all construction-related traffic were to occur during the weekday peak hours, then significant cumulative traffic levels on roadways or intersections could occur, because traffic congestion within the Bay Area occurs primarily during the weekday peak hours. Cumulative projects would likely be scattered both geographically (throughout the entire South Bay) and over time (over the 50-year planning period). Also, construction-related traffic for the cumulative projects would likely occur throughout the day, rather than being concentrated only during the peak hours. However, because the number of construction-related truck trips is not known for the combination of cumulative projects that would be occurring at any given time, potential impacts from other cumulative projects must be assumed to be potentially significant.

The population of the South Bay and Alameda County in particular is expected to increase over the next 25 years. This increase would result in a corresponding increase in long-term traffic volumes. The increase in long-term traffic, particularly during the weekday peak hours, could potentially degrade traffic levels on a roadway or at an intersection. Projects identified in the MTC Transportation 2035 Plan (2009) are intended to maintain, manage, and improve surface transportation in the Bay Area. Project proponents are typically required to mitigate for adverse operational-traffic effects generated by their projects either by improving traffic facilities (e.g., widening roads, installing signals) or contributing to a regional fund for traffic improvements. Although MTC projects and mitigation measures for individual development projects are expected to address the potential for long-term degradation of traffic levels on roadways and intersections, due to the uncertainty of funding for these projects and the actual implementation of mitigation measures by project proponents, potential operational-traffic-related effects from cumulative projects would be potentially significant.

With the exception of worker vehicles that are primarily passenger cars, construction-related vehicles would involve the use of heavy trucks. These trucks would be required to follow the local jurisdictions' designated haul routes to the extent feasible; these routes consist primarily of larger roads capable of handling heavy loads. The increase in truck trips could increase wear and tear on local and regional roadways. Although major arterials and collectors are designed to accommodate a mix of vehicle types, including heavy trucks, residential streets are not designed with a pavement thickness that can withstand substantial truck traffic volumes. Because the increase in construction-related truck traffic traveling on designated routes and road improvements for the cumulative projects is not known, the impacts on roadways from cumulative construction projects would be potentially significant.

Cumulative Impacts of No Action Alternative

Because the No Action Alternative at the southern Eden Landing ponds would not involve construction of new facilities or features within the ponds, no construction-related traffic would be generated. As such, no increase in wear and tear on the designated haul routes during construction would occur under the No Action Alternative. Consequently, the No Action Alternative would not contribute to cumulative impacts.

Operation of the southern Eden Landing ponds under the No Action Alternative would require limited, intermittent vehicular traffic associated with O&M activities over the 50-year planning period; this traffic would constitute a less-than-significant contribution to cumulative impacts.

Although potentially significant cumulative impacts relative to construction traffic exist in the study region, the contribution of the Eden Landing Phase 2 No Action Alternative to cumulative impacts related to traffic would not be considerable.

Cumulative Impacts of Eden Landing Phase 2 Action Alternatives

Implementation of the Eden Landing Phase 2 Action Alternatives would involve several construction activities that generate construction traffic. The construction traffic would be temporary in nature, lasting the duration of the construction phase. Construction activities would generate traffic associated with the transport of materials and equipment at southern Eden Landing , and the delivery of fill material which could be done in a single construction seasons but could also be spread out over two or three seasons, depending on material availability. Truck trips would be required for the transport of equipment at the beginning and end of each construction season and for worker commuting on a daily basis. As discussed in Section 3.11.3, Environmental Impacts and Mitigation Measures, if all material is available at once and delivered as rapidly as possible, there could be up to 200 trips per day for 70 days (in the most extreme Action Alternative). In this case, the trips to deliver this material would contribute to increases in local traffic delays at the I-880 Southbound Ramps / Whipple Road / Dyer Street intersection during peak commute hours.

During construction of the Eden Landing Phase 2 Action Alternatives, construction traffic would be directed to use designated haul routes. The designated access routes are classified as major arterial streets. As such, these roads were designed to withstand substantial truck traffic. If residential streets are part of the designated haul routes, a video record of road conditions would be prepared before the start of construction for the residential streets affected by the project. A similar video of road conditions would be prepared after project construction is completed. An agreement would be entered into before construction that would detail the pre-construction conditions and post-construction requirements of the roadway rehabilitation program.

O&M activities for components of the Phase 2 action would continue as described in the existing regulatory permits, according to maintenance needs identified annually, and as described in Pond Operations Plans, and would be informed by relevant AMP activities. These activities would include pond maintenance, levee maintenance, nesting island maintenance, habitat transition zone maintenance, and maintenance of public access and recreational features. The increase in traffic volumes associated with routine maintenance and monitoring activities would be minimal relative to the baseline.

Under the Eden Landing Phase 2 Action Alternatives, new facilities would be installed to improve recreation and public access. Operation of the new recreational facilities would be anticipated to result in small increases in visitation. However, the increased visitation is not anticipated to result in a substantial increase in vehicle traffic relative to the traffic volumes of the local network. Due to the periodic nature of the O&M traffic, the limited number of trips generated by workers visiting the ponds, and the minimal increase in visitation, the implementation of the Action Alternatives would not result in a substantial increase in traffic volumes compared to the current traffic levels in the area.

There are potentially significant cumulative impacts relative to traffic in the study region. Construction-related traffic would be expected to increase on the local and regional transportation network if the cumulative projects were to occur simultaneously. Trips resulting from the delivery of equipment and workers during construction could noticeably contribute to local traffic delays. Also, cumulative projects would likely be scattered both geographically (throughout the South Bay) and over time (over the 50-year planning period). There would be very little additional traffic associated with operation of the Eden Landing Phase 2 Action Alternatives. Therefore, the contribution of the Eden Landing Phase 2 Action Alternatives to cumulative impacts related to traffic would not be considerable.

Noise

Noise and vibration impacts are localized such that the geographic area in which cumulative impacts may occur is limited to the vicinity of the proposed project and the areas adjacent to the proposed construction access and haul routes.

Review of the 2007 Final EIS/R and the cumulative projects listed in Table 4-1 indicates that less-than-significant cumulative impacts regarding short-term construction noise exist in the study region. The development of future cumulative projects, specifically large-scale residential, commercial, and industrial development as well as restoration and flood control projects, would require construction activities that generate noise. However, cumulative projects would likely be scattered both geographically (throughout the South Bay) and over time (over the 50-year planning period). Also, because project proponents are required to comply with the requirements of the noise regulations of affected jurisdictions, and exemptions are provided specifically for construction noise, the potential noise effects of cumulative projects during construction would be less than significant.

Cumulative Impacts of No Action Alternative

Under the No Action Alternative, no new construction would occur under Phase 2 and southern Eden Landing would continue to be monitored and managed through the activities described in the AMP and in accordance with current CDFW and ACFCWCD practices.

No significant cumulative impacts associated with noise exist in the project area, and the contribution of the Eden Landing Phase 2 No Action Alternative to cumulative impacts related to noise would not be considerable and would not trigger a significant cumulative impact.

Cumulative Impacts of Eden Landing Phase 2 Action Alternatives

As described above, other cumulative projects in the vicinity of the project area would generally result in less-than-significant, short-term construction noise cumulative impacts because project proponents are required to comply with the requirements of noise regulations of the affected jurisdictions. Further, exemptions are provided specifically for construction noise. Implementation of the Eden Landing Phase 2 Action Alternatives would involve noise-generating construction and earthmoving activities as well as noise related to construction traffic. The Eden Landing Phase 2 project has incorporated programmatic mitigation measure **SBSP Mitigation Measure 3.13-1,** which ensures that construction activities shall be limited to the days and hours or noise levels designated for the local jurisdictions where work activities occur. Therefore, construction activities will not occur during noise-sensitive hours. The Eden Landing Phase 2 project has also incorporated programmatic mitigation measure **SBSP Mitigation Measure 3.13-2,** which requires trucks to avoid residential areas for haul routes to the extent feasible.

Periodic maintenance of the pond infrastructure would be required following construction under the Eden Landing Phase 2 Action Alternatives. Maintenance would require approximately one CDFW staff person to travel to southern Eden Landing one or two times a week to perform activities such as water control structure operations, predator control, general vegetation control, and vandalism repairs. Also, AMP monitoring activities would occur, which could require additional workers (e.g., staff, scientific researchers) to access the project area. The frequency of visits to conduct AMP monitoring activities would depend on the actual activities and would vary by season (e.g., during the bird breeding season, there could be more trips to the site than during the non-breeding season). However, the number of trips to the project site for maintenance is not expected to increase over the baseline number by more than a few trips per week.

No significant cumulative impacts associated with noise exist in the project area. There would be very little additional noise associated with operation of the Eden Landing Phase 2 Action Alternatives. Construction noise would temporary. Noise resulting from the delivery of equipment and workers during construction would not noticeably increase the ambient noise levels in the project area. Noise from construction activities at the ponds would not exceed the applicable local noise standards. Also, cumulative projects would likely be scattered both geographically (throughout the South Bay) and over time (over the 50-year planning period). Therefore, the contribution of the Eden Landing Phase 2 Action Alternatives to cumulative impacts related to construction-related noise would not be considerable and would not trigger a significant cumulative noise impact.

Air Quality

The geographic study area for cumulative air quality impacts is the area surrounding the proposed construction activities in the ponds and the San Francisco Bay Area Air Basin (SFBAAB) in general. To address cumulative impacts on regional air quality, the Bay Area Air Quality Management District (BAAQMD) has established thresholds of significance for construction-related and operational emissions of criteria pollutants. These thresholds represent the levels at which a project's individual emissions of criteria pollutants and precursors would result in a cumulatively considerable contribution to the region's existing air quality conditions. In developing thresholds of significance for air pollutants, BAAQMD considered the emission levels for which a project's individual emissions would be cumulatively considerable. If a project exceeds the identified significance thresholds, its emissions would be cumulatively considerable, resulting in significant adverse air quality impacts to the region's existing air quality conditions. Therefore, additional analysis to assess cumulative impacts would be unnecessary.

The simultaneous construction of cumulative projects, including residential, commercial, industrial, restoration, flood risk management, and recreation projects, would generate air pollutant emissions, and if these project overlap geographically, could create a significant cumulative impact.

Cumulative Impacts of No Action Alternative

Under the Eden Landing Phase 2 No Action Alternative, no construction activities would occur. Although O&M activities would be ongoing, they would be the same as those that occur now. Further, they are considered part of project operation and not construction. As such, no construction-generated emissions would occur.

Under the No Action Alternative, operations would involve no new activities. Southern Eden Landing would continue to be monitored and managed through the activities described in the AMP and in accordance with current CDFW and ACFCWCD practices. The level of activity would be the same as the activities occurring under existing conditions and would not result in a change in emissions. O&M activities could require the use of diesel-powered equipment and vehicles that have the potential to generate toxic air contaminant (TAC) emissions. However, the use of this equipment would be limited in extent and occur intermittently and rarely over the multi-decadal lifetime of the project. As such, the potential for exposure of sensitive receptors to TAC emissions from use of diesel-powered equipment and vehicles would be less than significant. Therefore, potential impacts from long-term operational emissions would be less than significant.

Because of existing air quality conditions in the Bay Area, potentially significant cumulative impacts relative to air quality exist in the study region. Under the Eden Landing Phase 2 No Action Alternative, however, the level of activity would be the same as the activities occurring under existing conditions and would not result in a change in emissions. Therefore, the contribution of the Eden Landing Phase 2 No Action Alternative to cumulative impacts related to air quality would not be considerable.

Cumulative Impacts of Eden Landing Phase 2 Action Alternatives

Alameda County is currently designated as a marginal nonattainment area with respect to the national 8-hour ozone standard and as a moderate nonattainment area for the 24-hour fine particulate matter ($PM_{2.5}$) standard. Alameda County is also a maintenance area for carbon monoxide (CO).

Implementation of the Eden Landing Phase 2 Action Alternatives could involve the beneficial reuse of dredge materials; levee breaches; lowering, removal, or improvement of levees; excavation of channels; construction of habitat islands and habitat transition zones; installation of water control structures; and construction of public access and recreational facilities. The dredge material component of the construction would likely last 74 to 93 months and other construction activities would likely last 27 to 29 months, depending on the alternative chosen, but the traffic, noise, air quality, and greenhouse gas impacts analysis assumed a shorter and more concentrated construction period. Construction activities would result in the temporary generation of emissions from earthmoving activities; exhaust from off-road equipment, material hauling, worker commute activity; and other miscellaneous activities.

As shown in Section 3.13, Air Quality, construction-generated daily emissions of reactive organic gases (ROGs), respirable particulate matter (PM_{10}) exhaust, and $PM_{2.5}$ exhaust would not exceed the applicable regional significance thresholds. Annual emissions of ROGs, CO, and $PM_{2.5}$ would not exceed applicable *de minimis* thresholds for general conformity. Therefore, construction of the Eden Landing Phase 2 Action Alternatives would conform to the State Implementation Plan (SIP) for these parameters.

Construction-generated average daily NO_x emissions would exceed applicable regional significance thresholds during import and placement of dredge materials. Project-specific mitigation measures will be used to reduce NO_x emissions to the greatest extent feasible for those options where diesel fuel is used to power the offloading facility and booster pumps during import and placement of dredge materials, but NO_x emissions would still exceed the regional threshold of significance. By its very nature, air pollution is largely a cumulative impact. If a project exceeds the identified significance thresholds, its emissions would be cumulatively considerable, resulting in significant adverse air quality impacts to the region's existing air quality conditions. The regional thresholds of significance set forth by BAAQMD are considered the emission levels for which a project's individual emissions would be cumulatively considerable. Therefore, significant and unavoidable cumulative impacts for NO_x emissions would occur for each Action Alternatives if diesel fuel is used to power the offloading facility and booster pumps during import and placement of dredge materials.

Annual NO_x emissions would be below general conformity *de minimis* levels with incorporation of the project-specific mitigation measures. Therefore, construction-related emissions associated with diesel-powered construction equipment would conform to the SIP, and a formal conformity analysis would not be required.

Earthmoving activities would result in temporary construction fugitive dust emissions that have the potential to represent a significant impact with respect to air quality. Project design features include several dust control measures that would meet the BAAQMD's current Basic Construction Mitigation Measures Recommended for All Proposed Projects from the 2011 Guidelines (BAAQMD 2011), and therefore the Action Alternatives would not result in significant fugitive dust impacts.

Because the construction activities associated with the Eden Landing Phase 2 Action Alternatives would conform to the SIP, result in construction-generated emissions that would not exceed a significance threshold, incorporate program and project-specific mitigation measures to reduce construction-generated emissions to the greatest extent feasible, and include adequate fugitive dust control measures, the short-term construction-generated air pollutant emissions resulting from the Eden Landing Eden Landing Phase 2 Action Alternatives for ROGs, CO, PM_{10} and $PM_{2.5}$ would be less than significant.

Operations under the Eden Landing Phase 2 Action Alternatives would be similar to existing conditions and would not result in a substantial increase in emissions compared to the existing operational activity. Therefore, the potential impacts from long-term operational emissions would be less than significant for all Eden Landing Phase 2 Action Alternatives.

The BAAQMD's CEQA Guidelines also require evaluation of the project's contribution to cumulative TAC exposure of sensitive receptors (including schools, hospitals, and residential areas) in the project vicinity by considering all sources within 1,000 feet of the project site. In accordance with these guidelines, a project would have a cumulatively considerable impact if the total of these local sources plus the contribution from the project exceeds BAAQMD's cumulative risk and hazard thresholds of 100 in a 1 million excess cancer risk, a Hazard Index (chronic and acute non-cancer risks) of 10, or an annual average $PM_{2.5}$ concentration of 0.8 micrograms per cubic meter ($\mu g/m^3$).

Construction of the Eden Landing Phase 2 Action Alternatives would result in short-term diesel exhaust emissions from on-site heavy duty equipment. Sensitive receptors (residences) are approximately 1,000 feet away from the eastern boundary of major project activities at southern Eden Landing. BAAQMD recommends that a site screening be conducted to determine if the project would result in the receptors being within 1,000 feet of a particulate matter (PM) or TAC source. Construction would occur throughout southern Eden Landing, and many construction activities would occur at distances much greater than 1,000 feet from these receptors. Because of the distance of these sensitive receptors and the temporary use of off-road construction equipment, short-term construction activities would not expose sensitive receptors to substantial TAC emissions. In addition, construction activities at the Bay Trail spine would occur away from the main project boundary and extend to areas located in the vicinity of other sensitive receptors (also residences). These residences are located less than 100 feet from where the Bay Trail spine would be placed on existing levees along the eastern edge of northern Eden Landing. The construction activities at these existing levees would be minimal, and would only be anticipated to take no more than 8 weeks to complete. Because the generation of TACs from these activities would be temporary and would only occur within an influential distance of sensitive receptors over a short amount of time, these activities would not be anticipated to result in the exposure of sensitive receptors to substantial concentrations. Furthermore, Office of Environmental Health Hazard Assessment indicates that an evaluation of cancer risk is would not be recommended for exposure from projects lasting less than two months (OEHHA 2012). Therefore, short-term construction activities would not expose sensitive receptors to substantial PM and TAC emissions.

Project design features for the Action Alternatives would include requirements for the preparation of a Health and Safety Plan that would reduce the potential for workers and nearby residents to be exposed to airborne TACs entrained in fugitive dust during construction.

None of the cumulative projects are within close proximity to the southern Eden Landing and the air quality effects would not overlap with the Maximally Exposed Individual potentially affected by the Eden Landing Phase 2 Action Alternatives. Therefore, the project's contribution to cumulative risk and hazard impacts would not be cumulatively considerable.

The only criteria pollutant emissions associated with operation of the project would result from maintenance traffic and activities and would remain similar to those associated with existing maintenance activities. Therefore, there would not be a substantial increase in operational risk and hazard impacts associated with operation of the project, and the project would not have a cumulatively considerable contribution to the region's existing air quality conditions as a result of project operation. Visits to some of the Phase 2 Eden Landing ponds could increase somewhat following the addition of some new public access and recreation opportunities, but emissions from these visits would be not be a substantial increase compared to the background emissions that already exist.

O&M activities would require the use of diesel-powered equipment and vehicles that have the potential to generate TAC emissions. However, the use of this equipment would be limited in extent and occur intermittently over the lifetime of the project and would not substantially differ from existing O&M activities. As such, the potential increased exposure of sensitive receptors to TAC emissions during operations would not occur.

Given the use of a Health and Safety Plan, the great distances, intermittent nature of operational activities, the impacts to sensitive receptors from the Eden Landing Phase 2 Action Alternatives would be less than significant.

Although there are potentially significant cumulative impacts relative to air quality in the study region, because the potential increased exposure of sensitive receptors to TAC emissions during operations would not occur, the contribution of the Eden Landing Phase 2 Action Alternatives to cumulative impacts related to air quality would not be considerable.

Public Services

The geographic scope for cumulative impacts on public services includes the cities and communities where the proposed project and cumulative projects would be located (the cities of Hayward, Union City, and Fremont).

Review of the 2007 Final EIS/R and the cumulative projects listed in Table 4-1 indicates that less-than-significant cumulative impacts regarding public services exist in the study region. Development and operation of many cumulative projects, particularly residential, commercial and industrial projects, would increase the demand for fire and police protection services. Municipalities respond to increases in demand for emergency services by expanding their fire and police protection departments to keep with their service ratio goals. As part of this response, municipalities plan to ensure that sufficient services are provided for future growth. Therefore, impacts on fire and police protection services from cumulative projects would be less than significant.

Cumulative Impacts of No Action Alternative

Under the Eden Landing Phase 2 No Action Alternative, southern Eden Landing and its surroundings would continue to be monitored and managed through the activities described in the AMP and in accordance with current practices. No new public services facilities would be provided under the No Action Alternative; thus, there would be no substantial increases in visitor use or increased demand for fire and police protection services. Similarly, the habitat restoration actions and the various flood protection actions would not change the demand for public services or the ability of agencies to provide them.

No significant cumulative impacts associated with public services exist in the project area, and the contribution of the Eden Landing Phase 2 No Action Alternative to cumulative impacts related to public services would not be considerable and would not trigger a significant cumulative impact.

Cumulative Impacts of Eden Landing Phase 2 Action Alternatives

Under the Eden Landing Phase 2 Action Alternatives, some ponds would be breached to introduce tidal flows, others may be retained and enhanced as managed ponds, and other habitat enhancement features would be added. Existing trails on many of the levees would continue to be maintained, and construction of the Eden Landing Phase 2 Action Alternatives would also result in new recreation facilities. These facilities would be primarily an extension of existing services (e.g., viewing platforms and trails) and would not be expected to substantially increase the need for police and fire protection services in a manner that would require new facilities or additional staff. The proposed recreation facilities would be designed in a manner that would facilitate the movement of emergency service providers in the event of an emergency (e.g., sufficient trail width to accommodate vehicles and provision of entrances). The Eden Landing Phase 2 Action Alternatives would not be expected to increase the need for public services to such an extent that they would cause a reduction in the acceptable response time or outpace natural growth in the region and require construction of new police and fire protection stations.

No significant cumulative impacts associated with public services exist in the project area. The Eden Landing Phase 2 Action Alternatives would not be expected to increase the need for public services to such an extent that they would cause a reduction in the acceptable response time or outpace natural growth in the region and require construction of new police and fire protection stations. The contribution of the Eden Landing Phase 2 Action Alternatives to cumulative impacts related to public services would not be considerable and would not create a significant cumulative impact.

Utilities

The geographic scope for cumulative impacts on utilities includes the cities and communities where the proposed project and cumulative projects would be located (the cities of Hayward, Union City, and Fremont, all of which are in Alameda County).

The types of projects listed in Table 4-1 that could contribute to cumulative impacts associated with utilities include flood protection projects and development projects. Review of the 2007 Final EIS/R and the cumulative projects listed in Table 4-1 indicates less-than-significant cumulative impacts regarding utilities exist in the study region except for potential effects to storm drains. Tidal inundation of ponds as a result of unplanned levee breaches, along with other tidal habitat restoration projects, could contribute to reduced access to PG&E towers in the baylands at a time when continued population growth in the Bay Area is expected to increase the demand on these facilities. Other types of cumulative projects are not expected to contribute to reduced access to PG&E towers in the baylands. Other tidal wetland restoration projects are in areas containing towers for power transmission or distribution lines and may result in reduced PG&E access. The number of towers in these tidal restoration areas is small compared to the total number of towers in the South Bay and compared to the number of towers PG&E maintains in existing tidal areas. Impacts at restoration locations where the towers can be accessed by road are expected to be negligible. Therefore, cumulative projects would not significantly reduce access to PG&E towers in the South Bay.

Unplanned breaches in other portions of the SBSP Restoration Project area could affect storm drains in the vicinity of those breaches, and storm drain improvements implemented as part of other projects in the area would not offset adverse effects in these areas. These cumulative impacts would therefore be potentially significant.

Other cumulative projects are not expected to result in changes in water level, tidal flow, or sedimentation near pumping facilities and sewer force mains and outfalls.

Other cumulative projects are not expected to disrupt Hetch Hetchy Aqueduct services and are not expected to disrupt rail service.

Cumulative Impacts of No Action Alternative

Under the Eden Landing Phase 2 No Action Alternative, no new activities would be implemented as part of Phase 2. The southern Eden Landing ponds would continue to be managed through the activities described in the AMP and in accordance with current CDFW practices. In addition to levee maintenance, PG&E tower improvements would be made as part of routine maintenance, to comply with PG&E's internal requirements, and/or to adapt to sea-level rise. These improvements may involve raising towers and/or raising and strengthening the foundations or superstructures of towers. Because of the continued maintenance of levees and ponds and improvements planned for the towers under the NERC program, PG&E's ability to access existing towers via levees and boardwalks would be maintained.

Unplanned levee breaches could temporarily affect water level, tidal flow, and sedimentation near storm drain systems, but no changes are expected to water surface elevations during high tide. Therefore, any potential changes resulting from unplanned breaches are not expected to affect the ability to operate storm drain systems.

Impacts resulting from changes in water level, tidal flow, or sedimentation near pumping facilities would be less than significant. There are no sewer force mains or outfalls in close proximity to any of the Phase 2 Eden Landing ponds. Therefore, there would be no potential for changes in water level, tidal flow, or sedimentation near sewer force mains and outfalls.

The Eden Landing Phase 2 No Action Alternative would have no impacts regarding disruption of rail service.

There are potentially significant cumulative impacts relative to changes in water level, tidal flow, and sedimentation near storm drain systems in the study region. Unplanned breaches in other portions of the SBSP Restoration Project area could affect storm drains in the vicinity of those breaches. Under the Eden

Landing Phase 2 No Action Alternative, unplanned levee breaches could temporarily affect water level, tidal flow, and sedimentation near storm drain systems, but no changes are expected to water surface elevations during high tide. Therefore, any potential changes resulting from unplanned breaches are not expected to affect the ability to operate storm drain systems. Therefore, the contribution of the Eden Landing Phase 2 No Action Alternative to cumulative impacts related to storm drain systems would not be considerable.

No significant cumulative impacts associated with other utilities exist in the project area. Under the Eden Landing Phase 2 No Action Alternative, the existing access to PG&E's transmission towers would be maintained. Operation of storm drain systems are not expected to be affected. No sewer force mains or outfalls are within any of the southern Eden Landing ponds. Therefore, the contribution of the Eden Landing Phase 2 No Action Alternative to cumulative impacts related to other utilities would not be considerable and would not trigger a significant cumulative impact.

Cumulative Impacts of Eden Landing Phase 2 Action Alternatives

Under the Eden Landing Phase 2 Action Alternatives, one PG&E distribution line and the wooden poles supporting it would be removed, because it would no longer be necessary. A second (and only other) PG&E line would be retained on the existing levee, along with whatever improvements to the pole foundations are necessary. No changes to the access to this line would be made. There would be no changes to storm water management, or other utilities are planned at most of the ponds.

Other potential impacts to utilities include sedimentation near storm drain systems, pumping facilities, and sewer force mains and outfalls; disruption to Hetch Hetchy Aqueduct service; disruption of rail service; and reduced access to sewer force mains. However, as with the Eden Landing Phase 2 No Action Alternative, none of the Eden Landing Phase 2 Action Alternatives would directly affect or modify these systems, impair the functioning or operation and maintenance of these systems or their infrastructure, or otherwise adversely affect them.

There are potentially significant cumulative impacts relative to changes in water level, tidal flow, and sedimentation near storm drain systems in the study region. Unplanned breaches in other portions of the SBSP Restoration Project area could affect storm drains in the vicinity of those breaches. Overall, the expected changes in water levels and sedimentation patterns associated with the Eden Landing Phase 2 Action Alternatives are not expected to substantially affect the operation of storm drain systems or pumping facilities. Therefore the contribution of the Eden Landing Phase 2 Action Alternatives to cumulative impacts related to storm drain systems would not be considerable.

No significant cumulative impacts associated with other utilities exist in the project area. The Eden Landing Phase 2 Action Alternatives would have no impacts to the other utilities in the project area (i.e., electrical transmission lines, towers, sewer force mains, Hetch Hetchy Aqueduct, or rail). As such, the contribution of the Eden Landing Phase 2 Action Alternatives to cumulative impacts related to utilities would not be considerable and would not create a significant cumulative impact.

Visual Resources

The geographic scope for the visual resources cumulative impact analysis consists of the immediate, publicly viewable area within or surrounding the existing salt ponds.

Review of the 2007 Final EIS/R and the cumulative projects listed in Table 4-1 indicates potentially significant visual resources cumulative impacts exist within the study region. Cumulative projects (including residential, commercial, industrial, flood control, restoration, and recreation projects) would alter views of the South Bay, including the SBSP Restoration Project area, through construction of new facilities (e.g., buildings, recreational features, levees, floodwalls) or expansion of existing facilities (e.g., expansion of commercial centers). For those cumulative impact projects that would include features that could alter views, these changes would be required to comply with applicable government policies and guidelines related to aesthetic resources pertaining to the location of development, height restrictions, and architectural design. These policies and guidelines are intended to limit development of incongruous visual features and maximize visual integration. Flood protection projects and development projects could construct facilities that would obstruct scenic views. Because it is not known whether the cumulative projects would obstruct views or where facilities obstructing views would be constructed, the potential effects on views cannot be evaluated. Consequently, for this analysis, it is assumed that impacts on views resulting from cumulative projects would be potentially significant.

Cumulative Impacts of No Action Alternative

Under the No Action Alternative, the ponds at southern Eden Landing would continue to be managed through the activities described in the AMP and there would be no alteration of views in the Phase 2 Eden Landing SBSP Restoration Project area.

Although there are potentially significant cumulative impacts relative to visual resources in the study region, the contribution of the Eden Landing Phase 2 No Action Alternative to cumulative impacts related to visual resources would not be considerable.

Cumulative Impacts of Eden Landing Phase 2 Action Alternatives

Some of the Eden Landing Phase 2 Action Alternatives would open some ponds to tidal flows to restore them to tidal marsh, improve levees to provide additional flood protection, create habitat transition zones and other habitat enhancement features, increase pond connectivity, and add or improve public access features. The major effect of these actions would be the creation of tidal marsh habitat, which would change the visual environment of the southern Eden Landing ponds in various ways. At Eden Landing, the Action Alternatives would change the Bay Ponds from deepwater ponds to vegetated marshes, which would alter the texture and color of the views. The Inland Ponds and the Southern Ponds, would change these seasonal and managed ponds to either vegetated marshes or enhanced managed ponds (depending on the alternative selected), which would alter the texture and color of the views.

There are potentially significant cumulative impacts relative to visual resources in the study region. Cumulative projects would alter views of the South Bay, including the SBSP Restoration Project area, through construction of new facilities or expansion of existing. The Eden Landing Phase 2 Action Alternatives would create a less than significant impact to visual resources by altering the texture and color of the views and introducing a minor visual change. Although this represents a change to the visual character, this very minor change to the visual character of the study region as a whole would not be a considerable contribution to the cumulative impact.

Greenhouse Gas Emissions

Because GHG emissions affect global climate change, the evaluation of GHG emissions is inherently a cumulative impact issue. However, it is not feasible to evaluate GHG emissions impacts based on the sum of all past, present, and reasonably foreseeable future projects on a global scale. Therefore, the geographic scopes for cumulative GHG emissions impacts are the SFBAAB and the state of California as a whole.

Cumulative Impacts of No Action Alternative

Under the No Action Alternative, no construction activities would occur within the southern Eden Landing ponds. Although limited O&M activities would be ongoing, they are considered part of baseline operations, not construction. As such, no additional construction-generated GHG emissions would occur. Operations under the No Action Alternative would involve limited O&M activities, such as levee repair, railroad track maintenance, and biological surveys. These activities would occur intermittently over the 50-year lifetime of the project. O&M activities would generate GHG emissions associated with the use of vehicles and other equipment. However, the level of activity would be similar to the O&M activities occurring under existing conditions and would not result in a substantial increase in GHG emissions compared to the existing operational activity. Therefore, potential impacts from long-term operational GHG emissions under the No Action Alternative would be less than significant and would not make a considerable contribution to a cumulative impact.

Cumulative Impacts of Eden Landing Phase 2 Action Alternatives

Implementation of the Eden Landing Phase 2 Action Alternatives would involve GHG-emitting activities such as levee improvements, creation of nesting islands, creation of habitat transition zones, and construction of recreational facilities. Close to 100,000 cubic yards of material would be transported from off-site locations, depending on the alternative selected. The Eden Landing Phase 2 Action Alternatives would generate construction-related GHG emissions from off-road construction equipment, material hauling, and worker commute activity.

The environmental impacts of GHG emissions are long-term and global in nature. For that reason, unlike any of the other environmental resources or impacts analyzed in this Draft EIS/R, it is useful to include an estimate of the maximum GHG emission from the combined actions at southern Eden Landing. Assuming the Action Alternative with the most GHG emissions is selected, the estimated GHG emissions values from Table 3.17-1 (in Section 3.17) can be used to analyze this highest potential emissions scenario. As in that section, the construction GHG emissions from the most highly emitting alternatives were summed and amortized over the 50-year lifetime of the project. The estimated GHG emissions from construction actions under Alternative Eden D is 694 metric tons of CO_2e. Amortized over the 50-year project lifetime, this sum is 14 metric tons of CO_2e per year. This value for amortized construction GHG emissions would not exceed the bright line emissions threshold of 1,100 metric tons of CO_2 per year, which is the applicable regional significance threshold, and would thus be less than significant.

Further, the restored tidal marshes are projected to be a net absorber of carbon dioxide, the most common GHG, which would reduce the net emissions from the project. Relative to the overall emissions of GHGs in the southern portions of the SFBAAB and in California as a whole, the GHG emissions from Eden Landing Phase 2 Action Alternatives are extremely minor. As a result, this impact would be less than significant and would not make a considerable contribution to a cumulative impact.

This page intentionally left blank

5. OTHER NEPA AND CEQA CONSIDERATIONS

This chapter discusses broader considerations and other aspects of regulatory compliance that are required under the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA). Section 15126 of the CEQA Guidelines states that all aspects of a project must be considered when evaluating its impact on the environment, including planning, acquisition, development, and operation. This chapter describes any unavoidable, adverse, and potentially significant impacts that implementing Eden Landing Phase 2 of the South Bay Salt Pond (SBSP) Restoration Project would create, describes the relationship between short-term uses of the environment and long-term productivity, and discusses significant irreversible or irretrievable commitments of resources or foreclosures of future options that implementation of the Phase 2 project would create. This chapter also discusses compliance with federal executive orders and acts that may be required by the project but that are not directly included as part of this Draft Environmental Impact Statement/Report (EIS/R). This chapter is generally based on the detailed analysis of environmental resources of concern presented in Chapter 3, Environmental Setting, Impacts, and Mitigation Measures, as well as in the project designs and concepts described in Chapter 2, Alternatives.

5.1 Unavoidable Adverse Potentially Significant Impacts

Chapter 2, Alternatives, explains the efforts the agencies have made through the project development and environmental review process to design the Phase 2 project in a manner that avoids and minimizes impacts. Chapter 3, Environmental Setting, Impacts, and Mitigation Measures, describes the potential environmental consequences of developing the Phase 2 project. The program-level mitigation measures described in Chapter 2 were implemented as part of the project-specific designs, and additional project-level mitigation measures were prescribed for potentially significant adverse impacts that remained following those that were implemented. The impacts that cannot be mitigated to a less-than-significant level are the following:

- Biological Resources: Alternative Eden B would have potentially significant impacts to western snowy plovers. Since tidal marsh habitats are not well-suited for the western snowy plover, there would be a large net loss of nesting habitat for these birds. Additionally, the proposed trails may disturb individual plovers. This would cause a potentially significant impact.

- Recreation Resources: The temporary closure of existing trails and recreation facilities would be necessary to keep the public safe and provide a route through existing parks to bring materials and equipment to the project areas. Alternatives Eden B, Eden C, and Eden D would have significant and unavoidable impacts from construction activities related to the project resulting in temporary closure of existing trails and recreation facilities.

- Traffic: A traffic impact analysis was prepared to analyze the impact of construction-related traffic on each of the Action Alternatives; this study found that at the AM peak hour the impact is considered significant. The optimization of the I-880 Southbound Ramps/Whipple Road/Dyer Street intersection would mitigate the impact to less than significant. However, this mitigation is not feasible as this intersection is part of a synchronized series of intersections. This would therefore cause a significant and unavoidable impact for each Action Alternative.

- Air Quality: Construction-generated average daily NO_x emissions would exceed applicable regional significance thresholds during import and placement of dredge materials. Project-specific mitigation measures will be used to reduce NO_x emissions to the greatest extent feasible, but for those options where diesel fuel is used to power the offloading facility and booster pumps, NO_x emissions would still exceed the regional threshold of significance. Therefore, significant and unavoidable impacts would occur for each Action Alternatives if diesel fuel is used to power the construction equipment during import and placement of dredge materials; those would be Alternatives B1, C1, and D1. (Annual emissions would be below General Conformity *de minimis* levels with incorporation of the project-specific mitigation measures. Therefore, construction-related emissions associated with diesel powered construction equipment would conform to the State Implementation Plan, and a formal conformity analysis would not be required.)

5.2 Irreversible or Irretrievable Commitment of Resources

Section 15126.2(c) of the CEQA Guidelines states: "Uses of nonrenewable resources during the initial and continued phases of the Project may be irreversible since a large commitment of such resources makes removal or irreversible nonuse thereafter unlikely. Primary impacts and, particularly, secondary impacts (such as highway improvement which provides access to a previously inaccessible area) generally commit future generations to similar uses. Also, irreversible damage can result from accidents associated with the Project. Irretrievable commitments of resources should be evaluated to assure that such current consumption is justified."

Implementation of Alternative A (the No Action Alternative[1]) would result in no irreversible or irretrievable commitment of resources, since no restoration or other activities would occur within the Phase 2 area and only maintenance-related levee improvements would be limited. A limited degree of operations and maintenance (O&M) activities (e.g., levee improvement and replacement of water control structures) would involve some labor as well as energy usage by construction equipment, but this would be considered a relatively minor commitment of resources. Further, implementation of the No Action Alternative as part of the Phase 2 project would not preclude the possibility of including one or more of the currently proposed actions as part of a future project phase (Phase 3 or later) and thus would be reversible.

Compared to Alternative Eden A, implementation of any of the Action Alternatives (Alternatives Eden B, Eden C, or Eden D) would generally involve a greater short-term use of resources such as fossil fuels and labor, due to the greater degree of energy required to implement the restoration, flood risk management, and recreation and public access features proposed under these alternatives. However, almost all of these resources would be used during the implementation (i.e., construction) stages of Action Alternatives, rather than on a continual basis over the long term. Over the operations stage of the project, the long-term commitment of resources would not be radically different than the current O&M activities require, and may be less in some cases. Therefore, this commitment of resources would not be considered significant.

[1] "No Action Alternative" is the NEPA term. It corresponds to the CEQA term "No Project Alternative." This Draft EIS/R uses No Action throughout.

5.3 Growth Inducement

Section 15162.2(d) of the CEQA Guidelines requires that an Environmental Impact Report (EIR) address the potential growth-inducing impacts of a proposed project. Specifically, the EIR should “discuss the ways in which a project could foster economic or population growth, or the construction of additional housing either directly or indirectly, in a surrounding environment. Included in this are projects which would remove obstacles to population growth… It is not assumed that growth in an area is necessarily beneficial, detrimental, or of little significance to the environment.” Projects that could remove obstacles to population growth must also be considered in this discussion.

Existing and projected total population and households in the three counties and individual cities where the Phase 2 area is located are shown in Tables 3.10-1 and 3.10-2 in Section 3.10, Socioeconomics and Environmental Justice. The Phase 2 project does not propose construction of any housing, directly or indirectly, in the South San Francisco Bay Area.

Because no restoration activities and only limited O&M activities (e.g., levee improvements, replacement of water control structures) would occur under Alternative Eden A, no economic, population, or housing growth would result from implementation of these alternatives. Implementation of Alternatives Eden B, Eden C, or Eden D would increase public access and recreational opportunities in the Phase 2 area, potentially resulting in some increase in visits to Eden Landing for hiking, bicycling, photography, wildlife viewing, and other similar activities. These additional visits may bring some economic growth to the area through an increase in area businesses (see Section 3.10, Socioeconomics and Environmental Justice). However, this potential economic growth would be considered minor relative to the local and regional economy. While these Action Alternatives would increase recreational opportunities within southern Eden Landing, the surrounding areas already include recreational visitation and use at northern Eden Landing and in the adjacent East Bay Regional Park District facilities. The additional recreation and public access opportunities are relatively small enhancements to these existing uses, and the projected increases in visitation are expected to be minimal (see Section 3.6, Recreation Resources).

Further, such recreational facilities are not a known constraint to population growth in the San Francisco Bay Area. The proposed improvements are unlikely to induce or encourage additional population growth or development elsewhere, or remove obstacles to population growth. As such, the Phase 2 project would not result in direct growth or induce substantial growth in the region. Potential effects are considered less than significant.

5.4 NEPA Consultation

5.4.1 Federal Endangered Species Act (16 United States Code [USC] Section 1521 et seq.)

Section 7 of the Federal Endangered Species Act (ESA) requires federal agencies, in consultation with the Secretary of the Interior, to ensure that their actions do not jeopardize the continued existence of endangered or threatened species, or result in the destruction or adverse modification of the critical habitat of these species. Under Section 7, a project that could result in incidental take of a listed threatened or endangered species must consult with the United States Fish and Wildlife Service (USFWS) and/or the National Marine Fisheries Service (NMFS) – depending on the species in question – to obtain a Biological Opinion (BO). If the BO finds that the project could jeopardize the existence of a listed species (“jeopardy opinion”), the agency cannot authorize the project until it is modified to obtain a “nonjeopardy opinion.”

Impacts to federally endangered and threatened species are discussed in Section 3.5, Biological Resources. In the past, at the programmatic level, the lead agencies (USFWS and the California Department of Fish and Wildlife [CDFW]), whose mandates include protecting fish and wildlife resources, have conducted extensive formal consultation with the USFWS Endangered Species Unit regarding potential impacts of the 50-year SBSP Restoration Project as a whole. A Programmatic BO was issued and has guided the development and implementation of the program itself as well as the Phase 1 activities.

For Phase 2, consultation will occur in the form of one or more project-level Biological Assessments (BA), leading to a BO. This will address the potential impacts on ESA-listed species from the selected Eden Landing Phase 2 alternative. Generally, as described in Section 3.5, Biological Resources, potential significant effects to these federally listed species would either be avoided through the implementation of the Adaptive Management Plan (AMP) that is an integral part of the Phase 2 project, or through implementation of measures established in the BA/BO to avoid or minimize potential effects to biological resources. Prior to construction of the Phase 2 project, the lead agencies would obtain concurrence from the USFWS Endangered Species Unit that the Phase 2 project, with implementation of the measures established in the AMP and BO, would not adversely affect federally listed endangered or threatened species. Concurrence by USFWS would fulfill the requirements of this act.

5.4.2 Fish and Wildlife Coordination Act (16 USC Section 651 et seq.)

The Fish and Wildlife Coordination Act requires that agencies consult with fish and wildlife agencies (federal and state) on projects where the waters of any stream or other body of water are proposed or authorized to be impounded or diverted, the channel deepened, or the stream or other body of water otherwise controlled or modified for any purpose whatsoever, including navigation and drainage, that could affect biological resources. Compliance with the Fish and Wildlife Coordination Act will be achieved through consultation with USFWS, NMFS, and CDFW by federal agencies when issuing permits for Phase 2 activities by sponsoring agencies or when implementing other activities related to the Phase 2 project.

5.4.3 Federal Migratory Bird Treaty Act and Executive Order 13186

The Migratory Bird Treaty Act prohibits the take of migratory birds (or any part, nest, or eggs of any such bird). Executive Order (EO) 13186 requires that any project with federal involvement address impacts of federal actions on migratory birds. Impacts to migratory birds and other protected birds and their nests are discussed in Section 3.5, Biological Resources, of this Draft EIS/R. Potential significant effects to these species would be avoided through project designs that include seasonal avoidance of migratory birds, through implementation of the AMP, and through implementation of measures established in the BA/BO and other regulatory documents. The analyses provided in Section 3.5 demonstrate lead agency compliance with the Migratory Bird Treaty Act and EO 13186.

5.4.4 Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act prohibits the destruction of bald and golden eagles and their occupied and unoccupied nests. Impacts to bald and golden eagles and their nests are discussed along with other raptor species in Section 3.5, Biological Resources, of this Draft EIS/R. Potential significant effects to these species would be avoided through project designs that include seasonal avoidance of migratory birds, through implementation of the AMP, and through implementation of measures established in the BA/BO and other regulatory documents. The analyses provided in Section 3.5 demonstrate lead agency compliance with the Bald and Golden Eagle Protection Act.

5.4.5 National Historic Preservation Act (15 USC Section 470 et seq.)

Section 106 of the National Historic Preservation Act (NHPA) requires federal agencies to evaluate the effects of federal undertakings on historical, archaeological, and cultural resources. As described in Section 3.7, Cultural Resources, of this Draft EIS/R, the Section 106 review process occurs in four steps: initiation of the process, identification of historic properties, assessment of adverse effects, and resolution of adverse effects. As part of the Section 106 process initiation, which occurred as part of the SBSP Restoration Project, USFWS requested consultation with the California State Historic Preservation Officer (SHPO) regarding the SBSP Restoration Project as a whole. USFWS sent a letter to the Office of Historic Preservation in July 2004 to introduce the project, define the project's Area of Potential Effect (APE), establish the scope of the identification effort, and suggest the methods for consulting with SHPO. In addition, USFWS requested that the program alternatives be considered by SHPO under the 1997 Programmatic Agreement between the SHPO and USFWS; activities that do not meet the requirements of the agreement would then proceed through the standard Section 106 process. USFWS also indicated that the historic context report of the solar salt industry and evaluation framework for identifying historic resources within the APE would be provided to SHPO for review and comment. SHPO responded in November 2004, concurring with the USFWS delineation of the project's APE. In 2010, SHPO concurred with a finding of adverse effect for project impacts to the National Register of Historic Places-eligible Alviso Salt Works Historic Landscape and Eden Landing Salt Works Historic Landscape. Pursuant to this finding, a Memorandum of Understanding was developed between USFWS and SHPO that outlines mitigation and the protocol for completion of the Section 106 process (Appendix F).

Since the long-term restoration would occur over a 50-year planning period, the identification of historic properties and the assessment of effects would be phased to match project phasing, such as with this Draft EIS/R for Phase 2. To facilitate an identification effort that is consistent and comprehensive throughout the life of the project, USFWS has provided SHPO with an historic context and an evaluation framework that will serve as the basis for eligibility determinations. Potential effects of the Phase 2 project associated with cultural resources are addressed in Section 3.7, Cultural Resources, of this Draft EIS/R. In addition, during the programmatic phase, USFWS consulted with SHPO on Phase 2 additions to the APE. SHPO has concurred that there are no additional historic properties affected as a result of the Phase 2 APE additions. The analysis provided in Section 3.7 and the updated (2014) consultation with SHPO to ensure that the USFWS continues to comply with the NHPA.

5.4.6 Executive Order 11988 – Floodplain Management and Executive Order 11990 – Protection of Wetlands

EO 11988 requires federal agencies to recognize the value of floodplains and to consider the public benefits from restoring and preserving floodplains. Section 3.2, Hydrology, Flood Management, and Infrastructure, describes EO 11988 in more detail. Under EO 11990, federal agencies must avoid affecting wetlands unless it is determined that there is no practicable alternative.

As discussed in Chapter 1, Introduction, two of the objectives of the proposed Phase 2 project are to: (1) create, restore, or enhance habitats of sufficient size, function, and appropriate structure to promote restoration of native special-status plants and animals, maintain current migratory bird species, support increased abundance and diversity of native species, and (2) maintain or improve existing levels of de facto flood protection in the South Bay.

Section 3.2, Hydrology, Flood Management, and Infrastructure, discusses in further detail the potential project impacts associated with coastal flood risk. The objectives of the project as well as the analysis provided in Section 3.2 demonstrate compliance with EO 11988.

The Phase 2 Action Alternatives would impact some areas that are currently tidal wetlands. Section 3.5, Biological Resources, describes the location, amount, type, and reasons for these impacts to existing wetlands. However, the combined area of these impacts is small (on the order of tens of acres), while the implemented Phase 2 actions would restore and enhance approximately 2,000 acres of tidal wetlands. Thus, the objectives of the project as well as the analysis in Section 3.5 demonstrate compliance with EO 11990.

5.4.7 Farmland Protection Policy Act (7 USC Section 4201 et seq.)

The Farmland Protection Policy Act (FPPA) requires a federal agency to consider the effects of its actions and programs on the nation's farmlands. The FPPA is intended to minimize the impact of federal programs with respect to the conversion of farmland to nonagricultural uses. It ensures that, to the extent possible, federal programs are administered to be compatible with state, local, and private programs and policies to protect farmland. As discussed in Section 3.8, Land Use and Planning, no designated important farmlands are located within the Phase 2 area. As such, the lead agencies would be in compliance with this act.

5.4.8 Executive Order 12898 – Social Justice

EO 12898 prohibits discrimination against or exclusion of individuals and populations during the conduct of federal activities. It requires all federal agencies to identify and address disproportionately high and adverse human health or environmental effects of its programs and activities on minority and low-income populations. Section 3.10, Socioeconomics and Environmental Justice, describes the socioeconomic setting as it relates to the Phase 2 area and evaluates the potential for the project to disproportionately affect minority or low-income groups. As described in Section 3.10, the Phase 2 project would not disproportionately affect minority and low-income communities. The analysis provided in this Draft EIS/R regarding socioeconomic effects demonstrates lead agency compliance with this EO.

5.4.9 Executive Order on Trails for America in the 21st Century

The EO on Trails for America requires federal agencies to protect, connect, promote, and assist trails of all types throughout the United States. As described in Chapter 1, Introduction, one of the objectives of the Phase 2 project is to provide public access and recreation opportunities compatible with wildlife and habitat goals. Chapter 2, Alternatives, communicated the amounts and locations of new recreational trails and associated public access opportunities (e.g., viewing stations and interpretive platforms). Section 3.6, Recreation Resources, further describes the existing and proposed recreation facilities within Phase 2 project area, as well potential effects (including beneficial outcomes, where appropriate) on such resources. The Phase 2 project would provide public access and recreation opportunities, including new trails, in the project area. Therefore, the analysis provided in this Draft EIS/R demonstrates lead agency compliance with this EO.

5.4.10 Clean Air Act

Federal agencies must ensure that their actions conform to applicable federal, state, or tribal implementation plans for achieving national ambient air quality standards. To conform, federal actions must not contribute to new violations of the standards, increase the frequency or severity of existing violations, or delay the timely attainment of standards in the area of concern. Section 3.13, Air Quality, describes existing conditions in the project area, regulations relevant to air quality, and potential air quality effects resulting from the Phase 2 project. The analysis provided in Section 3.13 demonstrates lead agency compliance with this act.

This page intentionally left blank

6. GLOSSARY

The following glossary includes the full list of terms and definitions from the 2007 Final Environmental Impact Statement/Report (EIS/R) for the South Bay Salt Pond Restoration (SBSP) Project as well as additional terms or concepts developed for the current Draft EIS/R for Eden Landing Phase 2.

100-year floodplain: The area adjacent to a waterbody that would be inundated during a base flood.

Archimedes' screw: A machine historically used for transferring water from a low-lying body of water into irrigation ditches.

accretion: The act of adding material, such as from the deposition and accumulation of waterborne particles.

acute toxicity: For purposes of this project, a median of less than 90 percent survival, or less than 70 percent survival more than 10 percent of the time, of test organisms in a 96-hour static or continuous flow test. See also *chronic toxicity*.

adsorption: The adherence of a gas, liquid, or dissolved material on the surface of a solid.

Alameda County marsh/Alameda County-owned wetlands: An existing marsh feature owned by Alameda County that lies between Pond E2 and the ACFCC.

Alameda Creek Flood Control Channel (ACFCC): A federal flood control channel that forms the southern border of the Eden Landing Phase 2 Project Area. The lower 12 miles of Alameda Creek has been channelized for flood control and development. Both levees around the ACFCC support recreational trails (the Alameda Creek Regional Trail) that run along the top of the levee.

algae: Simple rootless plants that grow in bodies of water (e.g., estuaries) at rates dependent on sunlight, temperature and the amounts of plant nutrients (e.g., nitrogen and phosphorus) available in water.

alluvial: Relating to the deposits made by flowing water; washed away from one place and deposited in another; as, alluvial soil, mud, accumulations, deposits.

Alquist-Priolo Act: The Alquist-Priolo Earthquake Fault Zoning Act was passed in 1972 to mitigate the hazard of surface faulting to structures for human occupancy. This state law was a direct result of the 1971 San Fernando Earthquake, which was associated with extensive surface fault ruptures that damaged numerous homes, commercial buildings, and other structures. The Alquist-Priolo Earthquake Fault Zoning Act's main purpose is to prevent the construction of buildings used for human occupancy on the surface trace of active faults. The Act only addresses the hazard of surface fault rupture and is not directed toward other earthquake hazards. The Seismic Hazards Mapping Act, passed in 1990, addresses non-surface fault rupture earthquake hazards, including liquefaction and seismically induced landslides.

Alvarado Salt Works: An archaeological site that once held an early salt refinery, but now is in ruins along the northern border of Ponds E7 and E6. This site is eligible for the National Register of Historic Places under Criteria A and D.

amphibian: A cold-blooded, smooth-skinned vertebrate animal of the class Amphibia, such as a frog or salamander, that typically hatches as an aquatic larva with gills. The larva then transforms into an adult having air-breathing lungs.

amphipods: A small freshwater or marine crustacean with a thin body and without a carapace.

anadromous: Fish and invertebrates, such as shrimp, migrating from saline to freshwater to spawn.

anaerobic: Not containing oxygen or not requiring oxygen.

anoxic: Without oxygen; water that contains no dissolved oxygen.

anthropogenic: Involving the impact of humans on nature; induced, caused, or altered by the presence and activities of humans, as in water and air pollution.

aquifer: Underground rock or soil layer yielding groundwater for wells and springs, etc.

astronomic tides: The periodic rise and fall of a body of water resulting from gravitational interactions between the Sun, Moon and Earth.

atlatl: Spear-thrower.

attenuation: Reduction.

Authorized Expansion Boundary/Authorized Acquisition Boundary: In 1990, the United States Fish and Wildlife Service (USFWS) completed an Environmental Assessment and Finding of No Significant Impact (1990 EA) that evaluated potential acquisition of land to meet the Congressional purposes of establishing and expanding the San Francisco Bay National Wildlife Refuge (renamed the Don Edwards San Francisco Bay National Wildlife Refuge in 1995). The 1990 EA identified the Authorized Expansion Boundary on a map. (Both the 1990 EA and the Authorized Expansion Boundary map are presented in Appendix P of the 2007 Final EIS/R.) The vast majority of the Authorized Expansion Boundary is south of the San Mateo Bridge. Since 1990, USFWS has acquired land within the Authorized Expansion Boundary (through purchase, lease, or donation), including portions of the 15,100 acres acquired from Cargill Inc. in 2003. The Authorized Expansion Boundary has since been renamed the Approved Acquisition Boundary.

base flood: A flood having a one percent chance of being equaled or exceeded in any given year.

bathymetry: Of or relating to measurements of the depths of waterbodies, such as oceans, estuaries or lakes.

baylands: Shallow water habitats around San Francisco Bay (Bay). They include lands that are touched by tides and lands that would be tidal in the absence of man-made structures.

benthic organisms: Those organisms living at or near the bottom of a body of water.

berm: A mound or bank of earth, used especially as a barrier.

bioaccumulation: The increase in concentration of a chemical in organisms that reside in environments contaminated with low concentrations of various organic compounds. Also used to describe the progressive increase in the amount of a chemical in an organism resulting from rates of absorption of a substance in excess of its metabolism and excretion.

biosentinel: Wildlife or plant species that can be used as a primary indicator of a spatial pattern or temporal trend.

biota: The combined flora and fauna of a region.

biotic: Pertaining to life or living things, or caused by living organisms.

bittern pond: A repository of concentrated soluble salts other than sodium chloride.

bittern: Waste materials left over after common salt (sodium chloride) is harvested from salt ponds. Shown in laboratory studies to have toxic effects on aquatic life.

bog: A wetland that has poorly drained, acidic peat soil dominated by sedges and sphagnum moss.

borrow ditch: An excavated ditch adjacent to the pond levees where material was excavated in order to create and maintain the pond levees.

brackish: A mixture of fresh and saltwater typically found in estuarine areas; of intermediate salinity.

brackish water: Water containing a mixture of seawater and freshwater; contains dissolved materials in amounts that exceed normally acceptable standards for municipal, domestic, and irrigation uses.

breach: An opening (especially a gap in a levee).

brines: Water containing large amounts of a salt or salts, especially sodium chloride.

buffer zone: A barrier between sensitive wildlife habitat and land uses such as agriculture or urban development. A transitional zone intended to provide for compatibility of nearby dissimilar uses.

Cal Hill: A hill that is part of Cargill's remaining inholdings.

candidate species (federal definition): A species for which the U.S. Fish and Wildlife Service has on file sufficient information to support a proposal to list the species as endangered or threatened, but for which proposed rules have not yet been issued.

candidate species (state definition): A native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant that the California Fish and Game Commission has formally noticed as being under review by the California Department of Fish and Game for addition to either the list of endangered species or the list of threatened species, or a species for which the Commission has published a notice of proposed regulation to add the species to either list.

catadromous: Fish and invertebrates, such as shrimp, migrating from fresh to saline water to spawn.

channel density: The amount of channel habitat per acre of marshplain.

chronic toxicity: A detrimental biological effect on growth rate, reproduction, fertilization success, larval development, population abundance, community composition, or any other relevant measure of the health of an organism, population, or community. See also acute toxicity.

CP3C: A pond that is owned by Cargill; this private inholding borders the Southern Ponds to the south.

cytochemical: Related to the chemistry of cells.

datum: A base elevation used as a reference from which to reckon heights or depths.

deep water habitat: Aquatic habitats, such as in lakes, rivers and oceans, where surface water is permanent and deeper than 6.6 feet (2 meters) most of the year.

delta: A nearly flat plain of alluvial deposits between diverging branches of the mouth of a river.

demersal: Dwelling at or near the bottom of a body of water.

desalination: The removal of salt (especially from sea water).

detritus: Organic waste material from decomposing dead plants or animals.

diadromous fishes: Fishes that migrate through estuaries on their way either to freshwater or to saltwater. Includes anadromous species, which migrate from salt water to spawn in fresh water, and catadromous species, which migrate from fresh water to spawn in the ocean.

diatoms: A major group of eukaryotic algae, and one of the most common types of phytoplankton.

ditch block: A constructed blockage in a flow path, such as a borrow ditch, designed to deflect the flow of water into an alternate flow path, such as a historic marsh channel.

diurnal: Having a daily cycle.

diversity: An ecological measure of the variety of organisms present in a habitat.

donut: A circular water control structure that has multiple intakes and that is used to distribute water through a canal and siphon system.

ebb tide: The tide defined when the movement of the tidal current is away from the shore or down a tidal river or estuary.

ecology: The study of the interactions between living things and their environment.

ecosystem: A basic functional unit of nature comprising both organisms and their nonliving environment, intimately linked by a variety of biological, chemical, and physical processes.

ecotone: A transition zone between two ecosystems; referred to as *habitat transition zone* in the Final EIS/R.

endangered (federal definition): Any species which is in danger of extinction throughout all or a significant portion of its range.

endangered (state definition): A native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant which is in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, or disease.

essential fish habitat: Waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.

estuarine: Of, relating to, or found in an estuary.

estuary: The wide part of a river where it nears the sea; where fresh- and saltwater mix in a semi-enclosed body of water.

eustatic sea level: The global sea level, effected by changes due to glacial melting or formation, thermal expansion or contraction of sea water, etc.

eutrophication: Having waters rich in mineral and organic nutrients that promote a proliferation of plant life, especially algae, which reduces the dissolved oxygen content and often causes the extinction of other organisms.

exotic species: Any introduced plant or animal species that is not native to the area and that may be considered a nuisance (e.g., Norway rat, Spartina, etc.). See also invasive species.

fauna: Animals, especially the animals of a particular region or period, considered as a group.

floodplain: An area adjacent to a lake, stream, ocean or other body of water lying outside the ordinary banks of the water body and periodically filled by flood flows. Often referred to as the area likely to be filled by the 100-year flood (base flood).

flora: Plants considered as a group, especially the plants of a particular country, region, or time. fluvial flooding: Results when river, stream or creek discharges overtop their banks and result in the inundation of adjacent lands.

geomorphic: Pertaining to the shape or surface of the earth, including small-scale changes in land surface resulting from restoration projects.

geotechnical: A science that deals with the application of geology to engineering.

ground lurching: The horizontal movement of ground located adjacent to slope faces during strong, earthquake-induced ground motion.

groundwater: Water that penetrates the earth's surface from precipitation and from infiltration from streams; water present below ground from ponds and lakes; water that flows or ponds underground.

habitat: The range of environmental factors at a particular location supporting specific plant and animal communities.

habitat transition zone: High marsh, or ecotone, where species frequently occur above the high tide line; indicated by wrack material (water-transported organic and synthetic detritus); a transitional habitat from marsh to upland or other habitat. A habitat transition zone is sometimes also referred to as an upland transition zone, transition zone habitat, ecotone, or horizontal levee; this document uses “habitat transition zone” for this constructed feature.

halophyte: Salt-tolerant vegetation.

halophytic: having the characteristics of a hylophyte (salt-tolerant) plant.

hazardous air pollutant: The classification, under federal law, for a pollutant that increases the public’s risk of developing cancer. See also toxic air contaminant.

hemiparasitic: Partially dependent on another host plant in order to survive.

histopathological: Pertaining to the tissue changes that affect a part or accompany a disease.

hydraulic: Of or involving a fluid, especially water, under pressure.

hydrodynamics: Deals with the motion of fluids.

hydrographic: The scientific description and analysis of the physical conditions, boundaries, flow, and related characteristics of the earth's surface waters.

hydrology: The scientific study of the properties, distribution, and effects of water on the earth's surface, in the soil and underlying rocks, and in the atmosphere.

hygroscopic: Describing a chemical substance with an affinity for water, one that will absorb moisture, usually from the air.

hypersaline: Marked by increased salt in a saline solution. Applies to highly saline brines, typically several times as salty as seawater.

hypoxic: Refers to natural waters that have a low concentration of dissolved oxygen (≤2 milligrams per liter as compared with a normal level of 8–10 milligrams per liter).

igneous: Said of a rock or mineral that solidified from molten or partially molten material, i.e., from a magma.

infauna: Aquatic animals that live in the substrate of a body of water, especially in a soft sea bottom.

intermittent stream: A stream filled with water for only a portion of the year.

interstitial: Pertaining to the interstices, or small spaces between adjacent objects.

intertidal habitat: The tidal area between the mean lower low water (MLLW) and mean higher high water (MHHW) which is alternately exposed and covered by water twice daily.

intertidal mudflats: The habitat zone that is generally found between MLLW and approximately one foot above local mean sea level and that lacks vascular plants.

inundation: Covered by a flood.

invasive species: A species that is 1) non-native (exotic) to the ecosystem under consideration and 2) whose introduction causes or is likely to cause economic or environmental harm or harm to human health.

invertebrate: A animal without a backbone.

J-Ponds: The “J-Ponds” are Alameda County-owned freshwater outflow channels and diked marsh areas. The J-Ponds separate the Bay and Inland Ponds from the Southern Ponds.

jurisdictional wetlands: Wetlands which meet the criteria of “waters of the United States” and are thereby under the jurisdiction of the U.S. Army Corps of Engineers and the U.S. Environmental Protection Agency. The definition developed by the Corps of Engineers considers as wetlands those areas which “...are inundated or saturated by surface or ground water at a frequency and duration to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.” Under this definition, all three of the following conditions must be present: a) a dominance of wetland plants; b) hydric soils (soils with low oxygen concentrations in the upper layers during the growing season); and c) wetlands hydrology.

lagoon: A coastal body of water separated from the ocean by a sand bar, which may periodically breach, opening the lagoon to the ocean for a time. Lagoons can form where a river meets the ocean (an estuarine lagoon), or without the influence of a river.

larvicide: Control agent that targets the larval portion of the life cycle, as used in the control of mosquitoes.

lateral and vertical tectonic displacement: The large scale horizontal and vertical movement of the Earth's crust due to structural plate interaction.

lateral spreading: The horizontal displacement of soil during strong, earthquake-induced ground motion.

levee: A barrier constructed to contain the flow of water, prevent flooding, or to keep out the sea.

liquefaction: see "soil liquefaction".

lower tidal marsh: Habitat that occurs above mudflats along stream and slough channels and typically is found between mean tide level and mean high water (3.3 to 5.5 feet National Annual Vertical Datum 88). Within the range of daily tidal fluctuations; ground surface and low-growing plants are exposed at low tides and completely inundated at higher tides and during periods of high stream discharge.

mammal: Any of various warm-blooded vertebrate animals of the class Mammalia, including humans, characterized by a covering of hair on the skin and, in the female, milk-producing mammary glands for nourishing the young.

managed ponds: Diked wetland, generally shallow open water habitats.

marsh: A common term applied to describe treeless wetlands characterized by shallow water and abundant emergent, floating, and submerged wetland flora. Typically found in shallow basins, on lake margins, along low gradient rivers, and in calm tidal areas. Marshes may be fresh, brackish or saline, depending on their water source(s).

marsh panne: Marsh pannes are topographic depressions on mature tidal marsh plains. They are most common in areas most distant from any tidal source and exist on drainage divides between channel networks, and on the backsides of natural levees. Marsh pannes range in age from less than 50 years to more than 1,500 years.

mean sea level: The arithmetic mean of hourly heights observed over the National Tidal Datum Epoch. metamorphic rock: Any rock derived from pre-existing rocks by mineralogical, chemical, and/or structural changes, essentially in the solid state, in response to marked changes in temperature, pressure, shearing stress, and chemical environment, generally at depth in the earth's crust.

methylation: Conversion of sediment-bound mercury may through both biotic and abiotic processes to its more bioavailable methylated form. Methyl mercury has known neurological toxicity effects that tend to increase at each level up the food chain in aquatic environments. Thus, the availability of such contaminants, even in the seemingly insignificant parts per trillion range, often are ecologically important.

MHHW: Mean Higher High Water, the average height of the higher of the two daily high tides.

MHW: Mean High Water, the average height of all the high tides.

microtidal marsh: A tidal marsh that receives less than full tidal flow because of a physical impediment. Muting can result from the presence of natural formations such as a sand bar or of human-made structures such as tide gates, culverts, or other water control structures. Muted tidal marshes exhibit many of the same features of fully tidal marshes, although they frequently lack the same range of plant diversity.

middle tidal marsh: Habitat that occurs between mean high water and mean high higher water (5.5 to 6.0 feet National Annual Vertical Datum 88); inundated only during higher high tides.

migratory: Moving regularly or occasionally from one region or climate to another; as, migratory birds.

MLLW: Mean Lower Low Water, the average height of the lower of the two daily low tides.

MLW: Mean Low Water, the average height of all low water heights.

morphology: That branch of biology which deals with the structure of animals and plants.

MTL: Mean Tide Level.

mudflat: Flat un-vegetated wetlands subject to periodic flooding and minor wave action. The area, which lies between tidal marshes and the edge of the Bay at low tide, provides habitat for invertebrates, fish, and shorebirds.

mutagenicity: The capacity to induce a mutation or an abrupt change in the genetic constitution of an organism.

muted tidal marsh: A tidal marsh that receives less than full tidal flow because of a physical impediment. Muting can result from the presence of natural formations such as a sand bar or of human-made structures such as tide gates, culverts, or other water control structures that reduce the range of the tides but still allow for frequent inundation. Muted tidal marshes exhibit many of the same features of fully tidal marshes, although they frequently lack the same range of plant diversity. Also referred to as damped tidal marsh (see also microtidal marsh).

native species: Species which have lived in a particular region or area for an extended period of time.

navigation channel: The buoyed, dredged, and policed waterway through which ships proceed, especially in general shallow areas.

neap tides: The tides resulting when the sun and moon are at right angles to each other, characterized by a reduced tidal range.

Newark Aquiclude: A thick layer of silt and clay which overlies the Newark groundwater aquifer, creating a shallow water-bearing zone.

nonattainment areas: Areas that do not meet the national ambient air quality standards established in 1970 by the Clean Air Act.

nonpoint source: A diffuse source of pollution that cannot be attributed to a clearly identifiable, specific physical location or a defined discharge channel. This includes the nutrients that run off the ground from any land use (e.g., croplands, feedlots, lawns, parking lots, streets, forests, etc.) and enter waterways. It also includes nutrients that enter through air pollution, through the groundwater, or from septic systems.

nutrient load: Quantity of plant nutrients added to a given area (e.g., a pond).

obligates: Obligate wetland plant species. Wetland indicator species are designated according to their frequency of occurrence in wetlands. Obligate and facultative wetland indicator species are hydrophytes that occur "in areas where the frequency and duration of inundation or soil saturation produce permanently or periodically saturated soils of sufficient duration to exert a controlling influence on the plant species present" (Environmental Laboratory 1987).

Old Alameda Creek (OAC): A creek that forms the northern border of the Eden Landing Phase 2 Project Area; it also separates the Reserve into northern and southern halves.

outfall: The place where a sewer, drain, or stream discharges.

oxidant: An oxidizing agent.

pannes: See salt pannes.

pelagic: Referring to the open sea at all depths.

peripheral halophytes: Plants adapted to living in a saline environment. Peripheral halophytes occur along the banks and tops of levees separating tidal areas from salt ponds, and occasionally along levees separating salt ponds from each other.

permeability: The degree to which something (e.g., an earthen structure) can be penetrated by a liquid.

pH: Measure of the acidity or alkalinity (basicity) of water (pH 7 is neutral, increasing values indicate alkalinity and decreasing value indicate acidity).

phytoplankton: Small (often microscopic) aquatic plants suspended in water.

piecemealing: An unacceptable practice in which projects are analyzed incrementally by parts to make the environmental impacts appear smaller to the overseeing agencies.

piscivorous: Fish-eating.

point source: A source of pollution that can be attributed to a specific physical location; an identifiable, end of pipe "point." The vast majority of point source discharges of plant nutrients are from wastewater treatment plants, although some come from industries.

point-source discharge: A discharge of a pollutant from an identifiable point, such as a pipe, ditch, channel, sewer, tunnel, or container.

pond complex: A group of salt ponds being treating as a unit for planning purposes.

ppt: Parts per thousand (used as a measurement of salinity); the salinity of ocean water is approximately 35 ppt.

proposed species of concern (federal definition): A group of organisms for which a general notice has been published in a local newspaper and a proposed rule for listing has been published in the Federal Register. A species that may or may not be listed in the future (formerly "C2 candidate species" or "species under consideration for listing for which there is insufficient information to support listing").

rare (state definition): A species, subspecies, or variety is rare when, although not presently threatened with extinction, it is in such small numbers throughout its range that it may become endangered if its present environment worsens.

restoration: The return of an ecosystem to a close approximation of its condition prior to disturbance.

riparian area: Riparian refers to the area of land adjacent to a body of water, stream, river, marsh, or shoreline, forming a transition between the aquatic and the terrestrial environment.

riprap: Large rock or other material often used to stabilize streambanks or erosive shorelines.

ruderal: Disturbed habitat usually of poor quality.

saline wedge: Viscous, dense brine that forms in the siphon when the denser, heavier saline water falls to the bottom of the siphon and blocks the passage of water.

salina: Natural impoundment of tidal water less than 30 cm deep on the high marsh plain. They tend to be longer than wide, and to parallel the extreme high tide contour.

saline: Of, relating to, or containing salt; salty.

salinity: A measure of the salt concentration of water; higher salinity means more dissolved salts.

salt marsh: A coastal habitat consisting of salt-resistant plants residing in an organic-rich sediment.

salt pannes: Salt pannes are shallow, generally unvegetated areas that form shallow ponds on the salt marsh. They become hypersaline in late summer. Salt pannes often contain fish populations and provide valuable habitat for shorebirds when flooded.

salt ponds: Commercial facilities that extract salt from Bay water by evaporation. Algae are the main vegetation, brine shrimp and birds the primary inhabitants.

sand boil: Sand and water ejected to the ground surface as a result of liquefaction at shallow depth; the conical sediment deposit that remains as evidence of liquefaction

sausal: Sausals (termed by Spanish explorers) are groves of willows on flat lands, often associated with creeks that are sustained by springs, seeps, or a shallow water table.

seasonal wetlands: Shallow depressions that typically contain standing water during the rainy season but become drier, or dry out, in summer and fall. They include diked (formerly tidal) salt and brackish marshes, farmed wetlands, abandoned salt ponds, inland freshwater marshes and vernal pools.

sediment budget: An accounting of all sediment delivery, export, and storage.

sedimentation: The deposition or accumulation of sediment.

semidiurnal: Occurring twice each day.

sensitive receptors: For impacts related primarily to noise or air quality, sensitive receptors are those facilities that typically host people or communities that are more susceptible to adverse environmental impacts. For air quality impacts, for example, these include schools, churches, residences, apartments, hospitals, licensed day care facilities, elderly care facilities, etc.

sensitive species (federal definition): Those plant and animal species identified by a regional forester for which population viability is a concern, as evidenced by significant current or predicted downward trends in population numbers or density, or significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.

sessile: Sitting directly on base without support, stalk, pedicel, or peduncle; attached or stationary as opposed to free living, or exhibiting or capable of movement.

slough: A narrow, winding waterway edged with marshy and muddy ground. These water bodies are distinguished by low flow or stagnant waters.

soil liquefaction: The sudden and total loss of soil strength during earthquake-induced ground motion. Occurs in loose, saturated, clean sand where ground shaking increases effective pore pressure resulting in the displacement of individual sand grains and groundwater. The soil transforms into a fluid-like state, allowing displacement of water and the potential mobilization of sand if not confined.

Spartina (alterniflora): Smooth cordgrass, an invasive species.

special status species: Collective term for endangered species, threatened species, species of concern and species of special concern.

species of concern (federal definition): An informal term that refers to those species which USFWS believes might be in need of concentrated conservation actions. (Formerly known as Category 1 or 2 Candidate).

species of special concern (state definition): Native species or subspecies that have become vulnerable to extinction because of declining population levels, limited ranges, or rarity. The goal is to prevent these animals and plants from becoming endangered by addressing the issues of concern early enough to secure long term viability for these species.

specific yield: A measure of aquifer productivity; the volume of water drained divided by the total volume of the sample.

spring tides: The tides resulting when the gravitational forces exerted on the earth by the sun and moon are acting in the same direction.

staircase issue: A staircase issue is an area of uncertainty for which it is difficult to predict specific outcomes based on the available data and current understandings of the system. Staircase issues are being addressed through the Adaptive Management Plan (AMP), which includes monitoring to measure and track actual outcomes of management and restoration actions, together with predefined triggers designed to detect adverse outcomes early on, before they reach levels of significance. Corrective actions can thus be developed and implemented before the thresholds of significance are reached. If monitoring indicates that no adverse impacts are occurring, then the planned restoration can continue along the staircase to the next step. The “restoration staircase” was a concept developed for the South Bay Salt Pond Restoration Project at its program level and was included in the 2007 Final EIS/R.

stillwater flood elevation: Projected elevation that flood waters would assume in the absence of waves resulting from wind or seismic effects.

streambed: A channel occupied (or formerly occupied) by a stream.

strike slip fault: A fault on which the movement is parallel to the fault's strike (the direction taken by a structural surface, e.g., a bedding or fault plane, as it intersects the horizontal).

submerged plants: Plants growing with their root, stems, and leaves completely under the surface of the water.

submerged: Below water.

subsidence: The motion of a surface (usually, the Earth's surface) as it shifts downward relative to a datum such as sea level.

subtidal habitat: Areas below mean lower low water (MLLW) that are covered by water most of the time.

swamp: A seasonally flooded bottomland with more woody plants than a marsh and better drainage than a bog.

tectonically: Pertaining to the forces involved in, or the resulting structures of geology dealing with the broad architecture of the outer part of the earth, that is, the major structural or deformational features and their relations, origin, and historical evolution.

teratogenicity: The capacity to cause birth defects.

tertiary wastewater treatment: Selected biological, physical, and chemical separation processes to remove organic and inorganic substances that resist conventional treatment processes; the additional treatment of effluent beyond that of primary and secondary treatment methods to obtain a very high quality of effluent.

threatened (federal definition): Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

threatened (state definition): A native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant that, although not presently threatened with extinction, is likely to become an endangered species in the foreseeable future in the absence of the special protection and management efforts.

tidal dispersion: The transportation of a water parcel resulting from the spatial and temporal variability in the speed and direction of tidal currents.

tidal excursion: The horizontal distance a particle or water parcel travels during a single flood or ebb tide.

tidal marsh: Wetlands with fresh water, brackish water, or salt water along tidal shores.

tidal marsh corridor: A continuous band of tidal marsh.

tidal mud flat: The unvegetated shoreline area exposed to air during low tide.

tidal muting: The restriction of tidal flow by friction; contributes to channel shape and form as a result of erosion and sedimentation.

tidal prism: The volume of water that flows into and out of a marsh.

topography: The general configuration of a land surface, including its relief and the position of its natural and man-made features.

Total Maximum Daily Load program: A quantitative assessment, provided for in the Clean Water Act, of a problem that affects water quality. Establishes the amount of a pollutant present in a water body and specifies an allowable load of the pollutant from individual sources to ensure compliance with water quality standards.

toxic air contaminant: The classification, under California law, for a pollutant that increases the public's risk of developing cancer. See also hazardous air pollutant.

toxic: The property of being poisonous, of causing death or severe temporary or permanent damage to an organism.

toxicity: The degree to which a substance is toxic.

trophic level: Stage in a food chain or web leading from primary producers (lowest trophic level) through herbivores to primary and secondary carnivores (consumers—highest level).

tsunami: A seismically induced flood caused by the transfer of energy from an earthquake epicenter to coastal areas by ocean waves.

turbidity: The relative clarity of water, which depends in part on the material in suspension in the water.

Turk Island: A Cargill-owned inholding within the Southern Ponds.

upland: Ground elevated above the lowlands along rivers or shorelines.

upper tidal marsh: Habitat that occurs from mean high higher water and up several feet (>6.0 feet National Annual Vertical Datum 88) to the maximum elevation of tidal effects. This habitat is inundated only during higher high tides.

upland transition zone: High marsh, or ecotone, where species frequently occur above the high tide line; indicated by wrack material (water-transported organic and synthetic detritus); referred to as *habitat transition zone* in the Final EIS/R.

vascular plant: Green plant having a vascular system: ferns, gymnosperms, angiosperms.

vector: An insect or other organism that transmits a pathogenic fungus, virus, bacterium, etc.

water control structure: A structure in a water management feature that conveys water, controls the direction or rate of flow, or maintains a desired water surface elevation. Examples of water control structures include tide gates, culverts, and others.

watershed: An area of land where all of the ground water and surface water drains to the same water body (typically a river or creek).

zooplankton: Floating and free-swimming invertebrates that are suspended in the water column.

This page intentionally left blank

7. REFERENCES

1.0 Introduction

AEP (Association of Environmental Professionals). 2016. *2016 California Environmental Quality Act (CEQA) Statute and Guidelines*. Palm Desert, CA.

CEQ (Council on Environmental Quality). 2015. *Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act*. CEQ Executive Office of the President. 40 CFR Parts 1500-1508.

Cohen, Andrew. 2000. *An Introduction to the San Francisco Estuary*. 3d ed. Drawings by Jack Laws. Prepared for Save the Bay, San Francisco Estuary Project, and San Francisco Estuary Institute. December 2000.

Collins, J.N., and R.M. Grossinger. 2004. *Synthesis of Scientific Knowledge concerning Estuarine Landscapes and Related Habitats of the South Bay Ecosystem*. Technical report of the South Bay Salt Pond Restoration Project. Oakland, CA: San Francisco Estuary Institute, 2004, 91 pp. As cited in 2007 EIS/R, Volume 2, page 7-8.

EDAW. 2005. *South Bay Salt Pond Restoration Project Historic Context Report*. San Francisco, CA: Prepared for: California State Coastal Conservancy, US Fish and Wildlife Service, California Department of Fish and Game. As cited in 2007 EIS/R, Volume 2, page 7-9.

Foxgrover, Amy C., Shawn A. Higgins, Melissa K. Ingraca, Bruce E. Jaffe, and Richard E. Smith. 2004. *Deposition, Erosion, and Bathymetric Change in South San Francisco Bay: 1858-1983*. U.S. Geologic Survey Open-File Report 2004-1192, 2004, 25 pp.

Goals Project. 1999. *Baylands Ecosystem Habitat Goals*. A Report of Habitat Recommendations. Prepared by the San Francisco Bay Area Wetlands Ecosystem Goals Project. First Reprint. San Francisco/Oakland, CA: U.S. Environmental Protection Agency/San Francisco Bay Regional Water Quality Control Board, June 2000.

Orlando, J.L., J.Z. Drexler, and K.G. Dedrick. 2005. *South San Francisco Bay Tidal Marsh Vegetation and Elevation Surveys: Corkscrew Marsh, Bird Island, and Palo Alto Baylands, California, 1983*. Sacramento, CA: U.S. Geological Survey Data Series 134, 2005.

Siegel SW, Bachand PAM, 2002. *Feasibility Analysis: South Bay Salt Pond Restoration*. San Francisco Estuary, California. Wetlands and Water Resources, San Rafael, CA. 228 pp.

USFWS and CDFG (United States Fish and Wildlife Service and California Department of Fish and Game). 2003. *South Bay Salt Ponds Initial Stewardship Plan*. Prepared by Life Science! June.

———.2004. *Final South Bay Salt Pond Initial Stewardship Plan: Environmental Impact Report/Environmental Impact Statement*. Prepared by: Life Science! March 2004.

———. 2007. *South Bay Salt Pond Restoration Project Environmental Impact Statement / Report*, Volumes 1 and 2, Draft. Prepared by EDAW, Philip Williams and Associates, Ltd., H.T. Harvey and Associates, Brown and Caldwell, and Geomatrix. Submitted to U.S. Army Corps of

Engineers, U.S. Fish and Wildlife Service, and California Department of Fish and Game. March.

2.0 Alternatives

BAAQMD (Bay Area Air Quality Management District). 2010. *California Environmental Quality Act Air Quality Guidelines*. May.

———. 2011. *California Environmental Quality Act Air Quality Guidelines*. May.

CDFG (California Department of Fish and Game). 1999. *Final Eden Landing Ecological Reserve (Baumberg Tract) Restoration and Management Plan*. Prepared for the Wildlife Conservation Board. Yountville, CA. July.

CDFW (California Department of Fish and Wildlife). 2016. *South Bay Salt Ponds Operation Plan -- Pond Systems E2 and E2C.* Eden Landing Ecological Reserve. Hayward, Alameda County. March.

USFWS and CDFG (United States Fish and Wildlife Service and California Department of Fish and Game). 2007. *South Bay Salt Pond Restoration Project Environmental Impact Statement / Report*, Volumes 1 and 2, Draft. Prepared by EDAW, Philip Williams and Associates, Ltd., H.T. Harvey and Associates, Brown and Caldwell, and Geomatrix. Submitted to U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, and California Department of Fish and Game. March.

3.1 Introduction

AEP (Association of Environmental Professionals). 2016. *2016 California Environmental Quality Act (CEQA) Statute and Guidelines*. Palm Desert, CA.

USFWS and CDFG (United States Fish and Wildlife Service and California Department of Fish and Game). 2007. *South Bay Salt Pond Restoration Project Environmental Impact Statement / Report*, Volumes 1 and 2, Draft. Prepared by EDAW, Philip Williams and Associates, Ltd., H.T. Harvey and Associates, Brown and Caldwell, and Geomatrix. Submitted to U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, and California Department of Fish and Game. March.

3.2 Hydrology, Flood Management, and Infrastructure

Barnard PL, Schoellhamer DH, Jaffe BE, McKee LJ, 2013. *Sediment transport in the San Francisco Bay Coastal System: An overview*. Marine Geology 345 (2013) 3–17.

Borgnis, EL, Callaway, JC, Schile, L, Busnardo, M, Archibald, G, and Duke, R. 2013. *Sediment Dynamics in Restored Tidal Wetlands of San Francisco Bay*. Presentation at the South Bay Science Symposium, U.S. Geological Survey Western Ecological Research Center.

Borrero J, Dengler L, Uslu B, Synolakis C, 2006. *Numerical Modeling of Tsunami Effects at Marine Oil Terminals in San Francisco Bay*. Prepared for: Marine Facilities Division of The California State Lands Commission, June 8.

CDFG (California Department of Fish and Game). 2008. *2007 Self-Monitoring Report, Baumberg Complex - Hayward, California*. Eden Landing Ecological Reserve. March.

CDFW (California Department of Fish and Wildlife). 2015. *2014 Self-Monitoring Report, Baumberg Complex - Hayward, California*. Eden Landing Ecological Reserve. March.

———. 2016. *South Bay Salt Ponds Operation Plan -- Pond Systems E2 and E2C.* Eden Landing Ecological Reserve. Hayward, Alameda County. March.

Cheng RT, Casulli V, Gartner JW, 1993. *Tidal, residual, intertidal mudflat (TRIM) model and its applications to San-Francisco Bay, California.* Estuarine, Coastal, and Shelf Science 36(3):235-280.

FEMA (Federal Emergency Management Agency), 1988. *Part 65 - Identification and Mapping of Special Hazard Areas,* CFR Title 44, Volume 1 - Emergency Management and Assistance: Federal Emergency Management Agency (FEMA).

Fischer HB, Lawrence GA, 1983. *Currents in South San Francisco Bay.* State Water Resources Control Board, California. Report No. UCB/HEL-83/01.

Jaffe B, Foxgrover A, 2006. *Sediment Deposition and Erosion in South San Francisco Bay, California from 1956 to 2005*. U.S. Geological Survey Open-File Report 2006-1287.

McKee JL, Lewicki M, Schoellhamker DH, Ganju NK, 2013. *Comparison of sediment supply to San Francisco Bay from watersheds draining the Bay Area and the Central Valley of California*. Marine Geology 345 (2013) 47–62.

Monsen NE, Cloem JE, Lucas LV, 2002. *A Comment on the Use of Flushing Time, Residence Time, and Age as Transport Time Scales.* Limnol Oceanogr 47(5):1545-1553.

Powell T, Cloern J, Huzzey L., 1989. *Spatial and Temporal Variability in South San Francisco Bay (USA). I. Horizontal Distributions of Salinity, Suspended Sediments, and Phytoplankton Biomass and Productivity.* Estuarine, Coastal, and Shelf Science 28(6):583-597.

Phillip Williams & Associates, Ltd, H. T. Harvey & Associates, EDAW, and Brown and Caldwell, 2005. *Hydrodynamics and Sediment Dynamics Existing Conditions Report.* San Francisco, CA. Prepared for: California State Coastal Conservancy, U.S. Fish and Wildlife Service, California Department of Fish and Game. March.

Schemel LE, 1995. *Measurements of Salinity, Temperature, and Tides in South San Francisco Bay, California, at Dumbarton Bridge: 1990-1993 Water Years.* U.S. Geological Survey. Open-File Report 95-326.

USGS (United States Geological Survey), 2005. *Progress Report for Mercury in Sediments of the Alviso and Eden Landing Salt Ponds – Results from Winter 2005 Sampling.* Western Ecological Research Center, USGS-Davis Field Station. May 5.

USACE (United States Army Corps of Engineers), 1988. *San Francisco Bay Shoreline Study, Southern Alameda and Santa Clara Counties*, Interim. San Francisco District Office Report. October.

———. 1989. *San Francisco Bay Shoreline Study, San Mateo and Northern Alameda Counties*, Interim. San Francisco District Office Report. September. 179 p.

———. 1992. Letter Report: San Francisco Bay Shoreline Study. San Francisco District. April.

USFWS and CDFG (United States Fish and Wildlife Service and California Department of Fish and Game). 2007. *South Bay Salt Pond Restoration Project Environmental Impact Statement / Report*, Volumes 1 and 2, Draft. Prepared by EDAW, Philip Williams and Associates, Ltd., H.T. Harvey and Associates, Brown and Caldwell, and Geomatrix. Submitted to U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, and California Department of Fish and Game. March.

Walters RA, Cheng RT, Conomos TJ, 1985. *Time scales of circulation and mixing processes of San Francisco Bay waters*. Hydrobiologia 129: 13-36.

3.3 Water Quality

ACWD (Alameda County Water District), 2017. *Groundwater Monitoring Report, 2016*. Prepared by E. Chen, P. McMahon, and A. Shorno, Water Resources Department, Groundwater Resources Division. February 9.

Benoit, J., C. Gilmour, A. Heyes, R.P. Mason, and C. Miller, 2003. “Geochemical and Biological Controls over Methylmercury Production and Degradation in Aquatic Ecosystems.” In: *Biochemistry of Environmentally Important Trace Elements*, ed. by Y. Chai and O.C. Braids, 262–297.Washington, DC: American Chemical Society, 2003.

Brown and Caldwell, Philip Williams & Associates, Ltd., EDAW, and H.T. Harvey & Associates, 2005. *South Bay Salt Pond Restoration Project: Water and Sediment Quality Existing Conditions Report*. Prepared for: California State Coastal Conservancy, U.S. Fish and Wildlife Service, and California Department of Fish and Game. March 2005.

CDFG (California Department of Fish and Game), 2008. *2007 Self-Monitoring Report, Baumberg Complex - Hayward, California*. Eden Landing Ecological Reserve. March.

CDFW (California Department of Fish and Wildlife), 2015. *2014 Self-Monitoring Report, Baumberg Complex - Hayward, California*. Eden Landing Ecological Reserve. March.

———. 2016. *South Bay Salt Ponds Operation Plan -- Pond Systems E2 and E2C.* Eden Landing Ecological Reserve, Hayward, Alameda County. March.

Cloern JE, 2001. *Our evolving conceptual model of the coastal eutrophication problem*. Marine Ecological Progress Series 210: 223–253

Gilmour CC, Riedel GS, Ederington MC, Bell JT, Benoit JM, Gill GA, Stordal MC, 1998. *Methylmercury concentrations and production rates across a trophic gradient in the northern Everglades.* Biogeochemistry 40: 327–345

Gilmour CC, Henry EA, Mitchell R, 1992. *Sulfate Stimulation of Mercury Methylation in Freshwater Sediments*. Environmental Science and Technology, 26(11): 2281-2287.

Grenier, J. Letitia, and Jay A. Davis. 2010. *Water Quality in South San Francisco Bay, California: Current Condition and Potential Issues for the South Bay Salt Pond Restoration Project.* Reviews of Environmental Contamination and Toxicology 206: 115-147. Springer New York.

McKee L, Oram J, Leatherbarrow J, Bonnema A, Heim W, Stephenson M, 2006. *Concentrations and Loads of Mercury, PCBs, and PBDEs in the Lower Guadalupe River, San Jose, California: Water Years 2003, 2004, and 2005*. A Technical Report of the Regional Watershed Program: SFEI Contribution #424. San Francisco Estuary Institute, Oakland, CA.

McKee L, Lewicki M, Schoellhamer DH, Ganju NK, 2013. *Comparison of sediment supply to San Francisco Bay from watersheds draining the Bay Area and the Central Valley of California*. Marine Geology 345:47–62.

Robinson A, Slotton D, Lowe S, Davis J, 2014. *North Bay Mercury Biosentinel Project.* Contribution No. 738. San Francisco Estuary Institute and the Aquatic Science Center. Richmond, CA. December.

RWQCB (San Francisco Bay Regional Water Quality Control Board), 2000. *Beneficial Reuse of Dredged Materials: Sediment Screening and Testing Guidelines.* Draft Staff Report. May.

———. 2004. *Waste Discharge Requirements For: U.S. Fish & Wildlife Service and California Department of Fish & Game, South San Francisco Bay Low Salinity Salt Ponds, Alameda, Santa Clara, And San Mateo Counties*. Order No. R2-2004-0018. South Bay Salt Ponds Initial Stewardship Plan. March 17.

———. 2006. *Mercury in San Francisco Bay: Proposed Basin Plan Amendment and Staff Report for Revised Total Maximum Daily Load (TMDL) and Proposed Mercury Water Quality Objectives*, California Environmental Protection Agency, Oakland, California. August 1.

———. 2008. *Waste Discharge Requirements and Water Quality Certification for U.S. Fish and Wildlife Service and California Department of Fish and Game, South Bay Salt Pond Restoration Project (SBSPRP), Phase I.* Order No. R2-2008-0078. August 13.

———. 2012. *Amending Waste Discharge Requirements Order No. R2-2008-0078 for: U.S. Fish and Wildlife Service and California Department of Fish and Game, South Bay Salt Pond Restoration Project, Modification 1 to Phase I*. Order No. R2-2012-0014. February 12.

Schemel LE, Brown RL, Bell NW, 2003. *Salinity and Temperature in South San Francisco Bay, California, at Dumbarton Bridge: Results from the 1999-2002 Water Years and an Overview of Previous Data*. U.S. Geological Survey Water Resources Investigation Report 03–4005. Menlo Park, CA. January. Data updated in 2005–2006.

SFEI (San Francisco Estuary Institute). 2012. *2012 Regional Monitoring Program Update*. Contribution No. 678. San Francisco Estuary Institute, Richmond, CA.

———. 2015. *The Pulse of the Bay: The State of Bay Water Quality, 2015 and 2065.* Contribution No. 759. San Francisco Estuary Institute, Richmond, CA.

———. 2016. Contaminant Data Download and Display (CD3). http://cd3.sfei.org/

SWRCB (State Water Resources Control Board), 2009. *Water Quality Control Plan for Enclosed Bays and Estuaries, Part 1, Sediment Quality*. August 25.

Tyler RM, Brady DC, Targett TE, 2009. *Temporal and Spatial Dynamics of Diel-Cycling Hypoxia in Estuarine Tributaries*. Estuaries and Coasts 32:123–145

USACE, USEPA, BCDC, and RWQCB (U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, San Francisco Bay Conservation and Development Commission, and San Francisco Bay Regional Water Quality Control Board). 2001. *Long Term Management Strategy (LTMS) for the Placement of Dredged Material in the San Francisco Bay Region*. Final LTMS Management Plan. July.

USFWS and CDFG (United States Fish and Wildlife Service and California Department of Fish and Game). 2003. *South Bay Salt Ponds Initial Stewardship Plan*. Prepared by Life Science! June.

———. 2007. *South Bay Salt Pond Restoration Project Environmental Impact Statement / Report*, Volumes 1 and 2, Draft. Prepared by EDAW, Philip Williams and Associates, Ltd., H.T. Harvey and Associates, Brown and Caldwell, and Geomatrix. Submitted to U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, and California Department of Fish and Game. March.

USGS (United States Geological Survey), 2005. *Progress Report for Mercury in Sediments of the Alviso and Eden Landing Salt Ponds – Results from Winter 2005 Sampling.* Western Ecological Research Center, USGS-Davis Field Station. May 5.

Wiener, J.G., D.P. Krabbenhoft, G.H. Heinz, and A.M. Scheuhammer, 2003. Chapter 16, “Ecotoxicology of Mercury.” In: *Handbook of Ecotoxicology*, ed. by D.J. Hoffman, B.A. Rattner, G.A. Burton Jr., and J. Cairns Jr., 409–463. Boca Raton, FL: CRC Press.

3.4 Geology, Soils, and Seismicity

Atwater, B.F., E.J. Helley, and C.W. Hedel, 1977. *Late Quaternary Depositional History, Holocene Sea-Level Changes, and Vertical Crustal Movement, Southern San Francisco Bay, California*. U.S. Geological Survey Professional Paper 1014.

CDFG (California Department of Fish and Game). 1999. *Final Eden Landing Ecological Reserve (Baumberg Tract) Restoration and Management Plan*. Prepared for the Wildlife Conservation Board. Yountville, CA. July.

Helley EJ, Lajoie KR, Spangle WE, Blair ML, 1979. *Flatland Deposits – Their Geology and Engineering Properties and Their Importance to Comprehensive Planning.* Selected Examples from the San Francisco Bay Region, California. U.S. Geological Survey Professional Paper 943. 88 pp.

McDonald SD, Nichols DR, Wright NA, Atwater B, 1978. *Map Showing Thickness of Young Bay Mud, Southern San Francisco Bay, California*. Department of the Interior, U.S. Geological Survey, Miscellaneous Field Studies Map MF – 976.

United States Department of Agriculture Soil Conservation Service and University of California Agricultural Experiment Station. 1981. *Soil Survey of Alameda County, California, Western Part*. March.

USFWS and CDFG (United States Fish and Wildlife Service and California Department of Fish and Game). 2007. *South Bay Salt Pond Restoration Project Environmental Impact Statement / Report*, Volumes 1 and 2, Draft. Prepared by EDAW, Philip Williams and Associates, Ltd., H.T. Harvey and Associates, Brown and Caldwell, and Geomatrix. Submitted to U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, and California Department of Fish and Game. March.

Wentworth, CM, 1997. *General Distribution of Geologic Materials in the San Francisco Bay Region, California: A Digital Map Database*. U.S. Geological Survey Open-File Report 97-744.

Witter RC, Knudsen KL, Sowers JM, Wentworth CM, Koehler RD, Randolph CE, Brooks SK, Gans KD, 2006. *Maps of Quaternary Deposits and Liquefaction Susceptibility in the Central San Francisco Bay Region, California*. Final Technical Report. U.S. Geological Survey Open-File Report 2006-1037. April.

3.5 Biological Resources

Ackerman JT, Hartman CA, Herzog MP, Smith LM, Moskal SM, De La Cruz SEW, Yee JL, Takekawa JY, 2014. *The Critical Role of Islands for Waterbird Breeding and Foraging Habitat in Managed Ponds of the South Bay Salt Pond Restoration Project, South San Francisco Bay, California*. U.S. Geological Survey Open-File Report 2014-1263, 108 p.

Ackerman JT, Herzog MP, Hartman CA, 2014. *Effects of Human Disturbance on Waterbird Nesting and Reproductive Success at Restoration Pond SF2, South San Francisco Bay, California*. U.S. Geological Survey Open-File Report 2014-1223, 16 p.

Ackerman J, Hartman CA, Strong C, 2015. Science Foundation Chapter 5, Appendix 5.1 – Case Study Forster's Tern (*Sterna forsteri*) and California Least Tern (*Sternula antillarum browni*). In: *Baylands Ecosystem Habitat Goals Science Update*.

AEP (Association of Environmental Professionals). 2016. *2016 California Environmental Quality Act (CEQA) Statute and Guidelines*. Palm Desert, CA.

Audubon. 2016. Guide to North American Birds. Available at: http://www.audubon.org/bird-guide

Audubon and Cornell Lab of Ornithology. 2016. eBird. Online Observations and Species Maps. Available at: http://ebird.org/

Ayres DR, Smith DL, Zaremba K, Klohr S, Strong DR, 2004. "Spread of Exotic Cordgrasses and Hybrids (*Spartina* sp.) in the Tidal Marshes of San Francisco Bay, California, USA." *Biological Invasions* 6(2): 221–231.

Baxter R, Hieb K, DeLeon S, Fleming K, Orsi J, 1999. *Report on the 1980–1995 Fish, Shrimp, and Crab Sampling in the San Francisco Estuary, California*. The Interagency Ecological Program for the Sacramento–San Joaquin Estuary. Technical Report 63. November.

Brand LA, Takekawa JY, Shinn J, Graham T, Buffington K, Gustafson KB, Smith LM, Spring SE, Miles AK, 2014. *Effects of Wetland Management on Carrying Capacity of Diving Ducks and Shorebirds in a Coastal Estuary*. Waterbirds 37(1): 52–67.

CDFG (California Department of Fish and Game). 1999. *Final Eden Landing Ecological Reserve (Baumberg Tract) Restoration and Management Plan*. Prepared for the Wildlife Conservation Board. Yountville, CA. July.

———. 2012. *Staff Report on Burrowing Owl Mitigation*. Natural Resources Agency, Department of Fish and Game. Sacramento, CA. March 7.

CDFW (California Department of Fish and Wildlife). 2016a. *South Bay Salt Ponds Operation Plan -- Pond Systems E2 and E2C.* Eden Landing Ecological Reserve. Hayward, Alameda County. March.

———. 2016b. Newark, Mountain View, San Leandro, and Redwood Point. California Natural Diversity Database, Biogeographic Data Branch, Sacramento, CA. August. Available online at https://www.wildlife.ca.gov/Data/CNDDB

City of Hayward. 2014. *Hayward 2040 General Plan Policy Document*. July.

CNPS (California Native Plant Society), Rare Plant Program. 2016. Inventory of Rare and Endangered Plants (online edition, v8-02). California Native Plant Society, Sacramento, CA. http://www.rareplants.cnps.org.

De La Cruz SEW, Smith LM, Moskal S, Strong C, Krause J, Wang Y, Takekawa JY, in press. *Trends and Habitat Associations of Waterbirds Using the South Bay Salt Pond Restoration Project, San Francisco Bay, California*. U.S. Geological Survey Open-File Report.

Donehower C, Tokatlian K, 2012. *Citizen Science-based Colonial Waterbird Monitoring at the San Francisco Bay Bird Observatory – 2012 Nesting Summary*. San Francisco Bay Bird Observatory report prepared for C. Strong and E. Mruz, Don Edwards San Francisco Bay National Wildlife Refuge, and J. Karuse, Eden Landing Ecological Reserve, December 29.

Environmental Laboratory. 1987. *Corps of Engineers Wetlands Delineation Manual*. Wetlands Research Program Technical Report Y-87-1. Vicksburg, MS: U.S. Army Engineers Waterways Experiment Station. January.

FAA (Federal Aviation Administration). 2007. *Hazardous Wildlife Attractants on or Near Airports*. Advisory Circular. Initiated by AAS-300. Washington, DC: U.S. Department of Transportation. August 28.

Gill R, 1977. "Breeding Avifauna of the South San Francisco Bay Estuary." *Western Birds* 8(1):1-12.

Goals Project, 1999. *Baylands Ecosystem Habitat Goals*. A report of habitat recommendations prepared by the San Francisco Bay Area Wetlands Ecosystem Goals Project. U.S. Environmental Protection Agency/San Francisco Bay Regional Water Quality Control Board. San Francisco/Oakland, CA. March. Reprint with minor corrections, June 2000.

———. 2000. *Baylands Ecosystem Species and Community Profiles: Life Histories and Environmental Requirements of Key Plants, Fish and Wildlife*. Prepared by the San Francisco Bay Area

Wetlands Ecosystem Goals Project, P.R. Olofson, ed. San Francisco Bay Regional Water Quality Control Board. Oakland, CA.

Grossinger R, Alexander J, Cohen AN, Collins JN, 1998. *Introduced Tidal Marsh Plants in the San Francisco Estuary: Regional Distribution and Priorities for Control*. Richmond, CA: San Francisco Estuary Institute. August.

Harvey TE, 1988. "Breeding Biology of the California Clapper Rail in South San Francisco Bay." *Transactions of the Western Section of the Wildlife Society* 24: 98–104.

Harvey TE, Miller KJ, Hothem RL, Rauzon MJ, Page GW, Keck RA, 1992. *Status and Trends Report on Wildlife of the San Francisco Estuary*. Prepared by U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Enhancement Field Office. Report for the San Francisco Estuary Project, San Francisco, CA.

Hobbs, J. 2012. "South Bay Salt Pond Restoration–Fish Monitoring: Summary Progress Report for January–June, 2012. Technical report prepared for the South Bay Salt Pond Restoration Project.

———. 2016. Personal Communication. Email communication to David Halsing on September 19, 2016: Subject: Green Sturgeon at Eden Landing

H.T. Harvey and Associates, Philip Williams & Associates, Ltd., EDAW, and Brown and Caldwell. 2005. *South Bay Salt Pond Restoration Project: Biology and Habitats Existing Conditions Report*. March 2005.

Liu L, Herzog M, Nur N, Abbaspour P, Robinson A, Warnock N, 2005. *San Francisco Bay Tidal Marsh Project Annual Report 2005. Distribution, Abundance, and Reproductive Success of Tidal Marsh Birds*. Prepared by Point Reyes Bird Observatory (PRBO) Conservation Science. December 31.

Marschalek DA, 2012. *California Least Tern Breeding Survey: 2011 Season*. Nongame Wildlife Program, 2012-1. Natural Resource Agency, Department of Fish and Game, Wildlife Branch.

Moyle PB, 2002. *Inland Fishes of California*. Revised and Expanded. Berkeley, CA: University of California Press.

Overton, T.C. 2007. "Data Summary: A Review of Literature Regarding California Clapper Rail (*Rallus longirostris obsoletus*) Demographics, Habitat Use, Home Range, Movements, and Effects of Disturbance." U.S. Geological Survey, Western Ecological Research Center. Dixon Field Station, Dixon, CA. Prepared for the State Coastal Conservancy and San Francisco Estuary Invasive Spartina Project, Berkeley, CA. March 29.

Page GW, Stenzel LE, Kjelmyr JE, 1999. "Overview of Shorebird Abundance and Distribution in Wetlands of the Pacific Coast of the Contiguous United States." *The Condor* 101(no. 3): 461–471.

Pearl B, Tokatlian K, Scullen J, 2015. *Western Snowy Plover Monitoring in the San Francisco Bay, Annual Report 2015.* Prepared by San Francisco Bay Bird Observatory. February 17.

Richmond OMW, Dulava S, Strong CM, Albertston JD, 2014. *San Francisco Estuary Midwinter Waterfowl Survey: 2012 Survey Results and Trend Analysis (1981–2012)*. U. S. Fish and

Wildlife Service, Pacific Southwest Region. National Wildlife Refuge System Inventory and Monitoring Initiative. Fremont, CA, March 27.

Rogers P, 2015. *San Francisco Bay: Bird populations doubled since 2003 in vast salt pond restoration area*. The Mercury News. Published October 22, 2015. Updated August 12, 2016.

RWQCB (San Francisco Regional Water Quality Control Board), 2017. *San Francisco Bay Basin (Region 2), Water Quality Control Plan (Basin Plan)*. Incorporating all amendments approved by the Office of Administrative Law as of May 4, 2017.

SCC and USFWS (California State Coastal Conservancy and United States Fish and Wildlife Service). 2003. *San Francisco Estuary Invasive Spartina Project: Spartina Control Program*, Volume 1, *Final Programmatic Environmental Impact Statement/Environmental Impact Report*. Oakland and Sacramento, CA. September.

———. 2010. *Best Practices for Tidal Marsh Restoration and Enhancement in the San Francisco Estuary*. San Francisco Estuary Invasive Spartina Project. March 26.

SFBBO (San Francisco Bay Bird Observatory). 2012. *Avian Disease Prevention Program Monitoring in Artesian and Alviso Sloughs, June–November 2012*. Prepared for the City of San Jose Environmental Services Department by C. Donehower and K. Totkatlian. November 30.

Shuford WD, Gardali T, 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 No. 1. Western Field Ornithologists. Camarillo, CA, and Sacramento, CA: California Department of Fish and Game. February 4.

Siegel SW, Bachand PAM, 2002. *Feasibility Analysis: South Bay Salt Pond Restoration*. San Francisco Estuary, California. Wetlands and Water Resources, San Rafael, CA. 228 pp.

Stenzel LE, Page GW, 1988. "Results of the First Comprehensive Shorebird Census of San Francisco and San Pablo Bays." *Wader Study Group Bulletin* 54: 43–48.

Stralberg D, Herzog M, Warnock N, Nur N, Valdez S, 2006. *Habitat-based modeling of wetland bird communities: an evaluation of potential restoration alternatives for South San Francisco Bay*. Draft final report to California State Coastal Conservancy. PRBO Conservation Science. Petaluma, CA. December.

Takekawa JY, Lu C, Pratt RT, 2001. "Avian Communities in Baylands and Artificial Salt Evaporation Ponds of the San Francisco Bay Estuary." *Hydrobiologia* 466: 317–328.

Thebault J, Schraga TS, Cloern JE, Dunlavey EG, 2008. "Primary Production and Carrying Capacity of Former Salt Ponds after Reconnection to San Francisco Bay." *Wetlands*, 28(3): 841–851.

Tokatlian K, Scullen J, Burns C, 2014. *Western Snowy Plover Monitoring in the San Francisco Bay: Annual Report 2014.* San Francisco Bay Bird Observatory, Milpitas, CA. December 31.

Tome MW, 1984. "Changes in Nutrient Reserves and Organ Size of Female Ruddy Ducks Breeding in Manitoba." *The Auk* 101: 830–837.

Trivedi D, Gross E, 2005. "Key Science Issue 6: Impacts of Hydrological Modifications from Salt Pond Management and Ecosystem Restoration." *Science Synthesis* 6 (4).

Trulio LA, Callaway JC, Gross ES, Lacy JR, Nichols FH, Takekawa JY, 2004. *South Bay Salt Pond Restoration Project Science Strategy: A Framework for Guiding Scientific Input into the Restoration Process*. Unpublished Report to the State Coastal Conservancy, Oakland, CA, 96pp. April 4.

Trulio L, Robinson-Nilsen C, Sokale J, Lafferty KD, 2012a. *Report on Nesting Snowy Plover Response to New Trail Use in the South Bay Salt Pond Restoration Project*. Technical report to the South Bay Salt Pond Restoration Project. January 31.

Trulio L, White H, Sokale J, Tokatlian K, 2012b. *Report on Waterfowl Response to Trail Use in the South Bay Salt Pond Restoration Project*. Technical report to the South Bay Salt Pond Restoration Project. Revised July 16.

Trulio L, Sokale J, Chromczak D, 2013. *Experimental Study of Shorebird Response to New Trail Use in the South Bay Salt Pond Restoration Project*. Technical report to the South Bay Salt Pond Restoration Project. Submitted August 30, 2012. Revised March 10, 2013.

USFWS (U.S. Fish and Wildlife Service). 2013. *Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California*. Sacramento, California. August 27.

———. 2016a. List of Threatened and Endangered Species that May Occur in Your Proposed Project Location, and/or May be Affected by Your Proposed Project. Consultation Code: 08FBDT00-2016-SLI-0239. September 21. San Francisco Bay-Delta Fish and Wildlife. http://ecos.fws.gov/ipac

———. 2016b. Information for Planning and Conservation (IPaC) Trust Resource Report. San Francisco Bay-Delta Fish and Wildlife. September 21. IPaC v3.0.9. https://ecos.fws.gov/ipac/

USFWS and CDFG (United States Fish and Wildlife Service and California Department of Fish and Game). 2003. *South Bay Salt Ponds Initial Stewardship Plan*. Prepared by Life Science! June.

———. 2006. *Final Environmental Impact Statement/Environmental Impact Report: Bair Island Restoration and Management Plan, Don Edwards San Francisco Bay National Wildlife Refuge, Bair Island Ecological Reserve, San Mateo County, California.*

———. 2007. *South Bay Salt Pond Restoration Project Environmental Impact Statement / Report*, Volumes 1 and 2, Draft. Prepared by EDAW, Philip Williams and Associates, Ltd., H.T. Harvey and Associates, Brown and Caldwell, and Geomatrix. Submitted to U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, and California Department of Fish and Game. March.

Warnock N, 2004. "Synthesis of Scientific Knowledge for Managing Salt Ponds to Protect Bird Populations." PRBO Conservation Science. Prepared for the South Bay Salt Pond Restoration Project Science Team.

Washburn N, 2013. *Avian Disease Prevention Program Monitoring in Artesian and Alviso Sloughs, June–November 2013*. Prepared for the City of San Jose, Environmental Services Department. San Francisco Bay Bird Observatory. November 27.

Washburn N, Scullen J, Burns C, 2015. *Managed Pond Waterbird Surveys, September 2013 - August 2014*. San Francisco Bay Bird Observatory. June 17.

3.6 Recreation Resources

ACTC (Alameda County Transportation Commission). 2012a. *Alameda Countywide Pedestrian Plan*. Prepared by Eisen | Letunic. October 25.

———. 2012b. *Alameda Countywide Bicycle Plan*. Prepared by Eisen | Letunic. October 25.

Alta Planning + Design, DKS Associates, LSA Associates, 2004. *Union City San Francisco Bay Trail Preliminary Engineering & Feasibility Study*. Prepared for the City of Union City.

BCDC (San Francisco Bay Conservation and Development Commission). 2005. *Shoreline Spaces Public Access Design Guidelines for the San Francisco Bay*. April.

———. 2012. *San Francisco Bay Plan*. Adopted 1968, reprinted March 2012.

National Research Council. 2012. *Sea-Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future*. Prepared by the Committee on Sea Level Rise in California, Oregon, and Washington; Board on Earth Sciences and Resources; Ocean Studies Board; Division on Earth and Life Studies; and National Research Council.

USFWS and CDFG (United States Fish and Wildlife Service and California Department of Fish and Game). 2007. *South Bay Salt Pond Restoration Project Environmental Impact Statement / Report*, Volumes 1 and 2, Draft. Prepared by EDAW, Philip Williams and Associates, Ltd., H.T. Harvey and Associates, Brown and Caldwell, and Geomatrix. Submitted to U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, and California Department of Fish and Game. March.

3.7 Cultural Resources

AEP (Association of Environmental Professionals). 2016. *2016 California Environmental Quality Act (CEQA) Statute and Guidelines*. Palm Desert, CA.

Baker, Suzanne, and Michael, Smith, 2007. Department of Parks and Recreation District Record for Union City/Alvarado Salt Ponds (P-01-10834). Archaeological/Historical Consultants, Oakland, California. On file at the Northwest Information Center of the California Historical Resources Information System, Rohnert Park, California.

Bard, James C., and Patricia M. Ogrey, 1982. A Cultural Resources Assessment of Five Salinity Barrier Well Sites, Alameda County, California. On file at the Northwest Information Center of the California Historical Resources Information System, Rohnert Park, California.

Beck, Warren A., and Ynez D. Haase. 1974. *Historical Atlas of California*. Norman, OK, University of Oklahoma Press.

CEQ (Council on Environmental Quality). 2015. *Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act*. CEQ Executive Office of the President. 40 CFR Parts 1500-1508.

City of Fremont. 2011. *City of Fremont General Plan*. December.

City of Hayward. 2014. *Hayward 2040 General Plan Policy Document*. July.

City of Union City. 2002. *2002 General Plan Policy Document.* February.

EDAW. 2005. *South Bay Salt Pond Restoration Project Historic Context Report.* Prepared for California State Coastal Conservancy, U.S. Fish and Wildlife Service, and California Department of Fish and Game. August.

Kyle DE, Hoover MB, Rensch HG, Rensch EG, Abeloe WN, 2002. *Historic Spots in California*. Fifth edition, revised by Douglas E. Kyle. Stanford University Press, Stanford, CA.

McDonald SD, Nichols DR, Wright NA, Atwater B, 1978. *Map Showing Thickness of Young Bay Mud, Southern San Francisco Bay, California*. Department of the Interior, U.S. Geological Survey, Miscellaneous Field Studies Map MF – 976.

Nelson NC. 1909. “Shellmounds of the San Francisco Bay Region. *University of California Publications in American Archaeology and Ethnology* 7(5).

OHP (Office of Historic Preservation), 1992. California Points of Historical Interest. California Department of Parks and Recreation, Sacramento, CA.

———. 1996. California State Historical Landmarks. California Department of Parks and Recreation, Sacramento, CA.

———. 2009. *Concurrence Letter regarding South Bay Salt Pond Restoration Project*. Reference number FWS040721A. On file at Office of Historic Preservation, Department of Parks and Recreation, Sacramento.

———. 2010. *Concurrence Letter regarding South Bay Salt Pond Restoration Project*. Reference number FWS040721A. On file at Office of Historic Preservation, Department of Parks and Recreation, Sacramento, CA.

Payne S. 1987. *Santa Clara County: Harvest of Change*. Northridge, CA: Windsor Publications.

Shoup, Laurence H., and Suzanne Baker. 2007. *Historic Resources Evaluation Report: Union City Bay Trail Project*, *Alameda County*, California. On-file at the Northwest Information Center, Rohnert Park, CA.

Reese, Elena, 2005. Archaeological Survey of the Proposed Union City/Dyer Cell Site, Alameda County, California. On file at the Northwest Information Center of the California Historical Resources Information System, Rohnert Park, California.

Speulda-Drews, Lou Ann, and Nick Valentine. 2007. *Department of Parks and Recreation District Record for the Eden Landing Salt Works Historic Landscape*. U.S. Fish and Wildlife Service, Reno, NV. On file at the Northwest Information Center of the California Historical Resources Information System, Rohnert Park, CA.

———. 2009. *Identification and Evaluation of the South San Francisco Bay Solar Salt Industry Landscape (Alameda, Santa Clara, and San Mateo Counties, California) for the Don Edwards San Francisco Bay National Wildlife Refuge and California Department of Fish and Game.* U.S. Fish and Wildlife Service, Region 8, Sacramento, CA.

USFWS (United States Fish and Wildlife Service). 2012. *Memorandum of Agreement between the U.S. Fish & Wildlife Service and the California State Historic Preservation Officer, Regarding the South Bay Salt Pond Restoration Project, Including Restoration of Former Industrial Salt Ponds to Tidal Salt Marsh and Other Wetland Habitats, Including the Former Salt Works Sites within the Alviso Unit on the Don Edwards San Francisco Bay National Wildlife Refuge and California Department of Fish and Game's Eden Landing Ecological Reserve; Alameda and Santa Clara Counties, California*. June 28.

USFWS and CDFG (United States Fish and Wildlife Service and California Department of Fish and Game). 2007. *South Bay Salt Pond Restoration Project Environmental Impact Statement / Report*, Volumes 1 and 2, Draft. Prepared by EDAW, Philip Williams and Associates, Ltd., H.T. Harvey and Associates, Brown and Caldwell, and Geomatrix. Submitted to U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, and California Department of Fish and Game. March.

Ver Planck WE, Heizer RF, 1958. *Salt in California*. San Francisco. San Francisco: State of California Department of Natural Resources, Division of Mines. Bulletin 175. March.

Witter RC, Knudsen KL, Sowers JM, Wentworth CM, Koehler RD, Randolph CE, Brooks SK, Gans KD, 2006. *Maps of Quaternary Deposits and Liquefaction Susceptibility in the Central San Francisco Bay Region, California*. Final Technical Report. U.S. Geological Survey Open-File Report 2006-1037. April.

3.8 Land Use and Planning

ABAG and MTC (Association of Bay Area Governments and Metropolitan Transportation Commission). 2013. *Plan Bay Area: Regional Transportation Plan and Sustainable Communities Strategy for the San Francisco Bay Area 2013 – 2040*. July 18.

BCDC (San Francisco Bay Conservation and Development Commission). 2005. *Shoreline Spaces Public Access Design Guidelines for the San Francisco Bay*. April.

———. 2012. *San Francisco Bay Plan*. Adopted 1968, reprinted March 2012.

CALFED Bay Delta Authority. 2000. *CALFED Bay-Delta Program Programmatic Record of Decision*. August 28.

———. 2000. *CALFED Bay-Delta Program Final Programmatic Environmental Impact Statement/ Environmental Impact Report.* July.

———. 2001. *CALFED Bay-Delta Program Environmental Restoration Program Draft Stage 1 Implementation Plan.* August.

CDFG (California Department of Fish and Game). 1999. *Final Eden Landing Ecological Reserve (Baumberg Tract) Restoration and Management Plan*. Prepared for the Wildlife Conservation Board. Yountville, CA. July.

CDFW (California Department of Fish and Wildlife). 2016. *South Bay Salt Ponds Operation Plan -- Pond Systems E2 and E2C.* Eden Landing Ecological Reserve. Hayward, Alameda County. March.

City of Fremont. 2011. *City of Fremont General Plan*. December.

City of Hayward. 2014. *Hayward 2040 General Plan Policy Document*. July.

City of Union City. 2002. *2002 General Plan Policy Document*. February.

County of Alameda. 1973. Open Space Element. In: *Alameda County General Plan*. May 30.

SCC and USFWS (California State Coastal Conservancy and United States Fish and Wildlife Service. 2014. Staff Recommendation for the Invasive Spartina Project. May 29. http://scc.ca.gov/webmaster/ftp/pdf/sccbb/2014/1405/20140529Board03F_InvasiveSpartinaProject.pdf

SFBJV (San Francisco Bay Joint Venture). 2001. *Restoring the Estuary: A Strategic Plan for the Restoration of Wetlands and Wildlife in the San Francisco Bay Area.*

Siegel SW, Bachand PAM, 2002. *Feasibility Analysis: South Bay Salt Pond Restoration*. San Francisco Estuary, California. Wetlands and Water Resources, San Rafael, CA. 228 pp.

USACE, USEPA, BCDC, and RWQCB (U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, San Francisco Bay Conservation and Development Commission, and San Francisco Bay Regional Water Quality Control Board). 2001. *Long Term Management Strategy (LTMS) for the Placement of Dredged Material in the San Francisco Bay Region*. Final LTMS Management Plan. July.

USFWS (United States Fish and Wildlife Service). 2012. *Don Edwards San Francisco Bay National Wildlife Refuge Comprehensive Conservation Plan*.

———. 2013. *Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California*. Sacramento, California. August 27.

USFWS and CDFG (United States Fish and Wildlife Service and California Department of Fish and Game). 2007. *South Bay Salt Pond Restoration Project Environmental Impact Statement / Report*, Volumes 1 and 2, Draft. Prepared by EDAW, Philip Williams and Associates, Ltd., H.T. Harvey and Associates, Brown and Caldwell, and Geomatrix. Submitted to U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, and California Department of Fish and Game. March.

3.9 Public Health and Vector Management

CDHP (California Department of Public Health). 2005. *Overview of Mosquito Control Practices in California*. Vector-Borne Disease Section. Prepared August 2005, updated July 2008.

SFBJV (San Francisco Bay Joint Venture). 2001. *Restoring the Estuary: A Strategic Plan for the Restoration of Wetlands and Wildlife in the San Francisco Bay Area.*

USFWS and CDFG (United States Fish and Wildlife Service and California Department of Fish and Game). 2007. *South Bay Salt Pond Restoration Project Environmental Impact Statement / Report*, Volumes 1 and 2, Draft. Prepared by EDAW, Philip Williams and Associates, Ltd., H.T. Harvey and Associates, Brown and Caldwell, and Geomatrix. Submitted to U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, and California Department of Fish and Game. March.

3.10 Socioeconomics and Environmental Justice

AEP (Association of Environmental Professionals). 2016. *2016 California Environmental Quality Act (CEQA) Statute and Guidelines*. Palm Desert, CA.

City of Fremont. 2011. *City of Fremont General Plan*. December.

City of Hayward. 2014. *Hayward 2040 General Plan Policy Document*. July.

City of Union City. 2002. *2002 General Plan Policy Document.* February.

———. 2015. *Union City Housing Element*. In: Union City 2040 General Plan Update. January 27.

State of California, Department of Finance. 2012. E-8 Historical Population and Housing Estimates for Cities, Counties, and the State, 2000-2010. Sacramento, California. November, 2012.

———. 2013. “Press Release: New Population Projections: California to Surpass 50 Million in 2049.” January 31.

———. 2014. P-1 (Total Population). State and County Projections. July 1. 2010-2060 (5-year increments). Sacramento, California. December, 2014.

———. 2016. E-5 Population and Housing Estimates for Cities, Counties, and the State, January 1, 2011-2016, with 2010 Benchmark. Sacramento, California. May, 2016.

State of California, Employment Development Department. 2015. 2012-2022 Projection Highlights. Oakland-Hayward-Berkeley Metropolitan Division. Alameda and Contra Costa Counties. Labor Market Information Division. January 2015.

———. 2016a. Monthly Labor Force Data for Cities and Census Designated Places (CDP). August 2016-Preliminary. Data Not Seasonally Adjusted. Labor Market Information Division. September, 2016.

———. 2016b. Historical Civilian Labor Force. Alameda County. Labor Market Information Division. September 2016.

U.S. Census Bureau. 2000a. *Summary File 1 (SF1). Population Data*. Online at http://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml

———. 2000b. Summary File 3 (SF3). *Employment Data*. Online at http://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml

———. 2010. *Population and Employment Data by County and Census Tract*. Online at http://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml

———. 2015. U.S. Census Bureau Population Estimates Program. http://www.census.gov/quickfacts/table/PST045215/0633000/accessible

USFWS (United States Fish and Wildlife Service). 2007. *Environmental Impact Checklist for some of the More Common Social Concerns*. In: Reference Handbook.

3.11 Traffic

AEP (Association of Environmental Professionals). 2016. *2016 California Environmental Quality Act (CEQA) Statute and Guidelines*. Palm Desert, CA.

Caltrans (California Department of Transportation). 2014. *2013 Traffic Volumes on California State Highways*. Division of Traffic Operations. Prepared in Cooperation with the Federal highway Administration. Sacramento, CA.

City of Fremont. 2011. *City of Fremont General Plan*. December.

City of Hayward. 2014. *Hayward 2040 General Plan Policy Document*. July.

City of Union City. 2002. *2002 General Plan Policy Document.* February.

Transportation Research Board. 2000. *Highway Capacity Manual.* National Research Council. October.

USFWS and CDFG (United States Fish and Wildlife Service and California Department of Fish and Game). 2007. *South Bay Salt Pond Restoration Project Environmental Impact Statement / Report*, Volumes 1 and 2, Draft. Prepared by EDAW, Philip Williams and Associates, Ltd., H.T. Harvey and Associates, Brown and Caldwell, and Geomatrix. Submitted to U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, and California Department of Fish and Game. March.

3.12 Noise

Caltrans (California Department of Transportation). 1998. *Traffic Noise Analysis Protocol: Technical Noise Supplement.* Sacramento, CA. October

———. 2014. *2013 Traffic Volumes on California State Highways*. Division of Traffic Operations. Prepared in Cooperation with the Federal highway Administration. Sacramento, CA.

City of Hayward. 2011. *Hayward Municipal Code, Section 4.1*. Chapter 4, Public Welfare, Morals, and Conduct, Article 1, Public Nuisances.

———. 2014. *Hayward 2040 General Plan Policy Document*. July.

City of Fremont. 2011. “Safety Element.” In: *City of Fremont General Plan*. December.

———. 2016. *City of Fremont Municipal Code, Chapter 18.160.* Title 18, Planning and Zoning.

City of Union City. 2002. *2002 General Plan Policy Document.* February.

County of Alameda. 1966. *Alameda County Code of Ordinances, Chapter 6.60, Noise*. Title 6, Health and Safety.

———. 1994. “Alameda County Noise Element.” In: *Alameda General Plan*. Amended May 5, 1994.

FTA (Federal Transit Administration). 2006. *Transit Noise and Vibration Impact Assessment*. Office of Planning and Environment. FTAA-VA-90-1003-06. May.

USFWS and CDFG (United States Fish and Wildlife Service and California Department of Fish and Game). 2007. *South Bay Salt Pond Restoration Project Environmental Impact Statement / Report*, Volumes 1 and 2, Draft. Prepared by EDAW, Philip Williams and Associates, Ltd., H.T. Harvey and Associates, Brown and Caldwell, and Geomatrix. Submitted to U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, and California Department of Fish and Game. March.

3.13 Air Quality

ABAG and MTC (Association of Bay Area Governments and Metropolitan Transportation Commission). 2013. *Plan Bay Area: Regional Transportation Plan and Sustainable Communities Strategy for the San Francisco Bay Area 2013 – 2040*. July 18.

AEP (Association of Environmental Professionals). 2016. *2016 California Environmental Quality Act (CEQA) Statute and Guidelines*. Palm Desert, CA.

BAAQMD (Bay Area Air Quality Management District). 1999. *BAAQMD CEQA Guidelines: Assessing the Air Quality Impacts of Projects and Plans.* Planning and Research Division. December.

———. 2001. *Revised San Francisco Bay Area Ozone Attainment Plan for the 1-Hour National Ozone Standard*. October 24.

———. 2009. *California Environmental Quality Act Guidelines Update: Proposed Thresholds of Significance*. December 7.

———. 2010. *California Environmental Quality Act Air Quality Guidelines*. May.

———. 2011. *California Environmental Quality Act Air Quality Guidelines*. May.

———. 2012a. *California Environmental Quality Act Air Quality Guidelines*. May.

———. 2012b. *Recommended Methods for Screening and Modeling Local Risks and Hazards*. May.

———. 2013. *Particulate Matter (PM) Planning*.

———. 2014. “Air Quality Standards and Attainment Status.” http://www.baaqmd.gov/research-and-data/air-quality-standards-and-attainment-status

———. 2017. *Final 2017 Clean Air Plan*: *Spare the Air, Cool the Climate*. April 19.

CAPCOA (California Air Pollution Control Officers Association). 2013. *USEPA AP-42 for fugitive dust emissions*.

CARB (California Air Resources Board). 2010. *Off-Road Diesel Vehicle Regulation Compliance Requirements Summary*.

———. 2016a. *Air Quality Statistics.* California Air Resources Board. https://www.arb.ca.gov/adam/index.html

———. 2016b. *Ambient Air Quality Standards*. California Air Resources Board. https://www.arb.ca.gov/research/aaqs/aaqs2.pdf

CEQ (Council on Environmental Quality). 2015. *Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act*. CEQ Executive Office of the President. 40 CFR Parts 1500-1508.

City of Hayward. 2014. *Hayward 2040 General Plan Policy Document*. July.

City of Union City. 2002. *2002 General Plan Policy Document.* February.

USEPA (United States Environmental Protection Agency). 2011. “Completion of the Requirement to Promulgate Emissions Standards." In: *Federal Register*, Vol. 76, No. 54, 15308. March 21, 2011.

3.14 Public Services

City of Fremont. 2011. *City of Fremont General Plan*. December.

———. 2016. *City of Fremont Fiscal Year 2016/17 Adopted Operating Budget.* https://fremont.gov/1593/Financial-Reports .

City of Hayward. 2014. *Hayward 2040 General Plan Policy Document*. July.

———*. 2016a. Average Police Response Time: Public Records request issued to Hayward Police Department on 10/5/16; Fulfilled on 10/27/16*

———*. 2016b. By the Numbers. http://www.hayward-ca.gov/discover/by-the-numbers.*

———*. 2016c. Fire Protection and Emergency Services. http://www.hayward-ca.gov/fire-department.*

City of Union City. 2002. *2002 General Plan Policy Document.* February.

County of Alameda. 2013. Alameda County Safety Element. In: *Alameda County General Plan*. January 8. Amended February 2014.

———. 2016. *Alameda County Sheriff’s Office Organizational Chart.* https://www.alamedacountysheriff.org/index.php.

Fremont Fire Department. 2016 *Fire Department Responsibilities.* https://www.fremont.gov/96/Fire-Department.

Fremont Unified School District. 2016. *FUSD.* http://www.fremont.k12.ca.us/.

Hayward Unified School District. 2016. *HUSD.*

Hayward Police Department. 2016. *Police Chief's Message*. http://www.hayward-ca.gov/police-department/about/police-chiefs-message

New Haven Unified School District. 2016. *NHUSD*. http://www.mynhusd.org/.

Union City Fire Department. 2016. *Fire Protection and Emergency Services.* http://www.ci.union-city.ca.us/departments/fire-services.

Union City Police Department. 2016a. *Median Police Response Time.* Public Records request issued to Union City Police Department on 10/3/16, Fulfilled on 11/3/16

———.2016b. *Support Services Division.* http://www.ci.union-city.ca.us/departments/police-department/general-information/support-services-division.

U.S. Census Bureau. 2015. U.S. Census Bureau Population Estimates Program. http://www.census.gov/quickfacts/table/PST045215/0633000/accessible

3.15 Utilities

AEP (Association of Environmental Professionals). 2016. *2016 California Environmental Quality Act (CEQA) Statute and Guidelines*. Palm Desert, CA.

CAISO (California Independent System Operator). 2017. *2017 Summer Loads and Resource Assessment*. May 11.

CEC (California Energy Commission). 2017. *California Energy Demand Updated Forecast, 2017-2027*. January 12.

CEQ (Council on Environmental Quality). 2015. *Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act*. CEQ Executive Office of the President. 40 CFR Parts 1500-1508.

California Public Utilities Commission. 2012. Rules for Overhead Electric Line Construction. State of California (General Order No. 95), January 2012.

City of Fremont. 2011. *City of Fremont General Plan*. December.

City of Hayward. 2014. *Hayward 2040 General Plan Policy Document*. July.

City of Union City. 2002. *2002 General Plan Policy Document.* February.

County of Alameda. 2010. Eden Area General Plan: Public Facilities and Services Element. http://acgov.org/cda/planning/generalplans/documents/06_PublicFacilities.

SCC (California State Coastal Conservancy). 2005. *Inventory of Water Conveyance Facilities: South Bay Salt Pond Restoration Project*. Prepared for California State Coastal Conservancy. Prepared by Moffatt & Nichol Engineers. January 2005.

USFWS and CDFG (United States Fish and Wildlife Service and California Department of Fish and Game). 2007. *South Bay Salt Pond Restoration Project Environmental Impact Statement / Report*, Volumes 1 and 2, Draft. Prepared by EDAW, Philip Williams and Associates, Ltd., H.T. Harvey and Associates, Brown and Caldwell, and Geomatrix. Submitted to U.S. Army

Corps of Engineers, U.S. Fish and Wildlife Service, and California Department of Fish and Game. March.

3.16 Visual Resources

AEP (Association of Environmental Professionals). 2016. *2016 California Environmental Quality Act (CEQA) Statute and Guidelines*. Palm Desert, CA.

BCDC (San Francisco Bay Conservation and Development Commission). 2012. *San Francisco Bay Plan*. Adopted 1968, reprinted March 2012.

CDFW. 2016. California Waterfowl and Upland Game Public Use of Department Lands, Hunting Regulations.

City of Fremont. 2011. *City of Fremont General Plan*. December.

City of Hayward. 2014. *Hayward 2040 General Plan Policy Document*. July.

City of Union City. 2002. *2002 General Plan Policy Document.* February.

County of Alameda. 1973. Open Space Element. In: *Alameda County General Plan*. May 30.

USFWS and CDFG (United States Fish and Wildlife Service and California Department of Fish and Game). 2007. *South Bay Salt Pond Restoration Project Environmental Impact Statement / Report*, Volumes 1 and 2, Draft. Prepared by EDAW, Philip Williams and Associates, Ltd., H.T. Harvey and Associates, Brown and Caldwell, and Geomatrix. Submitted to U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, and California Department of Fish and Game. March.

3.17 Greenhouse Gas Emissions

ABAG and MTC (Association of Bay Area Governments and Metropolitan Transportation Commission). 2013. *Plan Bay Area: Regional Transportation Plan and Sustainable Communities Strategy for the San Francisco Bay Area 2013 – 2040*. July 18.

AEP (Association of Environmental Professionals). 2016. *2016 California Environmental Quality Act (CEQA) Statute and Guidelines*. Palm Desert, CA.

BAAQMD (Bay Area Air Quality Management District). 1999. *CEQA Guidelines*.

———. 2009. *CEQA Guidelines Update: Proposed Thresholds of Significance*.

———. 2010a. *CEQA: Air Quality Guidelines*. Updated May 2010.

———. 2010b. *Bay Area 2010 Clean Air Plan*.

———. 2011. *CEQA: Air Quality Guidelines*. Updated May 2011.

———. 2012. *California Environmental Quality Act (CEQA): Air Quality Guidelines*. Updated May 2012.

California Department of Finance. 2013. "Press Release: New Population Projections: California to Surpass 50 Million in 2049." January 31, 2013.

Callaway, J.C., E.L. Borgnis, R.E. Turner, and C.S. Milan. 2012. "Carbon Sequestration and Sediment Accretion in San Francisco Bay Tidal Wetlands." *Estuaries and Coasts* (2012) 35: 1163–1181.

CARB (California Air Resources Board). 2011. *Low Carbon Fuel Standard: 2011 Program Review Report*. December 8, 2011. http://www.arb.ca.gov/fuels/lcfs/workgroups/advisorypanel/20111208_LCFS%20program%20review%20report_final.pdf (accessed August 2013).

———. 2013. Clean Car Standards – Pavley, Assembly Bill 1493. Page last reviewed May 06, 2013. http://www.arb.ca.gov/cc/ccms/ccms.htm (accessed September 2013).

———. 2016. California Greenhouse Gas Emissions Inventory 2000-2014. http://www.arb.ca.gov/cc/inventory/pubs/reports/2000_2014/ghg_inventory_trends_00-14_20160617.pdf. (accessed September 2016).

CEC (California Energy Commission). 2006. *Inventory of California Greenhouse Gas Emissions and Sinks: 1990 to 2004*. December 2006.

———. 2012. *Our Changing Climate, 2012: Vulnerability & Adaptation to the Increasing Risks from Climate Change in California – A Summary Report on the Third Assessment from the California Climate Change Center*. CEC-500-2012-007. July 2012.

CEQ (Council on Environmental Quality). 2010. *Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions*. February 18, 2010.

———. 2012. *Federal Greenhouse Gas Accounting and Reporting Guidance*. Revision 1. June 4, 2012.

———. 2016. Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews. August 1, 2016.

IPCC (Intergovernmental Panel on Climate Change). 2007. *Climate Change 2007: The Physical Science Basis: Summary for Policymakers*. SCAQMD (South Coast Air Quality Management District). 2008. "Interim CEQA GHG Threshold for Stationary Sources, Rules, and Plans." http://www.aqmd.gov/docs/default-source/ceqa/handbook/greenhouse-gases-(ghg)-ceqa-significance-thresholds/ghgboardsynopsis.pdf?sfvrsn=2 (accessed January 30, 2015).

SCAQMD (South Coast Air Quality Management District). 2008. "Interim CEQA GHG Threshold for Stationary Sources, Rules, and Plans." http://www.aqmd.gov/docs/default-source/ceqa/handbook/greenhouse-gases-(ghg)-ceqa-significance-thresholds/ghgboardsynopsis.pdf?sfvrsn=2 (accessed January 30, 2015).

SCC (California State Coastal Conservancy). 2011. *Guidance for Addressing Climate Change*, Appendix V.1, BMPs. April 2011.

Silverstrum, I.E., and S. Crooks. 2014. *Methodology for Tidal Wetland and Seagrass Restoration, Version 2013-1205*.

SLOAPCD (San Luis Obispo County Air Pollution Control District). 2012. *CEQA Air Quality Handbook: A Guide for Assessing the Air Quality Impacts for Projects Subject to CEQA Review*. April 2012. http://www.slocleanair.org/images/cms/upload/files/CEQA_Handbook_2012_v1.pdf (accessed January 30, 2015).

TCR (The Climate Registry). 2014. *General Reporting Protocol 2.0, Updates and Clarifications*. June 30, 2014.

Trulio, Lynne, John Callaway, and Steve Crooks. 2007. *White Paper on Carbon Sequestration and Tidal Salt Marsh Restoration*.

USEPA (United States Environmental Protection Agency). 2012a. “2017 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards." *Federal Register*, vol. 77, no. 199, 62624. October 15, 2012.

———. 2012b. “Standards of Performance for Greenhouse Gas Emissions for New Stationary Sources: Electric Utility Generating Units.” *Federal Register*, vol. 77, no. 72, 22392. April 13, 2012.

USFWS (United States Fish and Wildlife Service). 2010. *Rising to the Urgent Challenge: Strategic Plan for Responding to Accelerating Climate Change*.

USFWS and CDFG (United States Fish and Wildlife Service and California Department of Fish and Game). 2007. *South Bay Salt Pond Restoration Project Environmental Impact Statement / Report*, Volumes 1 and 2, Draft. Prepared by EDAW, Philip Williams and Associates, Ltd., H.T. Harvey and Associates, Brown and Caldwell, and Geomatrix. Submitted to U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, and California Department of Fish and Game. March.

4.0 Cumulative Impacts

BAAQMD (Bay Area Air Quality Management District). 2011. *CEQA: Air Quality Guidelines*. Updated May 2011.

CDFG (California Department of Fish and Game). 1999. *Final Eden Landing Ecological Reserve (Baumberg Tract) Restoration and Management Plan*. Prepared for the Wildlife Conservation Board. Yountville, CA. July.

City of Fremont. 2011. *City of Fremont General Plan*. December.

City of Hayward. 2014. *Hayward 2040 General Plan Policy Document*. July.

City of Union City. 2002. *2002 General Plan Policy Document.* February.

County of Alameda. 1973. Open Space Element. In: *Alameda County General Plan*. May 30.

Grenier, L., M. Marvin-DiPasquale, D. Drury, J. Hunt, A. Robinson, S. Bezalel, A. Melwani, J. Agee, E. Kakouros, L. Kieu, L. Windham-Myers, and J. Collins. 2010. *South Baylands Mercury Project*. Final Report prepared for the California State Coastal Conservancy by San Francisco Estuary Institute, U.S. Geological Survey, and Santa Clara Valley Water District, 97 pp.

MTC (Metropolitan Transportation Commission). 2009. *Change in Motion. Transportation 2035.* http://mtc.ca.gov/our-work/plans-projects/plan-bay-area-2040/transportation-2035. April 2009.

Shellenbarger, G.G., S.A. Wright, and D.H. Schoellhamer. 2013. *A sediment budget for the southern reach in San Francisco Bay, CA: Implications for habitat restoration*. Marine Geology 345 (2013) 281–293.

OEHHA (Office of Environmental Health Hazard Assessment) 2012. Technical Support Document for Exposure Assessment and Stochastic Analysis. August.

URS (URS Corporation). 2014. *Wetland Delineation Report South Bay Salt Pond Restoration Project – Phase 2*.

USFWS and CDFG (United States Fish and Wildlife Service and California Department of Fish and Game). 2007. *South Bay Salt Pond Restoration Project Environmental Impact Statement / Report*, Volumes 1 and 2, Draft. Prepared by EDAW, Philip Williams and Associates, Ltd., H.T. Harvey and Associates, Brown and Caldwell, and Geomatrix. Submitted to U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, and California Department of Fish and Game. March.

5.0 Other NEPA and CEQA Considerations

No references.

8. REPORT PREPARERS

8.1 Federal Lead Agency

United States Fish and Wildlife Service (USFWS)
Don Edwards San Francisco Bay National Wildlife Refuge
1 Marshlands Rd.
Fremont, CA 94555
Contact: Chris Barr, Deputy Complex Manager, San Francisco Bay National Wildlife Refuge Complex

8.2 State Lead Agency

California Department of Fish and Wildlife (CDFW)
P.O. Box 47
Yountville, CA 94599
Contacts: Greg Martinelli, Conrad Jones, John Krause

8.3 Partner Agencies or Entities

The following agencies and entities contributed to the preparation of this Final EIS/R:

California State Coastal Conservancy (SCC)
1330 Broadway, 13th Floor
Oakland, CA 94612

United States Army Corps of Engineers (USACE)
1455 Market Street
San Francisco, CA 94103

Alameda County Flood Control and Water Conservation District (ACFCWCD)
399 Elmhurst Street
Hayward, CA 94544-1395

East Bay Regional Parks District (EBRPD)
2950 Peralta Oaks Court
P.O. Box 5381
Oakland, CA 94605-0381

8.4 Principal Preparers

Responsibility for preparation of this Final EIS/R rests with the lead agencies for the SBSP Restoration Project, Eden Landing Phase 2: USFWS, the joint lead federal agency under NEPA; and CDFW, the state lead agency under CEQA.

Listed below are the employees of the consulting firms involved in preparation of this Draft EIS/R, including their qualifications (educational degree, area of expertise, and years of experience in their profession).

8.4.1 AECOM

Terry Cooke, M.S., Marine Sciences. 33 years of experience. Project Manager. Professional and technical review.

David Halsing, M.S., Natural Resource Policy and Behavior. 16 years of experience. Deputy Project Manager. Prepared and reviewed various EIS/R sections, including the introduction, alternatives, utilities, and other CEQA sections.

David Fee, M.A., Anthropology. 35 years of experience. Provided CEQA and NEPA advice and prepared and reviewed various EIS/R sections, including the noise and cumulative impacts section.

Elizabeth Nielsen, P.E., M.S., Civil and Environmental Engineering. 15 years of experience. Prepared the hydrology and water quality sections.

Brian Madigan, AICP, LEED A.P., M.A., Master of Community Planning and Development. 8 years of experience. Provided project assistance and prepared the geology and visual resources sections.

Justin Whitfield, P.W.S, B.S., Biological Sciences. 16 years of experience. Prepared the biological resources section.

Karin Beck, R.P.A., R.P.H., M.A., Cultural Resource Management. 20 years of experience. Prepared the cultural resources section.

Jay Rehor, PRA, M.A., Cultural Resources Management. 13 years of experience. Provided CEQA and NEPA advice and reviewed the cultural resources section.

Jillian Adams, B.S., Environmental Science. 4 years of experience. Provided project assistance and prepared the executive summary, land use, and public health and vector management sections.

Sadhika Kumar, M.S., Development Practice (specialization in Environmental Economics. 3 years of experience. Prepared the socioeconomics and environmental justice section.

Nichole Seow, P.T.P., M.S., Transportation Engineering. 18 years of experience. Prepared the traffic section.

Janson Paukovits, M.S., Public Policy, M.S., Environmental Management. 14 years of experience. Prepared the air quality and the greenhouse gases and climate change sections.

David Joe, M.S., Civil and Environmental Engineering. 4 years of experience. Prepared the air quality and the greenhouse gases and climate change sections.

Caitlin Miller, B.A., Environmental Systems: Environmental Policy. 5 years of experience. Prepared the air quality and the greenhouse gases and climate change sections.

Laura Adleman, M.A., European Integration. 17 years of experience. Prepared the public services section.

Eli Popuch, B.A., Geography. 9 years of experience. Provided GIS mapping and graphics for the EIS/R.

Elliott Schwimmer, LEED G.A., B.S., Conservation and Resource Studies. 4 years of experience. Provided project assistance and prepared the references section.

Geoffrey Mahley, B.S., Environmental Policy Analysis and Planning. 1 year of experience. Provided project assistance and prepared the references section.

Megan Collins, P.E., M.S., Civil & Environmental Engineering. 9 years of experience. Prepared project design alternatives, including modeling.

Phil Mineart, P.E., M.S., Civil Engineering. 34 years of experience. Prepared project design alternatives, including modeling.

Deborah Fournier, Word Processor. 47 years of experience. Provided word processing.

Jay Plano, M.A., Political Science. 28 years of experience. Provided technical editing.

Virginia Kean, M.A., Asian Studies. 28 years of experience. Provided technical editing.

8.4.2 Questa Environmental Consulting

Jeff Peters, M.S., Environmental Resources and Restoration. 41 years of experience. Prepared the recreational resources section and appendix.

Margaret Henderson, L.L.A., B.S.L.A. 25 years of experience. Prepared the recreational resources section and appendix.

8.4.3 Bay Metrics

Alex Choi, P.E., B.S., Civil Engineering. 26 years of experience. Collected traffic count data.

This page intentionally left blank

9. DISTRIBUTION LIST

All persons, agencies, and organizations listed in this chapter have been informed of the availability of, and locations for, obtaining the Draft EIS/R, as well as the timing of the formal comment period. The Notice of Availability of the Draft EIS/R has been included in the Federal Register. Additional local elected officials and agency representatives and all others on the SBSP Restoration Project's constantly updated email list have been sent a notification that includes information about how to access the Draft EIS/R; the timing of the formal comment period; and public hearing date, time, and location.

U.S. Elected Officials

Senator Dianne Feinstein
Senator Kamala Harris
Congressman Eric Swalwell, 15th District
Congressman Ro Khanna, 17th District

Federal Agencies

Army Corps of Engineers, San Francisco District
Environmental Protection Agency, Region 9
National Oceanic and Atmospheric Administration – Fisheries
U.S. Fish and Wildlife Service

California State Elected Officials

Governor Jerry Brown
Senator Bob Wieckowski, 10th Senate District
Assemblymember Bill Quirk, 20th Assembly District
Assemblymember Kansen Chu, 25th Assembly District

Local Elected Officials

Supervisor Scott Haggerty, Alameda County District 1
Supervisor Richard Valle, Alameda County District 2

State Agencies

California Air Resources Board Bay Area Air Quality Management District
Delta Protection Commission
Department of Conservation
Department of Fish and Wildlife
Department of Parks and Recreation
Department of Toxic Substances Control
Department of Transportation
Department of Water Resources
Native American Heritage Commission
Natural Resources Agency
Office of Emergency Services

Office of Historic Preservation
San Francisco Bay Conservation and Development Commission
San Francisco Bay Regional Water Quality Control Board
State Coastal Conservancy
State Water Resources Control Board
State Lands Commission
State Parks, Division of Boating and Waterways

Local Agencies

Alameda County Board of Supervisors
Alameda County Community Development Agency
Alameda County Flood Control and Water Conservation District
Alameda County Mosquito Abatement District
Alameda County Vector Control Services District
Alameda County Water District
Association of Bay Area Governments
City of Fremont
City of Hayward
City of Union City
East Bay Regional Parks District
Santa Clara Valley Water District

Native American Tribal Entities

Native American Heritage Commission
Amah Mutsun Tribal Band of Mission San Juan Bautista
Costanoan Rumsen Carmel Tribe
Indian Canyon Mutsun Band of Costanoan
Muwekma Ohlone Indian Tribe of the SF Bay Area
North Valley Yokuts Tribe
Ohlone Indian Tribe

Non-Governmental Organizations, Universities, Businesses, and Individuals

The SBSP Restoration Project keeps an email list of individuals, businesses, colleges & universities, non-governmental organizations, and other stakeholders and interested parties. The full list was presented in the 2007 EIS/R, but it is continually maintained and updated. The approximately 1,700 individuals businesses, NGOs, and other entities on the current email list received notice that the Draft EIS/R was available. That email included instructions on where physical, printed copies of the document could be viewed and of how electronic versions could be obtained.