Draft

STRATEGY TO ADVANCE FLOOD PROTECTION, ECOSYSTEMS, AND RECREATION ALONG SAN FRANCISCO BAY (SAFER BAY) PROJECT

Environmental Impact Report

State Clearinghouse No. 2022040504

SAN FRANCISQUITO CREEK
JOINT POWERS AUTHORITY

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Draft Environmental Impact Report

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Appendix AIR Air Quality, Greenhouse Gases, and Energy Calculations
Appendix BIO1 Biological Resources Existing Conditions Report
Appendix BIO2 Special-Status Animal Species Potentially Occurring in the Study Area
Appendix BIO3 Habitat Restoration Basis of Design
Appendix BIO4 Biological Resources Impacts by Reach
Appendix NOI Noise Analysis Supporting Information
Appendix ALT Alternatives Analysis Supporting Information

[1] Also available on the SFCJPA's website at: www.sfcjpa.org/files/5d3688878/ScopingReport_31Oct2022_reduced_size.pdf

Acronyms and Abbreviations

2017 Clean Air Plan	*2017 Clean Air Plan: Spare the Air, Cool the Climate*
µg/m3	micrograms per meters cubed
AB	Assembly Bill
ABAG	Association of Bay Area Governments
ACF	Advanced Clean Fleets
ADA	Americans with Disabilities Act
AERMOD version 24142	American Meteorological Society/Environmental Protection Agency Regulatory Model
AES	Aesthetics Resources
AIR	Air Quality
AMSL	above mean sea level
AQI	Air Quality Index
BAAQMD	Bay Area Air Quality Management District
Basin Plan	Water Quality Control Plan for the San Francisco Bay Basin
Bay Area	San Francisco Bay Area
Bay Plan	San Franciso Bay Plan
Bay Trail	San Francisco Bay Trail
BCDC	Bay Conservation and Development Commission
bgs	below ground surface
BP	before present
BIO	Biological Resources
BP	before present
BRRIT	Bay Restoration Regulatory Integration Team
BSA	Biological Study Area
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CalEEMod	California Emissions Estimator Model
Cal-IPC	California Invasive Plant Council
Cal/OSHA	California Occupational Safety and Health Administration
California Register	California Register of Historical Resources
Caltrans	California Department of Transportation
CAL FIRE	California Department of Forestry and Fire Protection
CAP	Climate Action Plan
CARB	California Air Resources Board
CalRecycle	California Department of Resources Recycling and Recovery
CDFW	California Department of Fish and Wildlife
CEC	California Energy Commission

CEQA	California Environmental Quality Act
CEQA Air Quality Guidelines	*California Environmental Quality Act Air Quality Guidelines*
CESA	California Endangered Species Act
CGP	Construction General Permit
CGS	California Geologic Survey
CLUP	comprehensive land use plan
CNEL	community noise equivalent level
CNRA	California Natural Resources Agency
CO	carbon monoxide
COLE	coefficient of linear extensibility
construction SWPPP	construction stormwater pollution prevention plan
CPUC	California Public Utilities Commission
CRMP	construction risk management plan
CUL	Cultural Resources
CTHMMP	Congdon's Tarplant Habitat Mitigation and Management Plan
CUPA	Certified Unified Program Agency
CWA	Clean Water Act
CY	cubic yards
dB	decibels
dBA	A-weighted decibels
DBWA Study	*Dumbarton Bridge West Approach + Adjacent Communities Resilience Study Technical Report*
DDT	dichlorodiphenyltrichloroethane
DMMO	Dredged Material Management Office
DOE	U.S. Department of Energy
Don Edwards SFB Final CCP/EA	*Don Edwards San Francisco Bay National Wildlife Refuge Final NWR Comprehensive Conservation Plan and Environmental Assessment*
DOT	U.S. Department of Transportation
DPM	diesel particulate matter
DTSC	Department of Toxic Substances Control
EFH	Essential Fish Habitat
EFZ	Earthquake Fault Zones
EIR	environmental impact report
EIS	environmental impact statement
EJ	Environmental Justice
ENE	Energy
EPA	U.S. Environmental Protection Agency
EPAC	East Palo Alto Charter School
EQ Zapp	Earthquake Hazards Zone Application
ESA	Environmental Science Associates
ESLs	Environmental Screening Levels

ESU	evolutionarily significant unit
FAR	Federal Aviation Regulations
Fed/OSHA	U.S. Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FESA	Federal Endangered Species Act
FHSZ	Fire Hazard Severity Zone
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
GEO	Geology, Soils, and Paleontology
GHG	greenhouse gas
GWP	global warming potential
HAZ	Hazards, Hazardous Materials, and Wildfire
HHEs	Heat-Health Events
HMBP	Hazardous Materials Business Plan
HRA	health risk assessment
HRMP	Habitat Restoration and Monitoring Plan
HSP	health and safety plan
HTL	high-tide line
Hz	hertz
IPCC	Intergovernmental Panel on Climate Change
in/sec	inch per second
Ldn	day-night noise level
Leq	average equivalent sound level
L_{max}	instantaneous maximum noise level
LU	Land Use, Agriculture and Forestry
Master QAPP	master quality assurance project plan
MEIR	maximally impacted individual receptor
MG	million gallons
MHW	mean high water
mg/kg	microgram/kilogram
mg/L	milligram per liter
MPFPD	Menlo Park Fire Protection District
MRP	Municipal Regional Stormwater NPDES Permit
MRZ	Mineral Resource Zones
MTC	Metropolitan Transportation Commission
MTCO2e	metric tons of CO2 equivalent
MW	megawatts
NAAQS	National Ambient Air Quality Standards
NAHC	Native American Heritage Commission
National Register	National Register of Historic Places

NAVD88[2]	North American Vertical Datum of 1988
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NO	nitric oxide
NOI	Noise
NO_2	nitrogen dioxide
NOP	notice of preparation
North of Bay Road	North of Bay Road–East Palo Alto
NO_X	oxides of nitrogen
NPDES	National Pollutant Discharge Elimination System
NWIC	Northwest Information Center
NWL	Natural and Working Lands
OEHHA	Office of Environmental Health Hazard Assessment
OHWM	ordinary high water mark
OneShoreline	San Mateo County Flood and Sea Level Rise Resiliency District
OSHA	Occupational Safety and Health Administration
PCBs	ppolychlorinated biphenyls
PG&E	Pacific Gas and Electric Company
PM	particulate matter
PM_{10}	particulate matter less than or equal to 10 microns in diameter
$PM_{2.5}$	particulate matter less than or equal to 2.5 microns in diameter
POP	Population Housing
ppm	parts per million
PPV	peak particle velocity
Project	Strategy to Advance Flood Protection, Ecosystems, and Recreation along San Francisco Bay Project
QSD	Qualified SWPPP Developer
QSP	Qualified SWPPP practitioner
RCNM	Roadway Construction Noise Model
Refuge	Don Edwards San Francisco Bay National Wildlife Refuge
Refuge System	National Wildlife Refuge System
RHNA	Regional Housing Needs Allocation
ROG	reactive organic gases
RPS	Renewable Portfolio Standard
RWQCB	regional water quality control board
RWQCP	Regional Water Quality Control Plant
SAFER	Strategy to Advance Flood Protection, Ecosystems, and Recreation along San Francisco

[2] Unless otherwise noted, elevations discussed in this document are assumed to be in NAVD88.

SAFER Bay Project	Strategy to Advance Flood Protection, Ecosystems, and Recreation along San Francisco Bay Project
SamTrans	San Mateo County Transit District
SB	Senate Bill
SBSPRP	South Bay Salt Ponds Restoration Project
Scoping Plan	Climate Change Scoping Plan
SFBAAB or Bay Area	San Francisco Bay Area Air Basin
SFCJPA	San Francisquito Creek Joint Powers Authority
SFPUC	San Francisco Public Utilities Commission
SIP	State Implementation Plan
SLR	sea level rise
SMP	soil management plan
SO_2	sulfur dioxide
South Bay	South San Francisco Bay
South of Bay Road	South of Bay Road–East Palo Alto
Specific Plan	Ravenswood Business District/4 Corners Specific Plan
SR	State Route
State Water Board	State Water Resources Control Board
SVCWWTP	Silicon Valley Clean Water Wastewater Treatment Plant
SWPPP	stormwater pollution prevention plan
TACs	toxic air contaminants
TCE	trichloroethylene
TMDLs	total maximum daily loads
T-zone	transition zone
Unified Program	Unified Hazardous Waste and Hazardous Materials Management Regulatory Program
U.S. 101	United States Route 101
USACE	United States Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
USP	Utilities, Service Systems, and Public Services
VdB	vibration decibels
VMT	vehicles miles traveled
VOC	volatile organic compounds
ZEVs	Zero Emission Vehicles

SUMMARY

S.1 Introduction

This environmental impact report (EIR) has been prepared by the San Francisquito Creek Joint Powers Authority (SFCJPA) in conformance with the provisions of the California Environmental Quality Act (CEQA). SFCJPA serves as the CEQA Lead Agency for the proposed Strategy to Advance Flood Protection, Ecosystems, and Recreation along San Francisco Bay Project (SAFER Bay Project or Project), which consists of engineered and natural shoreline protection features, habitat restoration, and recreational improvements.

SFCJPA has determined that the Project could cause significant environmental impacts, and that preparation of an EIR is warranted. This EIR has been prepared to provide information about the Project's potential effects on the environment to the public and responsible and trustee agencies reviewing the Project. This EIR describes the potential direct, indirect, and cumulative environmental impacts that could result from implementation of the Project or alternatives, identifies mitigation measures for reducing impacts to less-than-significant levels where feasible, and evaluates a reasonable range of alternatives to the Project.

S.2 Project Objectives

The overall purpose of the Project is to reduce risks to people, property, and infrastructure from current tidal flooding and projected sea level rise through engineered and natural features that enhance shoreline ecosystems and improve recreational opportunities. The specific objectives of the Project include the following:

- Reduce the risk of flooding within the cities of East Palo Alto and Menlo Park from San Francisco Bay waters, including up to 3.5 feet of future sea level rise, and support the communities' objective to be removed from the Federal Emergency Management Agency (FEMA) floodplain.
- Enable adaptation to our changing climate by implementing flood protection in ways that sustain and restore marsh habitat, support sensitive tidal marsh species, and enhance and protect habitat for western snowy plover, consistent with the South Bay Salt Ponds Restoration Project and other restoration efforts.
- Expand opportunities for recreation and community connectivity in collaboration with the Bay Trail Program and efforts to enhance local trails.
- Minimize future maintenance requirements.
- Partner with agencies and organizations pursuing similar goals and objectives and with assets to be protected by the Project.

S.3 Summary Project Description

The Project includes shoreline protection, restoration, and recreational features, briefly described below. The SAFER Bay Project site is located west of San Francisco Bay along approximately 7 miles of shoreline between O'Connor Street in East Palo Alto at San Francisquito Creek and Redwood City near the Menlo Park city boundary to the northwest (refer to **Figure S-1**). The Project would connect to and is consistent with design criteria for SFCJPA's completed San Francisquito Creek Flood Protection and Ecosystem Restoration Project. The Project is divided into eight reaches[1] based on local geography and hydrology, shown on Figure S-1:

- South of Bay Road—East Palo Alto (South of Bay Road)
- North of Bay Road—East Palo Alto (North of Bay Road)
- Dumbarton Approach
- Substation and Marsh Restoration
- Tech Campus
- Bayfront Expressway
- Bedwell Bayfront Park
- Marsh Road

The Project is located within the cities of East Palo Alto, Menlo Park, and Redwood City on both public and privately owned property. The Project includes actions within the Don Edwards San Francisco Bay National Wildlife Refuge (Refuge), including Refuge-managed land in the Ravenswood Pond Complex; in Faber and Laumeister marshes (owned by the City of Palo Alto); and in the Ravenswood Open Space Preserve (owned by Midpeninsula Regional Open Space District). The Project also includes actions within land owned by the State of California (within the State Route 84 right-of-way at the western approach to the Dumbarton Bridge), the City and County of San Francisco (managed by the San Francisco Public Utilities Commission), Cargill Corporation, and others. Appendix APN lists the Assessor Parcel Numbers of properties that are wholly or partially within the footprint of the Project site.

Table S-1 summarizes key features of the SAFER Bay Project by reach.

- ***Shoreline Protection Features***. The Project is being designed to satisfy current FEMA coastal flood protection requirements (i.e., the existing 100-year flood event with required freeboard for FEMA accreditation) and up to an additional 3.5 feet of elevation to account for anticipated sea level rise as well as other applicable FEMA design criteria. The design criteria are consistent with the intermediate scenarios described in the State of California Sea Level Rise Guidance: 2024 Science and Policy Update, as well as San Mateo County Flood and Sea Level Rise Resiliency District June 2023 Planning Policy Guidance. The Project includes the following features to protect parts of Menlo Park and East Palo Alto from coastal flooding: levees, floodwalls, hybrid shoreline protection features, and flood risk reduction structures. Refer to Section 2.4.2 in Chapter 2, *Project Description*, for descriptions of the proposed shoreline protection design as well as changes to infrastructure (e.g., stormwater management facilities, electrical utilities) by reach.

[1] As used here, *reach* refers to a linear segment of the Project.



SOURCES: NAIP Imagery, 2024; HDR, 2024; ESA, 2024

NOTES: Reaches to be evaluated at a project-level of detail are shown in solid lines; reaches to be evaluated at a program-level of detail are shown as dashed lines. The northern ends of the Bayfront Expressway and Bedwell Bayfront Park Reaches tie into high ground at Bedwell Bayfront Park.

SAFER Bay Project

Figure S-1
Project Location and Components

ESA

TABLE S-1
OVERVIEW OF SAFER BAY PROJECT BY REACH

Reach	Shoreline Protection	Habitat Improvements		Recreation[a]
		Transition Zone Habitat	Salt Marsh, Western Snowy Plover Habitat	
South of Bay Road	Levee/floodwall hybrid Flood gate at Bay Road	Revegetate 3H:1V levee slopes with transition zone habitat adjacent to the Faber and Laumeister marshes	Realign channel segments near bayward levee toe.	Realign and widen Bay Trail; reestablish connection to Faber–Laumeister Trail, create pedestrian access points.
North of Bay Road	Levee Flood gate at railroad tracks	Revegetate 3H:1V levee slopes with transition zone habitat adjacent to Ravenswood Open Space Preserve	Realign channel segments near levee toe, providing tidal connectivity west of existing Bay Trail.	Realign and widen Bay Trail from Bay Road to Bay Trail boardwalk, route boardwalk section over proposed levee.
Dumbarton Approach	Levee Levee/floodwall hybrid Floodwall	Revegetate 3H:1V levee slopes with transition zone habitat adjacent to Moseley Tract Marsh	Expand and enhance western snowy plover habitat in Pond SF2.	Southern portion of SF2 Trail would terminate at the new levee. Construct new Bay Trail north of SR 84. Widen affected existing portions of the Bay Trail south of the eastbound lanes of SR 84. Relocate viewing platforms near Pond SF2.
Substation and Marsh Restoration	Levee	Revegetate 10H:1V horizontal levee slopes with transition zone habitat adjacent to restored tidal marsh in Pond R2	Restore tidal salt marsh in Ponds R1/R2 Create seabird nesting islands in Pond R1.	Decommission a portion of the looped Ravenswood Trail, leaving two spur trails.
Tech Campus	Levee Levee/floodwall hybrid	Revegetation 3H:1V levee slopes with transition zone habitat adjacent to Ravenswood Slough	Enhance western snowy plover habitat in Pond R3.	Extend Bay Trail from Substation and Marsh Restoration Reach to public shoreline access trail at Meta Headquarters; replace public shoreline access trail around Meta Headquarters.
Bayfront Expressway	Levee	Revegetate 3H:1V levee slopes with transition zone habitat adjacent to Pond R4	Enhance western snowy plover habitat in Pond R3.	Create levee top trail (will parallel existing Bay Trail which is landward/south of proposed levee); improve existing Flyway Trail.
Bedwell Bayfront Park	Levee	Revegetation 3H:1V levee slopes with transition zone habitat adjacent to Flood Slough	No improvements proposed.	Extend Bay Trail west to Marsh Road Reach.
Marsh Road	Levee	No habitat improvements proposed	No improvements proposed.	No improvements proposed (levee alignment is on private property).

NOTES: Bay Trail = San Francisco Bay Trail; H:V = horizontal to vertical; SR = State Route

a. Refer to Figure 2-5 in Chapter 2, *Project Description*, for a map of existing and proposed trails in the Project vicinity.

SOURCE: ESA 2024; HDR 2024.

- ***Habitat Improvements***. Major habitat improvements include tidal salt marsh restoration, enhancement of habitat for western snowy plover, creation of seabird islands in the Ravenswood Pond Complex, and creation/restoration of salt marsh-upland transition habitat within the Ravenswood Pond Complex and elsewhere within the Project site. Refer to **Figure S-2** for an overview of habitat improvements and to Section 2.4.1, Proposed Shoreline Protection, Habitat Improvement, and Recreation Features, for a detailed description of habitat improvements.
- ***Recreational Features***. The Project overlaps with segments of the San Francisco Bay Trail (Bay Trail) and other trails and includes improvements to shoreline access. Where the Bay Trail would be replaced or extended, the segments would incorporate design standards adopted for the Bay Trail and designed in compliance with the Americans with Disabilities Act. By elevating shoreline trails, the Project would also reduce the current trails' exposure to flooding, thereby increasing public access and trail longevity. The reconstructed portions of the Bay Trail along the new levee tops would be paved; would include signage, viewing points, benches, and access points, with specific locations to be determined in future detailed designs and in coordination with stakeholders.

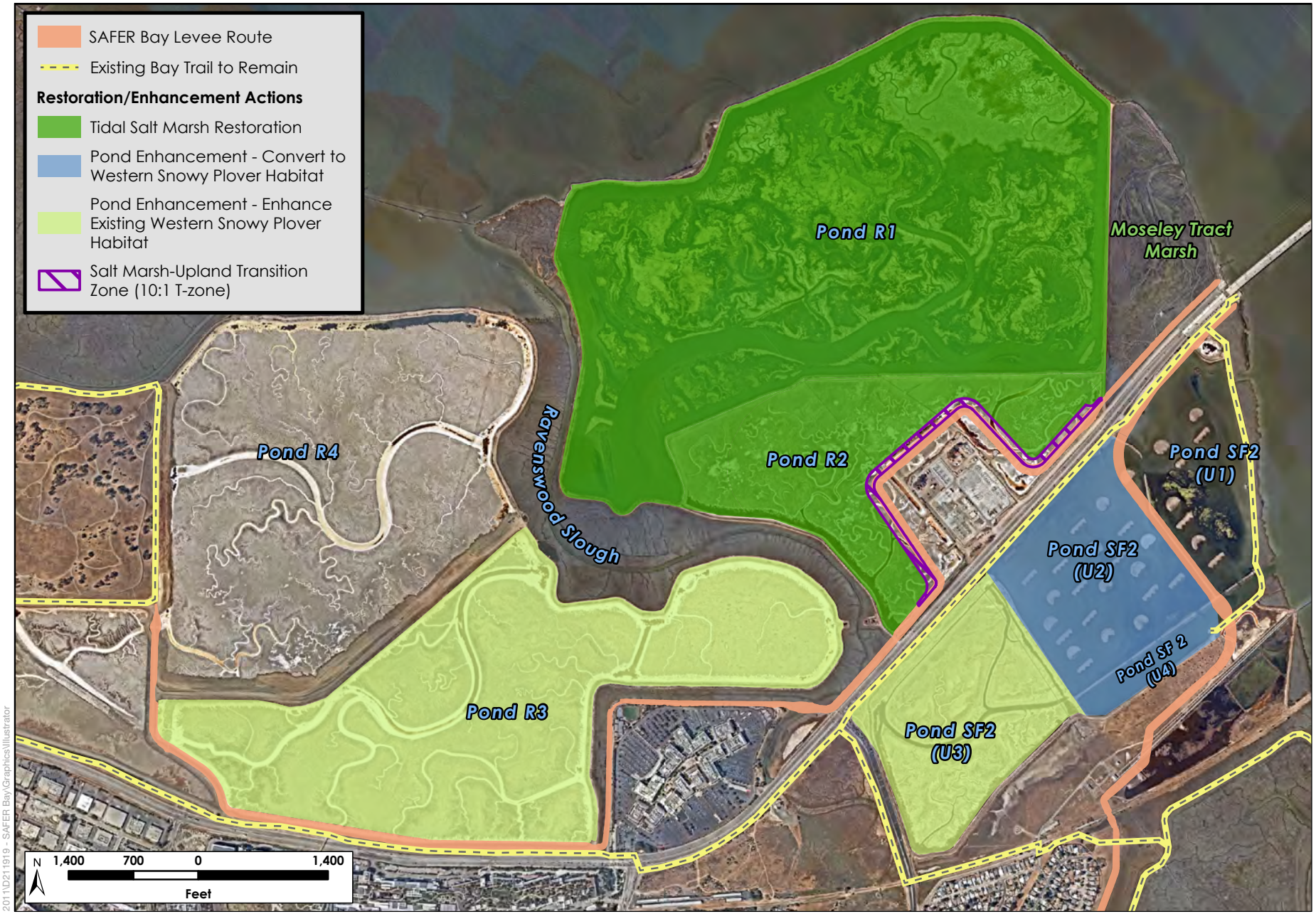
Consistent with CEQA, this EIR contains both project-level and program-level evaluations based on the level of design and construction information available. The programmatic evaluations herein have used conservative assumptions to facilitate future project-level evaluations.

Refer to Table 2-4 in Chapter 2, *Project Description*, for the Project's full anticipated implementation schedule, which is planned to occur in staggered phases.

S.4 Summary of Impacts and Mitigation Measures

Chapter 3, *Environmental Setting, Impacts, and Mitigation Measures*, of this EIR presents the environmental impacts analyses for several resource areas consistent with CEQA Guidelines Appendix G. For each resource area, the impact analysis describes the environmental and regulatory setting, identifies significance criteria used in the analysis, evaluates potential physical effects of the Project on both a project and cumulative basis, and provides feasible mitigation measures that would reduce the severity of significant impacts.

Table S-2 (at the end of the Summary section) summarizes all impacts identified for the Project in this EIR, lists the significance determination for each impact, and presents the full text of the mitigation measures identified to avoid, reduce, or otherwise lessen significant impacts. As shown in the table, although most of the impacts were determined to be less than significant or could be mitigated to less-than-significant levels, Project implementation was determined to result in significant and unavoidable impacts related to aesthetic resources (degrading the existing visual character or quality of public views within the South of Bay Road, Dumbarton Approach, Substation and Marsh Restoration, Tech Campus, and Bayfront Expressway reaches) (Impact AES-1) and noise (generating a substantial temporary increase in ambient noise levels during construction in the vicinity of the South of Bay Road, North of Bay Road, Tech Campus, Bedwell Bayfront Park, and Marsh Road reaches) (Impact NOI-1 and Impact C-NOI-1).



SOURCE: H.T. Harvey & Associates, February 2025

SAFER Bay Project

Figure S-2
Target Habitats Overview

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S.5 Summary of Project Alternatives

Chapter 4, *Alternatives*, presents the CEQA alternatives analysis for the Project. This chapter describes the methodology used to screen and select feasible alternatives that could avoid or substantially lessen the significant impacts identified for the Project while still meeting most of the Project's basic objectives. The alternatives selected for evaluation in Chapter 4 include:

1. **No Project.** This alternative describes conditions that would generally be expected to occur without Project implementation.
2. **Modified Footprint Alternative**. This alternative involves reducing impacts to waters of the U.S. and state through design modifications.

This chapter also describes candidate alternatives that were initially considered for evaluation but eliminated from further evaluation and the reasons for their elimination. Refer to Chapter 4 for more information.

S.6 Areas of Known Controversy and Issues to be Resolved

S.6.1 Areas of Known Controversy

Pursuant to CEQA Guidelines section 15123(b)(2), EIRs are required to identify areas of controversy known to the lead agency, including issues raised by agencies and the public.

On April 25, 2022, SFCJPA distributed a notice of preparation (NOP) to agencies and interested parties to begin the formal CEQA scoping process for the Project. The purpose of scoping is to determine the appropriate scope and content of the environmental review. The scoping period lasted for 52 days, from April 25, 2022, through June 15, 2022, during which the SFCJPA hosted a virtual public meeting on May 19, 2022. Issues raised in comments on the NOP and in the public meeting included the following:

- Project development process;
- Alternatives to the Project;
- Effects on public access and recreation;
- Adverse effects on biological resources;
- Adverse effects on aesthetics resources; and
- Effects on local hydrology.

Refer to Appendix SCOP for additional information, including all written comments received on the NOP.

S.6.2 Issues to Be Resolved

Changes to the Project may occur as design progresses in the future based on factors such as funding, land acquisition, permitting requirements, site-specific physical constraints (e.g., utilities, geotechnical conditions, or right-of-way access), or other changes initiated by a SFCJPA member agency or (for those

reaches within the State Route 84 right-of-way) the California Department of Transportation (Caltrans). For example, Caltrans may pursue a long-term solution of elevating the approach to Dumbarton Bridge, or the City of East Palo Alto may elevate the segment of Bay Road between the Cooley Landing Substation and Cooley Landing. Assuming the SFCJPA Board of Directors certifies this EIR as complete and adequate under CEQA, issues to be resolved by SFCJPA or its member agencies would also include the acquisition of properties and easements and/or rights-of-way.

As the design advances, SFCJPA or its member agencies and Caltrans will conduct additional CEQA review in accordance with CEQA Guidelines sections 15162 through 15164 and document changes in Project components that modify the severity of impacts evaluated in this EIR. Refer to Section 1.2.5, Program-Project EIR and Supplemental CEQA, for more details regarding supplemental CEQA analysis.

TABLE S-2
SUMMARY OF IMPACTS AND MITIGATION MEASURES

Impact	Significance Determination	Mitigation Measure*
Aesthetic Resources, EIR Section 3.2		
Impact AES-1: Substantially degrade the existing visual character or quality of public views of the site and its surroundings or conflict with applicable zoning and other regulations governing scenic quality.	SUM	**Mitigation Measure AES-1: Floodwall Design and Landscaping Treatments.** This measure applies to the South of Bay Road, Dumbarton Approach, Substation and Marsh Restoration, Tech Campus, and Bayfront Expressway reaches. During design of floodwalls, the Project Proponent shall incorporate context-sensitive design features to reduce the visual contrast and massing of any exposed floodwalls (i.e., sheet pile walls). At a minimum, these design features shall include one or more of the following, as appropriate to site conditions: • Use of low-glare or integral color finishes. • Incorporation of surface texturing, panel modulation, or similar treatments to break up large blank faces. • Installation of native landscaping or other screening on the landward side of levees, where feasible and compatible with maintenance needs. Prior to completion of final design, final sheet pile wall design and landscaping treatment plans shall be developed for each reach to which this measure applies.
Impact AES-2: Have a substantial adverse effect on a scenic vista.	LTS	No mitigation required.
Impact AES-3: Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area.	LSM	**Mitigation Measure AES-2: Nighttime Security Lighting.** This measure applies to all reaches. The Project Proponent shall require that Project contractors direct nighttime lighting used during construction away from adjacent residential areas or habitat, use the minimum amount of night lighting necessary for construction and safety, and shield and hood outdoor lighting to prevent light spillover effects during Project construction.
Impact C-AES-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse impacts related to aesthetic resources	LTS	No mitigation required.
Air Quality, EIR Section 3.3		
Impact AIR-1: Conflict with or obstruct implementation of the applicable air quality plan.	LSM	**Mitigation Measure AIR-1: Best Management Practices for Construction-Related Fugitive Dust Emissions.** This measure applies to all reaches. To reduce impacts from fugitive dust emissions during construction, the Project Proponent shall require construction contractors to implement the following Best Management Practices during activities involving soil disturbance, grading, and material hauling: • All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered up to two times per day during dry weather when winds are greater than 8 to 12 miles per hour. • All haul trucks transporting soil, sand, or other loose material offsite shall be covered completely with no loose flaps. • All visible mud or dirt trackout onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited. • All vehicle speeds on unpaved roads shall be limited to 15 miles per hour. • Temporary unpaved construction roads onsite shall be stabilized with soil binders such as dust palliatives or chemical stabilizers to reduce airborne dust from vehicle travel over unpaved surfaces. All roadways, driveways, and sidewalks to be

Impact	Significance Determination	Mitigation Measure*
		paved shall otherwise be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used. • All excavation, grading, and/or demolition activities shall be suspended when average wind speeds exceed 20 miles per hour. • All haul trucks, including their tires, shall be washed off prior to leaving the site. • Construction entrances and unpaved roads providing access to sites located 100 feet or further from a paved road shall be treated with a 6- to 12-inch layer of compacted wood chips, mulch, or gravel. • Publicly visible signs shall be posted with the telephone number and name of the person to contact at the lead agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The Air District's General Air Pollution Complaints number shall also be visible to ensure compliance with applicable regulations.
Impact AIR-2: Result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is in nonattainment under an applicable federal or state ambient air quality standard.	LSM	**Mitigation Measure AIR-1: Best Management Practices for Construction-related Fugitive Dust Emissions.** (refer to Impact AIR-1)
Impact AIR-3: Expose sensitive receptors to substantial pollutant concentrations.	LTS	No mitigation required.
Impact AIR-4: Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.	LTS	No mitigation required.
Impact C-AIR-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse impacts related to air quality.	LTS	No mitigation required.
Biological Resources, EIR Section 3.4		
Impact BIO-1: 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 the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service.	LSM	**Mitigation Measure BIO-1: Worker Environmental Awareness Training.** This measure applies to all reaches and the following impacts: all subtopics under BIO-1 and C-BIO-1. The Project Proponent will ensure that all construction personnel are trained by a qualified biologist to identify the special-status animals and plants, their habitats, and other sensitive habitats that may occur in or near the Project area; and the environmental protection measures put in place to prevent impacts on these sensitive biological resources. The training shall include, at a minimum, the following: • A review of the special-status species and sensitive habitats that could be found in or adjacent to work areas. • Measures to avoid and minimize impacts on sensitive species and habitats, including measures to be taken by construction personnel if a sensitive species is detected during Project activities. • A review of all conditions and requirements of environmental permits, reports, and plans that pertain to sensitive species and habitats. **Mitigation Measure BIO-2: Preconstruction Survey.** This measure applies to all reaches and the following subtopics under Impact BIO-1: 1a and 1b. Prior to the initiation of any construction activities in each Project reach. The Project Proponent will retain a qualified biologist to conduct a focused survey during the appropriate bloom season for Congdon's tarplant (June through October, and possibly later if conducted prior to the

Impact	Significance Determination	Mitigation Measure*
		first heavy rains of the fall). The survey will include all undeveloped areas that are to be affected by the Project, and that are within 50 feet of Project impacts. The survey shall take place no more than 3 years before ground disturbance and should be conducted in a year with near-average or above-average precipitation. Alternatively, these surveys may be conducted in a year of below-average precipitation if the biologist verifies that the species is flowering and detectable at a South Bay reference population despite the below-average rainfall. If no Congdon's tarplants are detected, then Mitigation Measures BIO-3 and BIO-4 would be unnecessary. During the same survey, the qualified biologist will also conduct a focused survey for milkweeds (*Asclepias* spp.) during the appropriate bloom season (May through October) that may support monarch butterfly eggs or larvae. **Mitigation Measure BIO-3: Congdon's Tarplant Avoidance and Minimization.** This measure applies to all reaches. If Congdon's tarplant is found in the impact area or 50-foot survey buffer, then in consultation with a qualified plant ecologist, the Project Proponent shall ensure that the Project is designed to avoid direct and indirect impacts on the species to the extent feasible. For example, avoidance of impacts might be feasible if the species is found on San Francisco Public Utilities Commission (SFPUC) lands south of Pond SF2 Cell U3, where construction will be more limited. If the plant ecologist determines that direct and indirect impacts will be avoided, then Mitigation Measure BIO-3 would be unnecessary. During operation and maintenance activities, areas where Congdon's tarplant occurs will not be mowed or weed whacked until late fall when seed has set. **Mitigation Measure BIO-4: Compensatory Mitigation for Congdon's Tarplant.** This measure is applicable to all reaches where Congdon's tarplant is observed. If Congdon's tarplant is found in the impact area or 50-foot survey buffer and the Project cannot avoid impacts, compensatory mitigation shall be provided by the Project Proponent via the management of currently occupied habitat or the establishment of a new population for the species affected. The mitigation habitat shall be of equal or greater habitat quality compared to the affected areas, as determined by a qualified plant ecologist, in terms of soil features, extent of disturbance, vegetation structure, and dominant species composition, and shall contain at least as many individuals of the species as are affected by Project activities. Habitat occupied by the affected species will be preserved and managed in perpetuity at a minimum 1:1 mitigation ratio (at least one plant preserved for each plant affected, and at least 1 occupied acre preserved for each occupied acre affected). Alternatively, seed from the affected population may be harvested and used either to expand an existing population (by a similar number/occupied area to compensate for impacts) or establish a new population in suitable habitat. The area to be landscaped around the wetland in the southeastern part of the site could potentially serve as an onsite mitigation area. The Project Proponent will retain a qualified plant biologist or restoration ecologist to develop a Congdon's Tarplant Habitat Mitigation and Management Plan (CTHMMP) to be implemented for the mitigation lands. Separate CTHMMPs may be prepared by each Project Proponent, as appropriate based on location and/or construction responsibilities. The CTHMMP shall be approved by the Project Proponent prior to the start of ground-disturbing activities and shall include, at a minimum, the following information: • Summary of habitat impacts and the proposed mitigation; • Description of the location and boundaries of the mitigation site and description of existing site conditions; • Description of measures to be undertaken to enhance (e.g., through focused management that may include removal of invasive species in adjacent suitable but currently unoccupied habitat) the mitigation site for Congdon's tarplant; • Description of measures to transplant individual plants or seeds from the impact area to the mitigation site, if appropriate (which will be determined by a qualified plant or restoration ecologist); • Proposed management activities to maintain high-quality habitat conditions for Congdon's tarplant; • Description of habitat and species monitoring measures on the mitigation site, including specific, objective final and performance criteria, monitoring methods, data analysis, reporting requirements, monitoring schedule, etc. At a minimum, performance criteria shall include demonstration that any Congdon's tarplant population fluctuations over the monitoring period do not indicate a downward trajectory in terms of reduction in numbers and/or occupied area for the preserved

Impact	Significance Determination	Mitigation Measure*
		mitigation population that can be attributed to management (e.g., that are not the result of local weather patterns, as determined by monitoring of a nearby reference population, or other factors unrelated to management); and • Annual monitoring should be conducted for a period of 5 years following seeding or the initiation of monitoring (e.g., for a mitigation site where the species is already present) to ensure that the population is healthy. • Description of the management plan's adaptive component, including potential contingency measures for mitigation elements that do not meet performance criteria. **Mitigation Measure BIO-5: Prevention of Spread or Mobilization of Pathogens and Invasive Plants.** This measure applies to all reaches and the following subtopics under Impact BIO-1: 1b, 1d, 1e, 1f, 1g, 1h, 1j, and 1k. To prevent the spread/introduction of non-native invasive plant species and pathogens, such as sudden oak death syndrome (*Phytophthora ramorum*) and other soil-based *Phytophthora* species, the Project Proponent will implement the following procedures: • Heavy equipment (e.g., excavators, drill rigs, track-mounted rigs), vehicles, and large tools must be cleaned (i.e., thoroughly washed) and free of soil and debris prior to entering the construction area from outside locations (i.e., arriving from other projects). Vehicles that only travel and park on paved roads do not require external cleaning. • The interior of vehicles and heavy equipment will be free of dirt/debris and other potentially contaminated materials. Interiors should be vacuumed, washed, and/or treated with sanitizing agents to minimize the introduction of invasive plants and pathogens. The exterior of large equipment, such as bucket loaders, tracks or wheels, undercarriage, and anything that accumulates soil and debris, will be thoroughly cleaned. • Spray bottles containing either 70 to 90 percent ethyl/isopropyl alcohol or a solution containing a 1:20 bleach-to-water ratio and boot brushes or hoof picks will be present at all entry points for personnel to decontaminate their shoes, PPE, small tools, and other equipment prior to entering the construction area when arriving from outside locations (i.e., arriving from other projects or areas outside of the Project area). The spray will be liberally applied (i.e., until thoroughly soaked) to all small equipment and tools (e.g., shovels, screens, boots) and allowed to air dry prior to entry. • To minimize the potential for introduction or spread of Phytophthora during revegetation work, container stock used at revegetation sites will be sourced from approved nurseries and will be installed in compliance with the latest guidance at www.Calphytos.org, which include the Guidelines to Minimize Phytophthora Pathogens in Restoration Nurseries, Guidance for Plant Pathogen Prevention when Working at Contaminated Restoration Sites or Sites with Rare Plants and Sensitive Habitat and Guidelines to Minimize Phytophthora Contamination in Restoration Projects. • Pathogens in Restoration Nurseries, Guidance for Plant Pathogen Prevention when Working at Contaminated Restoration Sites or Sites with Rare Plants and Sensitive Habitat, and Guidelines to Minimize Phytophthora Contamination in Restoration Projects. **Mitigation Measure BIO-6: Crotch's Bumble Bee and Monarch Butterfly Avoidance and Minimization.** This measure applies to all reaches. The Project Proponent will implement the following best management practices to avoid and/or minimize impacts on the monarch butterfly, Crotch's bumble bee, and their habitats: • The area of disturbance will be minimized to ensure that the footprint of soil disturbance is kept to the minimum area necessary to complete the maintenance work. • A pre-activity survey for milkweed plants will be conducted during the same growing season that construction will begin to identify potential host plants for breeding monarchs. If feasible, impacts on milkweed plants will be avoided. If avoidance of milkweed plants is infeasible, a qualified biologist will survey those plants for monarch butterfly eggs, larvae, or pupae within 7 days prior to impacts on those plants. If those life stages are present, they should be avoided if feasible until an adult has emerged. If avoidance is infeasible, the U.S. Fish and Wildlife Service (USFWS) will be consulted to determine appropriate measures. For example, the monarchs can be raised to adulthood in captivity and then released.

Impact	Significance Determination	Mitigation Measure*
		• A qualified biologist will conduct a pre-activity survey for foraging or nesting Crotch's bumble bees. The survey will be conducted within 7 days prior to the start of early tree removal and will occur at least 2 hours after sunrise and at least 2 hours before sunset during suitable conditions, with temperatures between 60 and 90°F and no rain. The survey will cover the entire Project site and a surrounding 100-foot buffer area. The survey duration will be based on the metric of a minimum of 1 person-hour of searching per 3 acres of suitable habitat. This survey will be a visual encounter survey, with identification aided by photographs. No bees will be captured or handled. During the survey, the qualified biologist will do the following: o Search areas with flowering plants for foraging Crotch's bumble bees. o Survey burrows and other possible nesting habitat. o Look and listen for concentrated bumble bee activity. o If bumble bees are observed, obtain photos of the bees for documentation and to determine if the bees are or are not Crotch's bumble bees. Photographs will be taken with an appropriate camera (e.g., a digital camera with a macro or telephoto lens or other cameras equipped with a view finder, continuous shooting mode, and macro or telephoto lens) from multiple angles to capture key features to aid identification, if possible, and will be in focus. • If Crotch's bumble bees and/or Crotch's bumble bee nests are detected, surveyors will record the location of the nest; nest substrate, slope, aspect, and distance to nearest forage if known; number of individuals observed; and vegetation used by individuals. • If Crotch's bumble bees are observed during the preconstruction survey, a qualified biologist will monitor all construction activities that, in the opinion of the biologist, could potentially result in take of individuals. • If a Crotch's bumble bee nest is detected, the nest will be avoided by a buffer (preferably of at least 50 feet) until late fall, when it is no longer active, unless the Project is covered by an Incidental Take Permit or Restoration Management Permit from CDFW allowing the nest to be affected. • Measures to minimize impacts on natural habitat areas due to staging and stockpiling of materials will be implemented, including locating staging areas in previously disturbed areas and incorporating erosion control measures during the wet season. • Dust management measures will be implemented to reduce dust within and adjacent to work areas, including watering exposed surfaces, covering haul trucks, sweeping streets, and limiting vehicle speeds. • Exposed soils will be revegetated with native seed to stabilize soils and prevent erosion. Operation and maintenance activities in areas where milkweed and/or Crotch's bumble bee nests may occur will be implemented November-January when milkweed have not yet emerged and Crotch's bumble bee nests are not active, outside the Crotch's bumble bee flight season. **Mitigation Measure BIO-7: Minimize Underwater Noise Impacts.** This measure applies to all reaches. During construction, the following noise minimization and avoidance measures shall be implemented by the Project Proponent: • Levee construction occurring in marsh and aquatic habitats will occur in dewatered work areas unless otherwise approved by regulatory agencies. • To the extent feasible, if sheet piles are necessary for dewatering, all sheet piles shall be installed and removed with a vibratory pile driver hammer. • Vibratory pile driving shall be conducted following the United States Army Corps of Engineers 2018 "U.S. Army Corps of Engineers Proposed Additional Procedures and Criteria for Permitting Projects under a Programmatic Determination of Not Likely to Adversely Affect Select Listed Species in California (the 2018 NLAA Program)", or as otherwise approved by regulatory agencies.

Impact	Significance Determination	Mitigation Measure*
		• An impact pile driver may only be used where necessary to complete installation of larger steel pilings in accordance with seismic safety or other engineering criteria. • If an impact pile driver is used, it will be cushioned using a 12-inch-thick wood cushion block. • A Hydroacoustic Monitoring Plan shall be prepared and approved by NMFS to be implemented in the event that an impact hammer is used. The sound monitoring results will be made available to CDFW, NMFS, and USFWS. • The plan will provide detail on the sound attenuation system, the methods used to monitor and verify sound levels during impact pile-driving activities. • The plan will include the use of a bubble curtain during any impact pile driving of piles in the water. The bubble curtain will be operated in a manner consistent with the following performance standards: o The bubble curtain will distribute air bubbles around 100 percent of the piling perimeter for the full depth of the water column. o The lowest bubble ring will be in contact with the mudline for the full circumference of the ring, and the weight attached to the bottom ring shall ensure 100 percent mudline contact. No parts of the ring or other objects shall prevent full mudline contact. o Air flow to the bubblers must be balanced around the circumference of the pile. o A "soft start" technique shall be employed in all pile driving to give fish and other aquatic species an opportunity to vacate the area. When initiating pile driving, or when there has been downtime of 30 minutes or more without pile driving, the contractor will initiate the driving with ramp-up procedures described below. – For vibratory hammers, the contractor will initiate the driving for 15 seconds at reduced energy, followed by a 30-second waiting period. This procedure will be repeated two additional times before continuous driving is started. – For impact driving, an initial set of three strikes would be made by the hammer at 40 percent energy, followed by a 30-second waiting period, then two subsequent three-strike sets at 40 percent energy, with 30-second waiting periods, before initiating continuous driving. • A biological monitor will be present during all pile driving to observe the work area before, during, and after pile driving. The monitor will be present as specified by NMFS during the impact pile-driving phases of construction. **Mitigation Measure BIO-8: Seasonal Restrictions.** This measure applies to all reaches. The Project Proponent will require that in-water work in tidal open water, intertidal mudflat, muted tidal open water, and managed pond (Ponds R1, R2, R3, R5/S5, and SF2) habitats, where fish may be present, will be conducted between June 1 through November 30, based on the standard work windows for green sturgeon and steelhead. If completion of in-water work within this period is not feasible due to scheduling issues, the Project Proponent will prepare and submit new timing guidelines to NMFS and CDFW for approval prior to initiation of in-water work. **Mitigation Measure BIO-9: Fish Exclusion at Dewatering Sites.** This measure applies to all reaches. Prior to levee construction, the Project Proponent will install cofferdams as necessary to dewater the work areas, unless otherwise approved by regulatory agencies. Cofferdams will be constructed in a manner that effectively dewaters the work area. Within areas determined by a qualified biologist to potentially support special-status fish or EFH, sheet piles or other suitable materials will be placed in such a way as to reduce the likelihood of fish being stranded. The final wall will be placed at low tide to minimize the amount and depth of water present within the cofferdam. Just before the final wall is installed, if water is present within the coffer dam, qualified biologists will use nets (with a maximum mesh size of 9.5 millimeters) to exclude fish from the construction area. At low tide, qualified biologists will walk from the upper edge of the work area to the lower edge of the work area with a seine stretched across any wetted portion of the work area to encourage fish to move out of the construction area (without catching the fish) through the gap where the final wall would be installed. When the lower end of the construction area is reached, a block net would be installed in that gap to prevent fish from moving back into the cofferdam. This procedure would be repeated as necessary to minimize the potential for fish to remain in the dewatered area.

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		The final sheet pile or other suitable dewatering material would then be installed. If any water that may still contain fish remains within the cofferdams following these procedures, a qualified biologist would use a dipnet or seine to capture the fish. The fish would be placed in buckets and immediately transported to suitable habitat outside the work area. Upon completion of in-water work activities, cofferdams shall be removed in a manner that would allow flow to resume with the least disturbance to the substrate. Cofferdams will be installed using vibratory hammers to minimize underwater vibratory impacts. **Mitigation Measure BIO-10: Minimize Dredging Impacts.** This measure applies to the Substation and Marsh Restoration Reach. If dredging a "bayward channel" at the mouth of Ravenswood Slough between the proposed primary breach at Pond R1 and the San Francisco Bay occurs, the Project Proponent will implement the following minimization and avoidance measures: • All dredging will be conducted between September 1 and November 30. • Impermeable silt curtains and/or gunderbooms, a tool similar to a silt curtain that is made of permeable material that allows water to flow through but traps sediment within the curtain, will be used to contain sediments within a limited area until it resettles. • Operational controls will be implemented for dredges to limit the amount of sediment released while dredging. • Use of clamshell dredges with a bucket ≤ 10 cubic yards will reduce the occurrence of fish and mobile invertebrate entrainment. **Mitigation Measure BIO-11: Minimize Operation and Maintenance Impacts.** This measure applies to the Dumbarton Approach, Tech Campus, Bayfront Expressway, and Bedwell Bayfront Park reaches. Where water control structures are present, the Project Proponent will implement the following minimization and avoidance measures: • A fish screen will be installed on pumps to prevent fish from being pumped into managed ponds during operations intended to support targeted water level management. • If managed ponds with passive water control structures are dewatered for maintenance activities, a qualified biologist will survey the area during and after dewatering to ensure that fish species are not stranded. Any fish species observed to be stranded will be collected and brought to the nearest body of water. **Mitigation Measure BIO-12: Western Snowy Plover Weekly Surveys and Nest Avoidance Buffers.** This measure applies to the Dumbarton Approach, Substation and Marsh Restoration, Bayfront Expressway, and Marsh Road reaches. During western snowy plover breeding season (March 1–-September 15), for construction activities that occur within 600 feet of potential western snowy plover breeding habitat, the Project Proponent will retain a qualified biologist to conduct a thorough survey of all suitable habitat in the construction area and adjacent suitable western snowy plover habitat within 600 feet of all potential work areas on a weekly basis. The survey will identify the location of western snowy plover adults, nests, and broods within the construction area and adjacent areas. The qualified biologist will then coordinate with Project construction personnel regarding appropriate avoidance of construction activities in areas where they could disturb nests and broods. A buffer of at least 600 feet, free from any construction activities that were not ongoing when the nests were initiated, will be established around the nests until they are no longer active. This buffer may be reduced if a qualified biologist, in consultation with the USFWS, determines that a reduced buffer would still adequately avoid disturbance of plover nests. **Mitigation Measure BIO-13: Western Snowy Plover Daily Preactivity Surveys and Monitoring.** This measure applies to the Dumbarton Approach, Substation and Marsh Restoration, Bayfront Expressway, and Marsh Road reaches. During western snowy plover breeding season (March 1–September 15), for construction and/or operation and maintenance activities that occur within 600 feet of potential western snowy plover breeding habitat, the Project Proponent will retain a qualified biologist to conduct daily preactivity clearance surveys where construction or maintenance activities, including walking, are planned prior to the start of these activities. The preactivity clearance surveys will ensure that nests have not been established in the construction/operation and maintenance area or adjacent areas, and western snowy plover adults and broods

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		have not moved into these areas, where they may be disturbed by construction/operation and maintenance activities. If an active nest is observed, work in the area will stop and a 600 feet buffer will be implemented to protect the nest while it remains active. This buffer may be reduced if a qualified biologist, in consultation with the USFWS, determines that a reduced buffer would still adequately avoid disturbance of plover nests. If adults or broods are present in work areas, work will stop, and they will be allowed to leave on their own prior to work occurring. A qualified biologist will be present to monitor construction and/or operation and maintenance activities and determine when work may occur in these areas. If work activities change during the day to a different location, a qualified biologist will re-survey that area to ensure broods have not moved into the area. Prior to adjusting water levels in managed ponds that may support breeding western snowy plovers, a qualified biologist will conduct a complete survey of the pond where water management will occur. If active nests and/or broods are observed in the pond, water intake will be limited to refilling borrow ditches and foraging channels to prevent inundating nesting areas, and discharge will be limited to ensure that the borrow ditch remains inundated to reduce mammalian and pedestrian access. **Mitigation Measure BIO-14: General Wildlife Impact Minimization Measures.** The Project Proponent will ensure that the following measures are applied to all Project activities: • No nighttime construction will occur unless otherwise approved by agencies. • No permanent night lighting will be installed for operations, and lighting will be avoided during construction and maintenance to the extent feasible. If lighting must be used during construction or maintenance activities (e.g., security lighting in staging areas), it shall be shielded and angled downward and away from sensitive marsh and aquatic habitats (including managed ponds) to avoid direct illumination of such habitats and to avoid having the luminaires visible from marsh and aquatic habitats. The lighting shall be as close to the ground as possible (i.e., light poles will be short), and the illumination magnitude shall be as low as possible while still achieving the purpose of the lighting. • Signage prohibiting access to sensitive habitats and areas that are closed to the public and indicating the importance of protection of sensitive biological resources, will be placed in key locations, such as along trails near sensitive habitats. All signs will be conspicuous but low in stature so they do not provide high-quality perches for avian predators. • Public benches installed will be backless to reduce opportunities for predatory bird perching unless a qualified biologist determines that due to the presence of other perches in the area, the presence of a bench with a back would not provide predatory birds with increased hunting opportunities, and agencies approve this variance. • No dogs will be allowed on trails (or elsewhere) on Refuge lands. Elsewhere, all dogs must be on leashes and must remain on established trails, and signage indicating these requirements will be placed in key locations. • Any permanent fencing near habitat for sensitive species will incorporate raptor perch deterrents and, as necessary, mammal climbing deterrents (such as coyote rollers). • Construction, maintenance, and management activities (including mowing) within or adjacent to tidal marsh habitat will not occur within 2 hours before or after extreme high tides (6.5 feet or above, as measured at the Golden Gate Bridge and adjusted to the timing of local high tides), when the marsh plain is inundated, because protective cover for tidal marsh species is limited and activities could prevent them from reaching available cover. • Viewing platforms, kiosks, benches, interpretive displays, and other focal areas for public use will be located a minimum of 300 feet from high-quality western snowy plover nesting habitat. **Mitigation Measure BIO-15: Preconstruction Surveys for Special-Status Marsh Birds.** This measure applies within the South of Bay Road, North of Bay Road, Substation and Marsh Restoration, Tech Campus, Bayfront Expressway, and Bedwell Bayfront Park reaches. If construction activities occur between February 1 and August 31, the Project Proponent will retain a qualified biologist to conduct a preconstruction survey for special-status marsh birds prior to the initiation of vegetation clearing, demolition, earth moving, or other activities that could affect adults, eggs, or chicks of these species. Surveys for the California Ridgway's rail and California black rail will be conducted in accordance with the latest USFWS/CDFW protocols for determining presence/absence of these species. The most recent protocol for the California Ridgway's rail requires conducting passive surveys (without broadcast vocalizations) followed by active surveys using broadcast

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		vocalizations if the species is not detected during passage surveys; the first survey must occur between January 15 and January 31, so advance planning is necessary to conduct protocol-level surveys for the California Ridgway's rail during a construction year. Surveys for the other marsh birds will be conducted within 7 days prior to the initiation of Project activities. If there is a lull in construction activities of at least 7 days during this time period, a qualified biologist will conduct another preconstruction survey for non-rail marsh birds prior to the resumption of construction activities. If an active nest is located, the qualified biologist will maintain an appropriate buffer to protect the nest until it is no longer active, as described in Mitigation Measure BIO-16. It should be noted that California Ridgway's rails are sufficiently abundant and widespread in Faber and Laumeister marshes that presence of this species may be assumed in lieu of needing to conduct surveys, in which case no construction would occur within 700 feet of this species' breeding habitat during the breeding season. **Mitigation Measure BIO-16: Breeding Season Habitat Buffers.** This measure applies within the South of Bay Road, North of Bay Road, Substation and Marsh Restoration, Tech Campus, Bayfront Expressway, and Bedwell Bayfront Park reaches. To avoid causing the abandonment of an active California Ridgway's rail or California black rail nest, the Project Proponent will ensure that Project/operation and maintenance activities aside from recreational uses and maintenance activities using light duty vehicles within 700 feet of salt marsh habitats suitable for these species within or adjacent to the Program or Project area will be avoided during the rail breeding season (from February 1 through August 31) unless: 1) A qualified biologist in coordination with USFWS and CDFW determines that a reduced buffer (but no less than 200 feet) is appropriate due to intervening development or obstructions, the level of disturbance by the activity (in terms of noise and equipment), or other factors that will reduce the potential for the activity to disturb nesting rails, or 2) Protocol-level surveys conducted by a qualified biologist pursuant to Mitigation Measure BIO-15 verifies the absence of these species from nearby areas. If breeding rails are determined to be present, construction activities will not occur within 700 feet of an identified California Ridgway's rail calling center, or within 300 feet of a California black rail calling center, during the breeding season unless the USFWS and CDFW provide guidance regarding the types of activities that may occur within lesser distances from calling centers, in which case USFWS and CDFW guidance shall be followed. Buffers around nests of the other marsh birds will be determined by a qualified biologist; such buffers will typically be at least 100 feet for non-raptors and 300 feet for raptors such as the northern harrier, although the qualified biologist may determine that reduced buffers are appropriate. Buffers around individual nests will be maintained until nests are no longer active (i.e., until young have fledged or the nesting attempt has failed). **Mitigation Measure BIO-17: Preconstruction Surveys for Colonial Nesting Birds.** This measure applies within the Dumbarton Approach, Substation and Marsh Restoration, Tech Campus, Bayfront Expressway, Bedwell Bayfront Park, and Marsh Road reaches. During the breeding season for colonial nesting birds (March 1 through August 31), the Project Proponent will retain a qualified biologist to conduct a survey for colonial nesting birds in all suitable habitats within 300 feet of construction or operation and maintenance activities within 5 days before activities begin. If a colony is observed to be active, Mitigation Measure BIO-18 will be implemented. **Mitigation Measure BIO-18: Breeding Season Colony Buffers for Colonial Nesting Birds.** This measure applies within the Dumbarton Approach, Substation and Marsh Restoration, Tech Campus, Bayfront Expressway, Bedwell Bayfront Park, and Marsh Road reaches. The Project Proponent will ensure that no construction or operation and maintenance activities occur within 100 feet of an active American avocet or black-necked stilt nest; within 100 feet of an active cliff swallow colony; or within 300 feet of an active tern or skimmer colony during the breeding season (March 1 through August 31) unless a qualified biologist determines that reduced buffers are appropriate. These buffers will be maintained until nests are no longer active (i.e., until young have fledged or all nests have failed). **Mitigation Measure BIO-19: Preconstruction Surveys for Other Nesting Birds.**

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		This measure applies to all reaches. During the breeding season, February through August 31, the Project Proponent will retain a qualified biologist to conduct a survey for raptors, such as white-tailed kites and red-tailed hawks, in all suitable habitats within 300 feet, and for all other nesting birds within 100 feet of construction and operation and maintenance activities within 7 days before activities begin. If there is a lull in construction activities for at least 7 days during this time period, a qualified biologist will conduct another preconstruction survey for nesting birds prior to the resumption of construction activities. **Mitigation Measure BIO-20: Breeding Season Nest Buffers for Other Nesting Birds.** This measure applies to all reaches. If an active nest (i.e., a nest with eggs or young, or any completed raptor nest attended by adults) of a protected bird species is found sufficiently close to work areas to be disturbed by these activities, the Project Proponent will retain a qualified biologist to determine the extent of a buffer zone to be established around the nest to ensure that the nesting birds will not be disturbed during the Project. No Project activities that were not ongoing when the nest was established may occur within the buffer zone. Typical buffers are 300 feet for nests of raptors and 100 feet for nests of other birds, although the qualified biologist may determine that reduced buffers are appropriate. Buffers around individual nests will be maintained until nests are no longer active (i.e., until young have fledged or the nesting attempt has failed). **Mitigation Measure BIO-21: Preconstruction Surveys for Burrowing Owl.** This measure applies to ruderal upland, ruderal levee slope, and culvert/riprap habitats throughout all reaches, as well as managed ponds in the Dumbarton Approach, Substation and Marsh Restoration, Bayfront Expressway, and Marsh Road reaches. Prior to Project activities, the Project Proponent will implement the following measures to ensure that individual burrowing owls are not injured or killed: Prior to initiation of construction activities (including demolition, vegetation clearing, or ground disturbance) associated with the Project in any given part of the Project area, a qualified biologist shall conduct preconstruction surveys in all potentially suitable burrowing owl habitat on and within 250 feet of the area in which ground disturbance is proposed. To maximize the likelihood of detecting owls, the preconstruction survey shall last a minimum of 3 hours. The survey shall begin 1 hour before sunrise and continue until 2 hours after sunrise (3 hours total) or begin 2 hours before sunset and continue until 1 hour after sunset. A minimum of two surveys shall be conducted (if owls are detected on the first survey, a second survey is not needed). Owls observed shall be counted and their location shall be mapped. Surveys shall conclude no more than 2 calendar days prior to construction; thus, surveys must begin no less than 4 days prior to the start of construction, operations, or reclamation activities (2 days of surveying plus up to 2 days between surveys and construction). To avoid last-minute changes in schedule that may occur if burrowing owls are found, a preliminary survey may be conducted up to 14 days before construction. This preliminary survey may count as the first of the two required surveys, as long as the second survey concludes no more than 2 calendar days in advance of construction. If the preconstruction survey does not identify the presence of burrowing owls on or within 250 feet of the site, no further measures are necessary. However, should the preconstruction survey determine the presence of burrowing owls on or within 250 feet the site, then the Project Proponent shall implement the following avoidance measures. **Mitigation Measure BIO-22: Burrowing Owl Buffers and Monitoring.** This measure applies to ruderal upland, ruderal levee slope, and culvert/riprap habitats throughout all reaches, as well as managed ponds in the Dumbarton Approach, Substation and Marsh Restoration, Bayfront Expressway, and Marsh Road reaches. 1. *Avoidance during the breeding season.* If evidence of burrowing owls is found during the breeding season (February 1 to August 31), the Project Proponent shall ensure that all nesting or roosting sites that could be disturbed by Project demolition or construction shall be avoided during the remainder of the breeding season (if owls remain throughout the breeding season) or while the nest (i.e., a burrow occupied during the period from February 1 to August 31) is occupied by adults or young (occupation includes individuals or family groups foraging on or near the site following fledging). Although burrowing owls are unlikely to nest on the Project site, there is a remote possibility that nesting may occur. Wintering owls in San Mateo County often remain past February 1, at which time they cannot be distinguished from breeding birds. As a result, any owl present between February 1 and August 31 will be considered a potential breeder unless and until it leaves the site.

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		Avoidance shall include establishment of a 250-foot non-disturbance buffer zone around nests. Demolition and construction may occur outside of the 250-foot non-disturbance buffer zone. Demolition and construction may occur inside of the 250-foot non-disturbance buffer during the breeding season only if the nest is not disturbed, and a qualified biologist develops an avoidance, minimization, and monitoring plan prior to Project construction that includes all of the following criteria: • A qualified biologist monitors the owls for at least 3 days prior to construction to determine baseline nesting and foraging behavior (i.e., behavior without construction). • The same qualified biologist monitors the owls during construction and finds no change in owl nesting and foraging behavior in response to construction activities. • If there is any change in owl nesting and foraging behavior as a result of construction activities, all disturbance activities shall cease within the 250-foot buffer. Construction shall not resume within the 250-foot buffer until the adults and juveniles from the occupied burrows have moved out of the Project area and 250-foot buffer. • If monitoring indicates that the nest is abandoned prior to the end of the nesting season (as would occur if a wintering owl lingered past February 1 and then eventually migrated to its breeding areas outside the region), and the burrow is no longer in use by owls, the non-disturbance buffer zone may be removed. The qualified biologist will excavate the burrow to ensure that no owls are present and to prevent reoccupation after receiving approval from CDFW. 2. *Avoidance during the non-breeding season.* During the non-breeding season (September 1 through January 31), the Project Proponent shall ensure that a 250-foot non-disturbance buffer shall be established around occupied burrows as determined by a qualified biologist. Construction activities outside of this 250-foot buffer are allowed. Construction activities within the 250-foot buffer are allowed if all of the following criteria are met to prevent owls from abandoning important overwintering sites: • A qualified biologist monitors the owls for at least 3 days prior to construction to determine baseline foraging behavior (i.e., behavior without construction). • The same qualified biologist monitors the owls during construction and finds no change in owl foraging behavior in response to construction activities. • If there is any change in owl nesting and foraging behavior as a result of construction activities, all disturbance activities shall cease within the 250-foot buffer. • If the owls are gone for at least 1 week, the Project Proponent may request approval from the CDFW that a qualified biologist excavate or block usable burrows to prevent owls from re-occupying the site. After all usable burrows are excavated, the buffer zone will be removed and construction may continue. Monitoring must continue as described above for the non-breeding season as long as the burrow remains active. 3. *Construction monitoring.* Based on the avoidance, minimization, and monitoring plan developed during construction, all non-disturbance buffer zones shall be established and maintained. A qualified biologist shall monitor the site consistent with the requirements described above to ensure that buffers are enforced and owls are not disturbed. The biological monitor shall also conduct training of construction personnel on the avoidance procedures, buffer zones, and protocols in the event that a burrowing owl flies into an active construction zone or within 250 feet of such zone. **Mitigation Measure BIO-23: Passive Relocation Burrowing Owl.** This measure applies to ruderal upland, ruderal levee slope, and culvert/riprap habitats throughout all reaches, as well as managed ponds in the Dumbarton Approach, Substation and Marsh Restoration, Bayfront Expressway, and Marsh Road reaches. Passive relocation shall only be allowed, with the approval of CDFW, during the non-breeding season (September 1 through January 31), and may only occur if the burrow needs to be removed or could collapse from construction activities. If passive relocation is allowed by CDFW, the Project Proponent shall have a qualified biologist passively exclude birds from their burrows during non-breeding season only by installing one-way doors in burrow entrances. These doors shall be in place for at least 48 hours to ensure owls have left the burrow, and then the qualified biologist shall excavate the burrow to prevent reoccupation. Burrows shall be excavated using hand tools. During excavation an escape route shall be maintained at all times.

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		This may include inserting an artificial structure into the burrow to avoid having the overburden collapse into the burrow and trap owls inside. **Mitigation Measure BIO-24: Vegetation Removal.** This measure applies to the South of Bay Road, North of Bay Road, Dumbarton Approach, Substation and Marsh Restoration, and Bedwell Bayfront Park reaches. Where vegetation removal occurs, the Project Proponent will ensure that vegetation and debris that could provide cover for salt marsh harvest mice will be removed under the supervision of a qualified biologist using only hand tools (which may include line trimmers) at least 1 week prior to the commencement of construction activities. Vegetation removal will be limited to the minimum amount necessary to permit the activity to occur. Vegetation will be removed on a progressive basis, such that the advancing front of vegetation removal moves toward vegetation that would not be disturbed. A qualified biologist will monitor the vegetation removal and make specific recommendations with respect to the rate of vegetation removal (to ensure that any small mammals present are able to escape to cover that would not be affected), and whether vegetation needs to remain in a certain area temporarily to facilitate dispersal of individuals into habitat outside the impact area. During mowing of vegetation along the levee, mowing will start from the top (the area of least suitable habitat) and proceed downslope toward more suitable habitat so any mice present in the narrow swath to be mown can move away from the disturbance of the mower and out of the mowing area. Below the zone at the top of the levee that will be mown, any woody plant removal that becomes necessary will be performed by hand; such hand-removal is expected to be necessary very infrequently (e.g., once every few years, at most). **Mitigation Measure BIO-25: Wildlife Exclusion Fencing.** This measure applies to the South of Bay Road, North of Bay Road, Dumbarton Approach, Substation and Marsh Restoration, and Bedwell Bayfront Park reaches. Once vegetation has been removed, where work occurs adjacent to suitable habitat, the Project Proponent will ensure that wildlife exclusion fencing is installed in a configuration that minimizes potential for small mammals to move from unaffected habitat into the work area. A qualified biologist will be present during initial vegetation removal and exclusion fence installation, then periodically inspect the site during construction activities to ensure that the exclusion fencing is functioning appropriately. This fencing will consist of material that cannot be climbed by harvest mice, buried at least 4 inches below the ground's surface, and with at least 1 foot (but no more than 4 feet) above the ground. All supports for the fencing will be placed on the inside of the work area. A buffer will be maintained free of vegetation around the outside of the exclusion fencing; this buffer will be the minimum width necessary to prevent vegetation from leaning against the fencing in a way that would allow small mammals to climb the fencing. Fencing will not be placed in areas where it would prevent small mammals from reaching refugial habitat during very high tides.
Impact BIO-2: Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.	LSM	**Mitigation Measure BIO-26: Habitat Restoration Monitoring Plan.** This measure applies to proposed habitat restoration activities in Ponds R1, R2, R3, and SF2 as well as all temporarily affected areas in all reaches, including replacement secondary channels and levee slope revegetation areas. The Project Proponent will prepare and implement a habitat restoration monitoring plan (HRMP). The HRMP will include specific plans for the revegetation, restoration, and enhancement of habitat in Ponds R1, R2, R3, and SF2 as well as in areas within the Project site that are subject to temporary construction-phase impacts. The detailed restoration and enhancement approaches presented in the HRMP will be consistent with the approved habitat restoration design and will include the following key elements: • A planting plan that specifies the use of locally obtained plant materials and include detailed descriptions of installation methods, after-installation care, and weed control measures; • A soil handling plan that identifies screening criteria pursuant to the Habitat Restoration BOD to confirm suitability of potential fill material for restoration purposes and processes to implement soil screening; • A site maintenance plan, including elements such as invasive plant control, trash removal, plant mortality thresholds to trigger replanting (where appropriate such as for T-zone habitat), and an irrigation plan for T-zone habitat; and

Impact	Significance Determination	Mitigation Measure*
		• An ecological monitoring plan that includes 10 years of post-restoration ecological monitoring for permanent impact areas, habitat restoration areas, and habitat enhancement areas and 5 years of post-restoration ecological monitoring for areas temporarily disturbed during construction. The ecological monitoring plan will include at a minimum: o Vegetation success criteria based on quantifiable metrics including percent cover of native vegetation, percent cover of native wetland vegetation, and maximum percent cover of invasive species (<10 percent). – For example, construction-phase temporary impact areas in tidal salt marsh will have at least 70 percent cover of native tidal wetland salt marsh vegetation in Year 5. o Success criteria and associated metrics that reflect adequate conditions for use by target wildlife species. o Success criteria and associated metrics that document stability of graded areas, including replacement secondary channels, and allow for corrective measures if there is evidence of erosion, slumping, undercutting, or other signs of issues that may pose a risk to target habitat establishment. o Final success criteria will be written to target Year 5 for temporary impact areas and Year 10 for permanent impact areas and habitat restoration areas, but the monitoring period may be extended if criteria are not met. In addition, if final performance criteria are not met, or if during monitoring it becomes clear that the restoration areas are not on a trajectory to meet final performance criteria, the plan will require preparation of remedial measures and may call for preparation of adapted final success criteria, which will be reviewed and approved by the regulatory agencies. o Repeat measurements of tidal hydrology, topography, and sedimentation throughout the monitoring period that document that tidal wetlands, managed ponds, created high-tide refugia, and seabird nesting islands are achieving target physical conditions for habitat establishment. • The HRMP will also include an adaptive management plan. The adaptive management plan will identify the management actions needed for attainment of the success criteria in the ecological monitoring plan). The performance period for the adaptive management plan will be the 10-year post-restoration monitoring period. Following this monitoring period, the habitat restoration sites within the Ravenswood Pond Complex will be adaptively managed in accordance with the South Bay Salt Pond Restoration Project's adaptive management plan. • Prior to Project construction, the Project Proponent will submit the HRMP to the San Francisco Bay Restoration Regulatory Integration Team (BRRIT) (including NMFS, USFWS, United States Army Corps of Engineers [USACE], CDFW, Regional Water Quality Control Board [RWQCB], and the San Francisco Bay Conservation and Development Commission [BCDC]) for approval pursuant to regulatory agency authorities.
Impact BIO-3: Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service.	LSM	**Mitigation Measure BIO-26: Habitat Restoration Monitoring Plan.** (refer to Impact BIO-2)
Impact BIO-4: 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.	LTS	No mitigation required.

Impact	Significance Determination	Mitigation Measure*
Impact BIO-5: Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.	LSM	**Mitigation Measure BIO-27: Protected Trees.** This measure applies to the following reaches: South of Bay Road, North of Bay Road, Dumbarton Approach, Substation and Marsh Restoration, Tech Campus, Bayfront Expressway, and Bedwell Bayfront Park. South of Bay Road and North of Bay Road are subject to the City of East Palo Alto Tree Ordinance, while the remainder are subject to the City of Menlo Park Municipal Code Section 13.24.040. The Project Proponent will retain a qualified arborist to conduct a tree survey of the construction footprint. Any trees to be removed will be evaluated for whether they are protected under the applicable local policies (City of East Palo Alto Ordinance 02-2022, City of Menlo Park Municipal Code Section 13.24.040, City of Redwood City Municipal Code Section 35.2). If so, the Project Proponent will avoid affecting these trees, if possible to do so without unreasonable added Project cost, or otherwise obtain a tree removal permit from the applicable local municipality. The Project will comply with all permit conditions, including replacement planting of removed trees if required. No replacement trees will be planted or allowed to grow within shoreline protection features or areas designated for restoration. Removed protected trees will be replaced at the ratio(s) stipulated in the terms of the tree removal permit(s) from the applicable local municipality, through one of the following means: • Replanting of ecologically appropriate native tree species in locations suitable for tree establishment and long-term survival; and/or • Protecting naturally recruited seedlings through the sampling stage. The Project Proponent will monitor the replacement trees for a 5-year period. The replacement trees will achieve at least 80 percent survival after 5 years of monitoring or will be replanted until at least 80 percent of the original replacement quantity is surviving at 5 years after initial planting or as stipulated in the tree removal permit(s).
Impact BIO-6: Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.	LTS	No mitigation required.
C-BIO-1: The Project, in combination with cumulative projects, would result in significant cumulative impacts on biological resources.	LSM	**Mitigation Measures BIO-1 through BIO-27.** (refer to Impacts BIO-1, BIO-2, BIO-3, and BIO-5)
Cultural Resources, EIR Section 3.5		
Impact CUL-1: Cause a substantial adverse change in the significance of a historical resource pursuant to § 15064.5.	NI	No mitigation required.

Impact	Significance Determination	Mitigation Measure*
Impact CUL-2: Cause a substantial adverse change in the significance of an archaeological resource pursuant to § 15064.5.	LSM	**Mitigation Measure CUL-1: Project-Level Cultural Resources Assessment.** When additional design details (including temporary and permanent areas of ground disturbance and depth of excavation) are available for shoreline protection features, habitat improvements, recreational features, and associated utilities improvements/relocations evaluated at a program-level of detail, the Project Proponent will retain a qualified archaeologist, defined as an archaeologist meeting the U.S. Secretary of the Interior's Professional Qualification Standards for Archaeology, to conduct a cultural resources investigation that includes, at a minimum: • An updated records search at the Northwest Information Center; • An intensive cultural resources survey of the proposed Area of Potential Effects; • A report disseminating the results of this research; and, • Recommendations for additional cultural resources work necessary to mitigate any adverse impacts on recorded and/or undiscovered cultural resources. **Mitigation Measure CUL-2: Monitoring Plan.** This measure applies to all reaches. Prior to authorization to proceed, the Project Proponent will retain a qualified archaeologist, defined as an archaeologist meeting the U.S. Secretary of the Interior's Professional Qualification Standards for Archeology. The archaeologist will prepare a cultural resources monitoring plan. The plan will be reviewed by consulting culturally affiliated Native American tribe(s) and the Project Proponent. The plan will include (but not be limited to) the following components: • Training program for all construction and field workers involved in site disturbance; onsite personnel shall attend a mandatory pre-Project training led by a Secretary of the Interior qualified archaeologist and consulting Native American representative(s). The training will outline the general cultural sensitivity of the area and the procedures to follow in the event cultural materials and/or human remains are inadvertently discovered. • Specifically, where monitoring will be completed and under what circumstances based on soil types, geology, distance to known sites, and other factors; • Person(s) responsible for conducting monitoring activities, including a request to consulting culturally affiliated Native American tribe(s) for a tribal monitor; • Person(s) responsible for overseeing and directing the monitors; • How the monitoring shall be conducted and the required format and content of monitoring reports; • Schedule for submittal of monitoring reports and person(s) responsible for review and approval of monitoring reports; • Protocol for notifications in case of encountering cultural resources, as well as methods of dealing with the encountered resources (e.g., collection, identification, curation); • Methods to ensure security of cultural resources sites; • Protocol for notifying local authorities (i.e., Sheriff, Police) should site looting and other illegal activities occur during construction. During monitoring, the archaeologist and consulting Native American tribe(s) may adjust the frequency—from continuous to intermittent—of the monitoring based on the conditions and professional judgment regarding the potential to affect resources. If cultural materials are encountered, all soil-disturbing activities within 100 feet in all directions of the find shall cease until the resource is evaluated. The archaeological monitor shall immediately notify the Project Proponent of the encountered resource. After making a reasonable effort to assess the identity, integrity, and significance of the encountered resource, in consultation with the consulting culturally affiliated Native American tribe(s), the archaeological monitor shall present the findings of this assessment and proceed according to the provisions of Mitigation Measure CUL-2 and, if applicable, Mitigation Measure CUL-3.

Impact	Significance Determination	Mitigation Measure*
		Mitigation Measure CUL-3: Inadvertent Discovery of Cultural Resources. This measure applies to all reaches. If pre-contact or historic-era archaeological resources are encountered during Project implementation, the Project Proponent will halt all construction activities within 100 feet of the resource, and a qualified archaeologist, defined as an archaeologist meeting the U.S. Secretary of the Interior's Professional Qualification Standards for Archaeology, shall inspect the find within 24 hours of discovery and notify the Project Proponent of their initial assessment. Pre-contact archaeological materials might include obsidian and chert flaked-stone tools (e.g., projectile points, knives, scrapers) or toolmaking debris; culturally darkened soil ("midden") containing heat-affected rocks, artifacts, or shellfish remains; stone milling equipment (e.g., mortars, pestles, handstones, or milling slabs); and battered stone tools, such as hammerstones and pitted stones. Historic-era materials might include building or structure footings and walls, and deposits of metal, glass, and/or ceramic refuse. If the Project Proponent determines, based on recommendations from a qualified archaeologist and a Native American representative (if the resource is pre-contact), that the resource may qualify as a historical resource or unique archaeological resource (as defined in CEQA Guidelines section 15064.5) or a tribal cultural resource (as defined in Public Resources Code section 21080.3), the resource shall be avoided, if feasible. Consistent with section 15126.4(b)(3), this may be accomplished through planning construction to avoid the resource; incorporating the resource within open space; capping and covering the resource; or deeding the site into a permanent conservation easement. If avoidance is not feasible, the Project Proponent shall consult with appropriate Native American tribes (if the resource is pre-contact), and other appropriate interested parties to determine treatment measures to avoid, minimize, or mitigate any potential impacts on the resource pursuant to Public Resources Code section 21083.2, and CEQA Guidelines section 15126.4. This shall include documentation of the resource and may include data recovery (according to Public Resources Code section 21083.2), if deemed appropriate, or other actions, such as treating the resource with culturally appropriate dignity and protecting the cultural character and integrity of the resource (according to Public Resources Code section 21084.3).
Impact CUL-3: Disturb any human remains, including those interred outside of dedicated cemeteries.	LSM	**Mitigation Measure CUL-4: Inadvertent Discovery of Human Remains.** This measure applies to all reaches. In the event of discovery or recognition of any human remains during construction activities, the Project Proponent will cease all such activities within 100 feet of the find until the County Coroner has been contacted to determine that no investigation of the cause of death is required. The Native American Heritage Commission (NAHC) will be contacted within 24 hours if it is determined that the remains are Native American. The NAHC will then identify the person or persons it believes to be the most likely descendant from the deceased Native American, who in turn would make recommendations to the lead agency for the appropriate means of treating the human remains and any grave goods.
Impact C-CUL-1: The Project, in combination with past, present, and probable future projects in the Project area, could result in significant adverse impacts related to cultural resources.	LSM	**Mitigation Measure CUL-1: Project-Level Cultural Resources Assessment.** (refer to Impact CUL-2) **Mitigation Measure CUL-2: Monitoring Plan.** (refer to Impact CUL-2) **Mitigation Measure CUL-3: Inadvertent Discovery of Cultural Resources.** (refer to Impact CUL-2) **Mitigation Measure CUL-4: Inadvertent Discovery of Human Remains.** (refer to Impact CUL-3)
Tribal Cultural Resources, EIR Section 3.6		
Impact TCR-1: Cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code § 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe.	LSM	**Mitigation Measure CUL-1: Project-Level Cultural Resources Assessment.** (refer to Impact CUL-2) **Mitigation Measure CUL-2: Monitoring Plan.** (refer to Impact CUL-2) **Mitigation Measure CUL-3: Inadvertent Discovery of Cultural Resources.** (refer to Impact CUL-2) **Mitigation Measure CUL-4: Inadvertent Discovery of Human Remains.** (refer to Impact CUL-3)

Impact	Significance Determination	Mitigation Measure*
Impact C-TCR-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse impacts related to tribal cultural resources.	LSM	**Mitigation Measure CUL-1: Project-Level Cultural Resources Assessment.** (refer to Impact CUL-2) **Mitigation Measure CUL-2: Monitoring Plan.** (refer to Impact CUL-2) **Mitigation Measure CUL-3: Inadvertent Discovery of Cultural Resources.** (refer to Impact CUL-2) **Mitigation Measure CUL-4: Inadvertent Discovery of Human Remains.** (refer to Impact CUL-3)
Energy, EIR Section 3.7		
Impact ENE-1: Result in a potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation or conflict with or obstruct a state or local plan for renewable energy or energy efficiency.	LTS	No mitigation required.
Impact C-ENE-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse impacts related to energy.	LTS	No mitigation required.
Geology, Soils and Paleontology, EIR Section 3.8		
Impact GEO-1: Cause potential substantial adverse effects involving rupture of a known earthquake fault, strong seismic ground shaking, seismic-related ground failure including liquefaction, and/or landslides.	LTS	No mitigation required.
Impact GEO-2: Result in substantial soil erosion or the loss of topsoil.	LTS	No mitigation required.
Impact GEO-3: Be located on a geologic unit or soil that is unstable, or that would become unstable because of the Project.	LTS	No mitigation required.
Impact GEO-4: Be located on expansive soil.	LTS	No mitigation required.
Impact C-GEO-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse impacts related to geology and soils.	LTS	No mitigation required.
Greenhouse Gas Emissions, EIR Section 3.9		
Impact GHG-1: Generate greenhouse gas emissions, either directly or indirectly, that	LTS	No mitigation required.

Impact	Significance Determination	Mitigation Measure*
may have a significant impact on the environment.		
Impact GHG-2: Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases.	NI	No mitigation required.
Impact C-GHG-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse impacts related to greenhouse gas emissions.	LTS	No mitigation required.
Hazards, Hazardous Materials, and Wildfire, EIR Section 3.10		
Impact HAZ-1: Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials, or reasonably foreseeable upset or accident conditions involving the release of hazardous materials into the environment.	LSM	**Mitigation Measure HYD-1b: Groundwater Handling Requirements.** (refer to Impact HYD-1) **Mitigation Measure HAZ-1: Health and Safety Plan.** This measure applies to all reaches. Where adopted plans are in place with measures and protocols to achieve performance standards related to hazardous soil and groundwater management (e.g., the CRMP for the 1990 Bay Road Site in the South of Bay Road Reach [prepared for and administered by RWQCB] and the Area-Wide Risk Management Plan for the Sycamore Real Estate Site in the North of Bay Road Reach [prepared for and administered by RWQCB]), the Project Proponent would implement the adopted measures to protect human health and the environment from potential impacts related to exposure to hazardous materials. For construction sites outside of adopted plan areas, before the start of ground-disturbing activities at a Project site, including grading, excavation, or demolition of structures, the Project Proponent shall require that the construction contractor(s) retain a qualified professional to prepare a site-specific health and safety plan (HSP) in accordance with federal OSHA regulations (Code of Federal Regulations title 29, section 1910.120) and Cal/OSHA regulations (California Code of Regulations title 8, section 5192). The HSP shall be submitted to the Project Proponent and San Mateo County or the applicable city for review before the start of demolition and construction activities and as a condition of the grading, construction, and/or demolition permit(s). The HSP shall include, but not be limited to, the following elements: • Designation of a trained, experienced site safety and health supervisor who has the responsibility and authority to develop and implement the site HSP. • A summary of all potential risks to demolition and construction workers and maximum exposure limits for all known and reasonably foreseeable site chemicals. • Specified personal protective equipment and decontamination procedures, if needed. • The requirement to prepare documentation showing that HSP measures have been implemented during construction (e.g., tailgate safety meeting notes with signup sheet for attendees). • A requirement specifying that any site worker who identifies hazardous materials has the authority to stop work and notify the site's safety and health supervisor. • Emergency procedures, including the route to the nearest hospital. • Procedures to follow if evidence of potential soil or groundwater contamination is encountered (such as soil staining, noxious odors, debris, or buried storage containers). These procedures shall be followed in accordance with hazardous waste operations regulations and shall specifically include, but not be limited to, immediately stopping work in the vicinity of

Impact	Significance Determination	Mitigation Measure*
		the unknown hazardous materials release; notifying the Project Proponent and the RWQCB; and retaining a qualified environmental firm to perform sampling and remediation. The construction contractor shall implement the HSP to protect construction workers, the public, and the environment during all ground-disturbing and demolition activities. **Mitigation Measure HAZ-2, Soil Management Plan.** This measure applies to all reaches. Contaminated soil is well documented in the Project area. Where adopted plans are in place with measures and protocols to achieve performance standards related to hazardous soil and groundwater management (e.g., the CRMP for the 1990 Bay Road Site in the South of Bay Road Reach and the Area-Wide Risk Management Plan for the Sycamore Real Estate Site in the North of Bay Road Reach), the Project Proponent would implement the adopted measures to protect human health and the environment from potential impacts related to exposure to hazardous materials. For construction sites outside of adopted plan areas and within or adjacent to known contamination sites, using existing data to the extent practicable, the Project Proponent or its contractor(s) shall develop and implement a Soil Management Plan that specifies how the construction contractor shall remove, handle, transport, and dispose of all excavated material in a safe, appropriate, and lawful manner. The plan shall identify protocols for: training workers to recognize potential soil contamination (such as soil staining, noxious odors, debris, or buried objects or containers), soil testing, and disposal by a qualified contractor in the event that contamination is identified, and identification of approved disposal sites (e.g., approved landfill or reuse site). Uncontaminated soil may be reused onsite. Contract specifications shall mandate approval of the Soil Management Plan by the Project Proponent as well as full compliance with all applicable local, state, and federal regulations related to the identification, transportation, and disposal of hazardous materials.
Impact HAZ-2: Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school.	LTS	No mitigation required.
Impact HAZ-3: Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code § 65962.5 and, as a result, would it create a significant hazard to the public or the environment.	LSM	**Mitigation Measure HAZ-1: Health and Safety Plan.** (refer to Impact HAZ-1) **Mitigation Measure HAZ-2: Soil Management Plan.** (refer to Impact HAZ-1) **Mitigation Measure HYD-1b: Groundwater Handling Requirements.** (refer to Impact HYD-1)
Impact HAZ-4: For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, result in a safety hazard or excessive noise for people residing or working in the project area.	LTS	No mitigation required.

Impact	Significance Determination	Mitigation Measure*
Impact HAZ-5: Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plans.	LSM	**Mitigation Measure TRA-1: Implement Traffic Control Plan.** (refer to Impact TRA-1)
Impact HAZ-6: Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires.	LTS	No mitigation required.
Impact C-HAZ-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse impacts related to hazards and hazardous materials.	LSM	**Mitigation Measure HAZ-1: Health and Safety Plan.** (refer to Impact HAZ-1) **Mitigation Measure HAZ-2: Soil Management Plan.** (refer to Impact HAZ-1) **Mitigation Measure HYD-1b: Groundwater Handling Requirements.** (refer to Impact HYD-1)
Hydrology and Water Quality, EIR Section 3.11		
Impact HYD-1: Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality.	LSM	**Mitigation Measure BIO-10: Minimize Dredging Impacts.** (refer to Impact BIO-1) **Mitigation Measure HYD-1a: Master QAPP for Imported Terrestrial Fill.** This measure applies to imported fill for all reaches including those outside the Refuge. The Project Proponent shall implement the requirements of the Master Quality Assurance Project Plan (Master QAPP) for the Don Edwards San Francisco Bay National Wildlife Refuge for all imported terrestrial fill to be used on the Project site. Consistent with the Master QAPP, fill testing shall be required, and no imported fill shall be placed that does not meet the Master QAPP process or requirements. Documentation shall be prepared to demonstrate compliance with the Master QAPP that specifies the identities and qualifications of the Project's team members, the Project purpose, Project-specific permits (including the agency-specific identification numbers for those permits), and project-specific material handling protocols. **Mitigation Measure HYD-1b: Groundwater Handling Requirements.** This measure applies to the North of Bay Road and Marsh Road reaches. If excavations for the North of Bay Road Reach east of 2081 Bay Road would occur in East Slough (located between 2081 Bay Road and the existing Bay Trail) or extend below approximately 5 feet below ground surface, dewatering of groundwater is likely. Excavations for the Marsh Road Reach could also require dewatering. If groundwater is encountered, and dewatering is necessary, the Project Proponent shall temporarily store and sample the groundwater to evaluate disposal options, which may include but are not limited to discharge to sanitary sewer or storm drain, application to land, or offsite disposal. Prior to discharge, a qualified engineer or other qualified professional shall review analytical sampling results and develop a proposed discharge that prevents the release of groundwater with contaminant levels that exceed the final Media Cleanup Objectives for Romic East Palo Alto (2081 Bay Road) in Table 1 of the EPA *Final Remedy Decision for Former Romic Environmental Technologies Corporation Facility, East Palo Alto, California*, July, 2008, unless otherwise specified by the EPA, Department of Substances Control, and RWQCB. The Project proponent shall document the proposed discharge approach in a groundwater management plan and submit it to the EPA, Department of Substances Control, and RWQCB for review. If discharging to the sanitary sewer is a possibility, the Project proponent shall contact the East Palo Alto Sanitary District to inquire about obtaining a special discharge permit.

Impact	Significance Determination	Mitigation Measure*
Impact HYD-2: Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would result in substantial erosion or siltation.	LTS	No mitigation required.
Impact HYD-3: Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or impede or redirect flood flows.	LSM	**Mitigation Measure HYD-2a: Runnymede Pump Station Design.** This measure applies to the South of Bay Road Reach. The Project Proponent shall include a pump station in the South of Bay Road Reach levee, a pipeline over the levee, or other method designed by a qualified engineer to convey discharge from the stormwater drainage system at the eastern end of Runnymede Street to San Francisco Bay. If the Runnymede Pump Station has been completed inland of the proposed shoreline protection, then the conveyance shall be sized to sufficiently convey the maximum flow from Runnymede Pump Station and shall include a discharge structure consistent with the proposed Runnymede Pump Station's discharge structure. If the Runnymede Pump Station has not been completed, then the Project proponent shall incorporate the Runnymede Pump Station into the proposed SAFER Bay Project. The conveyance or Runnymede Pump Station shall be operational prior to construction of the North of Bay Road shoreline protection. **Mitigation Measure HYD-2b: Substation and Marsh Restoration Reach Stormwater Infrastructure.** The Project Proponent shall conduct a detailed hydraulic analysis that assesses whether the portions of Pond R2 inboard of the proposed shoreline protection are sufficiently sized to detain runoff from the Ravenswood Substation during the 100-year recurrence interval precipitation event without flooding the Ravenswood Substation. If the portions of Pond R2 are not sufficient to detain runoff from the 100-year recurrence interval precipitation event, the Project proponent shall design and construct stormwater infrastructure that is sufficiently sized to accommodate the volume of runoff that exceeds the detention capacity of the portions of Pond R2 inboard of the levee. The stormwater infrastructure shall be designed by a qualified professional and could include extension of existing stormwater conveyance infrastructure in the frontage road to the Ravenswood Substation or other methods. The stormwater infrastructure shall be designed to prevent non-stormwater discharges from entering San Francisco Bay. **Mitigation Measure HYD-2c: Bayfront Canal Drainage Conveyance Design.** This measure applies to the Marsh Road and Bedwell Bayfront reaches. The Project Proponent shall include a pump station in the Marsh Road or Bedwell Bayfront Reach levee, a pipeline over the levee, or other method designed by a qualified engineer to convey discharge from the Bayfront Canal to San Francisco Bay. The conveyance design shall be based on updated stormwater drainage system modeling that includes improvement projects to storm drain systems since 2023 and incorporates the effects of the Marsh Road Reach levee and expected cumulative projects on storage capacity in Bayfront Canal. The conveyance shall be designed with sufficient capacity to avoid increasing flood water surface elevations in developed areas near Bayfront Canal and Atherton Channel. The conveyance shall be operational prior to construction of the Marsh Road Reach.
Impact HYD-4: In a flood hazard, tsunami, or seiche zone, risk release of pollutants due to project inundation.	LTS	No mitigation required.
Impact HYD-5: Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan.	LSM	**Mitigation Measure BIO-10, Minimize Dredging Impacts.** (refer to Impact BIO-1) **Mitigation Measure HYD-1a: Master QAPP for Imported Terrestrial Fill.** (refer to Impact HYD-1) **Mitigation Measure HYD-1b: Groundwater Handling Requirements.** (refer to Impact HYD-1)

Impact	Significance Determination	Mitigation Measure*
Impact C-HYD-1: The Project, in combination with past, present, and probable future projects in the Project area, would result in significant adverse impacts related to hydrology and water quality.	LSM	**Mitigation Measure HYD-1b: Groundwater Handling Requirements.** (refer to Impact HYD-1) **Mitigation Measure HYD-2a: Runnymede Pump Station Design.** (refer to Impact HYD-3) **Mitigation Measure HYD-2c: Bayfront Canal Pump Station Design.** (refer to Impact HYD-3)
Land Use, Agriculture, and Forestry Resources, EIR Section 3.12		
Impact LU-1: Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect.	LTS	No mitigation required.
Impact C-LU-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse impacts related to land use.	NI	No mitigation required.
Noise and Vibration, EIR Section 3.13		
Impact NOI-1: Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.	SUM	**Mitigation Measure NOI-1: Construction Noise Control Plan.** This measure applies to construction of the South of Bay Road, North of Bay Road, Tech Campus, Bayfront Expressway, Bedwell Bayfront Park, and Marsh Road reaches. The Project Proponent or its contractors shall develop and implement a Construction Noise Control Plan(s) that shall require implementation of specific noise attenuation measures during construction of these reaches to reduce the generation of construction noise. The Noise Control Plan(s) shall be submitted for review and approval by the City of East Palo Alto Community & Economic Development, City of Menlo Park Community Development Department, and City of Redwood City Community Development Department, as applicable. The Construction Noise Control Plan shall include, but not be limited to, the following measures: • Designation of an onsite construction noise manager responsible for receiving and investigating construction noise complaints; • Notification of the noise-sensitive receptors identified in Table 3.13-2, as well as noise-sensitive receptors along local road use for haul truck access, at least 30 days prior to the start of construction activities. This notice shall provide contact information for the designated onsite construction noise manager responsible for receiving and investigating construction noise complaints; • A procedure for notifying the appropriate planning or public works department of any noise complaints within 1 week of receiving a complaint; • A description of the measures that will be implemented to reduce construction noise levels, including, but not limited to: o Equipment and trucks used for construction shall use the best available noise control techniques (e.g., improved mufflers, equipment redesign, use of intake silencers, ducts, engine enclosures, and acoustically attenuating shields or shrouds). o Impact tools (e.g., jack hammers, pavement breakers, and rock drills) used for construction shall be hydraulically or electrically powered wherever possible to avoid noise associated with compressed air exhaust from pneumatically powered tools. Where use of pneumatic tools is unavoidable, an exhaust muffler on the compressed air exhaust shall be used; this muffler can lower noise levels from the exhaust by up to about 10 dBA. External jackets on the tools

Impact	Significance Determination	Mitigation Measure*
		themselves shall be used where feasible; this could achieve a reduction of 5 dBA. Quieter procedures, such as use of drills rather than impact tools, shall be used where feasible. o Stationary noise sources shall be located as far from adjacent receptors as possible, and shall be muffled and shielded from sensitive residential receptors by temporary barriers or enclosures. o Off-site truck queuing and staging on residential roads shall be prohibited unless specifically authorized by the Project's traffic control plan(s) required under Mitigation Measure TRA-1. All on-site queueing and staging of trucks shall occur as far from sensitive residential receptors as possible.
Impact NOI-2: Generation of excessive groundborne vibration or groundborne noise levels.	LTS	No mitigation required.
Impact NOI-3: For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels.	LTS	No mitigation required.
Impact C-NOI-1: The Project, in combination with past, present, and probable future projects in the Project area, would result in significant adverse impacts related to noise and vibration.	SUM	**Mitigation Measure NOI-1: Construction Noise Control Plan.** (refer to Impact NOI-1)
Population and Housing, EIR Section 3.14		
Impact POP-1: Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure).	NI	No mitigation required.
Impact C-POP-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse impacts related to population and housing.	NI	No mitigation required.
Recreation, EIR Section 3.15		
Impact REC-1: 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.	LTS	No mitigation required.

Impact	Significance Determination	Mitigation Measure*
Impact C-REC-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse impacts related to recreational resources.	LTS	No mitigation required.
Transportation, EIR Section 3.16		
Impact TRA-1: Conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities.	LSM	**Mitigation Measure TRA-1: Implement Traffic Control Plan.** This measure applies to all reaches. The Project Proponent shall require contractors to develop and implement traffic control plans. The traffic control plans shall be developed in coordination with SFCJPA member agencies, the City of Redwood City (for reaches within that city), other contractors constructing Project components, and Caltrans and emergency service providers (e.g., Menlo Park Fire Protection District) as applicable in developing circulation and detour plans. The traffic control plans shall address transportation facilities adjacent to and directly affected by the Project. The traffic control plans shall address the transportation impact(s) of Project construction trips related to conflicts with applicable policies related to transportation safety, the circulation system, and emergency access. The traffic control plans shall include, but not be limited to, the following: • Identification of full and partial closure of transportation facilities, including vehicle, bicycle, and pedestrian facilities. • Circulation and detour plans that include the use of signage, flagging, fences, barriers, lights, and/or guards as necessary to guide vehicles, pedestrians, and cyclists through or around the construction zone and any temporary traffic control devices. • Bicycle or pedestrian detour plans, where applicable. • Identification of parking for construction workers along public roadways. • Haul routes for construction trucks and staging areas for instances when multiple trucks arrive at the work sites. • Protocols for updating traffic control plans to account for delays or changes in the Project construction schedule. • Opportunities to direct construction traffic outside of peak hours where feasible. The contractors shall submit draft traffic control plans to the Project Proponent for review not less than 30 days prior to construction. The Project Proponent implementing each Project component shall verify that the appropriate agencies have been consulted in the assembly of each plan and that all appropriate measures are included in the plan.
Impact TRA-2: Conflict or be inconsistent with CEQA Guidelines § 15064.3, subdivision (b).	LTS	No mitigation required.
Impact TRA-3: Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment).	LSM	**Mitigation Measure TRA-1: Implement Traffic Control Plan.** (refer to Impact TRA-1) **Mitigation Measure TRA-2: Implement Roadway Maintenance Plan.** This measure applies to all reaches that require truck trips on residential streets. The Project Proponent shall implement a Roadway Maintenance Plan for roadway segments that will be utilized by Project haul trips that are not designated truck routes. The Roadway Maintenance Plan shall maintain sufficient roadway quality to serve all existing modes served by affected roadways to be utilized by the proposed project under existing conditions. The Roadway Maintenance Plan shall include the following elements: 1. Prior to the start of construction, the Project Proponent or its contractor shall: a. Identify designated haul routes for the Project, identifying roadway segments to be utilized that are not designated haul routes which shall be subject to the Roadway Maintenance Plan. b. Perform a preconstruction survey to assess and document the pre-Project baseline conditions of roadway segments subject to the Roadway Maintenance Plan.

Impact	Significance Determination	Mitigation Measure*
		2. During construction, the Project Proponent shall periodically assess the conditions of roadways included in the Roadway Maintenance Plan and shall implement repairs to affected facilities to the extent that function and the safe use of such facilities is maintained throughout the duration of Project construction, except where temporary facilities closures are implemented. 3. At completion of Project construction, the Project Proponent shall improve roadway segments included in the Roadway Maintenance Plan such that roads damaged by Project construction will be repaired to a structural condition equal to that which existed prior to construction activity.
Impact TRA-4: Result in inadequate emergency access.	LSM	**Mitigation Measure TRA-1: Implement Coordinated Traffic Control Plan.** (refer to Impact TRA-1)
Impact C-TRA-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse impacts related to transportation.	LSM	**Mitigation Measure TRA-1: Implement Coordinated Traffic Control Plan.** (refer to Impact TRA-1) **Mitigation Measure TRA-2: Implement Roadway Maintenance Plan.** (refer to Impact TRA-3)
Utilities, Service Systems, and Public Services, EIR Section 3.17		
Impact USP-1: Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects.	LTS	No mitigation required.
Impact USP-2: Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years.	LTS	No mitigation required.
Impact USP-3: Generate solid waste in excess of state or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals.	LTS	No mitigation required.
Impact USP-4: Fail to comply with federal, state, and local management and reduction statutes and regulations related to solid waste.	LTS	No mitigation required.

Impact	Significance Determination	Mitigation Measure*
Impact USP-5: Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for fire protection, police protection, schools, parks, or other public facilities.	LTS	No mitigation required.
Impact C-USP-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse impacts related to utilities, service systems, and public services.	LTS	No mitigation required.

NOTES: BOD = Basis of Design; BRRIT = Bay Restoration Regulatory Integration Team; CDFW = California Department of Fish and Wildlife; CQA = California Environmental Quality Act; CESA = California Endangered Species Act; CRMP = construction risk management plan; CTHMMP = Congdon's Tarplant Habitat Mitigation and Management Plan; EFH = essential fish habitat; EPA = U.S. Environmental Protection Agency; HRMP = habitat restoration monitoring plan; HSP = health and safety plan; Master QAPP= master quality assurance project plan; NAHC = Native American Heritage Commission; NMFS = National Marine Fisheries Service; OSHA = Occupational Safety and Health Administration; PG&E = Pacific Gas and Electric Company; Qualified Biologist- approved for the target species by the USFWS and CDFW; RWQCB = Regional Water Quality Control Board; SFCJPA = San Francisquito Creek Joint Powers Authority; SFPUC = San Francisco Public Utilities Commission; SMP = soil management plan; USFWS = U.S. Fish and Wildlife Service

SOURCE: Table compiled by Environmental Science Associates in 2025.

CHAPTER 1
Introduction

1.1 Purpose of this Environmental Impact Report

This environmental impact report (EIR) has been prepared by the San Francisquito Creek Joint Powers Authority (SFCJPA) in conformance with the provisions of the California Environmental Quality Act[1] (CEQA) and the CEQA Guidelines.[2] The SFCJPA serves as the lead agency for development of the EIR for the proposed Strategy to Advance Flood Protection, Ecosystems, and Recreation along San Francisco Bay Project (SAFER Bay Project or Project), with input and coordination provided by member agencies and other agencies. The lead agency is the public agency that has primary responsibility for carrying out or approving a project. CEQA requires the preparation of an EIR when a project could have significant impacts on the physical environment. SFCJPA determined that the Project, for which the SFCJPA is the Project Proponent, could cause significant environmental impacts, and that preparation of an EIR was warranted.

CEQA requires that all state and local government agencies consider the environmental consequences over which they have discretionary authority before taking an action that has the potential to affect the environment. Consistent with the CEQA Guidelines, the SFCJPA has prepared this EIR to inform agencies and the public about the Project, to evaluate the environmental impacts associated with the Project, and to identify measures to reduce such impacts.

Funding for this EIR has been provided by the California Department of Water Resources and the San Francisco Bay Restoration Authority.

1.2 Environmental Review Process

The environmental review process for the Project includes multiple steps: publication of a notice of preparation (NOP), public scoping period, publication of a Draft EIR, public and agency review of the Draft EIR, publication of responses to public and agency comments on the Draft EIR, and certification of the Final EIR. Each of these steps involves public outreach, as described below. Section 1.3 describes additional public outreach conducted for the Project.

This EIR includes program-level and project-level analyses and in part serves as a program EIR pursuant to CEQA Guidelines section 15168. Refer to Section 1.2.5 for more information on this topic.

[1] Public Resources Code sections 21000 et seq.

[2] California Code of Regulations title 14, division 6, chapter 3, sections 15000 et seq.

1.2.1 Notice of Preparation

In accordance with sections 15063 and 15082 of the CEQA Guidelines, on April 22, 2022, SFCJPA distributed an NOP to responsible and other public agencies and interested parties to begin the formal CEQA scoping process for the Project. The NOP informed agencies and the public about the Project and SFCJPA's decision to prepare an EIR and included a request for comments on environmental issues that should be addressed in the EIR.

SFCJPA held virtual public scoping meetings at 6:00 p.m. on Wednesday, May 11, 2022, and Thursday May 19, 2022, to receive comments on the scope of the EIR. The public comment period started on April 22, 2022, and ended on June 6, 2022. Appendix SCOP presents the NOP and written comments received during the scoping period. SFCJPA has considered comments pertaining to the scope and content of the EIR made by the public and agencies in preparing this EIR.

1.2.2 Draft EIR

This Draft EIR has been prepared in accordance with CEQA and the CEQA Guidelines. It provides an analysis of the physical environmental impacts of Project construction and operation, and the Project's contribution to the environmental impacts of foreseeable cumulative development.

The CEQA Guidelines encourage public participation in the planning and environmental review process. Publication of this Draft EIR marks the beginning of a comment period, during which the Draft EIR will be available to local, state, and federal agencies, interested organizations, and individuals for review. The Draft EIR is available for public review on the SFCJPA's web page (https://www.sfcjpa.org/safer-bay-project). Paper copies are also available to review by appointment at the SFCJPA's offices at 750 Menlo Avenue, Suite 250, Menlo Park.

The SFCJPA will hold the following public meetings during the Draft EIR public comment period to present the Project, summarize the impacts of the Project on the physical environment and solicit comments on the Draft EIR.

Monday, December 15, 2025, 6:00 p.m. to 8:00 p.m.

East Palo Alto Government Center
Council Chamber (1st Floor)
2415 University Avenue
East Palo Alto, CA 94303

Wednesday, December 17, 2025. 6:00 p.m. to 8:00 p.m.

Menlo Park City Hall, City Council Chambers
701 Laurel Street
Menlo Park, CA 94025

In addition, the regularly scheduled SFCJPA Board of Directors Meeting on December 18, 2025 will be a Public Hearing with a presentation about the Draft EIR and SAFER Bay Project. The SFCJPA Board meeting will begin at 3:30 p.m. and will take place in person at the Menlo Park City Hall, City Council Chambers (701 Laurel Street, Menlo Park, CA 94025) and online via Zoom

(https://us02web.zoom.us/webinar/register/WN_eAVko6C-Q7qfQuBHBn5grg). Participants must register to join the meeting online.

Written comments on the Draft EIR must be submitted by 5:00 p.m. on Friday, January 23, 2026. Comments may be submitted:

- Via email: tbyler@sfcjpa.org
- Via the form on the Project's website (www.sfcjpa.org/the-safer-bay-project)
- In person at the public meetings described above
- Via mail, postmarked on or before January 23, 2026 to:

  San Francisquito Creek Joint Powers Authority
  ATTN: Tess Byler, Sr. Project Manager
  750 Menlo Avenue #250
  Menlo Park, CA 94025

1.2.3 Final EIR

Following the close of the Draft EIR public comment period, the SFCJPA will prepare and publish a document entitled "Responses to Comments," which will contain a copy of all comments received on this Draft EIR and written responses to all substantive comments. The document may also contain specific changes and revisions to the Draft EIR. This Draft EIR, together with the Responses to Comments document, will constitute the Final EIR. In an advertised public meeting, the Board of Directors will consider whether to certify the Final EIR as adequate and in compliance with CEQA.

1.2.4 Mitigation Monitoring and Reporting Program

The SFCJPA will use the information in the certified Final EIR in its deliberations on whether to approve, modify, or deny the Project or aspects of the Project. If SFCJPA approves the Project, it will adopt CEQA findings that identify the Project-related impacts and the mitigation measures or alternatives that have been adopted to reduce significant impacts. A Mitigation Monitoring and Reporting Program must be adopted by SFCJPA as part of the adoption of the CEQA findings. The Mitigation Monitoring and Reporting Program lists the mitigation measures included in the Project as identified in the Final EIR, entities responsible for implementing the measures, timing of implementation of the measures, and associated reporting requirements. If significant and unavoidable impacts would occur even with implementation of all identified mitigation measures, SFCJPA must adopt as a condition of approval of the Project a Statement of Overriding Considerations documenting how the benefits of Project implementation outweigh its significant and unavoidable impacts on the environment.

1.2.5 Program–Project EIR and Supplemental CEQA

The SAFER Bay Project would be implemented in phases at different times; this is reflected in the degree to which design has been advanced for the Project and, consequently, the level of detail of the analyses in this EIR. Those Project components for which 30 percent design is available are generally evaluated at a project level of detail; those Project components for which conceptual (generally 10 percent) design information is available are generally evaluated at a program level of detail. Changes may occur as design progresses based on factors such as funding and land acquisition. At that time, the SFCJPA or its member

agencies will conduct evaluations pursuant to CEQA Guidelines sections 15162 through 15164 to determine whether the activity remains within the scope of this EIR or substantial changes are proposed in the Project that would require major revisions to this EIR due to the involvement of new significant environmental impacts or a substantial increase in the severity of a significant impact identified in this EIR. Based on those evaluations, an Addendum to this EIR may be prepared if design refinements would not result in new or more severe significant impacts; if they would, a supplemental or subsequent EIR may be prepared.

Chapter 3, *Environmental Setting, Impacts, and Mitigation Measures*, presents additional information on the approach to project- and program-level impact evaluations by environmental topic.

1.3 Other Public Outreach

SFCJPA has partnered with community-based organizations Climate Resilient Communities and Nuestra Casa and formed a citizen's advisory committee for sustained outreach regarding the SAFER Bay Project. SFCJPA has also partnered with Grassroots Ecology for educational outreach. **Table 1-1** identifies public outreach activities that the SFCJPA has conducted for the SAFER Bay Project, listed chronologically.

In addition to the public outreach activities noted in Table 1-1, there have been coordination meetings with the member cities, updates to city councils, Bay Area Restoration Regulatory Integration Team (BRRIT) preapplication meetings, meetings with SAFER landowners, coordination with universities or other working groups, and SAFER Bay Project tours for elected officials. Seven BRRIT preapplication meetings have occurred between March 2020 and May 14, 2025 to provide regulatory agencies opportunities to comment on and provide guidance for the Project and to provide the SFCJPA with a forum to solicit guidance regarding regulatory permitting.

The SFCJPA also conducted a survey to inform residents about the SAFER Bay Project and publication of the Draft EIR. The survey was mailed to over 3,000 residents in July 2025 and the SFCJPA has been conducting related outreach since then.

TABLE 1-1
ADDITIONAL PUBLIC OUTREACH REGARDING THE SAFER BAY PROJECT

Year	Date	Event
2020	May 29	Presentation to East Palo Alto Climate Action Group
	October 21	Update to Ravenswood Shores Business District public meeting
2021	December 20	Presentation to East Palo Alto Rotary Club
2022	March 13	Presentation to the Palo Alto Rotary Club
	May 16	Presentation to Menlo Park
	September 24	Tabling event at Harvest Properties and Original Good's Community Festival
	December 7	SAFER Community Advisory Committee Meeting #1
2023	April 29	Educational outreach event with Grassroots Ecology Bay Trail for trash cleanup, invasive plant removal, and planting in East Palo Alto
	May 2	California Smart Coast Policy Summit
	July 31–August 2	California Climate Adaptation Forum
	September 5	SAFER update with Citizens to Complete the Refuge, Save the Bay, and other interested parties
	September 11	Presentation on SAFER Bay to Sustainable Silicon Valley's "Virtual Waterpalooza"
	September 20	SAFER Community Advisory Committee Meeting #2
	October 6	Public tour of the SAFER Bay Project area for the Board of the San Francisco Bay Restoration Authority and interested members of the public with Climate Resilient Communities, Nuestra Casa, and Grassroots Ecology
	November 14	SAFER Bay Community Advisory Group Meeting #3
	November 18, December 16	Educational outreach event with Grassroots Ecology for Bay Trail trash cleanup, invasive plant removal, and planting in East Palo Alto
2024	May 28–29	State of the Estuary Conference
	May 31	Bay Conservation and Development Commission Workshop
	August 8	Rising Together: The Bay Adapt Summit at the Exploratorium in San Francisco
	August 14	SFCJPA presented an update on SAFER Bay to the Board of Midpeninsula Open Space Preserve
	August 15	SAFER Bay Project area tour for Youth United for Community Action with Nuestra Casa
	October 2	SAFER public tour following Bay Area Climate Adaptation Network (BayCAN) annual meeting
	October 19	Flyway Trail Opening Event
	October 22	Educational Outreach Event at Bedwell Bayfront Park in Menlo Park with Grassroots Ecology
	December 5	Wetlands For Climate Partnership Coastal and Deltaic Wetlands Bay Area Workshop
2025	January 11	Educational Outreach Event at Bedwell Bayfront Park in Menlo Park with Grassroots Ecology
	February 12	SAFER Community Advisory Group Meeting #4
	April 9	Bedwell Bayfront Park SAFER Educational Outreach Volunteer Workday with Dharma Treasury Temple
	April 12	Educational Outreach Event at Bedwell Bayfront Park in Menlo Park with Grassroots Ecology
	April 26	SAFER Bay Advisory Group bus tour of the SAFER Bay Project Area
	May 11	SAFER Community Advisory Group Meeting #5
	July 10	Meeting with East Palo Alto Climate Change Team
	July 17	Meeting with Belle Haven Climate Change Team
	August 13	SAFER Community Advisory Group Meeting #6

1.4 Organization of the EIR

This EIR is organized as follows:

- **Chapter S, *Summary*.** This chapter summarizes the Project, identifies potential significant environmental impacts and mitigation measures, describes the alternatives considered in this EIR, and identifies areas of controversy and issues to be resolved.
- **Chapter 1, *Introduction*.** This chapter describes the purpose and organization of the EIR, as well as the environmental review process and additional public outreach efforts.
- **Chapter 2, *Project Description*.** This chapter provides background information on the Project, describes its location, identifies Project Objectives, describes Project components, presents information on construction and operations, and identifies the intended uses of this EIR (including a list of approvals relevant to the Project).
- **Chapter 3, *Environmental Setting, Impacts, and Mitigation Measures*.** This chapter is subdivided into sections for each environmental resource topic analyzed. Each section describes the environmental and regulatory setting, the criteria used to determine impact significance, and the approach to the analysis for that resource topic. It then presents analyses of potential environmental impacts as well as mitigation measures that have been developed to address significant impacts. Each section also includes an evaluation of cumulative impacts with respect to that resource topic.
- **Chapter 4, *Alternatives*.** This chapter describes the alternatives to the Project and compares their impacts to those of the Project. This chapter also summarizes the alternatives that were considered but eliminated from further analysis.
- **Chapter 5, *Other CEQA Issues*.** This chapter identifies the significant environmental impacts that cannot be avoided if the Project is implemented, describes significant irreversible impacts, and discusses the Project's potential to induce growth.
- **Chapter 6, *Report Preparers*.** This chapter lists the authors of this EIR.

Technical and supporting information for the EIR are included as appendices to the EIR.

CHAPTER 2
Project Description

2.1 Project Background

The San Francisquito Creek Joint Powers Authority (SFCJPA) is a regional government agency represented and funded by the cities of East Palo Alto, Menlo Park, and Palo Alto; San Mateo County Flood and Sea Level Rise Resiliency District (OneShoreline); and Santa Clara Valley Water District. SFCJPA works with its member agencies to plan, design, and implement multi-benefit projects across these jurisdictional boundaries to reduce flood risks, enhance and restore ecosystems, and improve public trails within member cities.

The project known as the Strategy to Advance Flood Protection, Ecosystems, and Recreation along San Francisco Bay Project (SAFER Bay Project or Project) would be implemented by SFCJPA and its member cities, specifically East Palo Alto and Menlo Park.

2.2 Project Location

The SAFER Bay Project site is located west of San Francisco Bay along approximately 7 miles of shoreline, starting from O'Connor Street in East Palo Alto at San Francisquito Creek to Redwood City near the Menlo Park city boundary to the northwest (refer to **Figure 2-1**). The Project would connect to and is consistent with design criteria for SFCJPA's completed San Francisquito Creek Flood Protection and Ecosystem Restoration Project. The Project is divided into eight reaches[1] based on local geography and hydrology, shown on Figure 2-1:

- South of Bay Road–East Palo Alto (South of Bay Road)
- North of Bay Road–East Palo Alto (North of Bay Road)
- Dumbarton Approach
- Substation and Marsh Restoration
- Tech Campus
- Bayfront Expressway
- Bedwell Bayfront Park
- Marsh Road

The Project site is within the cities of East Palo Alto, Menlo Park, and Redwood City in San Mateo County on both public and privately owned property. The Project includes actions within the Don Edwards San Francisco Bay National Wildlife Refuge (Refuge), including Refuge-managed land in the Ravenswood Pond Complex; in the Faber and Laumeister marshes (owned by the City of Palo Alto); and in the Ravenswood Open Space Preserve (owned by Midpeninsula Regional Open Space District).

[1] As used here, *reach* refers to a linear segment of the Project.



SOURCES: NAIP Imagery, 2024; HDR, 2024; ESA, 2024

NOTES: Reaches to be evaluated at a project-level of detail are shown in solid lines; reaches to be evaluated at a program-level of detail are shown as dashed lines. The northern ends of the Bayfront Expressway and Bedwell Bayfront Park Reaches tie into high ground at Bedwell Bayfront Park.

SAFER Bay Project

Figure 2-1
Project Location and Components

ESA

The Project also includes actions within land owned by the State of California (within the State Route [SR] 84 right-of-way at the western approach to the Dumbarton Bridge), San Francisco Public Utilities Commission (SFPUC), Cargill Corporation, and others. Appendix APN lists the Assessor's Parcel Numbers of properties that are partially within the footprint of the Project site.

2.3 Project Need, Purpose, and Objectives

2.3.1 Need for the Project

Currently, parts of East Palo Alto and Menlo Park are exposed to coastal flooding from San Francisco Bay, and this flood hazard is expected to worsen with sea level rise. These areas are within the existing 1-percent annual chance (commonly referred to as the 100-year flood event) flood hazard area as mapped by the Federal Emergency Management Agency (FEMA; refer to Appendix FEMA for a map of flood hazard zones near the SAFER Bay Project). With respect to habitat, according to the *Baylands Ecosystem Habitat Goals Science Update 2015*, between the years 1800 and 1998, 79 percent of San Francisco Bay tidal marshes were lost to diking and filling.[2] Tidal marsh habitat provides nesting and foraging habitat and upland refugia for endangered species, such as the California Ridgway's rail (*Rallus obsoletus obsoletus*) and salt marsh harvest mouse (*Reithrodontomys raviventris*). In some areas of the Project site, tidal salt marsh habitat cannot be restored until adequate flood protection for landward uses is in place. Where salt marsh habitat has been restored, there has been a reduction in available nesting and foraging habitat for federally listed as threatened western snowy plover (*Charadrius nivosus nivosus*). Managed pond habitat for the western snowy plover is also vulnerable to coastal flooding, as are segments of the San Francisco Bay Trail (Bay Trail) and other trails.

2.3.2 Project Purpose and Objectives

The overall purpose of the Project is to reduce risks to people, property, and infrastructure from current tidal flooding and projected sea level rise through engineered and natural features that enhance shoreline ecosystems and improve recreational opportunities. The specific objectives of the Project include the following:

- Reduce the risk of flooding within the cities of East Palo Alto and Menlo Park from San Francisco Bay waters, including up to 3.5 feet of future sea level rise, and support the communities' objective to be removed from the FEMA floodplain.
- Enable adaptation to our changing climate by implementing flood protection in ways that sustain and restore marsh habitat, support sensitive tidal marsh species, and enhance and protect habitat for western snowy plover, consistent with the South Bay Salt Ponds Restoration Project (SBSPRP) and other restoration efforts.
- Expand opportunities for recreation and community connectivity in collaboration with the Bay Trail Program and efforts to enhance local trails.
- Minimize future maintenance requirements.

[2] Goals Project (San Francisco Bay Area Wetlands Ecosystem Goals Project), 2015. *The Baylands and Climate Change: What We Can Do. Baylands Ecosystem Habitat Goals Science Update 2015.* Prepared by the San Francisco Bay Area Wetlands Ecosystem Goals Project. California State Coastal Conservancy, Oakland, CA.

- Partner with agencies and organizations pursuing similar goals and objectives and with assets to be protected by the Project.

2.4 Project Components

2.4.1 Proposed Shoreline Protection, Habitat Improvement, and Recreation Features

Proposed SAFER Bay Alignment

SFCJPA has engaged with member agencies, regulators, and other interested parties in identifying the proposed SAFER Bay reach alignments. Factors considered in identifying the proposed reach alignments and shoreline protection design include, but are not limited to, the following:

- Spatial requirements and design guidelines and regulations for engineered shoreline protection features.
- Limiting impacts on salt marsh habitat.
- Limiting impacts on waters of the U.S. and waters of the state.
- Habitat improvements proposed as part of the Project.
- Property ownership.
- Presence of soil and groundwater contamination and remediation systems.[3]
- Presence of existing utilities.

Please refer to Chapter 4, *Alternatives*, for descriptions of other alignments considered.

Project-Level and Program-Level Components

Those Project components for which 30-percent design is available are generally evaluated at a project level of detail; those Project components for which conceptual (10-percent) design information is available are generally evaluated at a program level of detail, summarized below and depicted with solid and dashed lines, respectively, on Figure 2-1:

- ***Project-Level Components***. Proposed flood protection, restoration, and recreation features within the South of Bay Road and Substation and Marsh Restoration reaches are described and evaluated at a project level of detail. Within the Dumbarton Approach Reach, the shoreline levee and enhancements to western snowy plover habitat within Pond SF2 are evaluated at a project level of detail.
- ***Program-Level Components***: Proposed flood protection, restoration, western snowy plover habitat enhancement, and recreation features within the North of Bay Road, Tech Campus, Bayfront Expressway, Bedwell Bayfront Park, and Marsh Road reaches as well as parts of the Dumbarton Approach are generally described and evaluated at a program level of detail. Additionally, Project implementation would require changes to stormwater facilities and other infrastructure generally on the landward side of shoreline protection features. This *Project Description* chapter reflects the

[3] For more information on the presence of contamination, please refer to Section 3.10, Hazards, Hazardous Materials, and Wildfire, and Section 3.11, Hydrology and Water Quality. For a discussion of the potential for the Project to affect groundwater and water quality, please refer to Section 3.11, Hydrology and Water Quality.

design detail currently available for such improvements and provides the basis for the evaluations presented in this environmental impact report (EIR).

Changes may occur to the program-level components described and evaluated as design progresses due to factors such as funding, land acquisition, permitting requirements, site-specific physical constraints (e.g., utilities, geotechnical conditions, or right-of-way access), or other modifications. For segments within the SR 84 right-of-way, the California Department of Transportation (Caltrans) may initiate changes. Caltrans may decide to elevate the approach to the Dumbarton Bridge, or the City of East Palo Alto may elevate the segment of Bay Road between the Cooley Landing Substation and Cooley Landing. SFCJPA or its member agencies will review changes to the Project and conduct supplemental evaluations pursuant to the California Environmental Quality Act as warranted.

Shoreline Protection Features

The Project is being designed to satisfy current FEMA coastal flood protection requirements (i.e., the existing 100-year flood event with required freeboard for FEMA accreditation) and an additional 3.5 feet of elevation to account for anticipated sea level rise by 2100 as well as other applicable FEMA design criteria (e.g., for the evaluation of settlement and structural stability). The design criteria are consistent with the intermediate scenarios described in the State of California *Sea Level Rise Guidance: 2024 Science and Policy Update*, as well as San Mateo County Flood and Sea Level Rise June 2023 *Planning Policy Guidance*.

The Project includes the following features to protect parts of Menlo Park and East Palo Alto from coastal flooding:

- ***Levees***. A typical levee, composed of engineered fill, would have 3:1 (horizontal to vertical) side slopes, a final levee crest height of 16 to 17 feet North American Vertical Datum of 1988 (NAVD88),[4] and a base width of about 60 to 100 feet. In some cases, levees might be constructed and raised in stages given the long-term effects of sea level rise and budget limitations.
- ***Floodwalls.*** Where existing spatial or other constraints do not allow for the construction of a levee, concrete or steel floodwalls could be constructed.
- ***Hybrid Shoreline Protection Features.*** Some segments of the Project have a hybrid design incorporating levee and floodwall features.
- ***Flood Risk Reduction Structures.*** There are existing roadways that cross the Project site. Where it is impractical to raise roadways to an elevation sufficient to provide flood protection, a flood risk reduction structure, such as a flood gate, is proposed.

Section 2.4.2 describes the proposed shoreline protection design as well as changes to infrastructure (e.g., stormwater management facilities) by reach.

[4] The North American Vertical Datum of 1988 is the official vertical datum of the United States and is assumed for all elevations in this document unless otherwise noted.

Habitat Improvements

Information in this section is from the *SAFER Bay Project Habitat Restoration Basis of Design Report (Habitat Restoration BOD)*.[5]

Flood protection improvements would adversely affect tidal salt marsh and managed pond habitats that provide important habitat in the South San Francisco Bay for threatened and endangered species, including California Ridgway's rail, western snowy plover, salt marsh harvest mouse, and nesting seabirds. SFCJPA has been working with representatives of the U.S. Fish and Wildlife Service (USFWS), the Refuge, SBSPRP,[6] and San Francisco Bay Restoration Regulatory Integration Team (BRRIT) regarding the incorporation of habitat improvements into the Project to offset adverse effects on these resources in a manner consistent with the restoration goals of the SBSPRP.[7] These habitat improvements primarily consist of tidal salt marsh restoration, the enhancement of habitat for western snowy plover, the creation of seabird islands in the Ravenswood Pond Complex, and the creation/restoration of tidal salt marsh–upland transition habitat within the Ravenswood Pond Complex and elsewhere within the Project site. Section 2.5 describes the phasing of habitat improvements and the Project schedule.

Figure 2-2 presents an overview of the target habitat improvements. **Table 2-1** presents the estimated area of habitat improvements proposed as part of the Project.

TABLE 2-1
ESTIMATED HABITAT RESTORATION, ENHANCEMENT, AND CREATION FOR THE PROJECT

Habitat Type and Action[a]	Area (acres, approximate)
Restoration of tidal salt marsh in Ponds R1 and R2	576
Restoration of transition zone (salt marsh to upland) habitat within Pond R2	9
Enhancement of perennially ponded waterbird habitat in Pond SF2 (cells U2 and U4) to seasonally, partially inundated western snowy plover habitat	84
Enhancement of western snowy plover habitat in Pond SF2 (cell U3) and Pond R3 through installation of oyster shell/gravel and predator management	352
Construction of seabird nesting islands in Pond R1	1.8

NOTES:

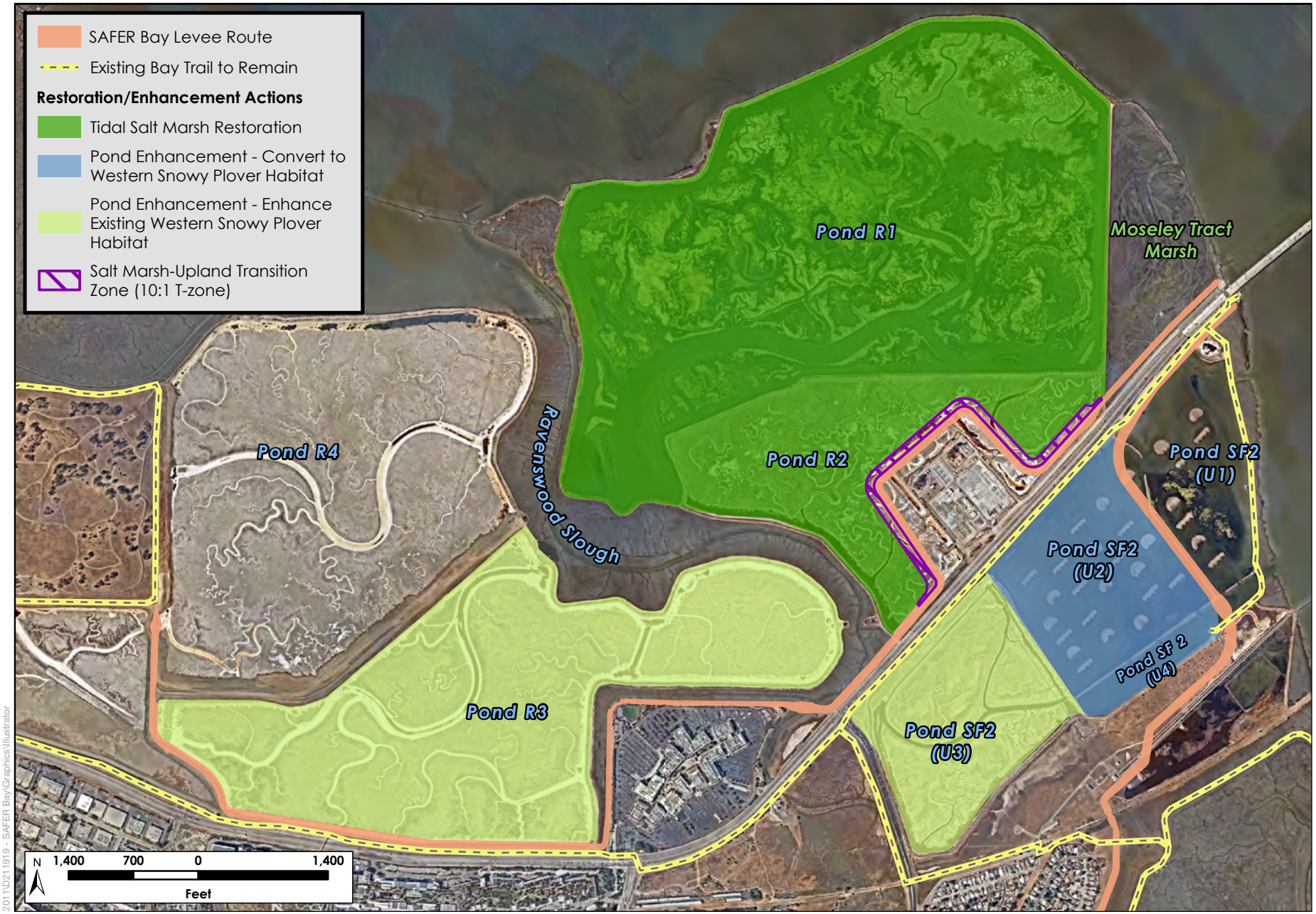
a. Refer to Section 3.4, Biological Resources, for a description of the Project's impacts on wetlands, waters of the U.S. and state, and special-status species.

SOURCE: H.T. Harvey & Associates, 2025. *SAFER Bay Project Habitat Restoration Basis of Design,* February.

5 H.T. Harvey & Associates, 2025. *SAFER Bay Project Habitat Restoration Basis of Design,* February.

6 The SBSPRP's programmatic environmental impact statement/report (EIS/R) calls for large-scale restoration of tidal salt marsh habitat in and adjacent to the SAFER Bay Project site, which involves breaching pond berms. The SBSPRP is currently using an adaptive management process to guide restoration activities. The SFCJPA is coordinating closely with the SBSPRP to ensure consistency with SBSPRP goals and objectives.

7 Adequate flood protection for land side uses (e.g., SR 84) must be in place before the breaching of berms surrounding Ponds R1/R2 and associated restoration can be implemented.



SOURCE: H.T. Harvey & Associates, February 2025

SAFER Bay Project

Figure 2-2
Target Habitats Overview

ESA

Tidal Salt Marsh Restoration in Ponds R1 and R2

Figure 2-3 presents the tidal salt marsh restoration plan within and adjacent to Ponds R1 and R2 (Substation and Marsh Restoration Reach). The goals of the plan are to restore high-quality tidal salt marsh habitat suitable for California Ridgway's rail, salt marsh harvest mouse, and other salt marsh resident species, including tidal channels providing high-quality fish habitat; facilitate vegetated tidal marsh establishment; facilitate establishment of ample high-tide refugial habitat for resident marsh species throughout the restored marsh; and incorporate sea level rise resilience into restored tidal marsh and constructed seabird nesting island plans.

The Project would implement tidal marsh restoration in Ponds R1 and R2 early in the construction sequence to reduce the temporal loss of tidal marsh habitat from levee fill in marshes. Marsh vegetation is expected to naturally establish in Ponds R1 and R2 within 10 to 20 years of breaching.

The proposed design targets restoration of full tidal action to the existing slough channel network and adjoining areas, which reflects the natural slough system that existed prior to construction of the salt pond berms. This approach promotes functions vital to tidal marsh habitat restoration, including efficient sediment transport and deposition as well as tidal flooding and draining. The primary breach location (shown on Figure 2-3) includes excavation of a pilot channel within Pond R1. An internal berm between Ponds R1 and R2 (also shown on Figure 2-3) would be breached in two locations to restore tidal action between the two former salt ponds.

Levee construction would generate spoils from excavation of soils that are not expected to be geotechnically suitable for the levee foundation (e.g., young bay mud). SFCJPA proposes to reuse such spoils[8] (as well as spoils from excavating the historic channel beds) in Ponds R1 and R2 to fill portions of borrow ditches along the perimeter of the ponds, create elevated slough channel berms to restore in-marsh high-tide refugia, provide vegetated refugia along the perimeters of the restored marshes, and potentially raise the initial marsh plain elevation in portions of Pond R2.[9]

Tidal Salt Marsh–Upland Transition Zone Habitat

Tidal salt marsh–upland transition zone (T-zone) habitat would be integrated on the bayward side of levee segments. The ecological benefits of T-zone habitat include the following:

- Provision of high-tide refugia for the endangered salt marsh harvest mouse, California Ridgway's rail, and other tidal marsh animals considered essential for the survival and recovery of these species.[10]

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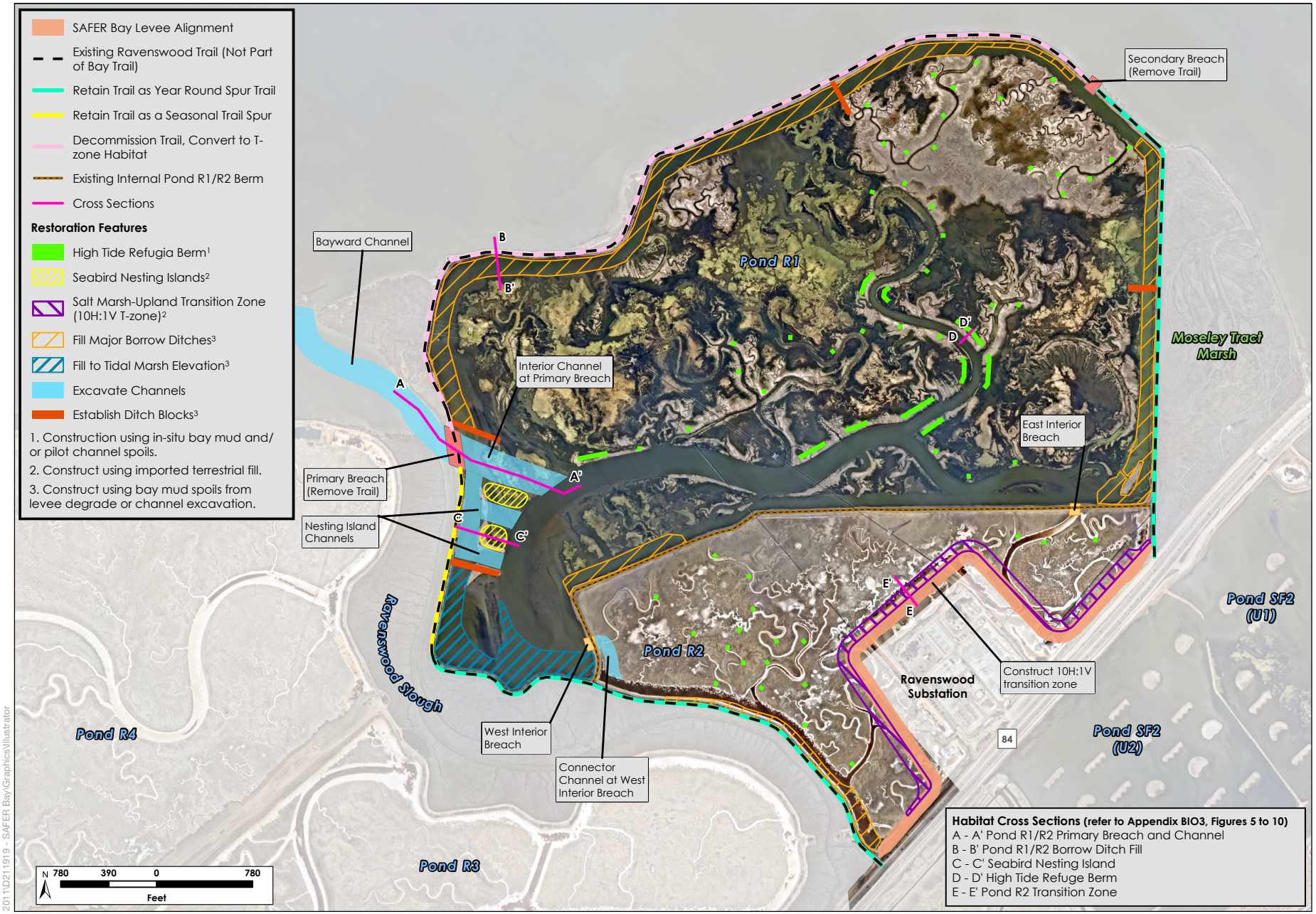
8 Spoils would be tested prior to reuse to ensure compliance with applicable water quality standards. Spoils failing to meet applicable standards and other construction debris would be disposed of at qualified disposal facilities (refer to Table 2-10 in Section 2.6.3).

9 The existing marsh plains in Ponds R1 and R2 are subsided. Sediment would need to accrete following levee breaching to restore marsh habitat and to keep pace with sea level rise. Reuse of spoils (placed bayward of the transition zone and outside historic slough channels) would increase the rate of vegetated marsh establishment.

10 Goals Project (San Francisco Bay Area Wetlands Ecosystem Goals Project), 2015. *The Baylands and Climate Change: What We Can Do. Baylands Ecosystem Habitat Goals Science Update*. Prepared by the San Francisco Bay Area Wetlands Ecosystem Goals Project. California State Coastal Conservancy, Oakland, CA.

USFWS (U.S. Fish and Wildlife Service), 1984. *Salt Marsh Harvest Mouse and California Clapper Rail Recovery Plan*.

USFWS (U.S. Fish and Wildlife Service), 2013. *Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California*.



SOURCE: H.T. Harvey & Associates, February 2025

SAFER Bay Project

Figure 2-3
Tidal Marsh Restoration and Enhancement Elements

ESA

- Promotion of high habitat diversity and high plant and animal diversity.
- Accommodation of landward movement of a relatively small portion of tidal marsh in response to sea level rise.

Substation and Marsh Restoration Reach

The T-zone habitat incorporated into the Pond R2 side of the levee surrounding the Ravenswood Substation would be constructed with a 10:1 (horizontal to vertical) slope from a combination of reused spoils and imported terrestrial topsoil (to support the establishment of upland vegetation above the high-tide line).

All Other Reaches

Some T-zone habitat would be incorporated into the bayward-facing slopes of levees in all other reaches. The proposed slope and width of the T-zones was determined based on characteristics of existing habitat and may follow an irregular or undulating pattern based on the site-specific quality of existing habitat. For example, the proposed width of T-zones where high-quality tidal marsh is already present, such as Faber and Laumeister marshes (South of Bay Road and North of Bay Road reaches), is reduced compared to other options.

Western Snowy Plover Breeding Habitat Enhancement

To offset the loss of western snowy plover habitat that could occur with levee construction and the breaching of Ponds R1 and R2, the Project proposes to construct high-quality, contiguous western snowy plover breeding and foraging habitat in Pond SF2 and enhance western snowy plover habitat in Ponds R3 and SF2. **Figures 2-4a** and **2-4b** present planned enhancements to western snowy plover habitat.

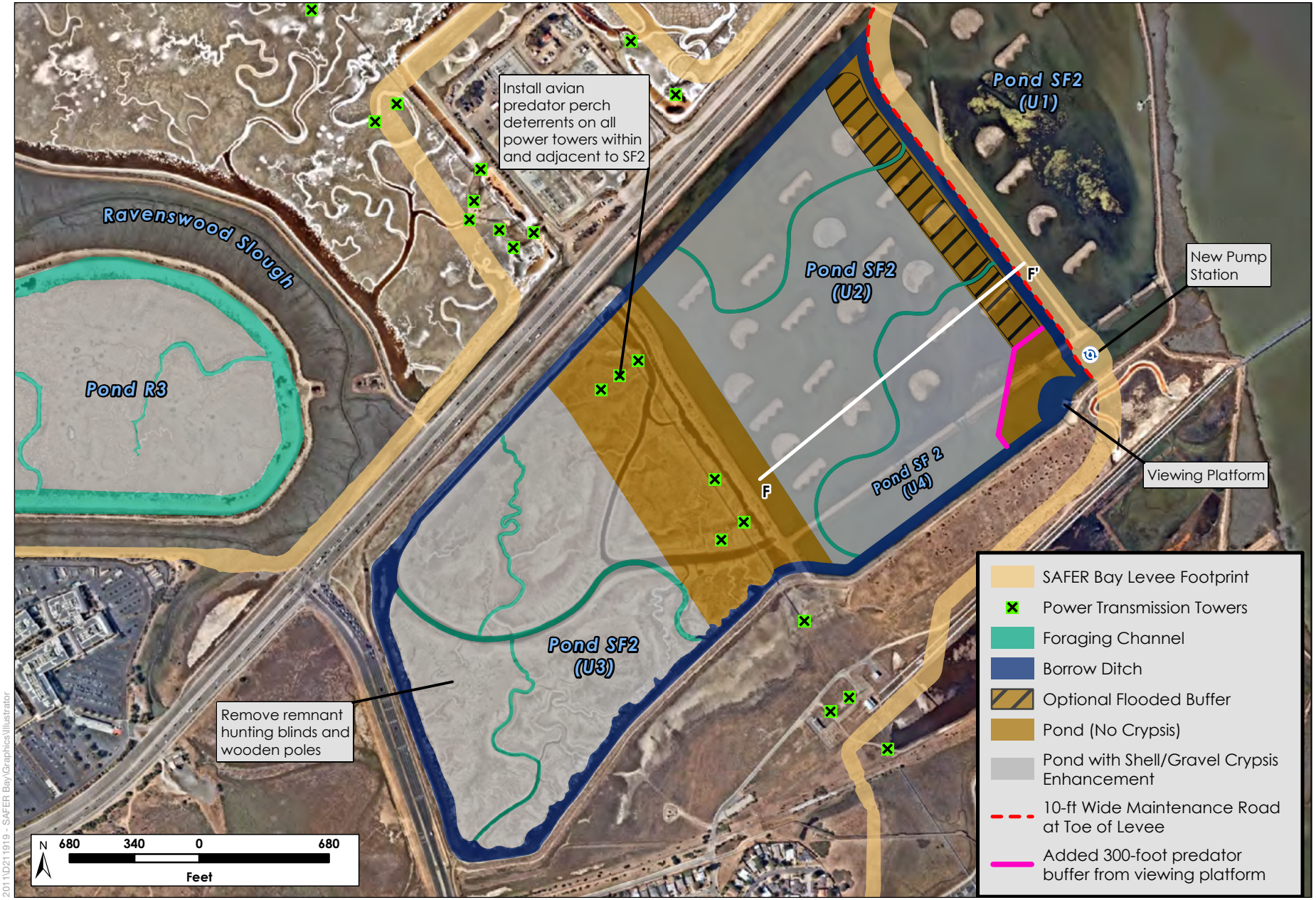
Construction of Western Snowy Plover Breeding Habitat

The Project would construct an earthen levee through Pond SF2 along an existing berm between cells U1 and U2. This alignment would provide coastal flood protection to the enhanced western snowy plover breeding habitat in cells U2, U3, and U4. Following levee construction, new western snowy plover habitat would be constructed in cell U2; cells U3 and U4 would be altered to connect with constructed habitat in cell U2, and substrate and predator deterrent elements would be installed in areas of Ponds SF2 (cells U2 and U3) and R3. Cell U3 is currently designated critical habitat for western snowy plover. The construction of the flood control levee combined with construction of additional breeding habitat in cells U2 and U4 would both protect existing critical habitat from future flooding (with sea level rise resilience) and approximately double the surface area of western snowy plover breeding habitat in Pond SF2 relative to the current area of critical habitat in U3.

Following levee construction across Pond SF2, the existing nesting islands in cell U2 would be removed, and the area would be graded to create western snowy plover nesting and foraging habitat. Existing berms between cells U2, U3, and U4 would be removed to create contiguous habitat, and an existing borrow ditch around cells U2 and U3 would be connected and widened to create a water barrier to mammalian predators.

Water Management in Pond SF2

USFWS currently uses a system of culverts and weirs to manage water in Pond SF2. The existing structures in cells U1 and U4 that provide intake from and discharge to the bay would remain in place, while internal culverts and weirs used to manage water between cells would be removed. A new pump



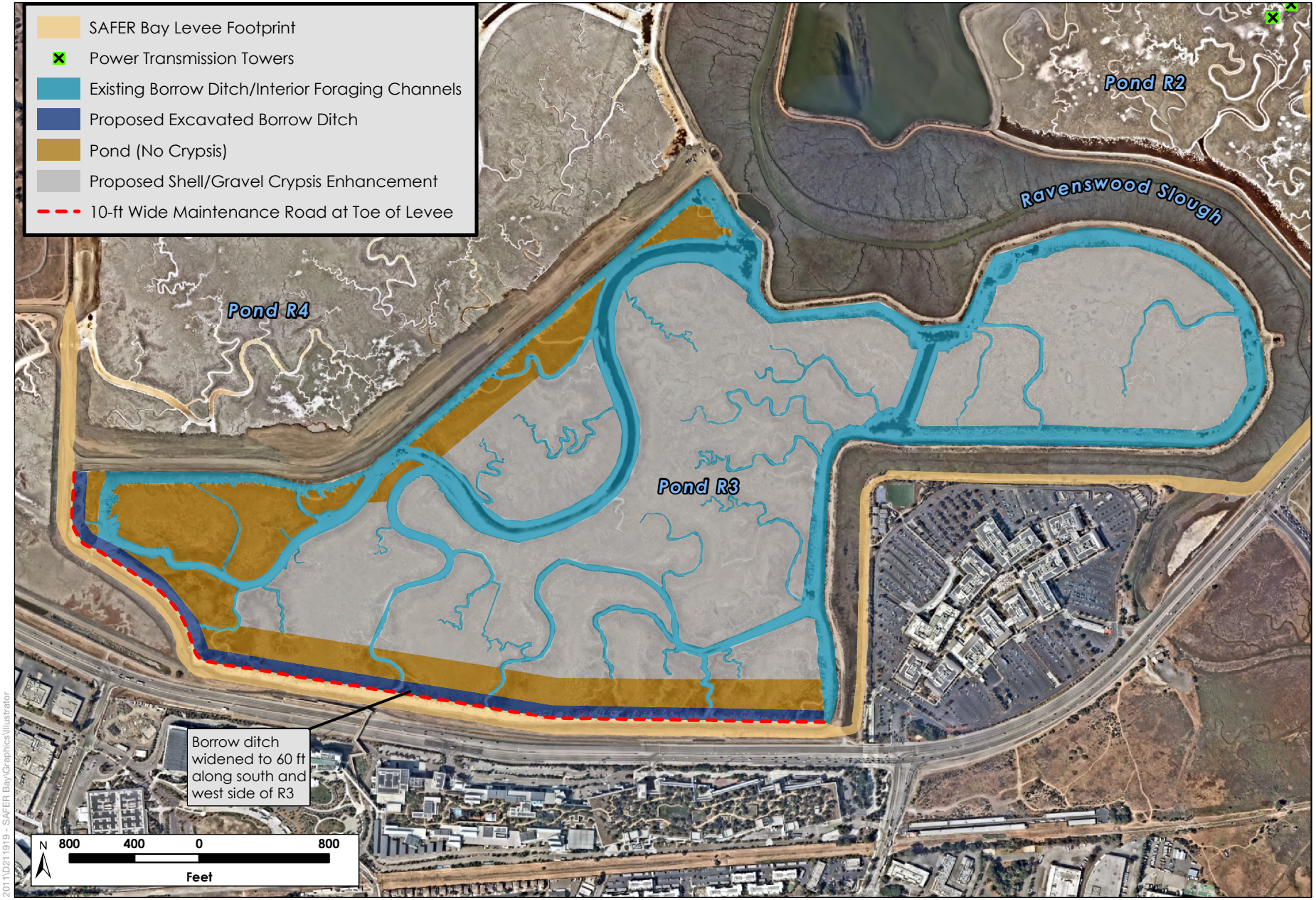
SOURCE: H.T. Harvey & Associates, February 2025

SAFER Bay Project

NOTE: Refer to Appendix REST for Cross Section F

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Figure 2-4a
Western Snowy Plover Habitat Substrate and Predator Deterrent Enhancement Plan (Pond SF2)



SOURCE: H.T. Harvey & Associates, February 2025

SAFER Bay Project

Figure 2-4b
Western Snowy Plover Habitat Substrate and Predator Deterrent Enhancement Plan (Pond R3)

ESA

station with intake and discharge capabilities would be installed on the newly constructed levee. USFWS would use the new water infrastructure to manage the hydroperiod in reconfigured Pond SF2 for targeted western snowy plover seasonal management, as follows:

- ***Non-breeding Season***. During the non-breeding (wet) season, the pond would be managed to provide western snowy plover roosting and foraging habitat and, when deemed necessary, flooded with bay water to varying depths to limit vegetative growth on the pond bottom. Wet season water management in Pond SF2 would be coordinated with Pond R3 (which requires similar management) to ensure that ample suitable habitat is always available to western snowy plover within the Ravenswood Pond Complex. This habitat is also expected to support foraging and roosting habitat for large numbers of migrant and wintering shorebirds of other species.
- ***Breeding Season***. During the breeding season, water levels in reconfigured Pond SF2 and Pond R3 would be drawn down to fully expose the pond bottom and allow them to dry for nesting. Water would always be present in the borrow ditch, inflow/outflow channel, and interior channels to provide foraging habitat and predator deterrence.

Substrate Enhancement, Predator Deterrents, and Predator Management Funding

Figure 2-4 depicts the proposed locations for substrate enhancement and predator deterrent elements. In Ponds SF2 (cells U2, U3, and U4) and R3, oyster shell and/or gravel enhancement plots would be spread over dry pond bottoms to attract plovers and improve crypsis[11] for plovers at all life stages. Remnant hunting blinds and salt pond infrastructure would be removed to reduce predator perches. Installation of anti-perching devices are recommended on power transmission towers present in Ponds R1, R2, and SF2 and land adjacent to Pond SF2 to further reduce predation by avian species. The SAFER Bay Project would need to fund predator management activities (e.g., mammalian predator trapping and targeted avian predator removal) to be implemented under the direction of USFWS and in accordance with their practices.

Seabird Habitat Creation

Pond SF2 is currently used by numerous bird species including the Caspian tern (*Hydroprogne caspia*), elegant tern (*Thalasseus elegans*), and black skimmer (*Rynchops niger*), which nest on islands in cell U2. Habitat enhancement for western snowy plover proposed in Pond SF2 would require the removal of the nesting islands in cell U2. Consequently, to offset a loss of seabird nesting habitat, the Project would construct seabird island nesting habitat in the southwest corner of Pond R1, which would function in tandem with proposed tidal marsh restoration (refer to Figure 2-3). Two islands totaling at least 1.84 acres of nesting habitat would be constructed to replace the nesting area provided by the four islands that these species have used for nesting in Pond SF2 cell U2. The islands would be placed in an area of existing high ground in Pond R1 where small islands have supported nesting Caspian terns and black skimmers in the past. Tidal flushing would be restored to existing channels around these islands to minimize vegetated marsh establishment directly around the islands that could impair their use by seabirds. The nesting habitat at the tops of these islands would be constructed to a height of 11 to 12 feet. Because these species prefer mostly unvegetated areas for nesting, the islands would be topped with several feet of gravel to

[11] *Crypsis* is the ability of an animal to avoid observation or detection by other animals. In this case, predators such as ravens (*Corvus corax*) would be less able to detect western snowy plover nesting on oyster shells or gravel compared to other land cover.

inhibit vegetation growth. Occasional vegetation management would be required to ensure that these islands remain mostly unvegetated.

Slough Channel Replacement

Some levee segments and/or the bayward construction buffer intrude into existing tidal marsh. For some of these intrusions, the levee footprint or the bayward construction buffer necessary for access and dewatering would fill tidal channels that currently provide hydraulic connectivity to marsh areas otherwise unaffected by the levee. Without this hydraulic connectivity, the associated marsh areas would experience altered tidal inundation impairing marsh vegetation and habitat function. To address the impacts of filling these channels, replacement tidal channels would be constructed as a first order of work to provide alternative hydraulic connectivity pathways and avoid hydrologic impacts to the tidal marsh. Affected channels are identified in Faber Marsh, Laumeister Marsh, Ravenswood Open Space, and Ravenswood Slough.

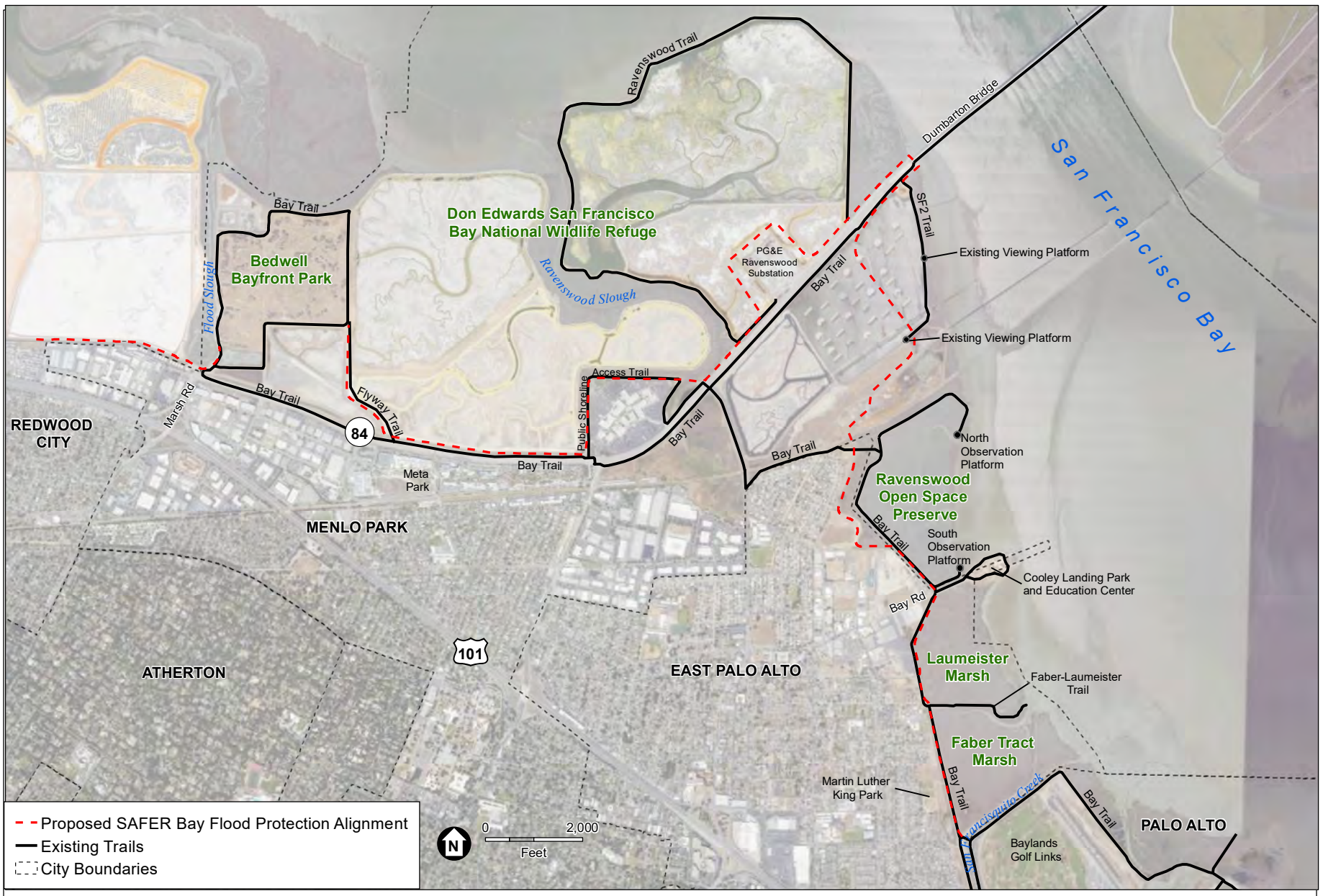
Proposed Changes to Recreation Features

The Project overlaps with segments of the Bay Trail and other trails and includes improvements to shoreline access. **Figure 2-5** shows the location of existing trails and other recreation facilities near the Project site in relation to the SAFER Bay Project alignment (upper half) and proposed improvements to trails (lower half). Where the Bay Trail would be replaced or extended, the segments would incorporate design standards adopted for the Bay Trail. By elevating shoreline trails, the Project would also reduce the trails' exposure to flooding, thereby increasing public access and trail longevity. The reconstructed portions of the Bay Trail along the new levee tops would be paved; would include signage, viewing points, benches, and access points (specific locations to be determined in future detailed designs and in coordination with stakeholders); and would be designed in compliance with the Americans with Disabilities Act (ADA).

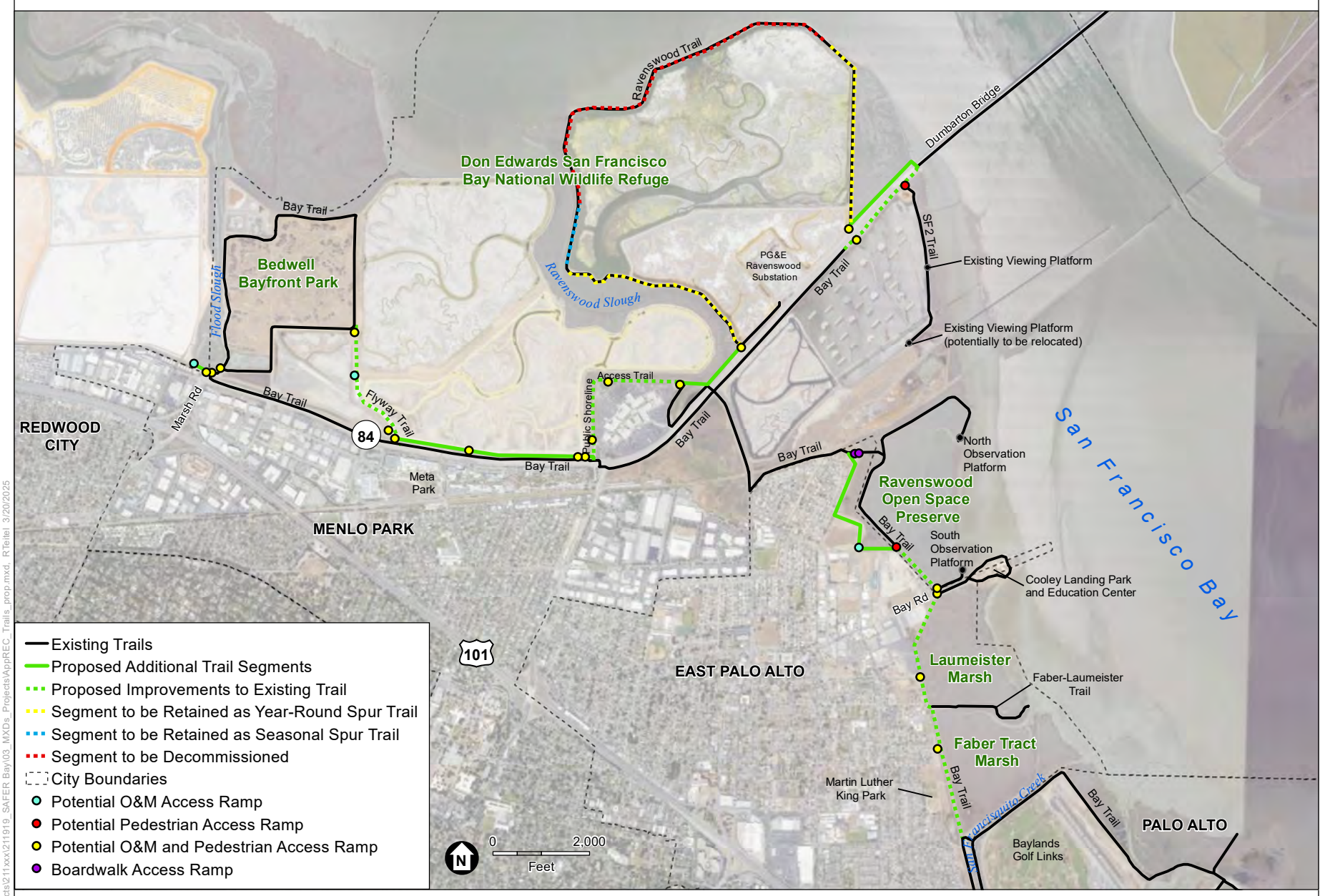
The publicly accessible Ravenswood Trail occupies the crest of a berm that extends around Ponds R1 and R2 (refer to upper portion of Figure 2-5). The two tidal restoration breaches shown in Figure 2-3 would remove trail access to the bayshore segment of the trail. The Project would decommission approximately 1.8 miles of the existing trail between the two breach locations (refer to lower portion of Figure 2-5) and convert the decommissioned segment to T-zone habitat. The decommissioned segment would provide near-term wind-wave protection to allow sufficient time for vegetated tidal salt marsh to establish within Pond R1; the berm would naturally erode over time. The remainder of the trail would be converted to two spur trails originating on either side of the Pacific Gas and Electric Company (PG&E) Ravenswood Substation. The northernmost 1,500 feet of the western spur trail would be closed during the seabird nesting season.

2.4.2 Proposed Design by Reach

Table 2-2 summarizes key features of the SAFER Bay Project by reach. **Table 2-3** summarizes basic Project dimensions. The reaches are described from south to north.



Existing Trails and Other Recreational Resources



Proposed Trail Changes

Path: U:\GIS\GIS\Projects\211xxx\211919_SAFER Bay\03_MXDs_Projects\AppREC_Trails_prop.mxd, RTeitel 3/20/2025

SOURCES: NAIP Imagery, 2024; Metropolitan Transportation Commission, August 2024; adapted by ESA

SAFER Bay Project

Figure 2-5
Existing Recreation Resources
and Proposed Trail Changes

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TABLE 2-2
OVERVIEW OF SAFER BAY PROJECT BY REACH

Reach	Shoreline Protection	Habitat Improvements		Recreation[a]
		Transition Zone Habitat	Salt Marsh, Western Snowy Plover Habitat	
South of Bay Road	Levee/floodwall hybrid Flood gate at Bay Road	3H:1V slopes adjacent to the Faber and Laumeister marshes	Realign channel segments near bayward levee toe.	Realign and widen Bay Trail; reestablish connection to Faber–Laumeister Trail, create pedestrian access points.
North of Bay Road	Levee Flood gate at railroad tracks	3H:1V slopes adjacent to Ravenswood Open Space Preserve	Realign channel segments near levee toe, providing tidal connectivity west of existing Bay Trail.	Realign and widen Bay Trail from Bay Road to Bay Trail boardwalk, route boardwalk section over proposed levee.
Dumbarton Approach	Levee Levee/floodwall hybrid Floodwall	3H:1V slopes adjacent to Mosely Tract Marsh	Expand and enhance western snowy plover habitat in Pond SF2.	Southern portion of SF2 Trail would terminate at new levee. Construct new Bay Trail north of SR 84. Widen affected existing portions of the Bay Trail south of the eastbound lanes of SR 84. Relocate viewing platforms near Pond SF2.
Substation and Marsh Restoration	Levee	10H:1V slopes adjacent to Pond R2	Restore tidal salt marsh in Ponds R1/R2 Create seabird nesting islands in Pond R1.	Decommission a portion of the looped Ravenswood Trail, leaving two spur trails.
Tech Campus	Levee Levee/floodwall hybrid	3H:1V slopes adjacent to Ravenswood Slough	Enhance western snowy plover habitat in Pond R3.	Extend Bay Trail from Substation and Marsh Restoration Reach to public shoreline access trail at Meta Headquarters; replace public shoreline access trail around Meta Headquarters.
Bayfront Expressway	Levee	3H:1V slopes adjacent to Pond R4	Enhance western snowy plover habitat in Pond R3.	Create levee-top trail (will parallel existing Bay Trail which is landward/south of proposed levee); improve existing Flyway Trail.
Bedwell Bayfront Park	Levee	3H:1V slopes adjacent to Flood Slough	No improvements proposed.	Extend Bay Trail west to Marsh Road Reach.
Marsh Road	Levee	3H:1V slopes adjacent to Flood Slough	No improvements proposed.	No improvements proposed (levee alignment is on private property).

NOTES: H:V = horizontal to vertical

a. Refer to Figure 2-5 for a map of existing and proposed trails in the Project vicinity.

SOURCE: ESA 2024; HDR 2024

TABLE 2-3
PROJECT REACH DIMENSIONS

Reach	Approx. Length (feet)	Elevation Change (approximate feet NAVD88)		Max. Depth of Disturbance below Grade (approximate feet NAVD88)	
		Existing Grade	Proposed Grade[a]	Excavation Depth	Sheet Pile Depth
South of Bay Road	5,270	4.5–18	Top of Bay Trail: 12.8–18; top of floodwall: 16.5	-2	-25 to -40
North of Bay Road	4,735	6.5–12	Top of Bay Trail/levee: 17.8–18.5	-6	N/A
Dumbarton Approach	9,135	3–12	• Southern Program-level segment, top of levee: 18.5–21.4 • Project-level segment, top of levee: 8–24.4 • Northern Program-level segment, top of floodwall: 18.5; top of Bay Trail: 14.5–21	-6	-25 to -40[b]
Substation and Marsh Restoration	5,215	2–10	Top of levee: 10–21	-6	N/A
Tech Campus	4,940	6–19.5	Top of levee: 19.3–22.3; top of levee/trail around Meta Headquarters: 14.7–19.6; top of floodwall: 18.5	-6	-25 to -40[b]
Bayfront Expressway	6,700	2–15	Top of Bay Trail/levee: 10–19.6		
Bedwell Bayfront Park	1,065	5–13	Top of levee: 12.1–18.7		
Marsh Road	3,165	4.5–13	Top of levee: 11.1–18.7		

NOTES: NAVD88 = North American Vertical Datum of 1988

a. Does not include appurtenant trail features such as handrails or signage.
b. To be confirmed in future design phases.

SOURCE: ESA 2024; HDR 2024

South of Bay Road

Existing Conditions

Refer to **Figure 2-6** and **Figure 2-7** for photos that represent existing conditions and features along the reach. The South of Bay Road Reach is wholly within the city of East Palo Alto and generally follows the existing levee/Bay Trail from O'Connor Street north to Bay Road. The eastern (bayward) side of the reach is within/borders Faber Marsh and Laumeister Marsh, owned by the City of Palo Alto and managed by the Refuge. The western (landward) side of the reach is bordered by the Runnymede Drainage Ditch that drains stormwater to Bayshore Pond. The O'Connor Pump Station pumps water from Bayshore Pond to San Francisquito Creek. Additional adjacent uses include residences, Martin Luther King Park, East Palo Alto Charter School, and Cooley Landing Substation. The Faber–Laumeister Trail starts east of Runnymede Street and extends into the marsh.



View A: Southern end of the reach facing northwest toward Bayshore Pond.



View B: Runnymede Drainage Ditch east of Martin Luther King Park facing north.

Viewpoint locations shown on Figure 2-7



View C: Bay Trail and transmission tower east of East Palo Alto Charter School facing south.



View D: Bay Trail and transmission tower south of Cooley Landing Substation facing south; Laumeister Marsh shown on left side of photo.

2011\D211919 - SAFER Bay\Graphics\Illustrator

SOURCE: S. Villegas and V. Molina, March 26, 2024

SAFER Bay Project

Figure 2-6
Existing Conditions: South of Bay Reach

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SOURCE: NAIP Imagery, 2024; HDR, 2024; ESA, 2024

SAFER Bay Project

Figure 2-7
South of Bay Road Reach Plan

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Existing infrastructure along the reach includes O'Connor Pump Station at the southern end, a sanitary sewer pipeline just west of the levee's inboard toe, transmission towers and overhead transmission lines, and the adjacent Runnymede Drainage Ditch and Bayshore Pond. The levee is designed not to interfere with the geosynthetic clay liner overlain by 1 foot of imported fill that was installed as an approved cap.[12] For more information concerning this issue, refer to Chapter 3, Section 3.10, Hazards, Hazardous Materials, and Wildfire.

Proposed Reach Conditions

This reach is evaluated at a project level of detail in this EIR.

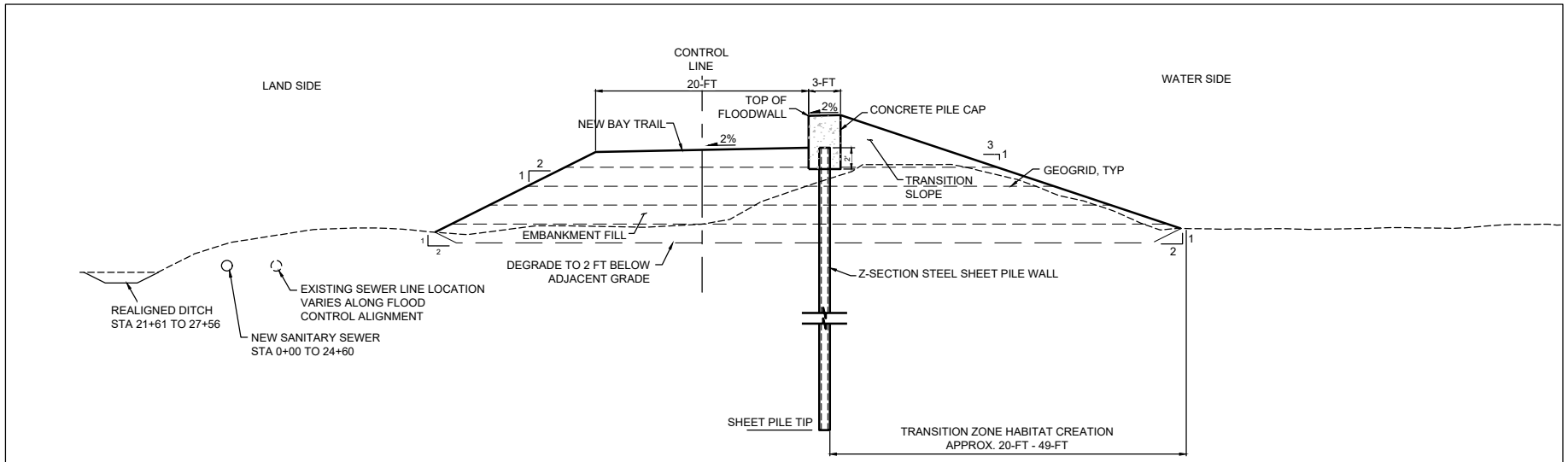
Shoreline Protection. The proposed shoreline protection design for this reach consists of a levee/ floodwall hybrid. Refer to **Figure 2-8** for typical sections along the reach and Figure 2-7 for the locations of those sections. SFCJPA's recently completed levee at San Francisquito Creek (shown on Figure 2-7) considered sea level rise in its design criteria and protects East Palo Alto from coastal and fluvial flooding from San Francisquito Creek. The southern end of the South of Bay Road Reach would tie into the levee at San Francisquito Creek. At the northern end of the South of Bay Road Reach/southern end of the North of Bay Road Reach, a flood gate across Bay Road would be installed. This flood gate would lay flat, embedded in the roadway, to allow access to the Cooley Landing Education Center most of the time. When bay floodwaters rise to the height of Bay Road at the gate's location, the gate would automatically rise to provide contiguous flood protection from the South of Bay Road Reach to the North of Bay Road Reach. Temporary sheet piles would be installed on the bay side of the reach to control water during initial site preparation and would be removed during closeout. Permanent sheet piles would be installed along the levee for seepage control after construction of the levee prism. Although the primary access to the reach would be along the top of the levee, an approximately 15- to 20-foot-wide unpaved access road would be maintained on the western side of the levee for operation and maintenance.

Habitat. T-zone habitat would be constructed on the bayward side of the levee slopes adjacent to existing tidal salt marsh habitat in Faber and Laumeister marshes. T-zone construction would include topsoil preparation and revegetation with native species to restore high-quality high-tide refugia along the edge of tidal marsh habitat. The proposed 3:1 slope (compared to a shallower slope and broader T-zone) would limit adverse impacts on existing high-quality tidal marsh in the Laumeister and Faber marshes. Slough channels filled by the levee would be realigned to prevent compromise of the structural integrity of the levee while retaining adequate tidal flushing of the adjacent tidal salt marsh.

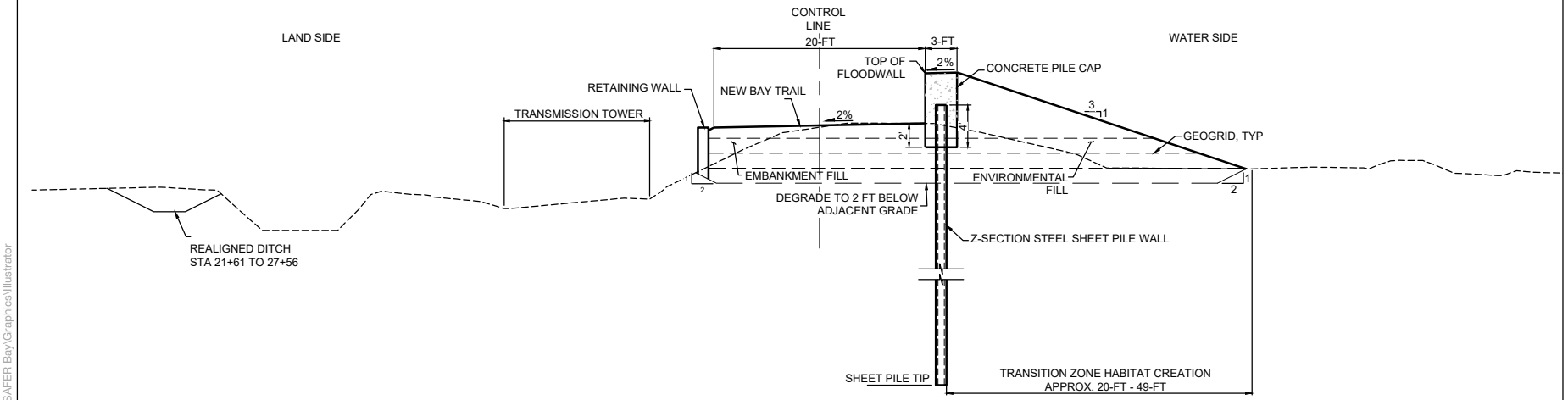
Recreation. The Bay Trail would be reconstructed atop the proposed levee and widened from about 8 feet to 20 feet. ADA-compliant pedestrian ramps would be installed at the locations shown on Figure 2-7.[13] The connection to the Faber–Laumeister Trail would be reestablished following levee construction.

[12] The deed restriction, San Mateo County Recorder's Office Document Number 2001040627, was recorded March 27, 2001. In accordance with the deed restriction, the cap cannot be penetrated without prior approval of the regional water quality control board. Arsenic in the soil in this area is greater than 200 milligrams per kilogram (2014 Comprehensive Site Management Plan 1990 Bay Road Site East Palo Alto, California).

[13] Recently installed signage along the Bay Trail would be removed and reinstalled on the new trail.



S2 TYPICAL SECTION (REFER TO FIG. 2-7)
SCALE: NTS



S1 TYPICAL SECTION AT TRANSMISSION TOWER (REFER TO FIG. 2-7)
SCALE: NTS

30% SUBMITTAL

2011\D211919 - SAFER Bay\Graphics\Illustrator

SOURCE: HDR, June 2024

SAFER Bay Project

Figure 2-8
Typical Sections: South of Bay Road Reach

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Infrastructure. Refer to Appendix INFRA for a list of utilities and encroachments that have been identified within the reach and proposed actions to address each. A portion of the Runnymede Drainage Ditch near the middle of the reach would be relocated west of the proposed levee where the levee toe would overlap the existing ditch. The relocated stormwater drainage ditch would continue to function as under current conditions and drain to Bayshore Pond. The O'Connor Pump Station would not be altered by the Project. An existing sanitary sewer line would be reconstructed landward of the levee toe in coordination with the East Palo Alto Sanitary District. The levee would be routed around the existing transmission towers. As indicated on Figure 2-7, a retaining wall would be constructed around a transmission tower across from East Palo Alto Charter School, and the elevated wooden access plank walkway to one tower would be demolished and reconstructed.

North of Bay Road

Existing Conditions

Refer to **Figure 2-9** and **Figure 2-10** for photos that represent existing conditions and features along the reach. The North of Bay Road Reach is in the cities of East Palo Alto and Menlo Park, and follows the existing levee/Bay Trail from Bay Road, shifting landward near 391 Demeter Street. The reach terminates just north of the Southern Pacific Railroad tracks (not currently in operation). The eastern (bayward) side of the reach is bordered by Ravenswood Open Space Preserve, owned and managed by the Midpeninsula Regional Open Space District. Uses adjacent to the western (landward) side of the reach include Infinity Auto Salvage, 391 Demeter Street (a potential future development site), and residences.

Existing electrical utilities along the reach include transmission towers and overhead transmission lines. Several stormwater catchments north of Bay Road currently drain via gravity to the bay, across the proposed levee alignment.

Proposed Reach Conditions

This reach is evaluated at a program level of detail in this EIR.

Shoreline Protection. Refer to Figure 2-10 for proposed improvements along the North of Bay Road Reach and **Figure 2-11** for typical sections along program-level reaches, which includes the North of Bay Road Reach. The proposed shoreline protection design for this reach is levee. As indicated previously, a flood gate would be installed at Bay Road. Another flood gate would be installed across the railroad tracks. Refer to Figure 2-10 for potential locations for operation and maintenance and pedestrian access.



View A: Drainage channel east of Bay Trail facing northwest.



View B: 2081 Bay Road and adjacent property from Bay Trail facing west.

Viewpoint locations shown on Figure 2-10



View C: End of Steven Avenue facing east toward Ravenwood Open Space Preserve.



View D: Bay Trail Boardwalk north of Ravenswood Open Space Preserve facing east toward transmission towers and overhead power lines.

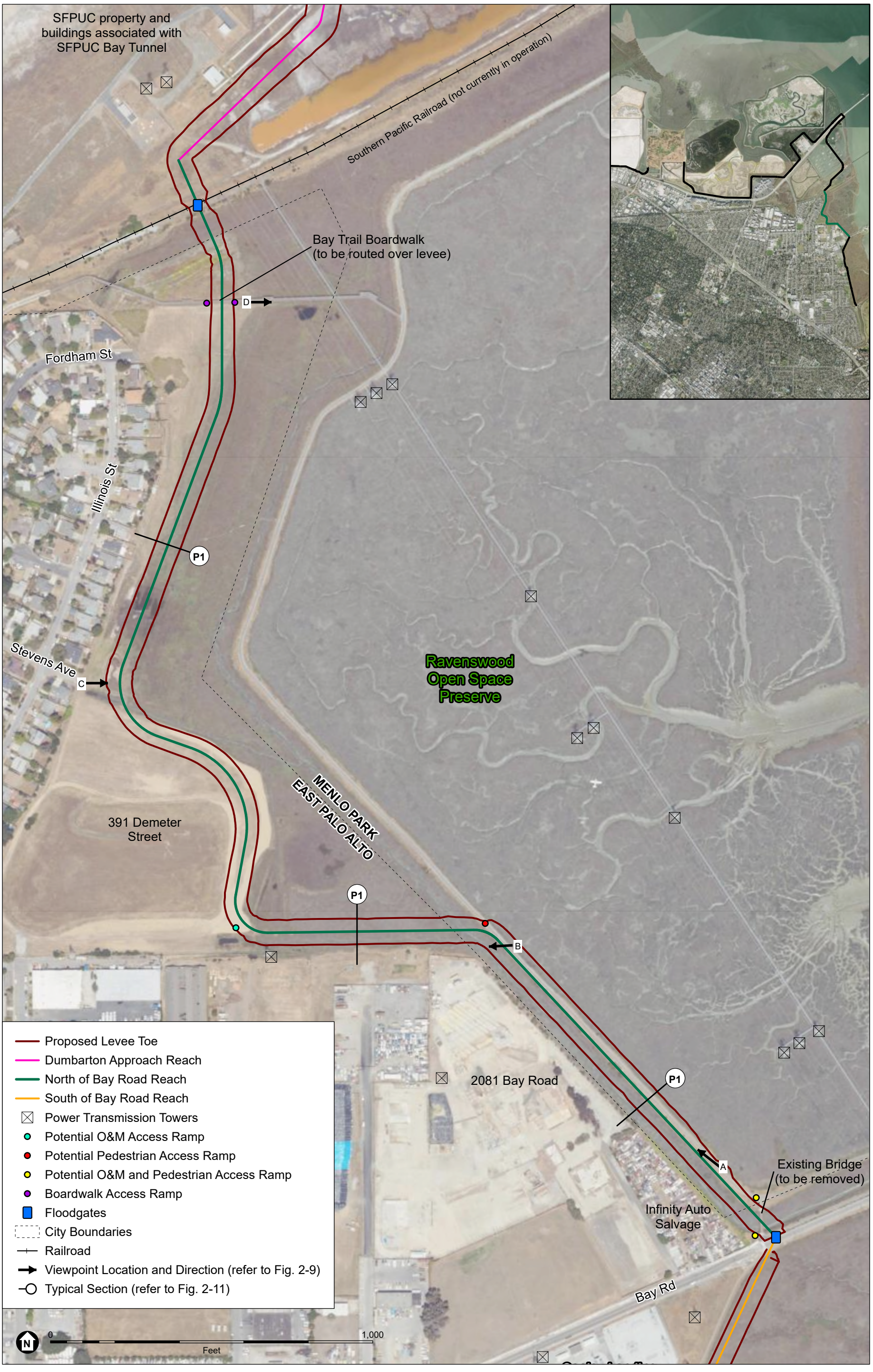
2011\D211919 - SAFER Bay\Graphics\Illustrator

SOURCE: S. Villegas and V. Molina, March 26, 2024

SAFER Bay Project

Figure 2-9
Existing Conditions: North of Bay Reach

ESA

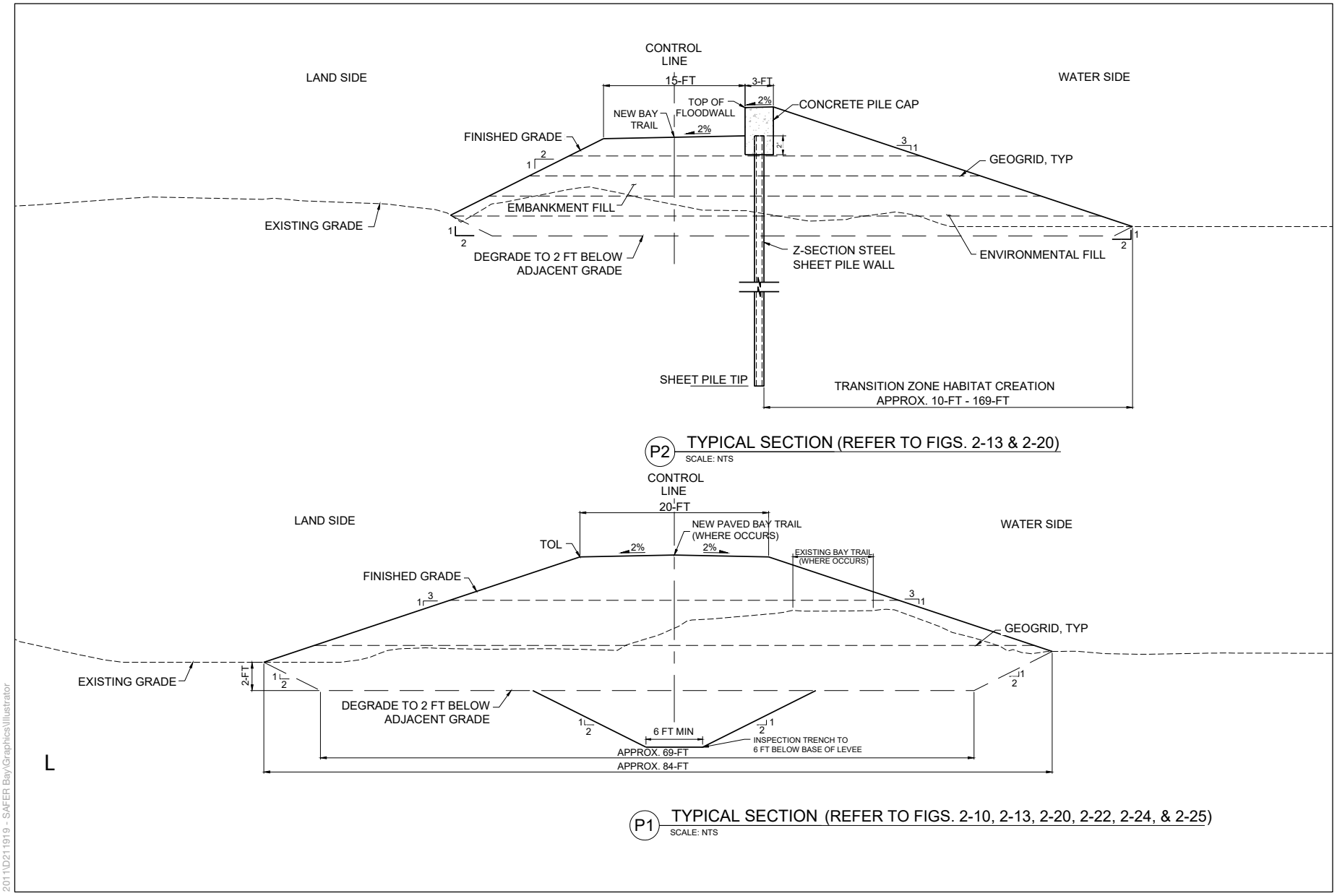


SOURCE: NAIP Imagery, 2024; HDR, 2024; ESA, 2025

SAFER Bay Project

Figure 2-10
North of Bay Road Reach Plan

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SOURCE: HDR, 2024; adapted by ESA

SAFER Bay Project

Figure 2-11
Typical Section: Program-level Reaches

ESA

Habitat. T-zone habitat would be constructed on the bayward side of the levee adjacent to existing tidal salt marsh habitat. T-zone construction would include topsoil preparation and revegetation with native species to restore high-quality high-tide refugia along the edge of tidal marsh habitat. The proposed 3:1 slope is intended to limit adverse impacts on sensitive resources within the Ravenswood Open Space Preserve marshes compared to other options. Slough channels filled by the levee would be realigned to prevent compromise of the structural integrity of the levee while retaining adequate tidal flushing of the adjacent tidal salt marsh.

Recreation. The Bay Trail would be realigned atop the proposed levee and widened to 20 feet. An existing Bay Trail pedestrian bridge at the southern end of the reach would be demolished. Toward the northern end of the reach, the Bay Trail boardwalk would be routed over the levee. Refer to Figure 2-10 for potential pedestrian access locations.

Infrastructure. Refer to Appendix INFRA for a list of utilities and encroachments that have been identified within the reach and proposed actions to address each. The storm drain outfall located just north of Bay Road and just west of the Midpeninsula Open Space District pedestrian bridge would be relocated to the east to a minimum of 20 feet beyond the water side toe of the new levee. A pipeline would be relocated and upgraded to current standards. The drainage from several smaller stormwater catchments that currently drain across the levee alignment are assumed to be removed by a combination of onsite stormwater management and/or new storm drain connections that convey stormwater to other trunk lines and pump stations.

Dumbarton Approach Reach

Existing Conditions

Refer to **Figure 2-12** and **Figure 2-13** for photos that represent existing conditions and features along the reach. The Dumbarton Approach Reach is wholly within the city of Menlo Park. The reach extends through land owned by the City and County of San Francisco and managed by the SFPUC, federally owned land managed by the Refuge (Pond SF2), state-owned land managed by Caltrans, and land owned by the City of San Jose (part of the Moseley Tract Marsh). The reach extends from north of the Southern Pacific Railroad tracks, through Pond SF2, and around the eastbound lanes of SR 84 to the northern side of the westbound lanes. The reach crosses portions of the Bay Trail and is adjacent to an existing viewing platform south of Pond SF2 and viewing area north of Pond SF2. North of SR 84, the Moseley Tract Marsh is within and north of the reach.

Existing infrastructure in this reach includes SR 84 and its associated approach and frontage road, the Dumbarton Bridge (managed by Caltrans), active and abandoned water conveyance facilities for SFPUC's Bay Tunnel, and water control facilities and structures associated with Pond SF2 and salt pond works.



View A: Pond SF2 from the Bay Trail facing southeast.



View B: Bay Trail and SR 84 north of Pond SF2 facing southwest.

Viewpoint locations shown on Figure 2-13



View C: Ravenswood frontage road north of SR 84 and south of Moseley Tract Marsh facing northeast.



View D: Ravenswood frontage road north of SR 84 and south of Moseley Tract Marsh facing southwest.

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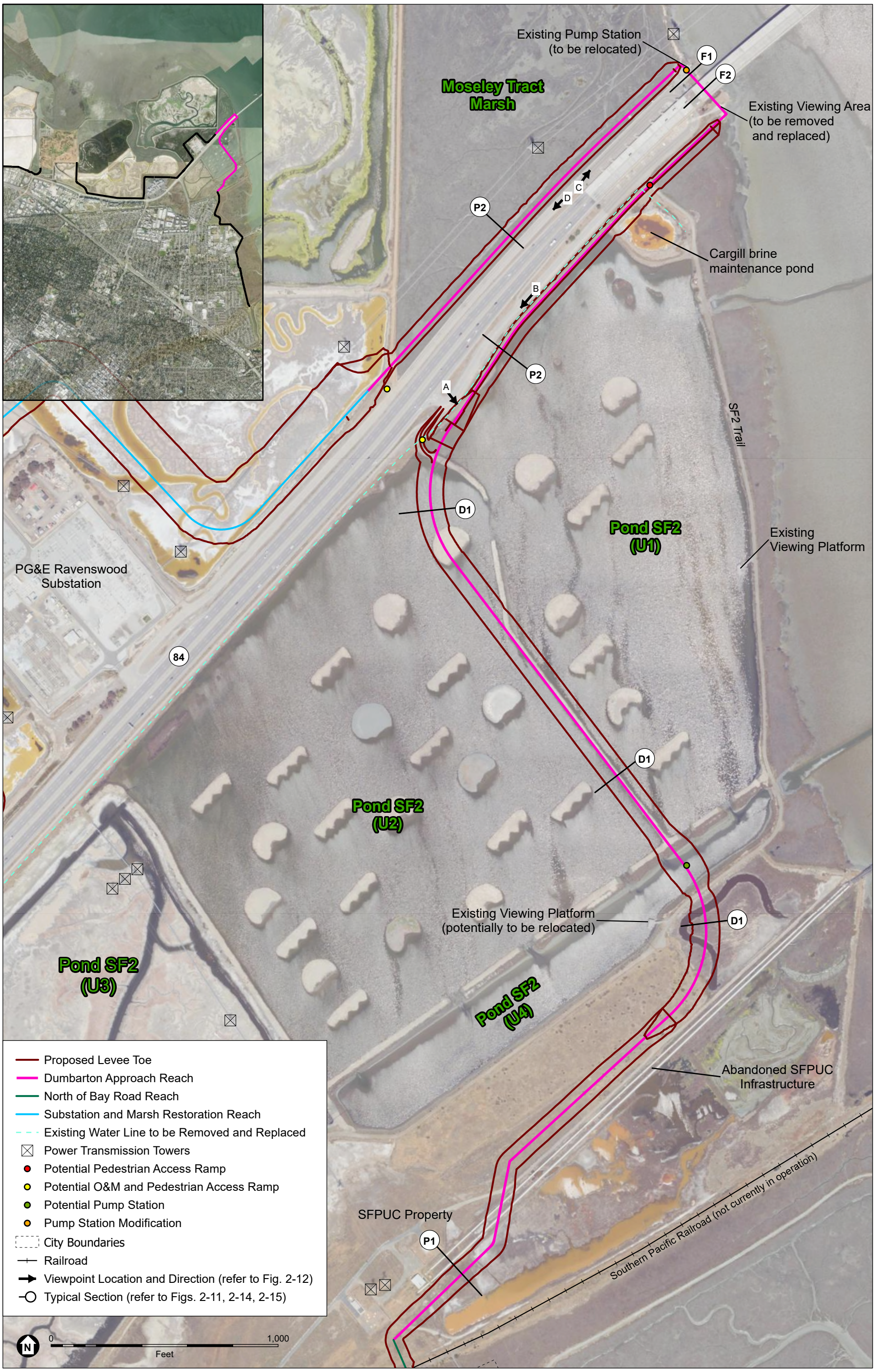
SOURCE: S. Villegas and V. Molina, March 26, 2024

SAFER Bay Project

Figure 2-12
Existing Conditions: Dumbarton Approach Reach

ESA

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SOURCE: NAIP Imagery, 2024; HDR, 2024; ESA, 2024

SAFER Bay Project

Figure 2-13
Dumbarton Approach Reach Plan

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Proposed Reach Conditions

This reach is evaluated at both a project and program level of detail in this EIR.

Shoreline Protection. Refer to Figure 2-13 for proposed improvements along the Dumbarton Approach Reach and Figures 2-11, **2-14**, and **2-15** for typical sections along different segments of the reach. The proposed shoreline protection design for this reach includes a levee south of and through Pond SF2, a levee/floodwall hybrid north and south of SR 84, and floodwalls beneath SR 84.

Habitat. A T-zone with 3H:1V slopes would be restored on the bayward side of the levee adjacent to the Moseley Tract Marsh (refer to Figure 2-13). T-zone construction would include topsoil preparation and revegetation with native species to restore high-quality high-tide refugia along the edge of tidal marsh habitat. Refer to *Habitat Improvements* (above) for a description of habitat improvements associated with Pond SF2. Short-stature, moderate-density grassland would also be established on the landward side of the levee adjacent to Pond SF2. The purpose of this revegetation is to stabilize topsoil and establish non-invasive vegetation while also preventing establishment of tall or dense vegetation that may provide cover for mammalian predators that prey on western snowy plover in SF2.

Recreation. The southern portion of the existing SF2 Trail would terminate at the new levee (refer to Figure 2-5). There would be no trail atop the levee through Pond SF2. Existing affected segments of the Bay Trail immediately south of SR 84 would be widened, and a new segment of the Bay Trail would be constructed north of SR 84 adjacent to Mosely Tract Marsh. An existing viewing platform in Pond SF2 cell U4 and a viewing area south of SR 84 would be removed and relocated as part of the Project (location to be determined). Refer to Figure 2-13 for potential pedestrian access locations.

Infrastructure. Refer to Appendix INFRA for a list of utilities and encroachments that have been identified within the reach and proposed actions to address each. This reach would protect active SFPUC infrastructure, and it is assumed that abandoned SFPUC infrastructure within the construction corridor for the levee would be demolished as part of the Project. An existing stormwater pump station north of SR 84 and appurtenant structures would be modified.

Substation and Marsh Restoration Reach

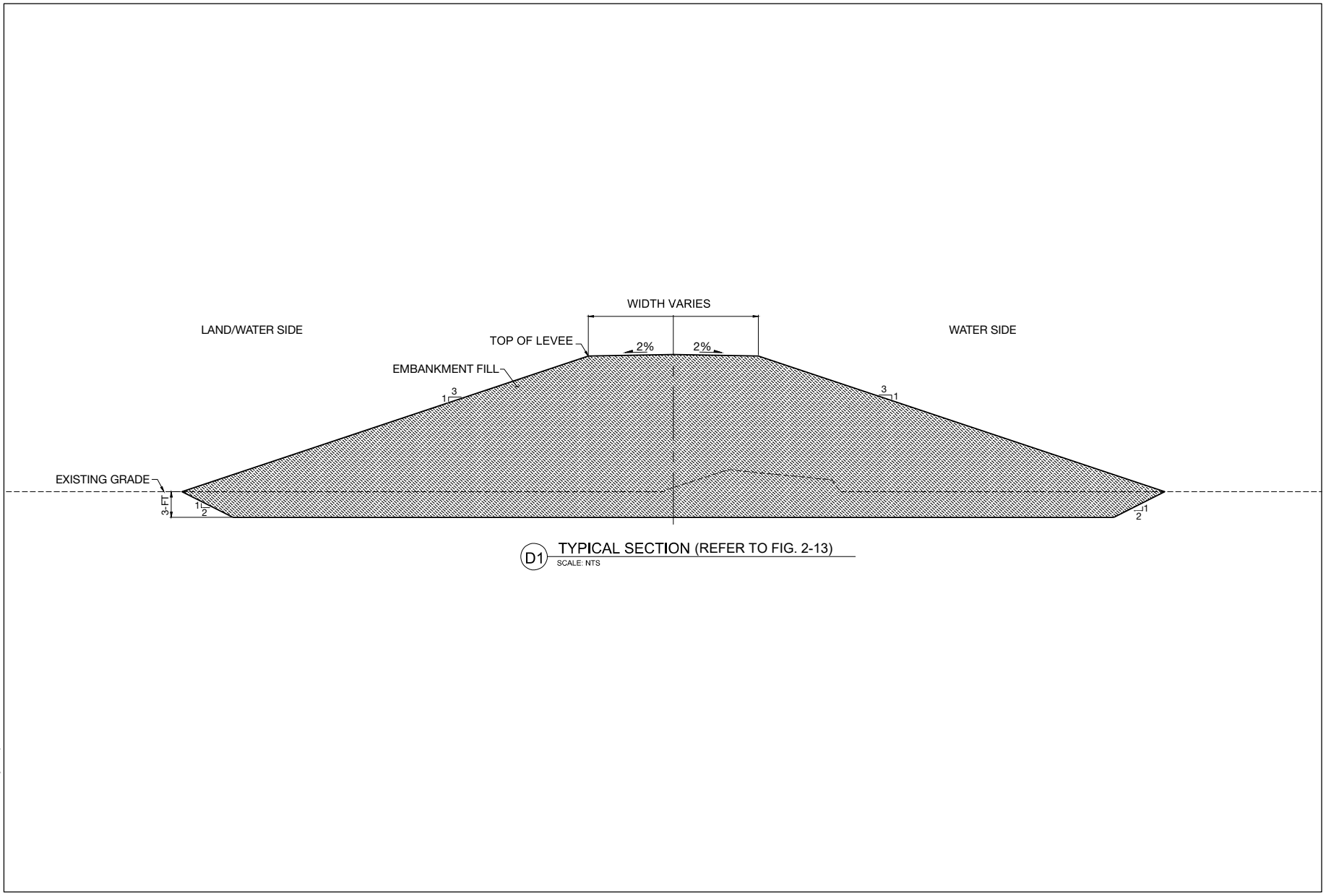
Existing Conditions

Refer to **Figure 2-16** and **Figure 2-17** for photos that represent existing conditions and features along the reach. The Substation and Marsh Restoration Reach is within the city of Menlo Park and extends through the Refuge (Pond R2). The eastern terminus of the reach is near a berm separating the Moseley Tract Marsh and Pond R2, and the western terminus is at the western edge of Pond R2, adjacent to Ravenswood Slough. The reach is bordered by Pond R2, SR 84, the Ravenswood Substation, and the Menlo Park Fire District training site.

Existing infrastructure along the reach includes SR 84 and frontage road, the Ravenswood Substation, and overhead transmission lines.

Proposed Reach Conditions

This reach is evaluated at a project level of detail in this EIR.



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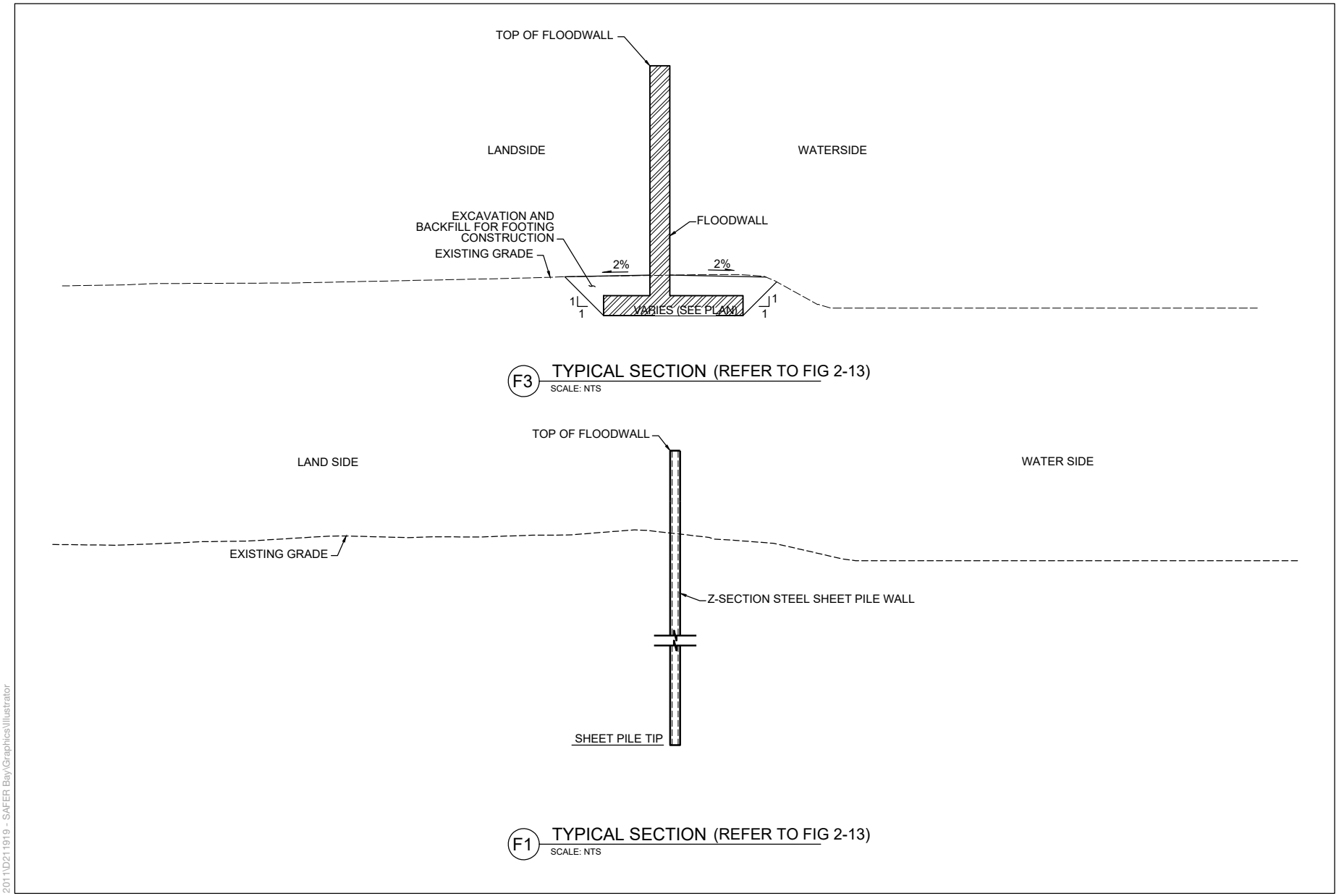
SOURCE: HDR, June 2024; adapted by ESA

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Figure 2-14

Typical Section: Dumbarton Approach Reach through Pond SF2

ESA



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SOURCE: HDR, July 2024

SAFER Bay Project

Figure 2-15
Typical Section: Dumbarton Approach Reach
Under State Route 84

ESA



View A: Bay Trail facing west toward PG&E Ravenswood Substation.



View B: Bay trail south of PG&E Ravenswood Substation facing northeast.

Viewpoint locations shown on Figure 2-17



View C: PG&E Ravenswood Substation from Bay Trail facing north.



View D: PG&E Ravenswood Substation and transmission towers within Pond R2 from trail facing northwest.

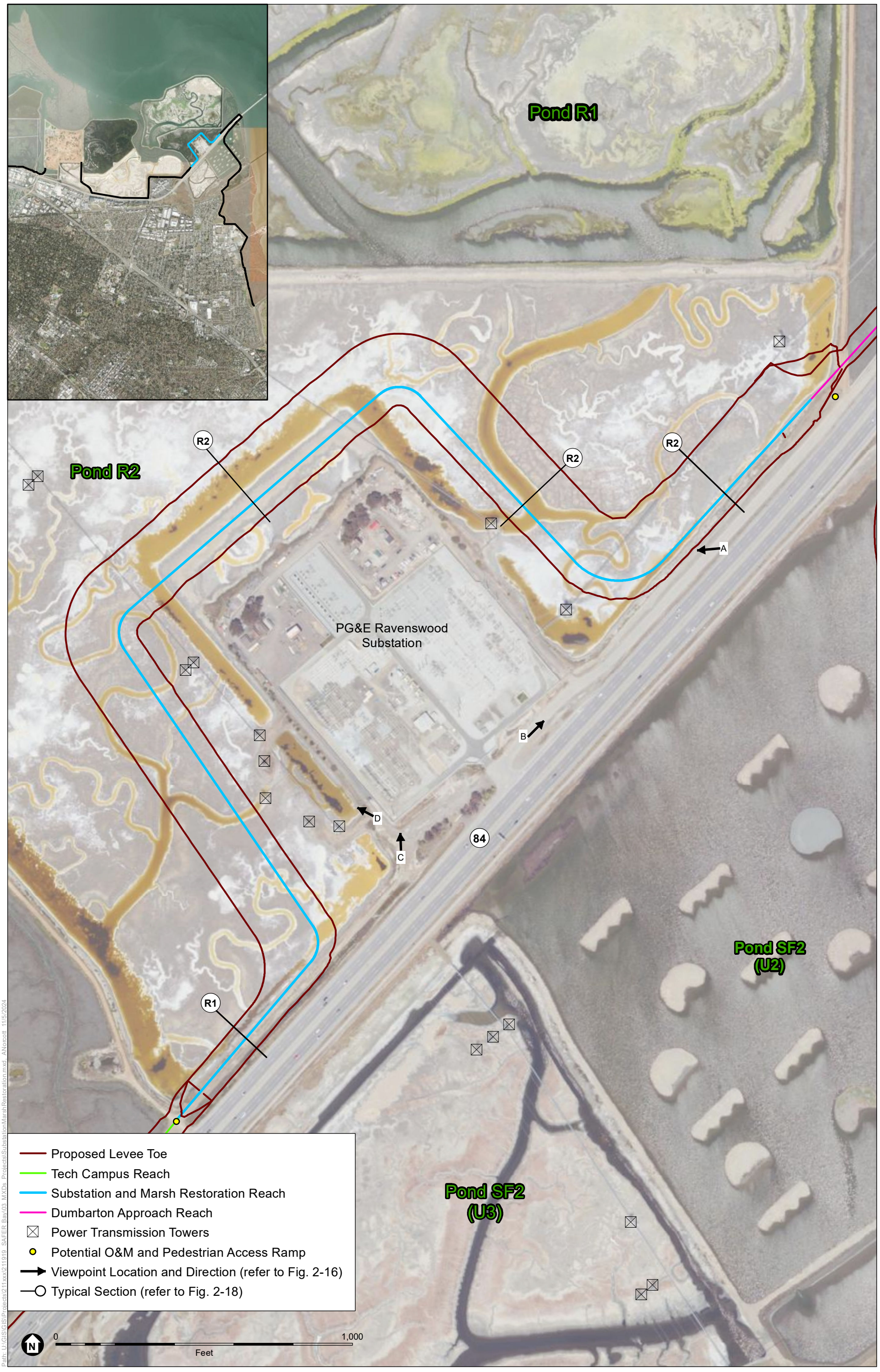
2011\D211919 - SAFER Bay\Graphics\Illustrator

SOURCE: S. Villegas and V. Molina, March 26, 2024

SAFER Bay Project

Figure 2-16
Existing Conditions: Substation and Marsh Restoration Reach

ESA



SOURCE: NAIP Imagery, 2024; HDR, 2024; ESA, 2024

SAFER Bay Project

Figure 2-17
Substation and Marsh Restoration Reach Plan

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Shoreline Protection. Refer to Figure 2-17 for proposed improvements along the Substation and Marsh Restoration Reach and **Figure 2-18** for typical sections. The proposed shoreline protection design for this reach includes levees adjacent to SR 84 and around the Ravenswood Substation.

Habitat. Refer to *Habitat Improvements* (above) for a description of habitat improvements associated with Ponds R1 and R2.

Recreation. The Project would decommission approximately 1.8 miles of the Ravenswood Trail that extend around Ponds R1 and R2 (refer to Figure 2-5). The remainder of the trail would be converted to two spur trails originating on either side of the Ravenswood Substation. The northernmost 1,500 feet of the western spur trail would be closed during the seabird nesting season.

Infrastructure. Refer to Appendix INFRA for a list of utilities and encroachments that have been identified within the reach and proposed actions to address each. The proposed levee may impair Caltrans' stormwater drainage infrastructure from the north frontage road, SR 84, and the Ravenswood Substation to detention in Pond R2. The Project would maintain current stormwater management conditions from these areas by providing either alternative conveyance, storage, and/or pumping.

Tech Campus Reach

Existing Conditions

Refer to **Figure 2-19** and **Figure 2-20** for photos that represent existing conditions and features along the reach. The Tech Campus Reach is wholly within the city of Menlo Park and parallels the westbound lanes of SR 84 and a pedestrian trail that surrounds Meta Headquarters/Classic Campus at 1 Hacker Way. The bayward side of the reach is bordered by Ravenswood Slough and Pond R3. Uses adjacent to the landward side of the reach include SR 84 and Meta.

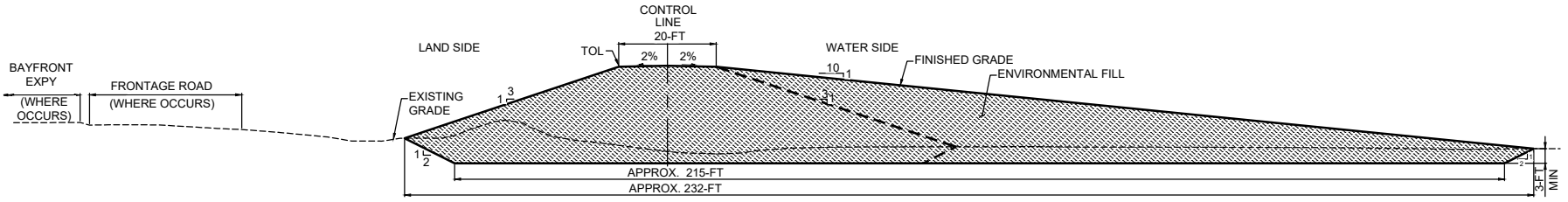
East of the Meta Headquarters, the alignment crosses a segment of Ravenswood Slough. Stormwater runoff from SR 84 collects in a basin adjacent to SR 84 and University Avenue. The Ravenswood Pump Station is south of the reach on the opposite side of SR 84, and pumps stormwater from this basin into the segment of Ravenswood Slough.

Proposed Reach Conditions

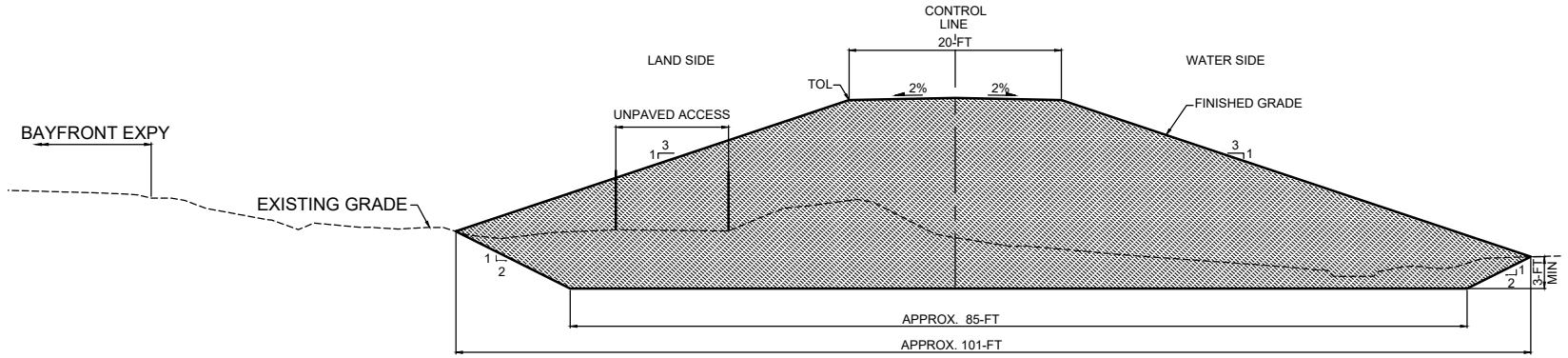
This reach is evaluated at a program level of detail in this EIR.

Shoreline Protection. Refer to Figure 2-20 for proposed improvements along the Tech Campus Reach and Figure 2-11 for typical sections along program-level reaches, which includes the Tech Campus Reach. The shoreline protection design proposed for this reach includes a levee along SR 84 and levees/floodwalls hybrids around Meta Headquarters. A pump station would be constructed east of Meta Headquarters.

Habitat. T-zone habitat would be constructed on the bayward side of the levee adjacent to tidal salt marsh habitat in Ravenswood Slough. The proposed 3:1 slope is intended to limit adverse effects on sensitive resources associated with salt marsh habitat compared to other options. T-zone construction would include topsoil preparation and revegetation with native species to restore high-quality high-tide refugia along the edge of tidal marsh habitat. Refer to *Habitat Improvements* (above) for a description of habitat improvements associated with Pond R3.



R2 TYPICAL SECTION (REFER TO FIG 2-17)
SCALE: NTS



R1 TYPICAL SECTION (REFER TO FIG 2-17)
SCALE: NTS

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SOURCE: HDR, June 2024

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Figure 2-18
Typical Sections: Substation and Marsh Restoration Reach

ESA



View A: Trail along westbound State Route 84 facing southwest toward Meta Headquarters.



View B: Public Shoreline Access Trail east of Meta Headquarters facing south.

Viewpoint locations shown on Figure 2-20



View C: Public Shoreline Access Trail north of Meta Headquarters facing east.



View D: Pond R3 and Public Shoreline Access Trail west of Meta Headquarters facing north.

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SOURCE: S. Villegas and V. Molina, March 26, 2024

SAFER Bay Project

Figure 2-19

Existing Conditions: Tech Campus Reach

ESA

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SOURCE: NAIP Imagery, 2024; HDR, 2024; ESA, 2024

SAFER Bay Project

Figure 2-20
Tech Campus Reach Plan

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Recreation. The Bay Trail would be extended atop the levee from the Substation and Marsh Restoration Reach to the public shoreline access trail around Meta Headquarters. The existing public shoreline access trail around Meta Headquarters would be replaced by a levee-top trail. Refer to Figure 2-20 for potential pedestrian access locations.

Infrastructure. Refer to Appendix INFRA for a list of utilities and encroachments that have been identified within the reach and proposed actions to address each. Because the proposed levee alignment would be bayward of the current discharge point for the existing Ravenswood Pump Station, supplemental pumping and/or piping would be added to convey discharge from that pump station to Ravenswood Slough. Although these changes have not been designed yet, a potential location for a pump station to convey water from the outfall channel to Ravenswood Slough has been identified (refer to Figure 2-20).

Bayfront Expressway Reach

Existing Conditions

Refer to **Figure 2-21** and **Figure 2-22** for photos that represent existing conditions and features along the reach. The Bayfront Expressway Reach is within the city of Menlo Park, largely within the Refuge, and extends between the Meta Headquarters and Bedwell Bayfront Park (owned by the City of Menlo Park) along the Bay Trail. The eastern segment of the reach parallels SR 84 (referred to in this area as the Bayfront Expressway), and the western segment of the reach extends between Ponds R3 and R4 to the east and S5 and R5 to the west. Uses adjacent to the landward side of the reach include SR 84, a portion of the Bay Trail, and a bike/pedestrian bridge spanning SR 84. South of the expressway, stormwater is routed into the storm drain network that conveys water to the Chrysler Drive Pump Station. A section of a brine channel (part of Cargill's brine conveyance system used to convey saline water between various salt production facilities) runs along the southern berm of Pond R3.

Proposed Reach Conditions

This reach is evaluated at a program level of detail in this EIR.

Shoreline Protection. Refer to Figure 2-22 for proposed improvements along the Bayfront Expressway Reach[14] and Figure 2-11 for typical sections along program-level reaches, which includes the Bayfront Expressway Reach. The shoreline protection design proposed for this reach is a levee. An existing water pipeline would be removed and replaced in-kind as needed for levee construction.

Habitat. A borrow ditch would be constructed along the bayward side of the proposed levee in Pond R3 to deter mammalian predator access to the pond and its western snowy plover habitat. At the northwest end of this reach adjacent to Pond R4, T-zone habitat would be constructed on the Pond R4 side of the 3H:1V levee slope to complement existing tidal salt marsh habitat recently restored in R4 by the SBSPRP. T-zone construction would include topsoil preparation and revegetation with native species to restore high-quality high-tide refugia along the edge of tidal marsh habitat. The purpose of this revegetation is to stabilize topsoil and establish non-invasive vegetation while also preventing

[14] As indicated on Figures 2-1, 2-22, and 2-24, the proposed levees would tie into high ground at Bedwell Bayfront Park. The Park is higher in elevation than the surrounding area; consequently, the Bayfront Expressway and Bedwell Bayfront Park levees can terminate at the Park (and not connect to each other) without compromising shoreline protection.



View A: Bay Trail along westbound SR 84 facing east toward Meta Headquarters.



View B: Pond R3 and Bay Trail along westbound SR 84 facing west toward bike and pedestrian bridge.

Viewpoint locations shown on Figure 2-22



View C: Bay Trail adjacent to bike and pedestrian bridge over SR 84 facing east.



View D: Bay Trail along westbound SR 84 facing east toward bike and pedestrian bridge.

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SOURCE: S. Villegas and V. Molina, March 26, 2024

SAFER Bay Project

Figure 2-21
Existing Conditions: Bayfront Expressway Reach

ESA



SOURCE: NAIP Imagery, 2024; HDR, 2024; ESA, 2024

SAFER Bay Project

Note: The northeastern levee of Pond R4 was breached to tidal action in December 2023 as part of the South Bay Salt Pond Restoration Project. This figure does not reflect that levee breach.

Figure 2-22
Bayfront Expressway Reach Plan

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establishment of tall or dense vegetation that may provide cover for mammalian predators that prey on western snowy plover in R3. Refer to *Habitat Improvements* (above) for a description of habitat improvements associated with Pond R3.

Recreation. The levee would be constructed on the bayward side of the Bay Trail and would be topped by a trail. (There would be no change to the existing Bay Trail, which parallels SR 84 and is between SR 84 and the proposed levee alignment.)

Infrastructure. Refer to Appendix INFRA for a list of utilities and encroachments that have been identified within the reach and proposed actions to address each. Two water control structures operated by the Refuge that regulate water levels within the adjacent ponds to support habitat would be rebuilt. The Project would disrupt operations of Cargill's brine conveyance system. If Cargill continues to operate the brine conveyance system in the future, Project implementation would require an alternative conveyance facility for the brine line outside the levee footprint.

Bedwell Bayfront Park Reach

Existing Conditions

Refer to **Figure 2-23** and **Figure 2-24** for photos that represent existing conditions and features along the reach. The Bedwell Bayfront Park Reach is in the cities of Menlo Park and Redwood City. The reach (which is not contiguous with Project reaches to the east) generally extends along Marsh Road within Bedwell Bayfront Park, which also functions as a segment of the Bay Trail, between Bedwell Bayfront Park and Flood Slough. The western terminus of the reach is near four existing water control structures, including one that conveys water from the Bayfront Canal to Flood Slough, one that diverts water from the Bayfront Canal to Refuge Ponds S5 and R5 during storm events, another that provides water inflow/ outflow to Refuge Ponds S5 and R5, and a fourth that provides muted tidal exchange from Flood Slough to a pond in Bedwell Bayfront Park.

Existing infrastructure in the immediate vicinity includes structures to control flows into and out of Flood Slough, stormwater channels and outfalls, the Menlo Park Pump Station (owned and operated by Silicon Valley Clean Water), and a water line.

Proposed Reach Conditions

This reach is evaluated at a program level of detail in this EIR.

Shoreline Protection. Refer to Figure 2-24 for proposed improvements along the Bedwell Bayfront Park Reach and Figure 2-11 for typical sections along program-level reaches, which includes the Bedwell Bayfront Park Reach. The proposed shoreline protection design for this reach is a levee.

Habitat. T-zone habitat would be constructed on the bayward side of the levee slope adjacent to existing tidal salt marsh habitat in Flood Slough. T-zone construction would include topsoil preparation and revegetation with native species to restore high-quality high-tide refugia along the edge of tidal marsh habitat. Short-stature, moderate-density grassland would also be established on the bayward side of the levee adjacent to the Redwood City Salt Ponds. The purpose of this revegetation is to stabilize topsoil and establish non-invasive vegetation while also preventing establishment of tall or dense vegetation that may



View A: Existing construction staging area within Bedwell Bayfront Park from Marsh Road north of park entrance.



View B: Marsh Road and SR 84 intersection/Bedwell Bayfront Park entrance from inside Bedwell Bayfront Park facing south.

Viewpoint locations shown on Figure 2-24



View C: Existing stormwater outfall at Flood Slough from Marsh Road within Bedwell Bayfront Park facing southwest.



View D: Flood Slough from Marsh Road within Bayfront Park facing north.

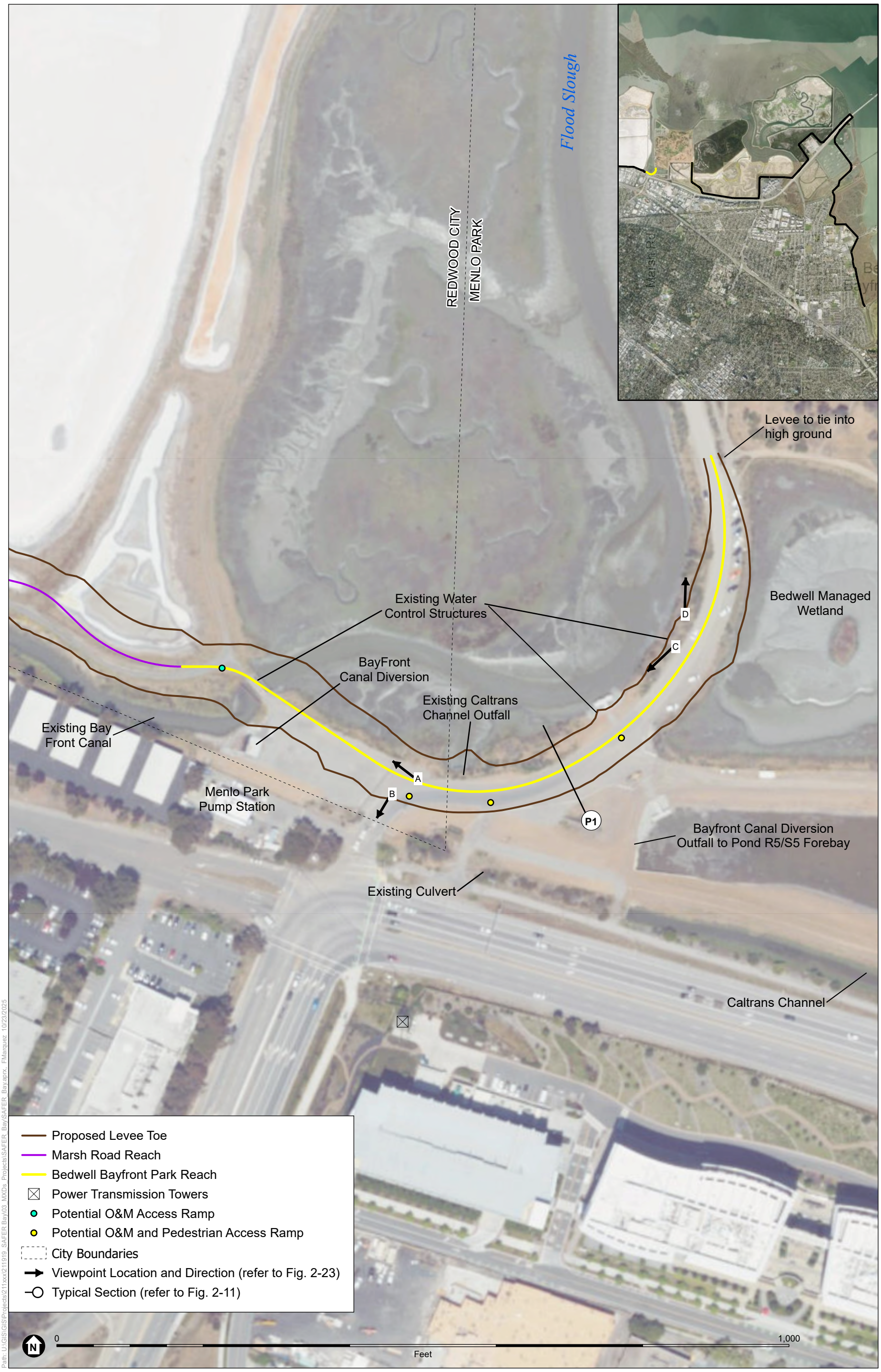
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SOURCE: S. Villegas and V. Molina, March 26, 2024

SAFER Bay Project

Figure 2-23
Existing Conditions: Bedwell Bayfront Park Reach

ESA



SOURCE: NAIP Imagery, 2024; HDR, 2024; ESA, 2024

SAFER Bay Project

Figure 2-24
Bedwell Bayfront Park Reach Plan

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provide cover for mammalian predators that prey on western snowy plover in the Redwood City Salt Ponds. The proposed 3:1 slope is intended to limit adverse impacts on sensitive resources associated with salt marsh habitat compared to other options.

Recreation. The Bay Trail (and Marsh Road) would be atop the proposed levee. Refer to Figure 2-24 for potential pedestrian access locations. The Bay Trail would be extended west to the Marsh Road Reach.

Infrastructure. Refer to Appendix INFRA for a list of utilities and encroachments that have been identified within the reach and proposed actions to address each. Marsh Road within Bedwell Bayfront Park would be replaced atop the proposed levee. A new flow control structure would be constructed on the western side of the reach to convey water from the Bayfront Canal to Flood Slough. The other three water control structures and an existing water line would be replaced in-kind as needed for levee construction. Wooden utility poles with overhead transmission lines would be relocated and the 12-foot-wide access bridge over Bayfront Canal that provides access between pond maintenance roads and the Menlo Park Pump Station would be replaced. Refer to Figure 2-24 for potential pedestrian access locations.

Marsh Road Reach

Existing Conditions

Refer to **Figure 2-25** for the location of this reach, which is not publicly accessible.[15] The Marsh Road Reach is mostly within Redwood City, with a small portion within Menlo Park. The reach extends westward from the Bedwell Bayfront Park Reach and follows the Bay Front Canal levee north of a storage facility and other industrial uses north of Haven Avenue and south of Pond 7C (used for salt production).

Existing infrastructure includes the canals on either side of the reach alignment: the Bay Front Canal is used to manage stormwater; the canal north of the proposed levee is used for water management in salt production. Numerous water control structures and outfalls (refer to Figure 2-24) as well as overhead transmission lines are present.

Proposed Reach Conditions

This reach is evaluated at a program level of detail in this EIR.

Shoreline Protection. Refer to Figure 2-25 for proposed improvements along the Marsh Road Reach and Figure 2-11 for typical sections along program-level reaches, which includes the Marsh Road Reach. The proposed shoreline protection system for this reach is a levee.

Contiguous connectivity of shoreline protection along this reach would be coordinated with the City of Redwood City, which is planning for flood protection west of and including this reach.

Habitat. At the eastern end of this reach, a short segment of T-zone habitat would be constructed on the bayward side of the levee adjacent to existing tidal salt marsh habitat in Flood Slough. The proposed relatively narrow 3:1 slope would limit adverse impacts on sensitive resources associated with salt marsh habitat.

[15] As the reach itself and views of the reach are entirely on private property, representative photos of existing conditions were not taken.

Recreation. No recreation improvements are proposed under the Project for the Marsh Road Reach, which is on private property. The Metropolitan Transportation Commission has identified a proposed trail between Bedwell Bayfront Park (in Menlo Park) and Seaport Boulevard in Redwood City, a segment of which is generally aligned with the Marsh Road Reach levee alignment. Refer to Table 3.1-2 in Chapter 3, *Environmental Setting, Impacts, and Mitigation Measures*, for more information about the proposed trail project.

Infrastructure. Refer to Appendix INFRA for a list of utilities and encroachments that have been identified within the reach and proposed actions to address each. Numerous changes to existing infrastructure would be required in this reach. The levee would fill the existing Cargill brine channel which, if necessary, would be realigned away from the levee toe.

2.5 Project Phasing and Schedule

The Project would be implemented in phases and in segments within each reach. General construction phases that would occur within each segment of a reach include site preparation/mobilization, demolition, grading and drainage/water control, shoreline protection construction, structural section and paving, and closeout.

Project construction would be implemented by member agencies who would determine the ultimate construction schedule. A preliminary construction schedule, presented in **Table 2-4**, has been developed for purposes of evaluation.[16] Prior to construction, the SFCJPA and member agencies would complete design, supplemental environmental review and permitting as needed, and bidding for each reach, which could last 2 or more years.

As described in Section 2.4.1, the Project proposes to restore tidal marsh and western snowy plover habitat to offset the spatial and temporal loss of habitat that would result from construction of shoreline protection and recreation features. This approach is reflected in the proposed construction phasing, which would proceed as follows:

- SFCJPA or its member agencies would construct the levee through Pond SF2 and protect and enhance western snowy plover habitat in Ponds SF2 and R3 before disturbance of western snowy plover habitat in Ponds R1 and R2 and elsewhere in the Project area. Seabird nesting islands would be constructed in Pond R1 concurrent with the construction of the SF2 levee (prior to dewatering SF2).
- After enhancement of western snowy plover habitat in Ponds SF2 and R3 and flood protection for Pond SF2 is completed, SFCJPA or its member agencies would initiate restoration earthwork in Ponds R1 and R2 and construct flood protection for the Substation and Marsh Restoration Reach. Excavated spoils from levee construction in Pond SF2 and the Substation and Marsh Restoration Reach would be beneficially reused in marsh restoration in Ponds R1 and R2. The existing levees for Ponds R1 and R2 would not be breached until shoreline protection within the Substation and Marsh Restoration Reach is completed.

[16] The construction schedule in Table 2-4 represents a conservative, illustrative scenario prepared for purposes of environmental analysis. Actual construction phasing may vary based on final design, settlement requirements, geotechnical conditions, and contractor means and methods.



SOURCE: NAIP Imagery, 2024; HDR, 2024; ESA, 2024

SAFER Bay Project

Figure 2-25
Marsh Road Reach Plan

TABLE 2-4
SAFER BAY PROJECT IMPLEMENTATION SCHEDULE[a]

	Reach/Activity	Approximate Schedule									
		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Project-Level Components	NEPA, supplemental CEQA as needed, design, and permitting for Project-level components										
	Dumbarton Approach Reach										
	Construct levee through Pond SF2 from railroad tracks to SR 84										
	Construct western snowy plover habitat in Pond SF2										
	Substation and Marsh Restoration Reach										
	Conduct Pond R1 and R2 restoration earthwork, except for breaching levees										
	Construct levee and 10H:1V T-zone at substation										
	Breach existing levees at Ponds R1 and R2 to restore tidal hydrology[b]										
	Tech Campus/Bayfront Expressway Reaches										
	Construct western snowy plover nesting habitat enhancements in R3										
	South of Bay Road Reach										
	Construct shoreline protection										
Program-Level Components	North of Bay Road Reach Construction										
	Dumbarton Approach Reach - Construct remaining shoreline protection										
	Tech Campus Reach Construction										
	Bayfront Expressway Reach Construction										
	Bedwell Bayfront Park Reach Construction										
	Marsh Road Reach Construction										

NOTES: CEQA = California Environmental Quality Act; NEPA = National Environmental Policy Act; SR = State Route; T-zone = Tidal salt marsh–upland transition zone

a. Project-level components shown in green; program-level components shown in blue; construction shown in dark green and dark blue.
b. Enhancement of western snowy plover habitat in Pond 3 would occur before Ponds R1 and R2 berms are breached.

SOURCE: ESA 2025; HDR 2025; H.T. Harvey & Associates 2025; SFCJPA 2024

- SFCJPA or its member agencies would also initiate construction of shoreline protection features in the South of Bay Road Reach at roughly the same time as initiation of restoration within Ponds R1 and R2 to reduce the duration of temporal marsh habitat loss from impacts in the South of Bay Road Reach. Excavated spoils from levee construction could also be beneficially reused for marsh restoration in Ponds R1 and R2.
- After shoreline protection is completed for the South of Bay Road Reach, it is assumed that levee construction would be implemented for the other reaches. The construction schedule shown in Table 2-4 is somewhat staggered to account for the scale and magnitude of the construction effort and the different agencies involved.

2.6 Construction Details

2.6.1 Construction Process

Shoreline Protection, Recreation, and Levee T-zones

Table 2-5 presents a description of the basic construction phases and activities to be employed for shoreline protection and recreation features for each reach. Although some activities (e.g., trail closures, demolition and off-haul of existing trail surfaces, construction of temporary access points) would be implemented for the entire reach, most would be sequenced over segments of a reach (e.g., implementing drainage/water control systems, removal of topsoil, degrading existing berms, constructing the levee or floodwall).

Degrading existing berms and excavating soils to develop the levee foundations would generate excess material (i.e., spoils). Spoils generated during Project construction would be used to construct habitat improvements or off-hauled to Recology Mountain View or an appropriate recycling facility/disposal area.

Habitat Improvements

Table 2-6 presents a description of the basic construction phases and activities to be employed for habitat improvements for each reach.

2.6.2 Construction Work Hours

Construction would generally occur between 8:00 a.m. and 5:00 p.m., Monday through Saturday. Construction contractors may install temporary security lighting at construction staging areas. Approximately four nighttime shifts of site preparation would occur for vehicles to place and remove a K-rail along the Bayfront Expressway. Due to the nature of K-rail placement, lighting beyond that provided by construction vehicles would not be necessary. Construction in and near sensitive habitats would occur outside of breeding seasons for California Ridgeway's rail (February 1 to August 31) and western snowy plover (March 1 to September 15).

TABLE 2-5
CONSTRUCTION PROCESS FOR SHORELINE PROTECTION AND RECREATION FEATURES

Construction Phase	General Description of Construction Activities[a]
Site preparation/ mobilization	• Close trails • Install erosion control features (e.g., silt/biological resources fencing) • Plug and fill water side channels as needed • Construct replacement slough channels • Construct temporary access routes • Remove vegetation • Strip and stockpile soil
Demolition	• Demolish/remove/relocate existing infrastructure (e.g., utilities, walkways, gates, signs, etc.)
Grading, drainage/ water control	• Degrade existing berm • Install temporary sheet pile wall • Install dewatering wells • Install water treatment and discharge systems • Excavate levee foundation
Shoreline protection construction	• Prepare foundation subgrade • Install settlement monitors • Place initial geogrid • Place embankment initial lifts • Construct utilities • Place levee prism and water side embankment • Drive sheet pile (if applicable) • Construct floodwall concrete cap • Finalize embankment placement
Section and paving for trail	• Respread topsoil • Make aggregate base subgrade • Haul and place aggregate base • Pave trail
Closeout	• Add trail striping and marking • Install access point fencing, bollards, signs, etc. • Prepare topsoil and revegetate levee slopes, including all T-zones • Hydroseed levee and habitat berms • Restore elevation of marshplain in dewatered areas • Place sod on marshplain, as needed • Decommission dewatering wells • Remove temporary sheet piles • Remove temporary erosion control features • Re-open trails • Demobilize

NOTES: T-Zone = Transition Zone

a. Descriptions are general and may vary by reach.

SOURCE: HDR 2024

TABLE 2-6
CONSTRUCTION PROCESS FOR HABITAT IMPROVEMENTS

Construction Phase	General Description of Construction Activities[a,b]
Site preparation/ mobilization	• Temporarily close trails • Install erosion control and biological exclusion fencing • Construct temporary access routes (e.g., upgrade berms) • Remove vegetation within the footprint of earthwork • Strip and stockpile soil for beneficial reuse in restoration
Demolition	• Remove water control features and predator perches
Grading, drainage/ water control	• Beneficially reuse bay mud from levee construction for restoration: transport and place bay mud (excavated from SF2 and Substation/R2 flood control levee key) into R1 and R2 for restoration (e.g., to fill borrow ditches in R1/R2) • Construct R1 seabird nesting islands • Remove SF2 (cell U2) nesting islands • Regrade SF2 (cells U2, U3, U4) to enhance and create western snowy plover breeding and foraging habitat • Construct western snowy plover nesting habitat enhancements in R3 • Build in-marsh high-tide refugia in R1/R2 • Install water control features • Dredge outboard slough channel (Ravenswood Slough) at R1 • Create transition zones following construction of shoreline protection on outboard levee face at R2 • Excavate proposed channels and borrow ditches and breach internal berms
Planting and creating nesting habitat	• Implement surface treatment for nesting areas (e.g., regrading import of gravel and/or oyster shells) • Install perch deterrents on power transmission towers • Plant high-tide refugia and transition zone with marsh and ecotone species
Breach existing berms (Ponds R1/R2 only)	• Excavate channel through existing berms to reintroduce tidal action
Closeout	• Install public access improvements where proposed • Decommission water management measures • Remove temporary erosion control features • Re-open trails • Demobilize

NOTES:

a. Descriptions are general and vary by restoration area.
b. Construction of shoreline protection and recreation features (described in Table 2-5) would be done in coordination with habitat restoration activities and would be completed before breaching berms.

SOURCE: ESA 2024; HDR 2024; H.T. Harvey & Associates 2024

2.6.3 Staging, Workforce, and Additional Construction Details

Figure 2-26 presents proposed staging and materials laydown areas for Project-level components. No staging areas have been identified for program-level components. Staging areas for program-level components would be in the vicinity of construction areas on the landward side of the shoreline protection alignment(s) and within areas that are paved or have been previously disturbed and lack wetland features. Worker parking would generally occur near active work areas. Construction workers and vehicles would access the sites via major roadways such as United States Route 101, SR 84, Willow Road (SR 114), and



SOURCE: HDR, 2024; ESA, 2024

SAFER Bay Project

Figure 2-26
Potential Staging and Materials Laydown Areas

University Avenue (SR 109), connecting to smaller adjacent roads such as Bay Road, Clark Avenue, Weeks Street, Donohoe Street, O'Connor Street, Purdue Avenue, Fordham Street, Marsh Road, and a privately owned railroad/pipeline access road.

Refer to **Table 2-7** for estimated worker and truck trip information during each construction phase and **Table 2-8** for expected construction equipment. A diesel generator would be used for approximately 10 days at each reach for dewatering/pumping water.

Table 2-9 indicates estimated construction water use. Active construction sites would be watered up to three times per day for dust suppression. Construction water would be provided by potable water fire hydrants adjacent to the Project sites.

Table 2-10 estimates the volume of material to be re-used for the Project as well as construction waste to be off-hauled. Demolition debris and spoils would be disposed of at Ox Mountain Landfill in Half Moon Bay or recycled at Stevens Creek Quarry west of Cupertino.

2.6.4 Trail Closures

During levee construction, segments of the Bay Trail would be closed for the duration of the construction period for a given reach. Access to segments of existing trails that intersect with a given reach and associated recreation destinations would also be disrupted during construction. Examples include the Faber–Laumeister Trail, Cooley Landing, the SF2 Trail, the public shoreline access trail around Meta Headquarters, and Bedwell Bayfront Park. Recreational facility closures would be noticed in advance and may be added to 511.org. Cautionary detour signs and/or possible trail closure mechanisms (e.g., red and white-striped gate arms, warning lights) would generally be implemented when detours are in place but would be subject to the protocols of the local agency that operates each portion of the Bay Trail.[17]

2.7 Operation and Maintenance

Member agencies would be responsible for conducting routine inspections of the shoreline protection facilities, operating flood gates, managing interior drainage, and maintaining the Bay Trail. Existing landowners would be responsible for maintaining public trails on their property.[18] The SBSPRP and/or Refuge would be responsible for monitoring and maintenance of proposed restoration areas. Maintenance activities would be completed by existing staff; no new staff would be hired for Project operation and maintenance.

The activities described below would result in an estimated two truck trips per month, except during high-water events, which may require daily inspections. Task lighting during maintenance and inspection would be temporary; no permanent lighting would be installed as part of the Project, and no emergency generators would be needed for Project operations.

[17] Szibbo, N., 2024. Bay Trail Operations. Personal communications between N. Szibbo (Metropolitan Transportation Commission) and S. Villegas (Environmental Science Associates). November 6, 2024.

[18] Although the Metropolitan Transportation Commission acts as the regional planning, funding, and coordinating agency, the local right-of-way owner is responsible for operation and maintenance of the Bay Trail. The multiple jurisdictions and local agencies that are responsible for segments of the Bay Trail network each have their own policies and practices around maintenance. The Metropolitan Transportation Commission coordinates with and provides guidance for local agencies as appropriate (Szibbo 2024).

TABLE 2-7
ESTIMATED CONSTRUCTION WORKER AND VEHICLE TRIPS PER REACH

Construction Phase[a]	Estimated Daily Construction Workforce	Estimated Daily One-Way Worker Trips[b]	Estimated Daily Average One-Way Truck Trips (Vendor[c] + Haul[d])
South of Bay Road			
Site preparation/mobilization	14	28	23
Demolition	3–11	6–22	17
Grading, drainage/water control (on-road/offsite trips)[e]	12	24	13
Shoreline protection construction	25	50	7
Structural section and paving	8	16	9
Closeout	10	20	2
North of Bay Road			
Site preparation/mobilization	11	22	35
Demolition/exporting contaminated soil	10–14	20–28	32
Grading, drainage/water control (on-road/offsite trips)[e]	10	20	122
Shoreline protection construction	9	18	5
Structural section and paving	10	20	87
Closeout	7	14	2
Dumbarton Approach			
Site preparation/mobilization	29	58	149
Demolition	12	24	10
Grading, drainage/water control (on-road/offsite trips)[e]	40	80	169
Remove water control features and predator perches in SF2 to prepare for western snowy plover enhancement earthwork	4	8	0
Grading, drainage/water control to enhance western snowy plover nesting habitat in SF2	12	24	21
Shoreline protection construction	25	50	11
Structural section and paving	17	34	163
Closeout	13	26	4
Substation and Marsh Restoration			
Site preparation/mobilization	6	12	422
Construct new seabird islands in Pond R1 prior to dewatering Pond SF2	12	24	72
Demolition	14	28	6
Grading (including beneficial reuse of bay mud), drainage/water control to restore tidal marsh in Ponds R1, R2 (no breach)	11	22	8
Grading, drainage/water control (on-road/offsite trips)[e]	29	58	314
Shoreline protection construction	6	12	5
Structural section and paving	11	22	34
Breach existing berms in R1/R2 only to restore tidal action	11	22	4
Closeout	6	12	2

Construction Phase[a]	Estimated Daily Construction Workforce	Estimated Daily One-Way Worker Trips[b]	Estimated Daily Average One-Way Truck Trips (Vendor[c] + Haul[d])
Tech Campus			
Site preparation/mobilization	14	28	192
Demolition	11	22	9
Grading, drainage/water control (on-road/offsite trips)[e]	29	58	123
Shoreline protection construction	25	50	11
Structural section and paving	10	20	65
Closeout	18	36	2
Bayfront Expressway			
Site preparation/mobilization	14	28	1
Demolition	5	10	7
Grading, drainage/water control (on-road/offsite trips)[e]	19	38	74
Shoreline protection construction	11	22	5
Structural section and paving	6	12	38
Closeout	7	14	2
Construct western snowy plover nesting habitat enhancements in R3	4	8	0
Bedwell Bayfront Park			
Site preparation/mobilization	14	28	1
Demolition	5	10	8
Grading, drainage/water control (on-road/offsite trips)[d]	7	14	57
Shoreline protection construction	14	28	5
Structural section and paving	8	16	6
Closeout	7	14	2
Marsh Road			
Site preparation/mobilization	14	28	1
Demolition	0	0	0
Grading, drainage/water control (on-road/offsite trips)[e]	7	14	43
Shoreline protection construction	0	0	0
Structural section and paving	6	12	25
Closeout	7	14	2

NOTES:

a. Includes vehicle trips associated with shoreline protection, recreation, and restoration.
b. **Worker Vehicle Trips:** Trips made by workers to and from the jobsite, as well as within the jobsite, for purposes unrelated to material haul-off or material placement. One-way worker trips are based on an estimate of two one-way trips per day.
c. **Vendor Truck Trips:** Trips made for the sole purpose of loading and unloading material destined for permanent disposal outside the Project area or destined for onsite staging. Construction trucks would have a capacity of between 10 to 20 cubic yards.
d. **Haul Truck Trips:** Trips made by workers to haul import materials or material generated by construction (e.g., grading activities) within the jobsite, to the jobsite, and away from the jobsite for disposal. Haul trucks would likely have a capacity of 10 cubic yards for onsite hauling and 15 cubic yards for offsite hauling.
e. **On-Road/Offsite Trips:** Haul trips that use the local road network to access and leave the construction site. Does not include off-road/onsite trips (haul trips that stay within the construction site and move material from one area of the site to another). Onsite trips have been considered in the analyses in Chapter 3, *Environmental Setting, Impacts, and Mitigation Measures*, (e.g., air pollutant emissions).

SOURCE: HDR 2025

TABLE 2-8
EXPECTED CONSTRUCTION EQUIPMENT

Construction Phase	Equipment[a]	
Site preparation/mobilization	• Excavators • Generator sets • Rough terrain forklifts	• Rubber tired loaders • Tractors/loaders/backhoes
Demolition	• Cranes • Excavators • Graders	• Rough terrain forklifts • Tractors/loaders/backhoes
Grading, drainage/water control	• Bore/drill rigs • Cranes • Crawler tractors • Excavators • Generator sets • Graders	• Rollers • Rough terrain forklifts • Dozers • Tractors/loaders/backhoes • Vibratory pile drivers or hammers[b] or Giken Silent Piler system
Shoreline protection construction	• Bore/drill rigs • Cranes • Excavators • Generator sets	• Rollers • Rough terrain forklifts • Tractors/loaders/backhoes • Vibratory pile drivers or hammers[b] or Giken Silent Piler system
Structural section and paving	• Graders • Pavers • Rollers	• Rubber tired loaders • Tractors/loaders/backhoes
Closeout	• Cranes • Excavators • Rubber tired loaders	• Rough terrain forklifts • Tractors/loaders/backhoes

NOTES:
a. Construction equipment would have Tier 4-rated engines where possible.
b. Vibratory hammers or pile drivers would be used for temporary (water control) and/or permanent (installation of sheet pile floodwalls or flood gates) features in the following reaches: South of Bay Road, North of Bay Road, Dumbarton Approach, Tech Campus, and Bedwell Bayfront Park.

SOURCE: HDR 2023

TABLE 2-9
ESTIMATED CONSTRUCTION WATER USE

Reach	Approximate Total Water Use (gallons)	Approximate Water Use per Day (gallons)
South of Bay Road	9,300,000	35,500
North of Bay Road	16,000,000	55,400
Dumbarton Approach	26,000,000	98,900
Substation and Marsh Restoration	27,000,000	106,300
Tech Campus	12,500,000	49,200
Bayfront Expressway	13,100,000	54,600
Bedwell Bayfront Park	2,600,000	4,500
Marsh Road	1,000,000	6,200
Habitat Improvements	540,000	11,000

SOURCE: HDR 2024

TABLE 2-10
ESTIMATED VOLUME OF RE-USE MATERIAL AND DEMOLITION DEBRIS

Reach	Estimated Volume of Material for Re-Use (cubic yards)[a]	Estimated Demolition Quantities		
		Existing Trail/Road (square feet)	Existing Trail/Road (converted to cubic yards)[b]	Other Material (cubic yards)
South of Bay Road	28,200	47,000	10,444	40
North of Bay Road	11,200	13,000	2,889	27,000
Dumbarton Approach	84,500	-	-	-
Substation and Marsh Restoration	154,500	-	-	-
Tech Campus	58,000	58,500	13,000	-
Bayfront Expressway	82,500	-	-	-
Bedwell Bayfront Park	-	21,000	4,667	-
Marsh Road	29,000	-	-	-
Total	**447,900**	139,500	31,000	27,040
		Project Total Cubic Yards of Waste		**58,040**

NOTES:

a. Includes volume of material stockpiled for reuse and volume of material for direct reuse.
b. Assumes excavation up to 6 feet below ground surface.

SOURCE: HDR 2024

2.7.1 Shoreline Protection

Levee maintenance would generally include vegetation control such as annual slope mowing or grazing. Mowing would be limited to outside T-zone and salt marsh habitats. T-zone habitat on the levee slopes would be actively maintained and monitored during a 5- to 10-year period (to be determined). Vegetation maintenance would include irrigation, weed control, and plant replacement, as needed to meet vegetation success criteria. Vegetation irrigation is anticipated to require up to approximately 91 MG per year (assuming grass cover).[19] The vegetation maintenance plan, ecological monitoring plan, and associated vegetation success criteria would be set forth in the Project's future Habitat Restoration and Monitoring Plan (HRMP), prepared for BRRIT approval during the regulatory permitting process. For vegetated slopes that are not T-zones (i.e., on the landward side of levees), annual mowing would likely occur over 2 days per reach and would be completed with a 40-horsepower mower.

The Project design includes one flood gate at Bay Road and potentially another at the railroad tracks in the North of Bay Road Reach; as design progresses for those reaches evaluated at a program level of detail, additional flood gates or other flood control infrastructure may be incorporated. Operation of the flood gates would depend on the type of flood gates selected during design and coordination with regulatory agencies and SFCJPA members. The frequency of flood gate operation would depend on hydraulic modeling and actual conditions. Flood gates would likely require annual testing and

[19] Grass typically requires approximately 1-2 inches of water per week on average during the dry season (approximately six months). Total levee area where irrigation could be required would be approximately 80 acres. The project could require 48 inches or 4 feet of irrigation per year, equivalent to 320 acre-feet or 91 MG per year.

maintenance, which would be coordinated with various agencies. Flood gate operations would depend on weather forecasting. If flood conditions are forecast and a storm may require flood gate closure, the member agency would mobilize the appropriate staff (e.g., a public works crew with training in gate operations) to close the flood gates at a pre-determined length of time prior to potential flooding. Once floodwaters recede, the gates would be returned to their open position. Flood gate operations would be documented in a Flood Management Plan and/or an Operation and Maintenance Plan. Power for operation of the flood gates installed at Bay Road and the railroad crossing would be provided by PG&E.

A key complement to coastal shoreline flood protection is the interior drainage system that manages water on landward development areas. Currently, interior drainage is addressed for the developed areas by the cities of Menlo Park and East Palo Alto as well as Caltrans via each entity's existing storm drain system. These systems rely on pump stations to remove storm and floodwater from within the confines of flood control projects, in accordance with interior drainage requirements needed for FEMA levee system accreditation. As described in Section 2.4.2, where the Project would affect components of the existing storm drain infrastructure that intersect with the levee alignment, the Project includes improvement and/or replacement of those components to maintain the system's current capacity. Pump stations would be operated once interior floodwaters are visually observed in certain key areas, to be determined during design. The pumps would cease operations once the storm has passed and the flood areas return to normal. Pump station operations would be documented in a Flood Management Plan and/or an Operation and Maintenance Plan. PG&E would provide power for operation of the pump stations.

As is common for most storm drain systems, shallow groundwater infiltrates into the systems' pipes and ditches and is then conveyed to the bay along with stormwater runoff. Future sea level rise will raise the groundwater table along the shoreline, which could result in additional groundwater infiltration into the interior drainage system. These future conditions facing the interior drainage system would be assessed in other studies and then addressed in future design phases for interior drainage systems. As indicated in Section 2.4.1, areas of soil and groundwater contamination are present near the proposed alignment. For a discussion of the potential for the Project to affect interior drainage, groundwater, and water quality, refer to Section 3.11, Hydrology and Water Quality.

2.7.2 Habitat Restoration and Enhancement in the Ravenswood Pond Complex

SFCJPA would prepare an HRMP for both the restoration in the Ravenswood Pond Complex and the T-zone restoration on levee slopes for BRRIT approval during the regulatory permitting process. The HRMP would set forth a 5- to 10-year habitat maintenance and ecological monitoring plan with success criteria. Maintenance of levee slopes under the HRMP would occur as described previously. Within the pond complex, maintenance may include invasive species removal and supplemental planting in restored marsh habitat, and removal of any vegetation and maintenance of pumps and other water management infrastructure in western snowy plover habitat. Following the attainment of success criteria, SBSPRP and Refuge would adaptively manage the restoration in accordance with the SBSPRP's Adaptive Management

Plan. The proposed restoration within Ponds R1 and R2 would be monitored and adaptively managed,[20] based on actual conditions that occur (e.g., sediment accretion, vegetation establishment, and other hydrologic, geomorphic, and habitat responses to the reintroduction of tidal action), to achieve the intended restoration goals. Examples of adaptive management procedures that could be implemented include invasive species management and dredging of the tidal channels that block predator access to the proposed seabird nesting islands in Pond R1.

In some areas, the Project would impede flow to and from ponds managed for wetland habitat. These ponds would require active management to ensure that the water levels and water quality are being maintained to meet various biological requirements. The pumps in these instances would have low flows to manage and maintain water elevations.

2.7.3 Recreation

There would be no change to existing maintenance practices for the Bay Trail. As indicated previously, while the Metropolitan Transportation Commission acts as the regional planning, funding, and coordinating agency, the local right-of-way owner is responsible for operation and maintenance of the Bay Trail.[21] The Metropolitan Transportation Commission would continue to coordinate with and provide guidance for local agencies as appropriate.

2.8 Intended Uses of the EIR

Responsible and trustee agencies are expected to use this EIR in their decision-making. **Table 2-11** presents a summary of anticipated permits and authorizations, organized by agency.

[20] *Adaptive management* is a process that promotes flexible decision-making that can be adjusted to address uncertainties as outcomes from management actions and other events become better understood. Careful monitoring of outcomes advances scientific understanding and helps adjust policies or operations as part of an iterative learning process. (National Research Council of the National Academies. 2004. *Adaptive Management for Water Resources Project Planning*.)

[21] Szibbo, N., 2024. Bay Trail Operations. Personal communications between N. Szibbo (Metropolitan Transportation Commission) and S. Villegas (Environmental Science Associates). November 6, 2024.

TABLE 2-11
REQUIRED PERMITS AND APPROVALS

Agency or Organization	Action Potentially Requiring Permit or Consultation
Federal	
U.S. Army Corps of Engineers	Impacts on wetlands and waters of the U.S.
U.S. Fish and Wildlife Service	Impacts on federally listed as threatened and endangered species. Authorizations related to construction of flood protection and related improvements on federal property managed by USFWS.
National Oceanic and Atmospheric Administration, National Marine Fisheries Service	Impacts on federally listed as threatened and endangered species and on Essential Fish Habitat and managed fisheries.
State	
State Historic Preservation Office	Construction in or near cultural resources.
State Lands Commission	Lease for portions of Project encroaching on state sovereign land.
California Department of Fish and Wildlife	Impacts on state-listed as threatened and endangered species; impacts on streams/drainages.
California Department of Transportation	Encroachment permit for construction with Caltrans' right-of-way
Regional Water Quality Control Board	Impacts on waters of the state and potential for surface water quality impairment from pollutant discharge.
Bay Conservation and Development Commission	Impacts on lands within BCDC jurisdiction.
Regional	
Midpeninsula Regional Open Space District	Authorizations related to construction of flood protection and related improvements on District-owned property.
Local	
City of East Palo Alto	Various, including encroachment permits, right-of-way or easements; building permits for construction of structural elements; tree removal permits.
City of Menlo Park	Various, including encroachment permits and/or encroachment agreements for construction on Menlo Park property, right-of-way or easements; building permits for construction of structural elements; heritage tree permits.
City of Palo Alto	Council approval for any proposed easements to construct and maintain infrastructure within City of Palo Alto property.[a]
City of Redwood City	Various.
City and County of San Francisco	Authorizations related to construction of flood protection and related improvements on City-owned property managed by the San Francisco Public Utilities Commission.

NOTES: BCDC = Bay Conservation and Development Commission; USFWS = U.S. Fish and Wildlife Service

a. Lait, J., 2022. Letter commenting on the SAFER Bay Notice of Preparation from J. Lait (Director, Planning & Development Services, City of Palo Alto). June 6, 2022.

SOURCE: Data compiled by ESA in 2025.

CHAPTER 3
Environmental Setting, Impacts, and Mitigation Measures

3.1 Overview

This chapter provides an analysis of the physical environmental effects of implementing the proposed SAFER Bay Project (Project) as described in Chapter 2, *Project Description*. This chapter describes the environmental setting, assesses impacts, and identifies mitigation measures for significant impacts.

This environmental impact report (EIR) provides an independent analysis of the Project's significant impacts and provides project-level and program-level analyses of the Project based on site-specific information developed for each of the reaches.

3.1.1 Scope of Analysis

This chapter is organized by environmental resource topics, as follows:

Chapter 3 Sections	
3.1 Overview	3.10 Hazards, Hazardous Materials, and Wildfire (HAZ)
3.2 Aesthetic Resources (AES)	3.11 Hydrology and Water Quality (HYD)
3.3 Air Quality (AIR)	3.12 Land Use, Agriculture, and Forestry (LU)
3.4 Biological Resources (BIO)	3.13 Noise and Vibration (NOI)
3.5 Cultural Resources (CUL)	3.14 Population and Housing (POP)
3.6 Tribal Cultural Resources (TCR)	3.15 Recreation (REC)
3.7 Energy (ENE)	3.16 Transportation (TRA)
3.8 Geology, Soils, and Paleontology (GEO)	3.17 Utilities, Service Services, and Public Services (USP)
3.9 Greenhouse Gas Emissions (GHG)	

Each section of Chapter 3 contains the following elements, based on the requirements of the California Environmental Quality Act (CEQA):

- **Setting.** This subsection describes the existing physical environmental conditions in the Project area with respect to each resource topic, at an appropriate level of detail to allow the reader to understand the impact analysis.
- **Regulatory Framework.** This subsection describes the relevant laws and regulations that apply to protecting the environmental resources within the Project area, and the governmental agencies responsible for enforcing those laws and regulations.
- **Impacts and Mitigation Measures.** This subsection evaluates the potential for the Project to result in adverse effects on the physical environment described in the setting. Each impact analysis section

defines significance criteria for evaluating environmental impacts, and the *Methodology* explains how the significance criteria are applied in evaluating the Project impacts. The conclusion of each impact analysis is expressed in terms of the impact significance under CEQA. Mitigation measures are identified for impacts considered significant, consistent with CEQA Guidelines section 15126.4.

- **Cumulative Impacts.** This subsection discusses cumulative impacts, considering the potential impacts of the Project in combination with the impacts of other past, present, and probable future projects.

3.1.2 Significance Determinations

The significance criteria used in this EIR are largely based on CEQA Guidelines Appendix G. Each section of this chapter presents, before the discussion of impacts, the significance criteria used to analyze each resource topic. The categories used to designate impact significance are as follows:

- **No Impact (NI).** This determination applies if there is no potential for impacts or the environmental resource does not occur within the Project area.
- **Less than Significant (LS).** This determination applies if there is a potential for some limited impact but not a substantial, adverse effect that qualifies under the significance criteria as a significant impact. No mitigation is required for impacts determined to be less than significant.
- **Less than Significant with Mitigation (LSM).** This determination applies if there is a potential for the Project to result in an adverse effect that would or could meet or exceed the significance criteria, but feasible mitigation is available that would reduce the impact to a less-than-significant level.
- **Significant and Unavoidable Despite Mitigation (SUM).** This determination applies if the Project would result in an adverse effect that would or could meet or exceed the significance criteria and there is feasible mitigation available to lessen the severity of the impact, but either the residual effect after implementation of the measure would remain significant or there is some uncertainty as to the effectiveness of the mitigation measure.
- **Significant and Unavoidable (SU).** This determination applies if the Project would result in an adverse effect that would or could meet or exceed the significance criteria and for which there is no feasible mitigation available.

Mitigation measures would be implemented by the San Francisquito Creek Joint Powers Authority (SFCJPA) or one of its member agencies, collectively referred to in the text of the mitigation measures as "Project Proponent."

3.1.3 Approach to Plans and Policies

Pursuant to the CEQA Guidelines section 15125(d), each topical section indicated above describes land use and resource-specific plans and policies that may apply to the Project. Policy conflicts do not, in and of themselves, indicate a significant environmental effect within the context of CEQA environmental review, in that the intent of CEQA is to determine physical effects associated with a project. Refer to **Table 3.1-1** for the jurisdiction within which each reach is located and Figure 2-1 in Chapter 2, *Project Description*, for jurisdictional boundaries in the Project area.

TABLE 3.1-1
JURISDICTIONS BY REACH

Reach	Jurisdiction(s) [a]
South of Bay Road	East Palo Alto
North of Bay Road	East Palo Alto, Menlo Park
Dumbarton Approach	Menlo Park, California Department of Transportation (Caltrans)
Substation and Marsh Restoration	Menlo Park, Caltrans
Tech Campus	Menlo Park
Bayfront Expressway	Menlo Park
Bedwell Bayfront Park	Menlo Park, Redwood City
Marsh Road	Redwood City, Menlo Park

NOTES:

a. Portions of the Project site are within federally owned property and property owned by Midpeninsula Open Space District, City of Palo Alto, and the City and County of San Francisco (in addition to privately owned property).

SOURCE: Data compiled by Environmental Science Associates in 2025.

Land use plans typically contain numerous policies emphasizing differing legislative goals, and an interpretation of consistency requires a balanced understanding of relevant policies. The board, commission, or city council that adopted the plan determines the meaning of such policies and how individual projects satisfy those policies at the time it considers approval of a project. Whether the proposed Project is consistent with a plan would be determined at the time of Project approval by the agency charged with making that consistency determination. In each case, the approving or reviewing agency will consider any potential inconsistencies between the Project and adopted plans or policies in the context of applicable objectives and policies and will determine consistency based on a balancing of relevant policies as part of the approval process.

3.1.4 Approach to Project-Level and Program-Level Evaluations

As indicated in Chapter 2, *Project Description,* the basis for evaluating the Project reflects available design details, which varies by reach. In general, those components for which 30-percent design is available are evaluated at a project level of detail and those components for which 10-percent design is available are evaluated at a program level of detail. Nonetheless, design engineers mapped footprints for shoreline protection features (shown as "proposed levee toe" in Figures 2-7, 2-10, 2-13, 2-17, 2-20, 2-22, 2-24, and 2-25, Chapter 2, *Project Description*) for all reaches, including those with 10-percent design and those with 30-percent design. Construction footprints (indicating the anticipated limits of ground disturbance for levees and related facilities) were also mapped for all reaches (shown in Appendix CONST), and detailed construction assumptions were provided for all reaches as well (e.g., worker and vehicle trips, equipment usage). Consequently, in many cases, quantitative evaluations for topics like impacts of wetlands or air pollutant emissions for program- and project-level reaches are at an equal level of detail across all reaches. There are aspects of the Project, particularly for "program-level" reaches, that are less well defined, including changes to utilities (e.g., stormwater management facilities) and access ramps. The extent to which such changes are evaluated reflects the information currently available. Refer to Appendix INFRA for a list of utilities and encroachments that have been identified within the reach, any proposed actions to address each utility and encroachment, and whether the proposed actions are

addressed at a project level or program level of detail. In addition, Pacific Gas and Electric Company (PG&E) may determine that its transmission towers in Ponds R1 and R2 requirement reinforcement prior to the restoration of tidal action in Ponds R1 and R2. Given that it is uncertain whether improvements would be needed, for informational purposes Appendix PGE presents a brief description and analysis of environmental effects of potential PG&E tower reinforcements.

Refer to Section 1.2.5, Program–Project EIR and Supplemental CEQA, in Chapter 1, *Introduction*, regarding supplemental evaluation that may be warranted under CEQA as design of the SAFER Bay Project progresses.

3.1.5 Approach to Cumulative Impacts Analysis and Cumulative Projects

CEQA Provisions Regarding Cumulative Impacts

Cumulative impacts, as defined in section 15355 of the CEQA Guidelines, refer to two or more individual effects that, when taken together, are "considerable" or that compound or increase other environmental impacts. A cumulative impact from several projects is the change in the environment that would result from the incremental impact of each project when added to those of other closely related past, present, or probable future projects. Section 15130 of the CEQA Guidelines provides the following pertinent guidance for cumulative impact analysis:

- An EIR shall discuss cumulative impacts of a project when the project's incremental effect is "cumulatively considerable" (i.e., the incremental effects of an individual project are significant when viewed in connection with the effects of past, current, and probable future projects, including those outside the control of the agency, if necessary).
- An EIR should not discuss impacts that do not result in part from the project evaluated in the EIR.
- A project's contribution is less than cumulatively considerable, and thus not significant, if the project is required to implement or fund its fair share of a mitigation measure or measures designed to alleviate the cumulative impact.
- The discussion of impact severity and likelihood of occurrence need not be as detailed as for effects attributable to the project alone.
- The focus of analysis should be on the cumulative impact to which the identified other projects contribute, rather than on attributes of the other projects that do not contribute to the cumulative impact.

Approach to Cumulative Impact Analysis in this EIR

CEQA Guidelines section 15130(b)(1) provides two approaches to a cumulative impact analysis. The analysis can be based on: (a) a list of past, present, and probable future projects producing related or cumulative impacts; and/or (b) a summary of projections contained in a general plan or related planning document. Both approaches are used in this EIR.

The cumulative impact analysis considers the effects of the Project together with those of other past, present, or probable future projects proposed by SFCJPA or others. In Sections 3.2 through 3.17 of this chapter, the cumulative impact analysis for each resource topic follows the analysis of the Project-specific

impacts. Additional mitigation measures are identified if the cumulative impact analysis determines that a significant cumulative impact could occur and the Project's contribution to a significant cumulative impact would be considerable, even with Project-level mitigation. As permitted in CEQA Guidelines section 15130(b)(1), the analysis in this EIR employs the list-based approach for defining projects to be considered in the cumulative impact analysis — that is, the analysis is based on a list of past, present, and probable future projects that could result in related or cumulative impacts. A probable future project is defined as one that is "reasonably foreseeable," which is generally a project for which an application has been filed with the approving agency or that has approved funding. The probable future projects are subject to independent environmental review and consideration by approving agencies. Consequently, it is possible that some of the projects will not be approved or will be modified prior to approval (e.g., because of the CEQA process). Projects that are relevant to the cumulative analyses include those that could contribute incremental effects on the same environmental resources and would have similar environmental impacts as those identified for the Project in this EIR.

The cumulative analyses presented in Sections 3.2 through 3.17 first consider whether an impact of the Project could result in adverse physical effects on the environment. If so, the cumulative analysis considers whether any of the relevant projects would result in related impacts or affect the same environmental resources as the Project, resulting in a cumulative impact. If the cumulative impact is considered significant based on the identified significance criteria, the analysis considers whether the Project's contribution would be cumulatively considerable (significant) or not cumulatively considerable (less than significant). If the Project's contribution would be cumulatively considerable, mitigation measures are identified to reduce the Project's contribution to a less-than-cumulatively-considerable level (less than significant with mitigation). If there is no feasible mitigation to reduce the Project's contribution to a less-than-significant level, the Project's contribution to the cumulative impact is considered significant and unavoidable.

Table 3.1-2 describes the past, present, and probable future projects that are considered in the cumulative analyses (based on the factors described above), and their locations are shown on **Figure 3.1-1**. In many cases, the list includes projects that have overlapping construction schedules with the Project (or would be completed prior to or following Project construction) and that could be constructed in the general vicinity of the Project, with the potential to result in cumulative impacts during construction. The list also includes projects that could be in operation concurrently with the Project and that could have similar environmental impacts as the Project's operations, with the potential to result in cumulative operational impacts.

TABLE 3.1-2
PROJECTS CONSIDERED IN CUMULATIVE IMPACT ANALYSIS

Project No. on Map	Project Name (Project Sponsor or Jurisdiction)	Project Description	Status/Construction Dates if Known
1	Ravenswood Business District/Four Corners Specific Plan Update (City of East Palo Alto)[a]	The City of Palo Alto adopted an update to the 2013 Ravenswood Business District/4 Corners Specific Plan (Specific Plan) on December 17, 2024. The 2024 Specific Plan update establishes expectations and a framework for providing amenities that benefit East Palo Alto residents, provides detailed regulations for all new development that occurs within its boundaries, lays down policies for transforming Four Corners, and establishes the required pedestrian and bicycle enhancements and Transportation Demand Management strategies that will ensure new development reduces its own vehicle trips and supports improved public transit in the future. The 2024 Specific Plan update increases the total amount of development allowed within the Specific Plan area and would be implemented as one of two development scenarios, both of which are evaluated in the Specific Plan's EIR. Scenario 1 would consist of an additional 2.8 million square feet of office and research and development space, 250,000 square feet of industrial space, 129,700 square feet of civic space, 112,400 square feet of retail space, 43,870 square feet of tenant amenity space, and 1,350 residential units. Scenario 2 would consist of an additional 3.3 million square feet of office and research and development space, 300,000 square feet of industrial space, 129,700 square feet of civic space, 112,400 square feet of retail space, 53,500 square feet of tenant amenity space, and 1,600 residential units.	Plan complete; construction schedule unknown.
2	Martin Luther King Jr. Park Master Plan (City of East Palo Alto)[b]	The planned improvements at Martin Luther King Jr. Park include expansion to the east toward San Francisco Bay. Key amenities will include a track, an amphitheater with performance space, accessible playground, outdoor fitness features, and multi-use courts for soccer, football, and rugby.	CEQA in progress as of December 2024; construction schedule unknown.
3	O'Connor Pump Station Stormwater Management Improvements (City of East Palo Alto)[c]	The City of East Palo Alto will improve the stormwater pump station near O'Connor Street, which requires extensive routine maintenance and upgrades. The O'Connor Pump Station provides flood protection for low-lying residential areas in the eastern portion of the city.	Project budgeted; construction schedule unknown.
4	16" Water Transmission Main Project–Purdue Ave (City of East Palo Alto)[d]	This project consists of improvements to the City's water distribution system to provide additional flow, storage, redundancy, and reliability. The water transmission main project includes the installation of a new turnout connection to the SFPUC (San Francisco Public Utilities Commission) system to feed the Ravenswood Business District and future development in that area. The water transmission main will increase the water capacity in the area.	Design in progress; construction schedule unknown.
5	1990 Bay Road, The Landing (City of East Palo Alto, Harvest Properties Inc.)[e]	This project includes mixed-use development with a variety of uses including a 95-unit housing development, commercial office and life-science space, subsidized ground-floor retail space dedicated to businesses, and approximately 7 acres of open space and recreational amenities (i.e., playground, fitness area, dog park, community garden, community plaza for community events and gathering, walking and biking trails, and family picnic areas along the Bayfront).	Project paused by developer as of December 2024. Will take 24 months to construct if pursued.
6	East Palo Alto Waterfront Project (City of East Palo Alto, Sycamore Real Estate Investment LLC, Emerson Collective)[f]	The East Palo Alto Waterfront Project is a proposed mixed-use development on a 52-acre site in the Ravenswood Business District adjacent to Ravenswood Preserve. The project focuses on jobs and residential uses.	Project under review; construction schedule unknown.
7	The Dumbarton Corridor Project (San Mateo County Transit District [SamTrans])[g]	SamTrans is conducting a feasibility study for a busway project on the Peninsula side of the Dumbarton Rail Corridor. The bus rapid transit service would bring bus service as well as bicycle and pedestrian improvements to East Palo Alto, Belle Haven (Menlo Park), Redwood City, and North Fair Oaks (unincorporated San Mateo County). Construction of the busway could begin in 2029.	2029

Project No. on Map	Project Name (Project Sponsor or Jurisdiction)	Project Description	Status/Construction Dates if Known
8	Hotel Moxy, 3723 Haven Avenue (Menlo Park, Menlo Park Hotel Group LLC)[h]	This project includes construction of a new 163-room hotel. The hotel would be a total of eight stories, consisting of three stories of podium parking, one story for hotel amenities, and three stories of guest rooms.	Under building permit review (24 months to construct, schedule unknown).
9	111 Independence Drive (City of Menlo Park, SP Menlo, LLC)[i]	This project includes construction of a new eight-story residential apartment building with 105 dwelling units (96,055 square feet) and a community-serving retail space.	Pending development (21 months to construct, schedule unknown).
10	123 Independence Drive (City of Menlo Park, Sobrato Organization)[j]	This project includes construction of 432 dwelling units (316 apartment units in one apartment complex and 116 townhomes) across four parcels.	2023–2028
11	165 Jefferson Drive (City of Menlo Park, Menlo Flats)[k]	This project includes construction of a 158-unit apartment development in an eight-story complex, consisting of five floors of apartment units above a three-story parking garage. The project would include 21 units and approximately 15,000 square feet of commercial space along the Jefferson Drive frontage.	Building permit submitted in 2022. 29 months to construct, schedule unknown.
12	Willow Village (City of Menlo Park, Signature Development Group, Peninsula Innovation Partners)[l]	This project includes redevelopment of a mixed-use 59-acre site with up to 1,730 dwelling units, up to 200,000 square feet of commercial retail uses, a 193-room hotel, and approximately 1,600,000 square feet of offices and accessory uses. The project would include approximately 20 acres of open space, including approximately 8 acres of publicly accessible open space, a 3.5 acre publicly accessible park, town square, dog park, and elevated linear park. The project would realign Hamilton Avenue at Willow Road and modify the parcels on the north and south sides of Hamilton Avenue west of Willow Road.	2025–2026
13	3705 Haven Avenue (City of Menlo Park, March Capital Management)[m]	This project includes construction of a new seven-story residential project, with 99 residential units plus a lobby and associated parking spaces on the first and second floors.	NOP published December 1, 2022; EIR in progress as of December.
14	Commonwealth Building 3, 162-164 Jefferson Drive (City of Menlo Park, Sobrato Organization)[n]	This project includes construction of a 249,500 square foot, four-story office building and a four-level parking structure with approximately 1,276 spaces. A new privately owned, publicly accessible open space would be provided along the Jefferson Drive frontage of the project site.	Draft EIR published July 1, 2022 (39 months to construct, schedule unknown).
15	Lume (formerly Menlo Uptown) (City of Menlo Park, Greystar)[o]	This project includes two seven-story apartment buildings with a total of 441 rental units (221 units in Building A and 220 units in Building B) and six townhome buildings with 42 for-sale units. It also includes approximately 2,940 square feet of ground-floor commercial space in Building A.	The two residential buildings and publicly accessible paseo are complete. Construction has not started on the townhomes, and schedule is unknown as of October 2025.
16	104 Constitution Drive (City of Menlo Park)[p]	This project includes a multifamily residential building with approximately 151,751 square feet of floor area, containing 140 units and reaching a maximum height of approximately 92 feet, 4 inches.	Under review.
17	320 Sheridan Drive (City of Menlo Park, Ravenswood City School District/Alliant Communities)[q]	This project includes three three-story residential apartment buildings totaling 88 units. It also includes an approximately 2,217-square-foot residential amenity center, 116 surface parking spaces, and 27,918 square feet of open space. The total proposed gross floor area is 87,724 square feet, and the buildings would have a maximum height of 40 feet.	Approximately 13 months starting 2026 or later (actual construction dates unknown as of October 2025).

Project No. on Map	Project Name (Project Sponsor or Jurisdiction)	Project Description	Status/Construction Dates if Known
18	1005 O'Brien Drive and 1320 Willow Road (City of Menlo Park, Tarlton Properties)[r]	This project would be constructed in two phases, beginning with demolition of the existing buildings at 985 and 1005 O'Brien Drive, partial demolition of the existing building at 1320 Willow Road, construction of a five-story research and development building fronting O'Brien Drive, and construction of the first five levels of a parking structure. Phase two would consist of demolition of the remainder of the existing 1320 Willow Road building and construction of a new four-story research and development building and two additional levels of the parking structure.	Draft EIR anticipated end of 2025. Phase 1 construction anticipated immediately after project approval (21 months). Phase 2 construction could begin as late as 2034 (15 months).
19	1125 O'Brien Drive (City of Menlo Park, Tarlton Properties)[s]	This project includes construction of a new five-story, approximately 131,825-square-foot research and development building with a surface parking lot and a 2,700-square-foot cafe. It would also demolish three existing one-story warehouse/research and development buildings across four parcels at 1105, 1135, and 1165 O'Brien Drive and 1 Casey Court; an existing drainage ditch on the site would remain.	Approximately 16 months starting 2026 or later (actual construction dates unknown as of October 2025).
20	citizenM Hotel (City of Menlo Park)[t]	This project included construction of a 240-room, approximately 90,900 square-foot, five-story limited-service hotel and an onsite restaurant. The hotel features a lobby with a bar and canteen, an outdoor terrace, fitness center, meeting rooms, and guest rooms on the second through fifth floors.	Project construction complete as of fall 2024.
21	1350 Adams Court (City of Menlo Park, Tarlton Properties)[u]	This project includes construction of a five-story life science research and development building totaling approximately 255,602 square feet, along with a partially below-grade parking structure providing 356 parking spaces.	Project construction is underway, expected to be complete by the end of 2025.
22	Sea-Level Rise Vulnerability and Adaptation Planning Study (Redwood City)[v]	Redwood City assessed its vulnerability to future flooding with sea level rise and developed conceptual alternatives to mitigate the risk. Redwood City used this study to select an approach for addressing sea level rise hazards including earthen levees, floodwalls, marshes, habitat opportunities and constraints, and space constraints. The study divides the project into four reaches. Reach 4 consists of the interior shoreline between the Cargill salt ponds and the adjacent neighborhoods of Friendly Acres to the south and Seaport Boulevard to the west; the proposed alignment for Reach 4 would connect to the Marsh Road Reach of the SAFER Bay Project.	Study complete; construction schedule unknown.
23	Planned Segment of Bay Trail Improvements (Redwood City)[w]	The Bay Trail does not currently connect segments of Menlo Park and Redwood City. This planned project along Cargill property could host a new 2.86-mile segment of the Bay Trail between Bedwell Bayfront Park and Seaport Boulevard.	Construction schedule unknown.
24	South Bay Salt Pond Restoration Project[x]	The South Bay Salt Ponds Restoration Project (SBSPRSP) is the largest tidal wetland restoration project on the West Coast, and, when complete, will restore 15,100 acres of industrial salt ponds to a rich mosaic of tidal wetlands and other habitats. The SBSPRP has been in progress since 2003 and has goals related to restoration of wetland habitat, public access and recreation, and flood protection/management in the South San Francisco Bay. The completed 294-acre project will feature bird ponds, trails, a viewing platform, a new tidal marsh along San Francisco Bay, nesting islands, and habitat slopes for wildlife.	Phase II underway.
25	South San Franciso Bay Shoreline Project (USACE, USFWS, Santa Clara Valley Water District)[y]	This is a multi-purpose flood risk management, ecosystem restoration, and recreation project in San José. The project will manage flood risk for approximately 6,000 people and 1,100 structures, restore 2,900 acres of tidal wetlands, and improve recreation in the area by providing key connections to the Bay Trail.	Construction underway; estimated completion is summer 2025.

Project No. on Map	Project Name (Project Sponsor or Jurisdiction)	Project Description	Status/Construction Dates if Known
26	Beneficial Reuse of Excavated Material in Tidal Marsh Restoration Project (USFWS, Santa Clara Valley Transportation Authority)[z]	The Project will place up to roughly 3.5 million cubic yards of sediment material into several former salt production ponds around South San Francisco Bay to raise the pond bottoms for the purpose of accelerating tidal marsh restoration. Placing excavated material into the pond bottoms would accelerate the timeline for eventual tidal marsh restoration relative to sedimentation from natural processes (i.e., tidal action) alone, helping to address sea level rise and the sediment deficit in the San Francisco Bay.	Undergoing environmental review.
27	Calabazas/San Tomas Aquino Creek-Marsh Connection Project (Santa Clara Valley Water District)[aa]	The project aims to restore creek–marsh connections and tidal flows to establish 1,800 acres of tidal marsh in Ponds A4 and A8. The project is at the southern end of the San Francisco Bay and northern shoreline of Santa Clara County.	Fall 2028 to fall 2030.

NOTES: BART = Bay Area Rapid Transit; Bay Trail = San Francisco Bay Trail; NOP = notice of preparation; SamTrans = San Mateo County Transit District; USACE = United States Army Corps of Engineers; USFWS = U.S. Fish and Wildlife Service.

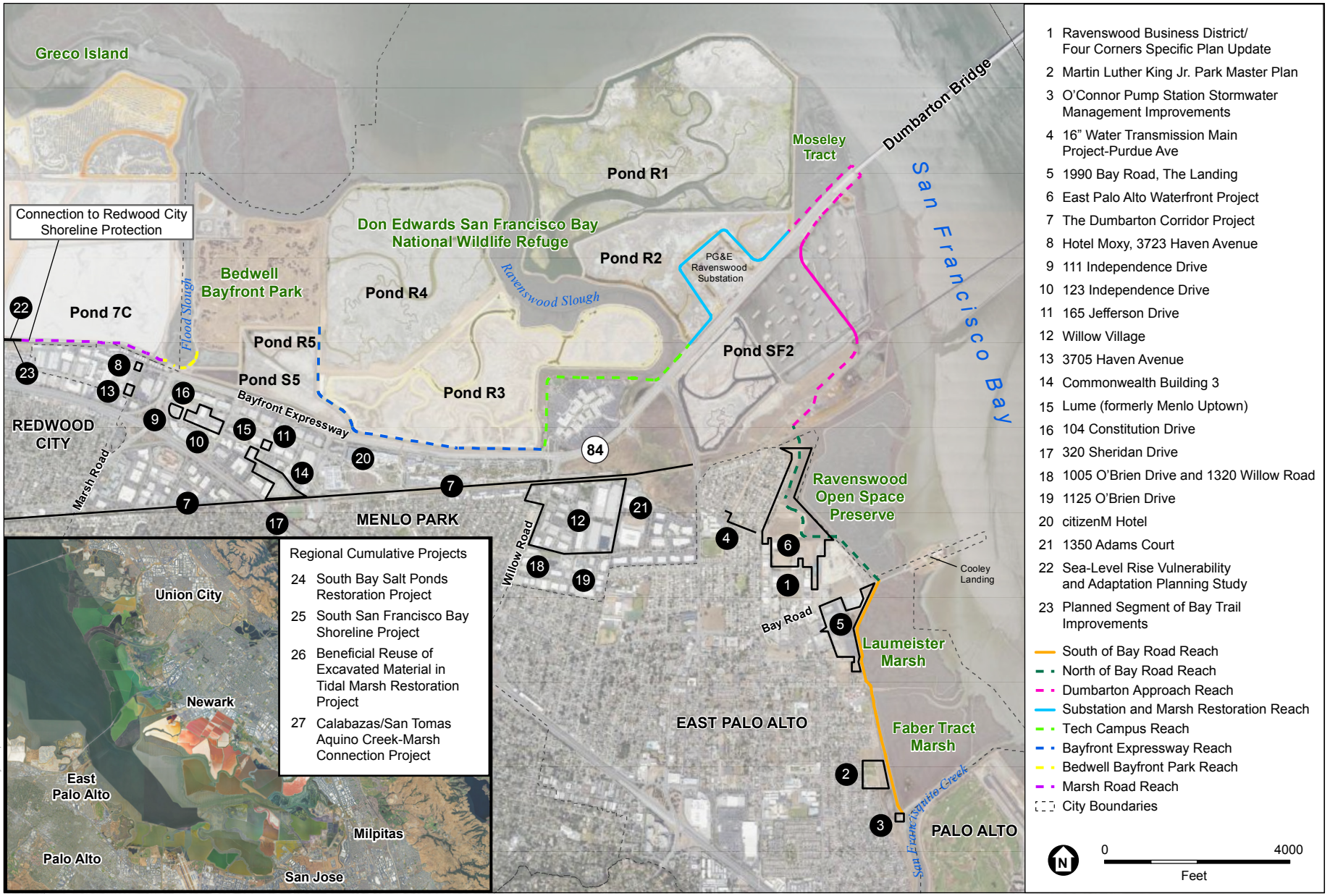
The following projects were not included in cumulative analyses for the following reasons:

- The City of East Palo Alto has indicated that the 2020 Bay Road Project, which would have included the redevelopment of a 17.2-acre site at the end of Bay Road, is on hold with no known resumption date. (City of East Palo Alto, Planning Department, 2024. "2020 Bay Road – Design Review." Available online at www.cityofepa.org/planning/project/2020-bay-road-design-review. Accessed November 11, 2024; Dacumos, C. 2024. Personal Communication between C. Dacumos [City of East Palo Alto] and S. Villegas [Environmental Science Associates]. December 4, 2024.)
- SamTrans has indicated that there is no active planning or project development for a Dumbarton Rail Corridor Project, which would have provided a new mass transit system between the San Francisco Peninsula and the East Bay, connecting the Caltrain Sequoia/ Redwood City station to the Union City BART station. (SamTrans [San Mateo County Transit District], 2020. Dumbarton Rail Corridor Project. January 2020. Available online at www.samtrans.com/media/5006/download?inline. Accessed November 11, 2024; Tolleson, M., 2024. Personal Communication between M. Tolleson [SamTrans] and S. Villegas [Environmental Science Associates]. November 26, 2024.)
- The City of Menlo Park's 80 Willow Road Project (a large mixed use develop that is being proposed to include residential units, offices, retail spaces, hotel rooms, and a private preschool) was not included due to the status of the Project (formal development application not approved and no public CEQA documentation complete as of November 2025) and the distance from SAFER Bay Project components (approximately 2 miles), making it unlikely that construction or operation of 80 Willow would be relevant to the cumulative analyses presented in Chapter 3 of this document.

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SOURCES: NAIP Imagery, 2024; HDR, 2024; ESA, 2025

NOTES: Reaches to be evaluated at a project-level of detail are shown in solid lines; reaches to be evaluated at a program-level of detail are shown as dashed lines.
The northern ends of the Bayfront Expressway and Bedwell Bayfront Park Reaches tie into high ground at Bedwell Bayfront Park.

SAFER Bay Project

Figure 3.1-1
Cumulative Projects Location and Components

ESA

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3.2 Aesthetic Resources

This section evaluates the potential impacts of the SAFER Bay Project (Project) on existing visual resources. For this assessment, *visual resources* are defined as state scenic highways, designated scenic vistas, and public views (including local scenic roadways) within and outside urbanized areas. This section presents information about the environmental and regulatory setting and identifies the criteria used to evaluate the significance of potential impacts, the methods used in evaluating these impacts, and the results of the impact assessment. The Project evaluated is described in Chapter 2, *Project Description*, of this EIR.

The following are brief definitions of terms used in the evaluation of aesthetic impacts:

- *Visual character* refers to the elements of form, line, color, and texture of the landscape's natural features (e.g., landforms, vegetation, rock and water features) and built features (e.g., buildings, utility infrastructure), which contribute to the public's experience and appreciation of the environment.
- A designated *scenic vista* is a location from which the public can experience a unique and exemplary view. Scenic vistas are typically available from elevated vantage points that offer panoramic views of great breadth and depth. For this analysis, a designated scenic vista is one identified in Project area planning documents (i.e., general plans, zoning ordinances) or a designated public roadway or trail vista point.
- *Scenic resources* are features visible from a state scenic roadway, as designated by the California Scenic Highway Program maintained by the California Department of Transportation (Caltrans) or otherwise designated by Project area planning documents (i.e., general plans, zoning ordinances).
- *Light* is the amount of luminance emitted from an object and *glare* is the result of a large contrast in luminance between a bright light source and dark background within a viewer's field of vision.

The severity of an aesthetic effect depends on viewer sensitivity to aesthetic changes. *Viewer sensitivity* is the degree of observer interest in visual quality and concern for existing conditions or proposed changes in the landscape. For this analysis, viewer sensitivity is categorized into high, moderate, and low visual sensitivity ranges. These ranges are based on a composite measurement of the overall susceptibility of an area or a viewer (or user) group to adverse visual or aesthetic impacts, given the following combined factors:

- *Visual quality.* An area's overall visual impression or attractiveness as determined by the particular intrinsic physical properties of the landscape, including landforms, rock forms, water features, and vegetation patterns, based on professional, public, and personal values. Land uses that derive value from the quality of their settings, such as parks or scenic routes, are considered particularly sensitive to changes in visual setting conditions. Natural and built features combine to form unique perspectives with varying degrees of visual quality, which are rated in this analysis as either high, moderate, or low. A *high visual quality rating* is assigned to visual resources that are unique or exemplary of the region's natural or cultural scenic amenities. A *moderate visual quality rating* is given to visual resources typical or characteristic of the region's natural and/or cultural visual amenities. A *low visual quality rating* is assigned to areas generally lacking in natural or cultural visual resource amenities typical of the region.

- *Visual sensitivity.* Reflects the level of interest or concern that viewers and responsible land management agencies have for a particular visual resource, taking into account visual quality, viewer concern, and viewer exposure. Visual sensitivity is a measure of how noticeable proposed changes might be in a particular setting and is determined based on the distance from a viewer, the contrast of the proposed changes, and the duration that a particular view would be available to viewers. For example, areas such as scenic vistas, parks, trails, and scenic roadways typically have high visual quality and visual sensitivity because these locales are publicly protected and appear natural, view durations are typically long, and close-up views are more commonly available. A *high visual sensitivity rating* is assigned to foreground views, views of high frequency and duration, and/or views where a contrast from the surrounding character would be highly noticeable. A *moderate visual sensitivity rating* is given to middle ground views, views of moderate frequency and duration, and/or views where a contrast from the surrounding character would be moderately noticeable. A *low visual sensitivity rating* is assigned to background views, views of low frequency and duration, and/or views where a contrast from the surrounding character would be marginally noticed.
- *Viewer types.* The types of people viewing the affected landscape, such as motorists traveling on nearby public roadways, users of public parks and other recreational areas, and residents and business patrons. Viewer types inform viewers' levels of sensitivity to changes in the visual landscape around them. For instance, a motorist traveling at highway speeds would not have the same visual experience as a hiker or pedestrian on a public trail who would experience a view for a longer period.
- *Public views.* Views experienced from representative publicly accessible vantage points.
- *Viewer exposure.* The visibility of the landscape, viewing distance, viewing angle, the extent of visibility, and the duration of the view. This analysis describes viewing distances using three categories.
  - *Foreground* refers to views observed up to 0.5 mile from the viewer.
  - *Middle ground* refers to views observed from 0.5 mile to 3 miles from the viewer.
  - *Background* refers to views extended outward beyond 3 miles from the viewer.

  The foreground can be designated with levels of clarity and simplicity that are not possible for middle ground and background views because the viewer is a direct participant in the foreground—maximum detail and color intensity are characteristic of the foreground zone. In the middle ground zone, visual elements begin to join in the landscape; conflicts of form, color, shape, and scale become evident and visual detail is reduced. In the background zone, visual elements lose detailed distinctions; the visual emphasis focuses on the outlines or edges of land masses, water resources, or the sky against each other.
- *Viewpoint.* A viewpoint, in the context of this analysis, is a publicly accessible vantage point on a travel route, or at a use area or a potential use area, where the view of a proposed activity would be most visible. For purposes of this analysis, viewpoints were identified along the Project reaches within the aesthetics study area and are discussed below. These viewpoints are located along local roadways, in parks, and on public recreational trails.

3.2.1 Environmental Setting

Study Area

The geographic scope for the analysis of impacts on aesthetics and visual resources reflects public views of the Project components. Generally, the study area for aesthetics and scenic resources encompasses public locations from which the public typically would view a component of the Project.

General Description of Project Area

The Project site is on the western shore of San Francisco Bay along approximately 7 miles of shoreline, from O'Connor Street in East Palo Alto to west of Marsh Road near the Redwood City and Menlo Park boundaries (refer to Figure 2-1 in Chapter 2, *Project Description*, for the Project location). The Project is wholly within the cities of East Palo Alto, Menlo Park, and Redwood City on public and privately owned property.

Table 3.12-1 in Section 3.12, Land Use, Agriculture, and Forestry, lists the existing land uses within each Project reach, which include segments of the San Francisco Bay Trail (Bay Trail), Ravenswood Open Space Preserve, Don Edwards San Francisco Bay National Wildlife Refuge (the Refuge), Bedwell Bayfront Park, other public recreational trails, and privately owned properties. The existing visual character of the Project area is characterized by baylands and other protected wetlands, public parks, recreational trails, urban residential neighborhoods, and office/business development.

Scenic Resources[1]

Scenic resources generally include scenic landscapes, scenic highways, or scenic areas, and other resources that contribute to the scenic values of an area.

City of East Palo Alto

Although the City of East Palo Alto General Plan does not specifically designate scenic resources, Cooley Landing, Ravenswood Open Space Preserve, and Faber and Laumeister marshes (labeled on Figures 2-1 and 2-5 in Chapter 2, *Project Description*) are natural resources directly adjacent to Project components that are generally considered scenic by public users. There are also views of the bay and beyond, including the East Bay Hills, that are visible from the Project area and contribute scenic landscapes. Additionally, the Ravenswood Business District/4 Corners Specific Plan (Specific Plan) designates view corridors, including the existing Bay Road view corridor (Bay Road east of Pulgas Avenue) and future major and minor view corridors directed eastward from new streets proposed west of the South of Bay Road and North of Bay Road reaches.

[1] The following local planning documents were consulted for this section: City of East Palo Alto, 2017. *Vista 2035 General Plan*. Adopted October 4, 2016; Final Version March 2017. Available online at www.ci.east-palo-alto.ca.us/planning/page/vista-2035-general-plan; City of Menlo Park, 2016. *General Plan, City of Menlo Park*. Adopted November 29, 2016. Available online at www.menlopark.gov/files/sharedassets/public/v/1/community-development/documents/general-plan/land-use-and-circulation-element-adopted-20161129.pdf; City of Redwood City, 2023. *Redwood City General Plan*. Adopted October 11, 2010; Amended August 2023. Available online at www.redwoodcity.org/departments/community-development-department/planning-housing/planning-services/environmental-documents/general-plan-eir.

Menlo Park

The Menlo Park General Plan indicates the location of view corridors/scenic vistas,[2] including the following:

- View corridor extending north along Marsh Road toward Bedwell Bayfront Park from the Bay Road intersection.
- View corridor extending east along State Route 84 (SR; also known as Bayfront Expressway) toward the Dumbarton Bridge from Willow Road.

These visual corridors are visually directed toward or parallel to Project components. Additionally, two gateways are along the visual corridors: one at the intersection of Marsh Road and United States Route 101 (U.S. 101) and one at the intersection of SR 84 and University Avenue at the western approach to the Dumbarton Bridge. In the context of the Menlo Park General Plan policies, a gateway is an entrance point that signifies an arrival at a unique place or cohesive neighborhood influenced, at least in part, by visual attributes. Several natural resources that are not designated as scenic resources but provide aesthetic pleasure for members of the public (e.g., Ravenswood Open Space Preserve, the Refuge, and Bedwell Bayfront Park, labeled on Figure 2-1 in Chapter 2, *Project Description*) are also directly adjacent to Project components in or adjacent to Menlo Park.

Redwood City

The Redwood City General Plan also does not designate scenic resources, but indicates that the city has "ample parks, trails, scenic resources, and wildlife habitat areas, which provide recreational and ecological benefits as well as a source of aesthetic pleasure."

Designated Scenic Highway

The nearest designated state scenic highway is Interstate 280 (I-280) between the city of San Bruno and Stanford University.[3] I-280 is located nearly 5 miles southwest from the nearest Project reach; the Project site is not visible from I-280 due to distance and intervening topography.

Parks and Open Spaces

As indicated previously, Project components are near numerous open spaces and parks providing a range of recreational and viewing opportunities and scenic values. Refer to Section 3.15, Recreation, for additional information on recreational facilities within the study area.

Viewer and Viewers Sensitivity

The primary potentially affected viewer groups within the study area are motorists and recreational facility users, along with residents within viewing distance of the Project site. These viewers experience the study area within the context of a setting that includes the existing recreational trails and other surrounding development and facilities.

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[2] City of Menlo Park, 2016. *General Plan, City of Menlo Park.* "Figure 3: Community Features." Adopted November 29, 2016.

[3] Caltrans (California Department of Transportation), 2024. "List of Eligible and Officially Designated State Scenic Highways." Available online at caltrans.maps.arcgis.com/apps/webappviewer/index.html?id=465dfd3d807c46cc8e8057116f1aacaa. Accessed November 22, 2024.

Motorists

Motorists are one of the most prominent viewer groups and include mostly local travelers who are familiar with the visual setting and those who use the roads less regularly. Motorists traveling on SR 84, which includes the Dumbarton Bridge, experience the foreground viewshed of several Project reaches. Motorists traveling on these roadways would generally experience views while traveling at high speeds (i.e., generally approximately 50 miles per hour, the speed limit of SR 84 in the Project area); consequently, the visual sensitivity would be at a low to moderate sensitivity rating due to the short duration of views.

Recreationists

Recreationists use several parks and numerous trails in the study area (identified on Figure 2-5 and described in Table 3.15-1 in Section 3.15, Recreation) and experience foreground views of the Project. Portions of multiple reaches generally follow existing levees and trails (e.g., the Bay Trail in the South of Bay Road and North of Bay Road reaches and the Public Shoreline Access Trail around the Tech Campus Reach). Recreationists' views of the Project site range from relatively brief to lengthier, depending on speed of travel, terrain conditions, weather conditions, and other factors. The sensitivity of recreationists is considered moderate to high given the potential for extended-duration views.

Residents

Residential neighborhoods near Project components are generally west of the South of Bay Road and North of Bay Road reaches in East Palo Alto and south of the Marsh Road Reach in Menlo Park and Redwood City (refer to Figure 2-1). Depending on proximity to the Project site, residential viewers tend to have high viewer exposure and awareness from publicly accessible viewing points (e.g., public roadways, neighborhood parks) within their neighborhoods; therefore, the sensitivity of residents is considered high.

Public Viewpoints

Table 3.2-1 identifies public views of the Project site and describes visual elements appropriate to each location, such as water resources, landforms, vegetation, land uses, and user activities. Refer to **Figure 3.2-1** for the viewpoint locations, and **Figures 3.2-2** through **3.2-4** for the specific viewpoint, viewing orientation, and view at each location from a pedestrian's perspective. As noted in Table 3.2-1, public views in the aesthetics study area are located along local roadways, in parks, and along public trails.

Light and Glare

Existing sources of light and glare in the study area include nighttime highway traffic and safety lighting along SR 84 and other roadways as well as localized lighting associated with residential and commercial development in East Palo Alto, Menlo Park, Redwood City, and adjacent communities.

TABLE 3.2-1
PUBLIC VIEWPOINTS IN THE STUDY AREA

Viewpoint No. (Figure No.)[a]	Viewing Location[b]	Description
Viewpoint 1 (Figure 3.2-2)	Martin Luther King Jr. Park, South of Bay Road Reach	This viewpoint looks west toward Martin Luther King Jr. Park from a path connecting the Bay Trail. In the foreground, chain-link fence and vegetation line both sides of a gravel pathway leading into Martin Luther King Jr. Park. Inside the park, a grass field and soccer goalposts are visible. To the right of the path, a utility transmission tower stands, with power lines spanning across the entire photo. No middleground or background views are available from this viewing location due to the intervening development and vegetation. The visual character of this view is representative of a trail/park setting. The viewer group experiencing views from Viewpoint 1 includes recreationists, who have a moderate to high sensitivity ranking.
Viewpoint 2 (Figure 3.2-2)	Bay Trail, North of Bay Road Reach	This viewpoint looks northwest from the existing Bay Trail adjacent to Ravenswood Open Space Preserve. The foreground shows the Bay Trail with vegetation/grasslands on both sides and a drainage canal left (west) of the trail. Trees to the northeast and transmission towers to the north are visible in the middle ground. The visual character of this view is representative of a trail/open space setting. The viewer group experiencing views from Viewpoint 2 includes recreationists, who have a moderate to high sensitivity ranking.
Viewpoint 3 (Figure 3.2-2)	Bay Trail, Dumbarton Approach Reach	This viewpoint looks northeast from the existing Bay Trail adjacent to the Don Edwards San Francisco Bay National Wildlife Refuge. The foreground shows the Bay Trail with a gravel shoulder between the roadway to the left and vegetation consisting of grass/shrubs and Pond SF2 to the right. The foreground predominantly features a brown recreational sign mounted on two wooden posts. In the middle ground, the pathway continues, bordered by grassy vegetation. The background features the Dumbarton Bridge and transmission towers. The visual character of this view is representative of a trail/open space with an urban setting beyond. The viewer group experiencing views from Viewpoint 3 includes recreationists, who have a moderate to high sensitivity ranking, and motorists, who have a low to moderate sensitivity ranking.
Viewpoint 4 (Figure 3.2-3)	SR 84, near Substation and Marsh Restoration Reach	This viewpoint looks northeast from the shoulder of SR 84 toward the Dumbarton Bridge and in front of the Ravenswood Substation. The foreground shows the gravel shoulder with SR 84 to the right and a chain-link fence surrounding the substation visible in the left side of the photo. The foreground predominantly features a brown recreational sign mounted on two wooden posts. The background features Dumbarton Bridge and transmission towers. The visual character of this view is representative of an urban setting. The viewer group experiencing views from Viewpoint 4 includes recreationists, who have a moderate to high sensitivity ranking, and motorists, who have a low to moderate sensitivity ranking.
Viewpoint 5 (Figure 3.2-3)	SR 84, near Tech Campus Reach	This viewpoint looks northwest from SR 84 adjacent to Pond R3 and Ravenswood Slough. The foreground shows the paved roadway with a narrow gravel shoulder. Beyond the roadway, the middleground consists of low-lying vegetation and seasonal grasses transitioning into open marsh habitat. The background features expansive baylands with a flat horizon and a clear sky, with faint transmission towers visible in the distance. The visual character of this view is representative of a transportation corridor adjacent to open space and marshland. The viewer group experiencing views from Viewpoint 5 includes recreationists, who have a moderate to high sensitivity ranking, and motorists, who have a low to moderate sensitivity ranking.
Viewpoint 6 (Figure 3.2-3)	Bay Trail, near Tech Campus Reach	This viewpoint looks northeast from the Bay Trail along SR 84 near the Meta Headquarters. The foreground shows the Bay Trail with SR 84 to the right and a chain-link fence and vegetation to the left of the trail. The background features transmission towers and streetlights. The visual character of this view is representative of an urban setting. The viewer group experiencing views from Viewpoint 6 includes recreationists, who have a moderate to high sensitivity ranking, and motorists, who have a low to moderate sensitivity ranking. This viewpoint shows a Scenic Corridor/Scenic Vista designated in the Menlo Park General Plan (SR 84 toward Dumbarton Bridge).
Viewpoint 7 (Figure 3.2-3)	Public Shoreline Access Trail, Tech Campus Reach	This viewpoint looks north from the Public Shoreline Access Trail adjacent to Meta Headquarters. The foreground shows the Public Shoreline Access Trail with vegetation and shrubs to the right and grassy vegetation and ponds to the left of the trail. The background features transmission towers. The visual character of this view is representative of a trail/open space setting. The viewer group experiencing views from Viewpoint 7 includes recreationists, who have a moderate to high sensitivity ranking.

Viewpoint No. (Figure No.)[a]	Viewing Location[b]	Description
Viewpoint 8 (Figure 3.2-4)	Bay Trail, Bayfront Expressway Reach	This viewpoint looks east from the Bay Trail adjacent to SR 84. This location is near the entrance to the Flyway Trail. The foreground shows the Bay Trail with vegetation on both sides. SR 84 and office buildings are visible to the right. The background features a pedestrian bridge crossing over SR 84 and transmission towers. The visual character of this view is representative of a trail/open space with an urban setting beyond. The viewer group experiencing views from Viewpoint 8 includes recreationists, who have a moderate to high sensitivity ranking, and motorists, who have a low to moderate sensitivity ranking.
Viewpoint 9 (Figure 3.2-4)	Bay Trail, Bedwell Bayfront Park Reach	This viewpoint looks northeast from the Bay Trail along Flood Slough within Bedwell Bayfront Park. The foreground shows water within the slough bordered with vegetated wetlands and shrubs to the right bank and additional vegetation and wetland features on the left. Power lines are visible in the foreground that extend into background views. The visual character of this view is representative of open space/wetlands with some urban elements. The viewer group experiencing views from Viewpoint 9 includes recreationists, who have a moderate to high sensitivity ranking, and motorists, who have a low to moderate sensitivity ranking.
Viewpoint 10 (Figure 3.2-4)	Marsh Road, near Bedwell Bayfront Park Reach and Marsh Road Reach	This viewpoint looks northeast from the sidewalk adjacent to Marsh Road facing toward the entrance of Bedwell Bayfront Park. The foreground shows the sidewalk adjacent to the Marsh Road/SR 84 intersection and vegetation including grass and a tree to the left of the sidewalk. The foreground also features power lines and streetlights. The visual character of this view is representative of an urban setting. The viewer group experiencing views from Viewpoint 10 includes motorists, who have a low to moderate sensitivity ranking. This viewpoint shows a Scenic Corridor/Scenic Vista designated in the Menlo Park General Plan (north along Marsh Road).

NOTES: Bay Trail = San Francisco Bay Trail; SR = State Route

a. Refer to Figure 3.2-1 for viewing locations. Refer to Figures 3.2-2 through 3.2-4 for photos from these viewpoints.
b. All viewing locations are publicly accessible.

SOURCE: Data compiled by Environmental Science Associates in 2025.

3.2.2 Regulatory Framework

Federal

No federal laws or requirements for aesthetic resources are applicable to the Project

State

Scenic Highway Program

The California Legislature created the Scenic Highway Program in 1963 to protect scenic highway corridors from changes that would diminish the aesthetic value of lands adjacent to the highways. State requirements in Streets and Highways Code section 260 et seq. govern the Scenic Highway Program. A highway may be designated as scenic depending on the amount of the natural landscape that can be seen by travelers, the scenic quality of the landscape, and the extent to which development intrudes upon the travelers' enjoyment of the view.

The Scenic Highway System includes highways that either are eligible for designation or have been designated as such. The status of a state scenic highway changes from *eligible* to *officially designated* when the local jurisdiction adopts a scenic corridor protection program, applies to Caltrans for scenic highway approval, and receives the designation from Caltrans. A city or county may propose adding routes with outstanding scenic elements to the list of eligible highways; however, state legislation is required for designation.



SOURCES: NAIP Imagery, 2024; HDR, 2024; ESA, 2025

NOTES: Reaches to be evaluated at a project-level of detail are shown in solid lines; reaches to be evaluated at a program-level of detail are shown as dashed lines. The northern ends of the Bayfront Expressway and Bedwell Bayfront Park Reaches tie into high ground at Bedwell Bayfront Park.

SAFER Bay Project

Figure 3.2-1
Viewpoint Locations

ESA



Viewpoint 1 - View looking west from a path connecting the Bay Trail toward Martin Luther King Jr. Park



Viewpoint 2 - View looking northwest from the existing Bay Trail adjacent to Ravenswood Open Space Preserve



Viewpoint 3 - View looking northeast from the existing Bay Trail adjacent to the Don Edwards San Francisco Bay National Wildlife Refuge

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SOURCE: ESA, 2025

SAFER Bay Project

Figure 3.2-2
Views from South of Bay Road, North of Bay Road, and Dumbarton Approach Reaches

ESA



Viewpoint 4 - View looking northeast from the shoulder of SR 84 adjacent to the PG&E Ravenswood Substation



Viewpoint 5 - View looking northwest from SR 84 adjacent to Pond R3 and Ravenswood Slough



Viewpoint 6 - View looking northeast from the Bay Trail adjacent to SR 84



Viewpoint 7 - View looking north from the Public Shoreline Access Trail

2011\D211919 - SAFER Bay\Graphics\Illustrator

SOURCE: ESA, 2025; Google Earth, 2025

SAFER Bay Project

Figure 3.2-3
Views from Substation and Marsh Restoration and Tech Campus Reaches

ESA



Viewpoint 8 - View looking east from the paved Bay Trail adjacent to SR 84



Viewpoint 9 - View looking northeast from the Bay Trail along Flood Slough



Viewpoint 10 - View looking northeast adjacent to Marsh Road

2011\D211919 - SAFER Bay\Graphics\Illustrator

SOURCE: ESA, 2025

SAFER Bay Project

Figure 3.2-4
Views from Bayfront Expressway, Bedwell Bayfront Park, and Marsh Road Reaches

ESA

McAteer-Petris Act and San Francisco Bay Plan

The San Francisco Bay Conservation and Development Commission (BCDC) was established under the McAteer-Petris Act[4] in 1965 with the mission to protect and enhance San Francisco Bay and encourage responsible and productive use of the bay. BCDC has jurisdiction over San Francisco Bay and Suisun Marsh, a shoreline band extending 100 feet inland, salt ponds, managed wetlands, and areas that are subject to tidal action on named tributaries that flow into San Francisco Bay. The McAteer-Petris Act required BCDC to prepare "a comprehensive and enforceable plan for the conservation of San Francisco Bay and the development of its shoreline." BCDC manages its jurisdiction through the Suisun Marsh Protection Plan and the *San Francisco Bay Plan* (Bay Plan).[5]

As discussed in greater detail in Section 3.4, Biological Resources, Project implementation would occur within BCDC jurisdiction. The Bay Plan identifies policies to guide future uses of San Francisco Bay and the shoreline, along with maps that apply these policies to the present San Francisco Bay and shoreline. As indicated in BCDC's comment letter in Appendix SCOP, the Project may require review by BCDC's design review board. Part IV, Development of the Bay and Shoreline: Findings and Policies, contains the following appearance, design, and scenic views policies that are applicable to the Project and its effect on aesthetic resources:

Appearance, Design, and Scenic Views

1. To enhance the visual quality of development around the Bay and to take maximum advantage of the attractive setting it provides, the shores of the Bay should be developed in accordance with the Public Access Design Guidelines.

2. All bayfront development should be designed to enhance the pleasure of the user or viewer of the Bay. Maximum efforts should be made to provide, enhance, or preserve views of the Bay and shoreline, especially from public areas, from the Bay itself, and from the opposite shore.

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.

Local

General Plans

The Project would be subject to local plans and policies of the jurisdictions in which it is located, including East Palo Alto, Menlo Park, and Redwood City. **Table 3.2-2** presents local plans and policies regarding recreation to support consideration of Project consistency with general plan policies.

[4] Government Code section 66600 et seq.

[5] BCDC (San Francisco Bay Conservation and Development Commission), 2020. *San Francisco Bay Plan*. May 5, 2020. The Bay Plan was completed and adopted by BCDC in 1968 and was transmitted to the California Legislature and the Governor in 1969; the Bay Plan has since been amended, with the most recent document released in May 2020.

TABLE 3.2-2
LOCAL PLANS AND POLICIES RELEVANT TO THE PROJECT - AESTHETICS

CITY OF EAST PALO ALTO VISTA 2035 GENERAL PLAN
POLICY 7.2: CONNECTIONS TO PARKS AND NATURE. Encourage physical connections and visual sightlines to parks, public space, San Francisquito Creek, and other beautiful outdoor areas.
POLICY 13.8: VIEWSHEDS. Encourage developers to design projects that capitalize on views of adjacent natural resources. Require viewshed analysis as part of any potential development application. New development shall allow for the proposed east-west view corridor through Ravenswood north of Bay Road (see Specific Plan for details).
CITY OF MENLO PARK GENERAL PLAN
GOAL LU-6: Preserve open-space lands for recreation; protect natural resources and air and water quality; and protect and enhance scenic qualities.
POLICY LU-6.6**:** Public Bay Access. Protect and support public access to the Bay for the scenic enjoyment of open water, sloughs, and marshes, including restoration efforts, and completion of the Bay Trail.
REDWOOD CITY GENERAL PLAN
Policy BE-23.9: Protect and enhance the natural environmental features in Redwood City. Preserve open space resources as visual, recreational, and habitat resources, finding creative ways to provide habitat areas and species protection.
NOTE: Bay Trail = San Francisco Bay Trail
SOURCES: City of East Palo Alto, 2017. *Vista 2035 General Plan*. Adopted October 4, 2016; Final Version March 2017. Available online at www.ci.east-palo-alto.ca.us/planning/page/vista-2035-general-plan; City of Menlo Park, 2016. *General Plan, City of Menlo Park*. Adopted November 29, 2016. Available online at www.menlopark.gov/files/sharedassets/public/v/1/community-development/documents/general-plan/land-use-and-circulation-element-adopted-20161129.pdf; City of Redwood City, 2023. *Redwood City General Plan*. Adopted October 11, 2010; Amended August 2023. Available online at www.redwoodcity.org/departments/community-development-department/planning-housing/planning-services/environmental-documents/general-plan-eir.

3.2.3 Impacts and Mitigation Measures

Significance Criteria

In accordance with the CEQA, CEQA Guidelines (including Appendix G), relevant plans, policies, and/or guidelines, and agency standards, the Project could have a significant impact if it were to do any of the following:

- Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway;
- In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings (public views are those that are experienced from publicly accessible vantage point). If the Project is in an urbanized area, would the Project conflict with applicable zoning and other regulations governing scenic quality;
- Have a substantial adverse effect on a scenic vista; or
- Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area.

Methodology

This analysis evaluates impacts on aesthetics and visual resources within public views associated with Project implementation. Data for this section were generated by reviewing the websites, planning and policy documents, and maps of cities within the study area; conducting site visits; and using Google Earth.

Regarding the first significance criterion, the California State Scenic Highway System maps were consulted to determine whether any of the Project components would be visible from state scenic highways traversing or within view of the study area for the aesthetics analysis (i.e., I-280).

Regarding the second significance criterion, U.S. Census Bureau Urban Area maps were reviewed to determine those Project components that would be in urbanized areas, as defined in CEQA Guidelines section 15387. The results of this review indicate that the Project reaches are in the San Francisco–Oakland Urbanized Area. The applicable general plans and zoning ordinances of the cities of East Palo Alto, Menlo Park, and Redwood City were reviewed for policies, regulations, or other enforceable guidance (e.g., locally designated scenic roadways) relative to aesthetics and visual resources. BCDC's policies related to preserving scenic views around the San Francisco Bay, City of East Palo Alto General Plan Policy 13.8 (visual connection to parks and nature), City of Menlo Park General Plan Policy LU-6 (protect and enhance scenic qualities), and Redwood City General Plan Policy BE-23.9 (preserve visual open space resources) were reviewed and applied to the analysis of the Project's effects in Impact AES-1. Although these policies address visual quality and aesthetic resources in the Project area, they do not provide measurable significance criteria for these topics. Because the Project corridor traverses both urbanized settings (e.g., residential neighborhoods and developed transportation corridors) and non-urbanized settings (e.g., open space areas and marshlands), the analysis under Impact AES-1 considers the Project's effects in both types of landscapes. The impacts to visual quality and character are based on the Project's effects on the visual characteristics of line, form, color, and texture, as well as the visual contrast created by the Project components within both urbanized and non-urbanized contexts.

Refer to the first page of Section 3.2 for the definition of *scenic vista* used in this analysis.

Regarding project-level versus program-level evaluations, the analysis reflects the information available for the Project at the time of EIR preparation. The scale and massing of proposed shoreline protection (levees, floodwalls, levee/floodwalls, and flood gates), which are the features with the greatest potential to affect aesthetic resources, are evaluated at a project level of detail for all reaches. Those reaches for which conceptual (generally 10-percent) design information is available, depicted with dashed lines on Figure 2-1 in Chapter 2, *Project Description*, lack information for certain components (e.g., ramps, relocation of the pedestrian bridge at Bay Road). Appendix INFRA identifies those changes to infrastructure and other encroachments that are evaluated programmatically. Most are belowground and their implementation is unlikely to have long-term adverse aesthetic impacts. Project infrastructure that could adversely affect aesthetic resources include replacement of fencing and gates (multiple reaches), relocation of viewing platforms (Dumbarton Approach and Tech Campus reaches), relocation of elevated walkways for transmission tower access (Substation and Marsh Restoration Reach), pumping improvements (Dumbarton Approach and Tech Campus reaches), relocation of utility poles (Bedwell Bayfront Park Reach), and various water control structures (particularly within the Bedwell Bayfront Park Reach at Flood Slough). Aesthetic impacts from these changes cannot be evaluated because little to no siting or design information is available on which to base the evaluations. The need for additional CEQA documentation would be evaluated once these design details are developed as discussed in greater detail in Section 1.2.5, Program–Project EIR and Supplemental CEQA.

Refer to the impact discussions below for additional information regarding methodology used in specific evaluations.

The following topic is not analyzed further in this section for the reasons described below:

- ***Substantially damage scenic resources within a state scenic highway.*** As noted in Section 3.2.1, the nearest designated state scenic highway is I-280, nearly 5 miles southwest from the nearest Project reach. The Project area is not visible from I-280 or any other state scenic highway due to distance, intervening topography and landscape, and the movement and speed of travel. Therefore, **no impact** would occur under this criterion.

Impacts and Mitigation Measures

Table 3.2-3 summarizes the impact conclusions presented in this section.

TABLE 3.2-3
AESTHETICS IMPACT CONCLUSIONS

Impact	Level of Significance
Impact AES-1: Substantially degrade the existing visual character or quality of public view of the site and its surroundings or conflict with applicable zoning and other regulations governing scenic quality.	SUM
Impact AES-2: Have a substantial adverse effect on a scenic vista.	LTS
Impact AES-3: Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area.	LSM
Impact C-AES-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse impacts related to aesthetic resources.	LTS
NOTES: LTS = Less than Significant; LSM = Less than Significant with Mitigation; SUM = Significant and Unavoidable despite Mitigation	

Impact AES-1: Substantially degrade the existing visual character or quality of public view of the site and its surroundings or conflict with applicable zoning and other regulations governing scenic quality. *(Significant and Unavoidable Despite Mitigation)*

Project implementation, in particular the proposed shoreline protection features (levees, floodwalls, and levee/floodwall hybrids), could alter existing public views and would result in visual changes in the Project area. The visual character and quality of the Project area would be altered for some sensitive viewer groups as scenic views would be blocked by Project components in certain reaches.

Construction

The Project would be implemented in phases and in segments within each reach. A preliminary schedule, depicted in Table 2-4 in Chapter 2, *Project Description*, shows that while construction of reaches would be staggered, there would be overlapping construction periods. Construction of each shoreline protection/recreation feature has an estimated 1-year construction duration although actual construction phasing may vary based on final design, settlement requirements, geotechnical conditions, and contractor means and methods. Construction activities associated with the Project components (e.g., site preparation, development of Project components, hauling of materials) would result in the presence and movement of construction equipment, vehicles, and personnel for varying periods of time in various locations in the Project area. Although these activities could result in temporary, short-term loss of visual quality and cohesion within the Project area for sensitive viewers, there are no applicable zoning or other regulations governing scenic quality from construction-related impacts. These transient and temporary effects would not result in permanent or substantial effects to the existing visual character or quality of the Project area

that would conflict with applicable zoning or other regulations governing scenic quality. Therefore, Project construction is not expected to substantially degrade the existing visual character or quality of the site and its surroundings, and impacts would be **less than significant**.

Operation and Maintenance

Once constructed, the proposed shoreline protection, recreational features, and improvements to habitat would be visible from public viewpoints within the study area. The Project levees and floodwalls could adversely affect existing visual character for sensitive viewer groups, including recreationists and motorists. For context regarding views from recreational facilities, please refer to Figure 2-5 in Chapter 2, *Project Description,* which identifies existing and proposed recreational facilities in the Project area. As described in Chapter 2, the Project includes improvements to existing sections of the Bay Trail, construction of new trail segments, and decommissioning of a portion of the Ravenswood Trail. Refer also to Table 3.15-4 in Section 3.15, Recreation, for the approximate mileage of improvements, new trail segments, and the decommissioned trail segment. **Table 3.2-4** lists representative public viewpoints affected by the Project and includes the Project reaches, distance of the viewpoints from the levee, and elevation changes within each reach. The impact of shoreline protection and recreation features is evaluated by reach below.

Once in place, the proposed habitat improvements would be consistent with the existing visual character of the undeveloped portions of the Project area and would not create a strong visual contrast for the sensitive viewer groups identified in Section 3.2.1. Additionally, while operation and maintenance activities associated with shoreline protection, restoration, and recreational features (e.g., operating flood gates, conducting adaptive management actions within habitat, managing interior drainage, maintaining levees and trails) could result in temporary, short-term loss of visual quality within the Project area for sensitive viewers, these transient and temporary effects would be similar to existing maintenance activities in the area and would not result in permanent or substantial effects on the existing visual character or quality of the Project area. Consequently, the potential for maintenance activities to degrade the existing visual character or quality of public views of the site and its surroundings would be **less than significant**.

Potential to Degrade the Existing Visual Character or Quality of Public Views of the Site and Its Surroundings

South of Bay Road Reach and Bay Road Flood Gate

Recreationists at Martin Luther King Jr. Park and on the Bay and Faber–Laumeister trails, as well as other viewers in publicly accessible locations (e.g., pedestrians and residents on streets), would experience changes in visual character and quality due to Project implementation on the South of Bay Road Reach. Similarly, motorists on Bay Road would have views of the Project levee and flood gate, which would also potentially affect the existing visual character and quality at this transition point between the South of Bay Road Reach and the North of Bay Road Reach. The visual character of this reach is primarily open to the east with level expansive views of Laumeister Marsh, Faber Marsh, and the bay, with the East Bay Hills beyond. Views to the west primarily include residential development and recreational facilities.

TABLE 3.2-4
PUBLIC VIEWPOINTS AFFECTED BY THE PROJECT [A]

Project Reach	Representative Viewpoint Evaluated	Distance from Levee	Elevation Change for Entire Reach (approximate feet NAVD88)[b]		
			Existing Grade throughout Reach	Height of Shoreline Protection	Difference
South of Bay Road	*Cypress Street*	*130 ft*	*4.5–18*	*16.5–17.9*	*Up to 13.5*
North of Bay Road	*Fordham Street*	*140 ft*	*6.5–12*	*17.8–18.5*	*Up to 12*
Dumbarton Approach	*SR 84*	*120 ft*	*3–12*	*18.5–24.4*	*Up to 21.4*
Substation and Marsh Restoration	*SR 84*	*95 ft*	*2–10*	*10–21*	*Up to 19*
Tech Campus	SR 84	60 ft	6–19.5	18.5–22.3	*Up to 16.3*
Bayfront Expressway	*SR 84*	*130 ft*	*2–15*	*10–19.6*	*Up to 17.6*
Bedwell Bayfront Park	Marsh Road	240 ft	5–13	12.1–18.7	*Up to 13.7*
Marsh Road	Bedwell Bayfront Park	0.25 mi	4.5–13	11.1–18.7	*Up to 14.2*

NOTES: ft = feet; mi = mile; NAVD88 = North American Vertical Datum of 1988; SR = State Route

a. *ITALICS* indicate that visual renderings depicting the height of proposed shoreline protection that have been prepared for these viewpoints (refer to Figures 3.2-5 and 3.2-6). The Dumbarton Approach and Substation and Marsh Restoration reaches are both depicted in one rendering (Viewpoint 13 on Figure 3.2-6. Reaches with and without renderings are represented with public viewpoints on Figures 3.2-2 through 3.2-4.

b. Includes top of levees and floodwalls but does not include appurtenant trail features such as handrails or signage, the placement of which have not been determined.

SOURCE: HDR, Inc., 10% Programmatic Plans and 30% Submittal Map and Construction Plans, June and July 2024; ESA 2025.

For recreationists and nearby residents, existing viewing opportunities from Martin Luther King Jr. Park, Faber–Laumeister Trail, and the existing Bay Trail would be altered by the Project levee and floodwall within this reach. The Project alignment is along an existing levee between Martin Luther King Jr. Park and Faber Marsh and the bay. Although the proposed levee would be higher than the existing levee (refer to Table 3.2-4), recreationists within Martin Luther King Jr. Park would experience similar views toward Faber Marsh and the bay as the Project levee and floodwall would be over 200 feet away; consequently, the difference in height would not be visibly discernible. Additionally, the Project levee would be vegetated and appear similar to the existing levee in terms of color, linear form, and texture. Therefore, the visual contrast attributable to the Project would be weak and the change in visual character and quality at the Martin Luther King Jr. Park viewpoint for recreationists would not be perceptible.

As seen on Figure 2-5 in Chapter 2, *Project Description*, the South of Bay Road Reach includes improvements to the existing Bay Trail, which would be relocated to the top of the proposed levee. The trail would be widened, pedestrian ramps would be installed, and connection to the Faber–Laumeister Trail would be reestablished following levee construction. The floodwall would be approximately 3.7 feet higher than the levee. The levee would not limit access to scenic views within the South of Bay Road Reach because recreationists would still be able to view scenic resources, including Cooley Landing and Faber and Laumeister marshes, from atop the new levee and over the floodwall. Therefore, impacts on visual character and quality would be **less than significant** for recreationists within the South of Bay Road Reach.

For others with publicly accessible views of, or toward, the Project on or near Beech, Cypress, and Garden streets (refer to Figure 2-7), viewing opportunities toward Faber Marsh and the bay would be interrupted by the Project levee and floodwall. Although there is an existing levee along the South of Bay Road Reach, the proposed levee and floodwall would be higher than the existing grade (refer to Table 3.2-4). **Figure 3.2-5** (Viewpoint 11) shows a visual representation of the levee/floodwall location and height and its effect on the publicly accessible view from Cypress Street in East Palo Alto. In the existing view, the East Bay Hills are visible in the background view above the existing levee. The rendering in Figure 3.2-5 shows that the higher levee and floodwall would block most of the view of the East Bay Hills from the same viewpoint. The presence of the Project levee and floodwall would create a change in the character of the view by interrupting views of the East Bay Hills, thereby reduce visual quality. To address this significant impact, **Mitigation Measure AES-1** (Floodwall Design and Landscaping Treatments, presented at the end of this impact discussion) would be implemented to reduce the effects to visual character and quality. Implementation of Mitigation Measure AES-1 would require the Project Proponent to incorporate design features to reduce the visual contrast created by the floodwalls. However, any such design features cannot reduce the height of shoreline protection. To achieve the Project's overall purpose of reducing risks to people, property, and infrastructure from current tidal flooding and projected sea level rise and to satisfy the Project's design standards, a solid barrier 16.5 to 17.9 feet North American Vertical Datum of 1988 (NAVD88; assumed for all elevations in this document unless otherwise noted) in elevation is needed in this reach. Consequently, Mitigation Measure AES-1 would not reduce the visual contrast created by blocked views to a less-than-significant level. Therefore, impacts on visual character and quality would remain **significant and unavoidable despite mitigation** for those who currently have publicly accessible views within the South of Bay Road Reach.

Bay Road is a designated view corridor in East Palo Alto's Specific Plan. The visual character of the Bay Road corridor is primarily industrial at the point where it enters Faber Marsh and approaches the Cooley Landing Park and Education Center. The flood gate at Bay Road would link the South of Bay Road and North of Bay Road reaches (see Figure 2-7) during flood events and would disrupt views toward the bay. This flood gate would lay flat, embedded in the roadway, when not in use to allow access to Cooley Landing. When bay floodwaters rise near Bay Road, the gate would automatically rise to provide contiguous flood protection with the South of Bay Road and North of Bay Road levees and floodwalls. Although the flood gates would block views toward Faber Marsh and the bay when in use, this would be a temporary situation during a flood event when there are likely to be few, if any, viewers on Bay Road. The visual contrast would be weak, and the impact on visual character and quality in the Bay Road view corridor would be **less than significant**.



Viewpoint 11 - View from Cypress Street in East Palo Alto looking east towards Faber Marsh (January 2022).



Viewpoint 12 - View from intersection of Fordham Street and Illinois Street in East Palo Alto looking east towards Ravenswood Open Space Preserve (February 2022).

NOTE: Rendering shows proposed levee height based on existing grade from current viewpoint locations. It does not include the height of appurtenant features such as trail handrails, signage, or viewing platforms. The Google Earth images used in this figure were taken at approximately 8.2 feet above the ground surface.

SOURCE: HDR, 2024; ESA, 2025; Google Earth, 2022

SAFER Bay Project

Figure 3.2-5
Renderings from South of Bay Road and North of Bay Road Reaches

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North of Bay Road Reach and Railroad Flood Gate

Recreationists at Cooley Landing Park and on the existing Bay Trail, as well as viewers in other publicly accessible locations within the North of Bay Road Reach (i.e., pedestrians and residents on streets) would experience changes in visual character and quality due to Project implementation. The visual character of this reach is primarily open to the east with level expansive views of Cooley Landing, Ravenswood Open Space Preserve, and the bay, with the East Bay Hills beyond. To the west (north of Purdue Avenue), the visual character is primarily residential development.

As shown on Figure 2-5, the North of Bay Road Reach includes proposed improvements to, and replacement of the existing Bay Trail, which is currently on an existing levee. The Bay Trail would be realigned atop the Project levee; the existing levee-top trail to the east would be retained (refer to Figure 2-5). Pedestrian ramps would be installed for the proposed trail, and the existing Bay Trail boardwalk would be reestablished following levee construction. The Project levee would not adversely affect views from recreationists on the Bay Trail within the reach as the relocated Bay Trail would continue to offer views of Cooley Landing, Ravenswood Open Space Preserve, and the bay from atop the new levee. Therefore, impacts on visual character and quality would be **less than significant** for recreationists within the North of Bay Road Reach.

For other viewers with publicly accessible views of, or toward, the Project near Stevens Avenue and Fordham Street, viewing opportunities toward the bay and Ravenswood Open Space Preserve would be interrupted by the proposed levee, which would be at higher elevation than the existing grade (refer to Table 3.2-4).

Figure 3.2-5 (Viewpoint 12) shows a visual representation of the Project levee location and height and its effect on the publicly accessible view from Fordham Street. In this view, the East Bay Hills are in the background view, but the view is obscured by a chain-link fence at the end of the street. The fence reduces the visual quality of the existing view. As shown in the rendering on Figure 3.2-5, the proposed levee would introduce an additional component and would create a change in the character to the existing view, but it would not substantially block the view of the East Bay Hills. The Project levee would also be vegetated and blend in with the existing vegetation in the view and maintain the existing visual character. The existing view of the East Bay Hills would not be substantially affected by the Project. Therefore, impacts on visual character and quality would be **less than significant** for publicly accessible views within the North of Bay Road Reach.

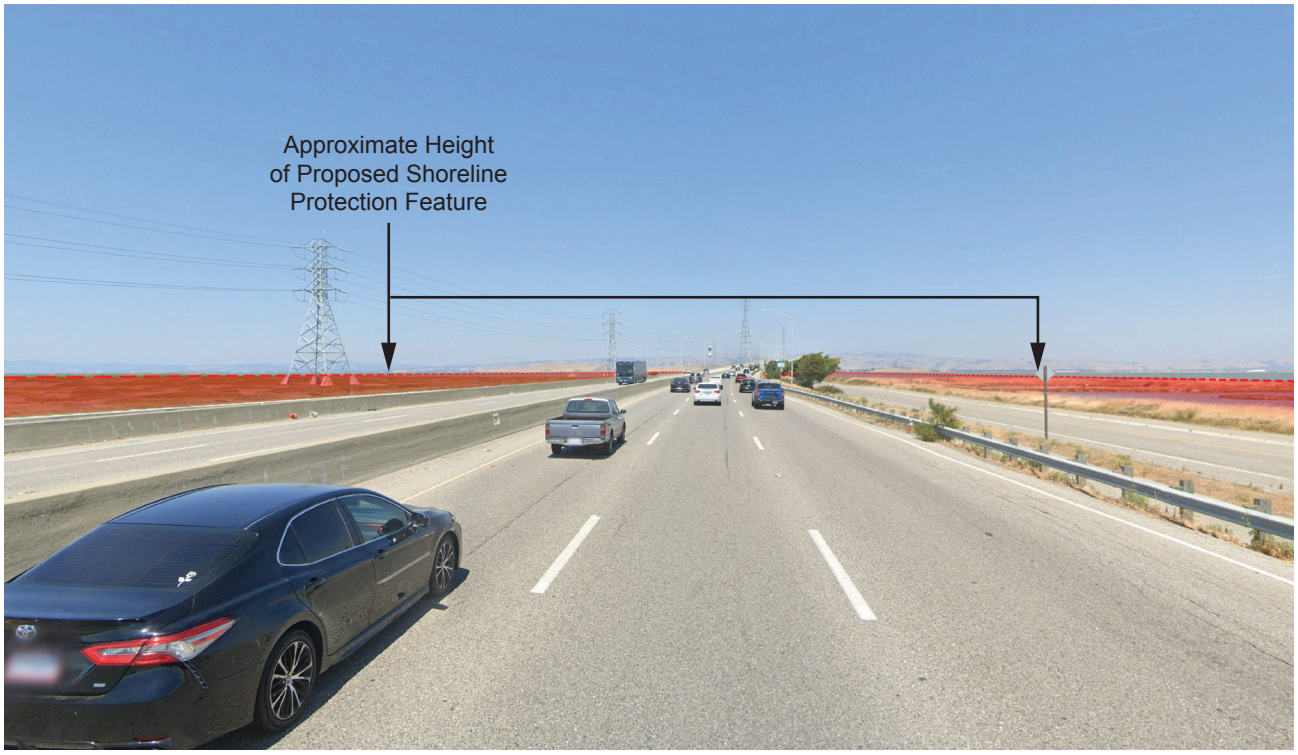
Views of the proposed flood gate at the Southern Pacific Railroad tracks (refer to Figure 2-10) would not be readily available from publicly accessible locations. The nearest potential viewpoint would be from the Bay Trail approximately 300 to 400 feet to the west. This flood gate would lay flat and out of view most of the time and automatically rise only when needed to provide contiguous flood protection (i.e., fill the gap in the Project levee) when bay floodwaters rise. The Southern Pacific Railroad is not currently in operation on this track, and the area is not accessible to the public; therefore, the flood gate would have **no impact** on visual character and quality in this portion of the North of Bay Road Reach.

Dumbarton Approach Reach

Recreationists within the Dumbarton Approach Reach would experience changes in visual character and quality along the SF2 Trail and the existing Bay Trail due to Project implementation. The visual character

of this reach is primarily open with level expansive views of the Moseley Tract Marsh, Pond SF2, and the abandoned rail bridge, with the East Bay Hills beyond. Viewpoint 3 on Figure 3.2-2 provides an example of visual conditions along this reach. Existing segments of the Bay Trail immediately south of SR 84 would be relocated atop the Project levee on either side of SR 84. An existing viewing platform in Pond SF2 cell U4 and a viewing area south of SR 84 would be removed and relocated as part of the Project (refer to Figure 2-13; relocation location to be determined). Although the proposed shoreline protection features in this reach would be higher than the existing grade (refer to Table 3.2-4), there would be no interruption of views for recreationists on the existing Bay Trail or the existing SF2 Trail. The Project would not limit access to scenic views of Pond SF2 and the East Bay Hills within the Dumbarton Approach Reach because the Bay Trail would be located atop the levee and the SF2 Trail would remain in place. Recreationists would still have views of these existing scenic resources from these vantage points. Therefore, impacts on visual character and quality would be **less than significant** for recreationists within the Dumbarton Approach Reach.

This discussion applies to motorists' views from SR 84 and includes the Dumbarton Approach and Substation and Marsh Restoration reaches. Motorists traveling on SR 84 would experience changes in visual character due to Project implementation approaching and exiting the Dumbarton Bridge. Levee/ floodwall hybrid and levee shoreline protection features would be constructed on both sides of SR 84 and would disrupt foreground views toward Pond SF2, Moseley Tract Marsh, and Pond R2. **Figure 3.2-6 (**Viewpoint 13) shows a visual representation of shoreline protection location and height on either side of SR 84 looking east; the East Bay Hills are in the background view. As shown in the rendering on Figure 3.2-6, the Project levee/floodwalls would block views of the easternmost portion of Pond SF2 and the Moseley Tract Marsh, and the background views of the East Bay Hills would be somewhat obscured. The levees would be vegetated and have a similar appearance to the existing foreground view experienced at highway speeds (i.e., generally at 55 or more miles per hour). The floodwalls atop the levees would have a visually harder, constructed appearance. The Project levee/floodwalls would substantially reduce the visual character or quality of views by introducing constructed forms that would block views. Therefore, impacts on visual quality would be significant for motorists within the Dumbarton Approach and Substation and Marsh Restoration reaches. To address this significant impact, Mitigation Measure AES-1 (presented at the end of this impact discussion) would be implemented to reduce the effects to visual character and quality by requiring the Project Proponent to incorporate design features into the Project to reduce visual contrast. However, any such design features cannot reduce the height of the floodwall. Consequently, Mitigation Measure AES-1 would not reduce the visual contrast created by constructed features and resulting blocked views to a less-than-significant level. Therefore, impacts on visual character and quality would be **significant and unavoidable despite mitigation** for those who currently have publicly accessible views within the Dumbarton Approach and Substation and Marsh Restoration reaches.



Viewpoint 13 - View from Bayfront Expressway near Ravenswood Trail looking east towards the Dumbarton Bridge (July 2023).



Viewpoint 14 - View from intersection of Bayfront Expressway and Meta Way in Menlo Park looking north towards Pond R3 (July 2024).

NOTE: Rendering shows proposed levee height based on existing grade from current viewpoint locations. It does not include the height of appurtenant features such as trail handrails, signage, or viewing platforms. The Google Earth images used in this figure were taken at approximately 8.2 feet above the ground surface.

SOURCE: HDR, 2024; ESA, 2025; Google Earth, 2023 and 2024

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Figure 3.2-6
Renderings from Dumbarton Approach and Bayfront Expressway Reaches

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Substation and Marsh Restoration Reach

Recreationists using the existing Bay and Ravenswood trails within the Substation and Marsh Restoration Reach would experience changes in visual character and quality due to Project implementation. Motorists would experience these visual changes from SR 84. The visual character of this reach is primarily industrial with the substation, electrical infrastructure, and SR 84 dominating the view, with extended views of the marshland and bay beyond (see Figure 3.2-3, Viewpoint 5).

The Project would decommission approximately 1.8 miles of the Ravenswood Trail that extends around Ponds R1 and R2 (refer to Figure 2-5). The remainder of the trail would be converted to two spur trails originating on either side of the PG&E substation and going along each pond. The northernmost 1,500 feet of the western spur trail would be closed during the seabird nesting season.

Although the proposed shoreline protection features in this reach would be higher than the existing grade (refer to Table 3.2-4), the levee would not interrupt views for recreationists or limit access to scenic views of the bay from the existing Bay Trail or Ravenswood spur trails because these trails would be relocated atop the levees. Recreationists would have views of existing scenic resources from the new vantage points, including views toward the bay and East Bay Hills. Therefore, impacts on visual character and quality would be **less than significant** for recreationists within the Substation and March Restoration Reach.

Refer to the discussion under the Dumbarton Approach Reach regarding motorists' views from the SR 84 approach to the Dumbarton Bridge. As noted in that discussion, impacts on visual character and quality would be **significant and unavoidable despite mitigation** for those who currently have publicly accessible views within the Dumbarton Approach and Substation and Marsh Restoration reaches.

Tech Campus Reach

Recreationists using the Public Shoreline Access Trail and the existing Bay Trail within the Tech Campus Reach would experience changes in visual character and quality due to Project implementation. Existing views along these trails are shown in Viewpoints 6 and 7 on Figure 3.2-3. Motorists would experience these visual changes from SR 84. The visual character of this reach is primarily landscaped office development at the Meta Headquarters, the ponds, electrical infrastructure, and SR 84 dominating the view.

The Bay Trail would be extended atop the levee from the Substation and Marsh Restoration Reach to the Public Shoreline Access Trail around Meta Headquarters (refer to Figure 2-5). The existing Public Shoreline Access Trail around Meta Headquarters would be replaced. Although the proposed shoreline protection features in this reach would be higher than the existing grade (refer to Table 3.2-4), the levee/floodwall would not interrupt views for recreationists on the Public Shoreline Access Trail and Bay Trail within the Tech Campus Reach because these trails would be relocated atop the levees and the viewing opportunities would be restored. Recreationists would still have views of existing scenic resources from the new vantage points, including views toward the bay and East Bay Hills. The Project would result in impacts to ornamental woodland habitats (see Table 3.4-4 in Section 3.4, Biological Resources) and require removal of trees in other habitat types. Over 200 trees have been surveyed within the Project alignment, almost all of which are along the Tech Campus Reach adjacent to the Public Shoreline Trail. Most of these are ornamental trees between Hacker Way (a private road) and the trail. The exact number of trees that would require removal is not yet determined, as the design for this levee is not yet to a level to make that determination with confidence. However, the removal of this high concentration of trees within

the Tech Campus Reach suggests that recreationists and motorists in this area would experience change in visual character due to tree removal and the creation of strong visual contrast for those using the trail. Although strong visual contrast would be introduced into the area's visual landscape, removal of these trees would not substantially impair views of Pond R3 and Ravenswood Slough; landscaped office development within Meta Headquarters in the opposite direction would be more visually apparent. Implementation of Mitigation Measure AES-1 (specifically, installation of native landscaping or other screening on the landward side, where feasible and compatible with maintenance needs) as well as Mitigation Measure BIO-27 (Protected Trees, described in Section 3.4) would help to reduce to the impact to aesthetics resources attributable to tree removal in the Tech Campus Reach.

Motorists traveling on SR 84 would experience changes in visual character due to Project implementation. As noted in Section 3.2.1, SR 84, including the Tech Campus Reach, is within a designated City of Menlo Park view corridor looking east toward the Dumbarton Bridge from Willow Road. This view corridor focuses on the view toward Dumbarton Bridge, which is also a designated gateway in the Menlo Park General Plan. This corridor view would include the Project's components (levee/floodwall and a pump station). A portion of the Project levee within the reach to the northeast of the Meta Headquarters would disrupt views north toward the bay at Pond R3/Ravenswood Slough (refer to Figure 2-20). Motorists would no longer experience this expansive view. While the levee would be vegetated, the constructed, unvegetated floodwall would introduce a visually hard feature into the view, creating a strong visual contrast. Therefore, impacts on visual character and quality would be significant for motorists within the Tech Campus Reach. Implementation of Mitigation Measure AES-1 would require the Project Proponent to incorporate design features into the Project floodwalls to reduce visual contrast. However, any such design features cannot reduce the height of the floodwall. Consequently, Mitigation Measure AES-1 would not reduce the visual contrast created by constructed features and resulting blocked views to a less-than-significant level. Therefore, impacts on visual character and quality would be **significant and unavoidable despite mitigation** for those who currently have publicly accessible views within the Tech Campus Reach.

Bayfront Expressway Reach

Recreationists using the existing Flyway and Bay trails within the Bayfront Expressway Reach would experience changes in visual character and quality due to Project implementation. Motorists would experience these visual changes from SR 84. As noted in Table 3.2-1, the visual character of this reach is representative of a trail/open space with an urban setting beyond. The visual character of this reach is primarily landscaped office development and electrical infrastructure dominating the view on the south side of SR 84 and open views of Ponds R3, R4, R5, and S5 on the north side of SR 84. Viewpoint 8 in Figure 3.2-4 provides a representative view of existing conditions in this reach.

The existing Bay Trail where it parallels the north side of SR 84 would remain in place; the levee would be constructed on the north, or bayward, side of the existing Bay Trail. Once the levee is constructed, views toward the ponds and bay from the existing Bay Trail would be blocked; however, a new trail and improvements to the Flyway Trail would be located atop the levee, which would restore views of the ponds and bay. For these reasons, the Project would not permanently limit access to scenic views within the Bayfront Expressway Reach for recreationists. Therefore, impacts on visual character and quality would be **less than significant** for recreationists within the Bayfront Expressway Reach.

Once the Project is constructed, a 0.80-mile segment of the proposed levee along the north side of SR 84 would obstruct motorists' views of the ponds and bay. Portions of the levee along SR 84 within this reach would interrupt views to the north as the top of the levee/floodwall would be higher than the existing grade and adjacent roadway surface as seen in the rendering on Figure 3.2-6 (Viewpoint 14). The proposed levees would block views of the ponds and the bay from SR 84. Motorists, such as those who stop at the signalized intersection at Meta Way, would no longer experience this expansive view, as the visual contrast to the existing visual character in this reach would be altered by the presence of the levee. Therefore, impacts on visual character and quality would be significant for motorists within the Bayfront Expressway Reach. To address this significant impact, Mitigation Measure AES-1 would be implemented to reduce the effects on visual character and quality by requiring the Project Proponent to incorporate landscaping where feasible into the shoreline protection corridor. However, such landscaping cannot reduce the height of the levee. Consequently, Mitigation Measure AES-1 would not reduce the visual contrast created by the blocked views to a less-than-significant level. Therefore, impacts on visual character and quality would be **significant and unavoidable despite mitigation** for those who currently have publicly accessible views within the Bayfront Expressway Reach.

Bedwell Bayfront Park Reach

Recreationists in Bedwell Bayfront Park and using the existing Bay Trail within the Bedwell Bayfront Park Reach would experience changes in visual character and quality due to Project implementation. Motorists would experience views primarily from the intersection of SR 84 and Marsh Road. Viewpoint 9 in Figure 3.2-4 presents a representative view of this reach from the Bay Trail.

The Bay Trail and Marsh Road at the entrance to Bedwell Bayfront Park would be atop the Project levee at the southern end of Flood Slough. Refer to Figure 2-24 for potential pedestrian access locations. The Bay Trail would be extended west to the eastern end of the Marsh Road Reach. Although the Project would include a heightened levee, this would not interrupt views for recreationists on the existing Bay Trail or Marsh Road within the reach. The Project would not permanently limit access to scenic views within the Bedwell Bayfront Park Reach for recreationists on the Bay Trail, as they would still have views of existing scenic resources, including views of Bedwell Bayfront Park and the bay, atop the new levee from the new viewpoints.

The Menlo Park General Plan designates a view corridor along Marsh Road between Bedwell Bayfront Park and the Bay Road intersection. From Bay Road, the scenic corridor extends north on an overpass over U.S. 101, then down to existing grade at its intersection with SR 84. For most of its distance, the visual character along this scenic corridor is urban and highway. The only portions of the scenic corridor with naturalistic visual character are at the entrance to Bedwell Bayfront Park and the intersection of SR 84. Neither Bedwell Bayfront Park nor the proposed levee would be visible from northbound Marsh Road until the viewer has crossed over U.S. 101. The view would be obscured by intervening vegetation and development. Marsh Road would continue onto the proposed levee as it enters Bedwell Bayfront Park, which would be at an elevation of approximately 18.7 feet in elevation (approximately 6 feet above the existing grade; refer to Table 3.2-4). In the direction of view along Marsh Road (north), the upper portions of the Bedwell Bayfront Park hills are approximately 70 feet. The proposed levee and raised Marsh Road would not create a strong visual contrast and would not detract from the existing character and quality of this view. Consequently, incrementally raising the roadway would not substantially affect views of Bedwell Bayfront Park from Marsh Road.

Motorists traveling on SR 84 would experience changes in visual character due to Project implementation. As motorists approach the Bedwell Bayfront Park Reach from the east, the proposed levee would be higher than the existing grade (refer to Table 3.2-4) immediately ahead and to the right (north) in the view. The levee would block the view of electric transmission infrastructure along Flood Slough. The levee would also visually connect with the higher portions of Bedwell Bayfront Park. The vegetates levee slope would be visually consistent with the appearance of the park and its surroundings, creating weak visual contrast. Therefore, impacts on visual character and quality would be **less than significant** for motorists within the Bedwell Bayfront Park Reach.

Marsh Road Reach

No designated trails or other recreational facilities are within the Marsh Road Reach. However, recreationists in the western portion of Bedwell Bayfront Park would have expansive views of this reach when looking southwest and inland toward the Coastal Hills and experience changes in visual character due to Project implementation. Motorists would experience brief and limited views of this reach primarily from SR 84 and Marsh Road.

Recreationists in the western portion of Bedwell Bayfront Park would have views of the Project levee when looking southwest and inland. Flood Slough and Pond 7C would be in the foreground, and mixed-use development in Menlo Park and Redwood City would be in the middle ground view. The Coastal Hills frame the view in the background and define the horizon. The Project levee would partially block the view of the mixed-use development in the middle ground view, appearing as a linear vegetated feature. With the levee height of approximately 18.7 feet in elevation, the proposed levee would not block the view of Pond 7C or the background view of the Coastal Hills. In this instance, the proposed levee would work as a partial vegetative screen for the mixed-use development and provide a naturalistic visual element, blending in with the foreground view. This would reduce the visual contrast in the existing view and improve visual character and quality. Therefore, impacts on visual character and quality would be **less than significant** for recreationists in Bedwell Bayfront Park with views of the Marsh Road Reach.

Motorists at the intersection of SR 84 and Marsh Road would only have a view of the eastern extent of the proposed levee where it would join with the Bedwell Bayfront Park Reach. Otherwise, views of the levee in this reach would be blocked by intervening development and landscaping. Although the proposed levee would roughly parallel Haven Avenue, views would be completely blocked by intervening development and landscaping. The proposed levee would have minimal effect on visual character and quality for motorists within the Marsh Road Reach and result in **no impact**.

Conflict with Applicable Zoning and Other Regulations Governing Scenic Quality

The Project's effects on existing visual character and quality of public views in the context of applicable zoning or other regulations governing scenic quality are discussed below. Local zoning requirements of East Palo Alto, Menlo Park, and Redwood City do not clearly permit, prohibit, or otherwise apply to the Project; therefore, this discussion considers the relevant general plan policies of these jurisdictions.

Section 3.2.2, lists state and local regulations governing scenic quality, consisting of the Bay Plan, East Palo Alto General Plan, Specific Plan, Menlo Park General Plan, and Redwood City General Plan.

The applicable Bay Plan policies require that the shoreline be developed in accordance with the Public Access Design Guidelines, that maximum effort be made to provide, enhance, or preserve views of the bay and shoreline, and that structures near the bay should be low enough to ensure the continued visual dominance of the hills around the bay. In the South of Bay Road Reach, the bay is not visible from public locations inland of the existing berm due to the existing berm, although hills around the bay are visible. In the Dumbarton Approach, Substation and Marsh Restoration, Tech Campus, and Bayfront Expressway reaches, motorists are the primary viewers and their views of the bay and East Bay Hills would be substantially blocked by the levees and/or floodwalls. In all other reaches, bay wetlands, salt ponds, or open water are visible from public locations in addition to long-range views of East Bay Hills. In all locations, the levee top would be publicly accessible and provide similar or better views of the bay and shoreline. Although in many locations foreground views of the bay shoreline from existing development would be blocked by the levee, the long-range view of hills around the bay would generally be preserved, and the visual dominance of expansive sky views and hills along the horizon would remain. As discussed in Chapter 2, *Project Description*, where the Project would replace or extend the Bay Trail, the levee segments would incorporate design standards adopted for the Bay Trail.[6] The Project would not obviously conflict with Bay Plan policies governing scenic quality.

The East Palo Alto General Plan encourages projects to capitalize on views of adjacent natural resources. The Specific Plan applies to development west of the Project and does not include policies governing scenic quality that apply to the Project. Future development under the Specific Plan would be raised to approximately the same grade as the proposed levee. The Menlo Park General Plan land use goals and policies include protecting and enhancing scenic qualities and protecting and supporting public access to the bay for scenic enjoyment of bay resources. The Redwood City General Plan Policy BE-23.9 encourages preserving open space resources as visual resources. The Project would replace or enhance public access to the bay and scenic views of the bay from the trail on the levee. The Project would also restore tidal wetlands, which are a scenic bay resource. The Project would not obviously conflict with local general plan policies governing scenic quality.

For these reasons, Project implementation would not conflict with local zoning or regulations concerning scenic quality. Therefore, the impact specific to local zoning or regulations concerning scenic quality would be **less than significant**.

> **Mitigation Measure AES-1: Floodwall Design and Landscaping Treatments.** This measure applies to the South of Bay Road, Dumbarton Approach, Substation and Marsh Restoration, Tech Campus, and Bayfront Expressway reaches. During design of floodwalls, the Project Proponent shall incorporate context-sensitive design features to reduce the visual contrast and massing of any exposed floodwalls (i.e., sheet pile walls). At a minimum, these design features shall include one or more of the following, as appropriate to site conditions:
>
> - Use of low-glare or integral color finishes.
> - Incorporation of surface texturing, panel modulation, or similar treatments to break up large blank faces.

[6] Current design standards are included in the San Francisco Bay Trail Design Guidelines and Toolkit 2.0, released in July 2025.

- Installation of native landscaping or other screening on the landward side of levees, where feasible and compatible with maintenance needs.

Prior to completion of final design, final sheet pile wall design and landscaping treatment plans shall be developed for each reach to which this measure applies.

Impact AES-2: Have a substantial adverse effect on a scenic vista. ***(Less than Significant)***

A project could have a substantial adverse effect on a scenic vista if it significantly alters or obstructs key visual elements that define the view. (Scenic vista, in the context of this analysis, is defined in Section 3.2.1.) As described above, the Menlo Park General Plan designates view corridors/scenic vistas along Marsh Road toward Bedwell Bayfront Park and along SR 84 toward the Dumbarton Bridge.[7] These view corridors/scenic vistas include views of portions of the Marsh Road, Bedwell Bayfront Park, Tech Campus, Substation and Marsh Restoration, and Dumbarton Approach reaches. Motorists and recreationist viewer groups, which have moderate to high sensitivity, would be affected by visual changes observed from the public viewpoints within these designated view corridors/scenic vistas.

Construction

Construction equipment and activity may temporarily introduce visually unappealing elements to the visual landscape. Visual impacts would occur from the temporary presence of construction equipment, materials, and work crews along the Project's reaches and in potential staging areas, which could draw a viewer's attention away from experiencing the vista view. The Project would be implemented in phases and in segments within each reach. A preliminary schedule, depicted in Table 2-4, shows that while construction of reaches would be staggered, there would be overlapping construction periods in 2029, 2030, 2031, 2032, and 2033. Construction of each shoreline protection/recreation feature has an estimated 1-year construction duration. Although the impact would be most noticeable to nearby motorists and recreationists, impacts would be temporary and short-term in nature as these viewers continue to move past construction activities. Upon completion of construction, any remaining equipment would be removed, and staging areas would be restored to their original condition. Therefore, impacts on scenic vistas due to Project construction would be **less than significant**.

Operation and Maintenance

Once constructed, the shoreline protection, recreational features, and habitat improvements would be visible by motorists and recreationists from public viewpoints within the Menlo Park designated scenic vistas. Motorists traveling on Marsh Road and SR 84 would have low to moderate visual sensitivity, and recreationists on the Bay Trial would have high visual sensitivity to the Project.

The Menlo Park General Plan identifies a designated scenic vista extending north along Marsh Road toward Bedwell Bayfront Park, beginning at the Bay Road intersection. However, views of Bedwell Bayfront Park and the Project would not be visible to motorists traveling northbound on Marsh Road until crossing over the U.S. 101 overpass. This is described more fully in Impact AES-1 under *Bedwell Bayfront Park Reach*. As part of the Project, a ramp would be constructed to redirect Marsh Road onto the new levee. The existing roadway elevation of Marsh Road within Bedwell Bayfront Park ranges from

[7] Impacts to views from Bay Road in East Palo Alto, a view corridor, are addressed under Impact AES-1.

approximately 10 to 12 feet. The elevation of the levee proposed within the reach is approximately 18.7 feet (6 feet above the existing grade; refer to Table 3.2-4). Given that the upper elevations of the Bedwell Bayfront Park hills reach approximately 70 feet, the Project would not substantially obstruct views of Bedwell Bayfront Park from the Marsh Road designated scenic vista/view corridor. Therefore, the Project would not have a substantial adverse effect on a scenic vista designated by the Menlo Park General Plan.

Within the SR 84 designated scenic vista, motorists traveling on SR 84 would experience changes in visual character due to Project implementation approaching and exiting the Dumbarton Bridge. This is described more fully in Impact AES-1 under *Dumbarton Approach Reach*. Portions of Project levee/floodwall would be constructed on both sides of SR 84 and would disrupt foreground views to the northwest and southeast, although views of the East Bay Hills in the background view in the eastbound direction on SR 84 would not be blocked, as shown on Figure 3.2-6. Although the existing foreground views would be blocked, in the broader visual context of a view corridor or scenic vista (as defined in Section 3.2.1), the Project levees would be vegetated and have a similar appearance to the existing foreground view experienced at highways speeds (i.e., generally 55 or more miles per hour). The Project levees/floodwall would not substantially block vista views in this designated scenic vista. Therefore, impacts on this designated scenic vista would be **less than significant**.

Impact AES-3: Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area. (*Less than Significant with Mitigation*)

Construction

As noted in Section 2.6.2 in Chapter 2, *Project Description*, construction activities would typically occur between typical daytime working hours, 8:00 a.m. and 5:00 p.m., Monday through Saturday. Although approximately four nighttime shifts of site preparation would occur for vehicles to place and remove a K-rail along SR 84, due to the nature of K-rail placement, lighting beyond that of the construction vehicles would not be necessary and would not create substantial vehicle lighting in addition to what already exists on SR 84 at night. Construction contractors may install temporary security lighting at construction staging areas that could create a new source of substantial light in adjacent residential areas or habitat resulting in a potentially significant impact. Implementation of **Mitigation Measure AES-2 (**Nighttime Security Lighting) would reduce this impact by requiring the minimum amount of lighting necessary and the prevention of light spillover.

Therefore, with implementation of Mitigation Measure AES-1, construction activities would not create new sources of light or glare that would adversely affect daytime or nighttime views in the area, and the impact would be **less than significant with mitigation**.

> **Mitigation Measure AES-2: Nighttime Security Lighting**
>
> This measure applies to all reaches. The Project Proponent shall require that Project contractors direct nighttime lighting used during construction away from adjacent residential areas or habitat, use the minimum amount of night lighting necessary for construction and safety, and shield and hood outdoor lighting to prevent light spillover effects during Project construction.

Operation and Maintenance

As noted in Section 2.7 in Chapter 2, *Project Description*, if needed, task lighting during maintenance and inspection activities would be temporary; no permanent lighting would be installed as part of the Project. The Project does not include buildings or structures with large reflective surfaces (i.e., surfaces greater than one to two stories tall). Therefore, the Project operation would not create new sources of light or glare that would adversely affect day or nighttime views in the area. Therefore, **no impact** would occur.

Cumulative Impacts

Impact C-AES-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse impacts related to aesthetic resources. (*Less than Significant*)

Cumulative projects listed in Table 3.1-2 and shown on Figure 3.1-1 may be within the foreground and middle ground viewsheds affected by the Project.

The Menlo Park General Plan designated view corridors/scenic vistas north along Marsh Road toward Bedwell Bayfront Park and east along SR 84 toward Dumbarton Bridge. None of the cumulative projects listed in Table 3.1-2 and shown on Figure 3.1-1 would be expected to be within the view corridor/scenic vista along SR 84 toward Dumbarton Bridge. Cumulative projects, including Hotel Moxy, 111 Independence Drive, 123 Independence Drive, 3705 Haven Ave, and 104 Constitution Drive, could affect views along Marsh Road toward Bedwell Bayfront Park. However, these cumulative projects are to the east and west of Marsh Road and would not be in the direct viewshed of the scenic vista, which primarily focuses on views of Bedwell Bayfront Park and beyond. Therefore, cumulative impacts related to substantial adverse effects on scenic vistas are not considered significant and the Project's contribution to that impact would be **less than significant**.

Several of the cumulative projects listed in Table 3.1-2 and shown on Figure 3.1-1 include upgrades/improvements or new housing/business development within already existing buildings or built-up land. For example, the Martin Luther King Jr. Park Master Plan includes improvements within an existing park. Although several of the cumulative projects include construction of housing or mixed-use developments, the projects would be required to comply with policies and regulations related to aesthetics and visual resources, which would result in development that is generally consistent with the existing visual quality of the area. Projects within the Specific Plan area, such as the East Palo Alto Waterfront Project, would be required to comply with height limitations and setbacks detailed in the Specific Plan that are meant to reduce impacts associated with blocking scenic views and resources. As analyzed under Impacts AES-1 and AES-2, Project implementation would generally result in features that look similar to existing conditions and would not create a substantial visual change in the study area. Therefore, the Project would not result in a cumulatively considerable impact related to aesthetic resources, and the impact would be **less than significant**.

3.3 Air Quality

This section evaluates the potential impacts of the SAFER Bay Project (Project) on existing air quality in the Project area and evaluates the potential for the Project to adversely affect air quality or increase health risks to sensitive receptors. This section presents information about the environmental and regulatory setting and identifies the criteria used to evaluate the significance of potential impacts, the methods used in evaluating these impacts, and the results of the impact assessment. The Project evaluated is described in Chapter 2, *Project Description*, of this EIR.

3.3.1 Environmental Setting

The Project area is located within the San Francisco Bay Area Air Basin (SFBAAB). The Project area's proximity to both the Pacific Ocean and San Francisco Bay has a moderating influence on the climate. The surrounding terrain greatly influences winds in the Santa Clara Valley, resulting in a prevailing wind that follows along the valley's northwest-southwest axis. The Bay Area Air District (Air District, formerly known as the Bay Area Air Quality Management District [BAAQMD] until January 2025) is the regional air quality agency for the SFBAAB.

The study area for regional air quality impacts is the SFBAAB. The study area for localized health risk impacts is the area in the Project vicinity, generally defined by the Air District as extending 1,000 feet out from a project site's boundaries.

Climate and Meteorology

Climate and meteorological conditions such as wind speed, wind direction, and air temperature gradients interact with the physical features of the landscape to determine the movement and dispersal of air pollutants. The SFBAAB encompasses the nine-county region including all of Alameda, Contra Costa, Santa Clara, San Francisco, San Mateo, Marin, and Napa Counties, and the southern portions of Solano and Sonoma counties.

The climate of the SFBAAB is determined largely by a high-pressure system that is often present over the eastern Pacific Ocean off the West Coast of North America. During winter, the Pacific high-pressure system shifts southward, allowing an increased number of storm systems to pass through the region. During summer and early fall, when fewer storms pass through the region, emissions generated in the San Francisco Bay Area (Bay Area) accumulate as a result of the more stable conditions. The combination of abundant sunshine and the restraining influences of topography and subsidence inversions creates conditions conducive to the formation of photochemical pollutants, such as ground-level ozone and secondary particulates, including nitrates and sulfates.

Criteria Air Pollutants

The U.S. Environmental Protection Agency (EPA) has identified criteria air pollutants and has set national ambient air quality standards (NAAQS) for widespread pollutants from numerous and diverse sources that pose a threat to public health and welfare. EPA has set NAAQS for seven principal pollutants, which are called "criteria" pollutants: carbon monoxide (CO), lead, nitrogen dioxide (NO_2), ozone, particulate matter less than or equal to 10 microns in diameter (PM_{10}), particulate matter less than

or equal to 2.5 microns in diameter ($PM_{2.5}$), and sulfur dioxide (SO_2). The State of California has established California ambient air quality standards (CAAQS) for these criteria pollutants, as well as ambient air quality standards for sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing particles.

The following sections describe sources and health effects of criteria pollutants that would be generated by the Project or have been monitored as part of regional air quality planning in the SFBAAB; these pollutants are considered in this analysis.

Nitrogen Dioxide

NO_2 is a reddish-brown gas that is a byproduct of combustion processes and is an air quality pollutant of concern because it acts as a respiratory irritant. NO_2 is a major component of the group of gaseous nitrogen compounds commonly referred to as *oxides of nitrogen* (NO_X). A precursor to ozone formation, NO_X is produced by fuel combustion in motor vehicles, industrial stationary sources (such as industrial activities), ships, aircraft, and rail transit. Typically, NO_X emitted from fuel combustion takes the form of nitric oxide (NO) and NO_2. NO is often converted to NO_2 when it reacts with ozone or undergoes photochemical reactions in the atmosphere.

Ozone

Ozone is a respiratory irritant and an oxidant that increases susceptibility to respiratory infections and can cause substantial damage to vegetation and other materials. Ozone is not emitted directly into the atmosphere; rather, it is a secondary air pollutant produced in the atmosphere through a complex series of photochemical reactions involving volatile organic compounds (VOC) and NO_X. VOC is also referred to by the California Air Resources Board (CARB) as *reactive organic gases* (ROG). ROG and NO_X are known as precursor compounds for ozone. Generally, for significant ozone production to occur, ozone precursors must be present in a stable atmosphere with strong sunlight for approximately 3 hours.

Ozone is a regional air pollutant because it is not emitted directly by sources but instead is formed downwind of sources of VOC and NO_X under the influence of wind and sunlight. Ozone concentrations tend to be higher in the late spring, summer, and fall, when conditions such as long sunny days and regional subsidence inversions are conducive to the formation and accumulation of secondary photochemical compounds.

Carbon Monoxide

CO is an odorless, colorless, and nonreactive pollutant that is a product of incomplete combustion and is associated mostly with motor vehicle traffic. High CO concentrations develop primarily during winter when periods of light winds combine with the formation of ground-level temperature inversions (typically from the evening through early morning). These conditions result in reduced dispersion of vehicle emissions. Motor vehicles also exhibit increased CO emission rates at low air temperatures. When inhaled at high concentrations, CO combines with hemoglobin in the blood and reduces the blood's oxygen-carrying capacity, which in turn reduces the amount of oxygen that reaches the brain, heart, and other body tissues. This condition is especially critical for people with cardiovascular diseases, chronic lung disease, or anemia.

Particulate Matter

Particulate matter is a class of air pollutants that consists of heterogeneous solid and liquid airborne particles from human-made and natural sources. In the SFBAAB, motor vehicles generate about half of the air basin's particulates through tailpipe emissions as well as brake pads and tire wear. Wood burning in fireplaces and stoves, industrial facilities, and ground-disturbing activities such as construction are other sources of fine particulates.

Large dust particles (diameter greater than 10 microns) settle out rapidly and are easily filtered by human breathing passages. This large dust is of more concern as a soiling nuisance rather than as a health hazard. However, PM_{10} and $PM_{2.5}$ represent fractions of particulate matter that can be inhaled into the air passages and the lungs and can cause adverse health effects. According to CARB, studies in the United States and elsewhere "have demonstrated a strong link between elevated particulate levels and premature deaths, hospital admissions, emergency room visits, and asthma attacks," and studies of children's health in California have demonstrated that particle pollution "may significantly reduce lung function growth in children".[1]

$PM_{2.5}$ is of particular concern because epidemiological studies have demonstrated that people who live near freeways and high-traffic roadways have poorer health outcomes, including increased asthma symptoms and respiratory infections, and decreased pulmonary function and lung development in children.[2]

Sulfur Dioxide

SO_2 is a colorless, acidic gas with a strong odor. It is produced by the combustion of sulfur-containing fuels such as oil, coal, and diesel. SO_2 has the potential to damage materials and can cause health effects at high concentrations. It can irritate lung tissue and increase the risk of acute and chronic respiratory disease. Pollutant trends suggest that the SFBAAB currently meets and will continue to meet the state standard for SO_2 for the foreseeable future.

Toxic Air Contaminants

In addition to criteria air pollutants, individual projects and sources emit toxic air contaminants (TACs), which are a diverse group of air pollutants that may cause chronic (long-duration) and acute (severe but short-term) adverse effects on human health, including carcinogenic effects. Human health effects of TACs include birth defects, neurological damage, cancer, and death. There are hundreds of different types of TACs with varying degrees of toxicity. Thus, individual TACs vary greatly in the health risk they present; at a given level of exposure, one TAC may pose a hazard that is many times greater than another. This could include legacy contamination sites with VOCs that may be encountered and released to the atmosphere during construction. To minimize this potential, the SAFER Bay alignment was selected specifically to be outside of mapped contamination areas, remediation infrastructure, and deed restrictions.

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1 CARB (California Air Resources Board), 2018. "Reduce Your Exposure to Particle Pollution." Available online at ww2.arb.ca.gov/resources/fact-sheets/reduce-your-exposure-particle-pollution. Accessed January 2025.

2 SFDPH (San Francisco Department of Public Health), 2008. *Assessment and Mitigation of Air Pollutant Health Effect from Intra-urban Roadways: Guidance for Land Use Planning and Environmental Review*. May 6, 2008. Available online at default.sfplanning.org/temp/Air%20Quality%20For%20EP%20and%20Consultants/Air%20Quality%20References/DPH%202008.pdf. Accessed January 2025.

Unlike criteria air pollutants, TACs are not subject to ambient air quality standards; rather, they are regulated by the Air District using a risk-based approach to determine which sources and which pollutants to control, as well as the degree of control. A health risk assessment (HRA) is an analysis that estimates human health exposure to toxic substances, and when considered together with information regarding the toxic potency of the substances, an HRA provides quantitative estimates of health risks.[3] Health effects from carcinogenic TACs are usually described in terms of increased cancer risk.

Motor vehicles are responsible for a large share of TAC-related air pollution, especially in California. Vehicle tailpipe emissions contain diverse forms of particles and gases, and vehicles also contribute to particulates by generating road dust and tire wear. Epidemiologic studies have demonstrated that people living close to freeways or busy roadways have poorer health outcomes, including increased asthma symptoms and respiratory infections, and decreased pulmonary function and poor lung development in children.

Although not a TAC, exposure to $PM_{2.5}$ is strongly associated with mortality, respiratory diseases, and reductions in lung development in children, and other endpoints, such as hospitalization for cardiopulmonary disease.[4]

Diesel Particulate Matter

Diesel engines emit a complex mixture of pollutants, including very small carbon particles, or "soot" coated with numerous organic compounds, known as diesel particulate matter (DPM). CARB identified DPM as a TAC in 1998, based primarily on evidence demonstrating cancer effects in humans.[5] The estimated cancer risk from exposure to diesel exhaust is much higher than the risk associated with any other TAC routinely measured in the region. In addition to "soot" coated with numerous organic compounds, DPM also contains more than 40 cancer-causing substances, most of which are readily adsorbed onto the soot particles. CARB as well as other agencies, such as the World Health Organization, the National Toxicology Program of the U.S. Department of Health and Human Services, EPA, and the National Institute of Occupational Safety and Health have concluded that exposure to diesel exhaust likely causes cancer.

Diesel engine emissions are believed to be responsible for about 70 percent of California's estimated known cancer risk attributable to TACs. In addition, DPM composes about 8 percent of outdoor $PM_{2.5}$, which is a known health hazard. As a significant fraction of $PM_{2.5}$, DPM contributes to numerous health impacts that have been attributed to particulate matter (PM) exposure, including increased hospital admissions, particularly for heart disease, but also for respiratory illnesses, and even premature death. CARB estimates that DPM contributes to approximately 1,400 premature deaths from cardiovascular

[3] In general, an HRA is required if the Air District concludes that projected emissions of a specific air toxic compound from a proposed new or modified source suggest a potential public health risk. The applicant is then required to prepare an HRA for the source in question. Such an assessment generally evaluates chronic, long-term effects, estimating the increased risk of cancer as a result of exposure to one or more TACs.

[4] SFDPH (San Francisco Department of Public Health), 2008. *Assessment and Mitigation of Air Pollutant Health Effect from Intra-urban Roadways: Guidance for Land Use Planning and Environmental Review*. May 6, 2008. Available online at default.sfplanning.org/temp/Air%20Quality%20For%20EP%20and%20Consultants/Air%20Quality%20References/DPH%202008.pdf. Accessed January 2025.

[5] CARB, 1998. *Fact Sheet: The Toxic Air Contaminant Identification Process: Toxic Air Contaminant Emissions from Diesel-fueled Engines*. October 1998. Available online at ww2.arb.ca.gov/sites/default/files/2020-02/factsht1.pdf. Accessed January 2025.

disease in California each year. Additionally, exposure to diesel exhaust may contribute to the onset of new allergies; a clinical study of human subjects has shown that diesel exhaust particles, in combination with potential allergens, may actually be able to produce new allergies that did not exist previously.

In 2000, CARB approved a comprehensive Diesel Risk Reduction Plan to reduce diesel emissions from both new and existing diesel-fueled vehicles and engines. Subsequent board regulations apply to new trucks and diesel fuel. With new controls and fuel requirements, 60 trucks built in 2007 would have the same particulate exhaust emissions as one truck built in 1988. The regulation resulted in an 80 percent decrease in statewide diesel health risk in 2020 as compared with the diesel risk in 2000. Despite notable emission reductions, CARB recommends that proximity to sources of DPM emissions be considered in the siting of new sensitive land uses. CARB notes that these recommendations are advisory and should not be interpreted as defined "buffer zones," and that local agencies must balance other considerations, including transportation needs, the benefits of urban infill, community economic development priorities, and other quality of life issues. With careful evaluation of exposure, health risks, and affirmative steps to reduce risk where necessary, CARB's position is that infill development and mixed-use, higher-density, transit-oriented development, and other concepts that benefit regional air quality, can be compatible with protecting the health of individuals at the neighborhood level.[6]

Existing Ambient Air Quality

Criteria Air Pollutants

Compliance with the standards determines the attainment status of a criteria air pollutant on a regional basis. In the SFBAAB, compliance is demonstrated through ongoing measurements of pollutant concentrations at more than 30 air quality monitoring stations operated by the Air District in all nine Bay Area counties.

The monitoring station in the Project vicinity site is located at 897 Barron Avenue in Redwood City, approximately 0.9 mile west of the Marsh Road Reach. This station is operated by the Air District and is part of the national regulatory network overseen by EPA in support of the federal Clean Air Act (described in Section 3.3.1.6). The measurements from this station are intended to represent regional air quality and demonstrate compliance with regional air quality standards and are therefore used to characterize existing ambient air quality in the Project area.

Table 3.3-1 outlines monitoring data for the Redwood City site for the years 2019 through 2023, for the criteria air pollutants of concern in the Bay Area: ozone, $PM_{2.5}$, and NO_2. PM_{10} is not monitored at the Redwood City station. The table does not include data for CO and SO_2 as these are no longer pollutants of concern for the region. The SFBAAB has attained the CO standard due to decreasing emissions over the last several decades from increasingly stringent emission standards and improved vehicle fuel efficiency. SO_2 is not monitored in the SFBAAB as the area has never been designated as nonattainment. Table 3.3-1 also compares the measured pollutant concentrations to the NAAQS and CAAQS for each of the criteria air pollutants of concern.

[6] CARB, 2005. *Air Quality and Land Use Handbook: A Community Health Perspective.* April 2005. Available online at www.aqmd.gov/docs/default-source/ceqa/handbook/california-air-resources-board-air-quality-and-land-use-handbook-a-community-health-perspective.pdf. Accessed January 2025.

TABLE 3.3-1
SUMMARY OF AIR QUALITY MONITORING DATA AT THE REDWOOD CITY STATION

Pollutant	Standard	Monitoring Data by Year[a]				
		2019	2020	2021	2022	2023
Ozone						
Maximum 1-Hour Concentration (ppm)	0.090 ppm[b]	0.083	**0.098**	0.085	0.079	0.089
Days 1-Hour Standard Exceeded		0	1	0	0	0
Maximum 8-Hour Concentration (ppm)	0.070 ppm[b,c]	**0.077**	**0.077**	0.063	0.061	0.061
Days 8-Hour Standard Exceeded		2	1	0	0	0
Fine Particulate Matter ($PM_{2.5}$)						
Maximum 24-Hour Concentration (µg/m^3)	35 µg/m^3[c]	29.5	**124.1**	30.1	27.4	**41.0**
Annual Average (µg/m^3)[d]	12µg/m^3[b,e]	- / 7.0	9.8 / 9.8	6.1 / 6.0	6.8 / 6.8	- / 8.0
Estimated Days 24-Hour Standard Exceeded		0	9	0	0	1
Nitrogen Dioxide (NO_2)						
Maximum 1-Hour Concentration (ppb)	100 ppb[c]	54.9	45.9	40.5	43.8	55.2
Days 1-Hour Standard Exceeded		0	0	0	0	0

NOTES: µg/m^3 = micrograms per cubic meter; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter; ppb = parts per billion; ppm = parts per million

bold values denote concentrations in excess of standards

a. "–" indicates that data are not available.
b. State standard, not to be exceeded.
c. Federal standard, not to be exceeded more than once per year.
d. Annual averages are calculated differently for comparison with the state and federal standards. For comparison with the federal annual $PM_{2.5}$ standard, a 3-year average is used. For comparison with the state annual standards, a calendar year average is used.
e. Federal standard, not to be exceeded. In February 2024, the U.S. Environmental Protection Agency lowered the federal $PM_{2.5}$ annual average standard to 9.0 µg/m^3 from the 12.0 µg/m^3 standard set in 2012.

SOURCE: CARB (California Air Resources Board), 2025. "iADAM Air Quality Data Statistics: Top 4 Summary." Available online at www.arb.ca.gov/adam/topfour/topfour1.php. Accessed in March 2025.

As shown in Table 3.1-1, the state 1-hour ozone standard of 0.09 parts per million (ppm) and the state/federal 8-hour ozone standard of 0.07 ppm was exceeded in Redwood City on days 1 and 3, respectively, between 2019 and 2023. Table 3.3-1 also shows that the federal 24-hour $PM_{2.5}$ standard of 35 micrograms per cubic meter (µg/m^3) was exceeded in 2020 and 2023. There were no exceedances of the state/federal annual average standards between 2019 and 2023. Ambient levels of NO_2 have been below standards.

Air Quality Index

The EPA developed the Air Quality Index (AQI) scale to make the public health impacts of air pollutant concentrations easily understandable. The index, much like an air quality "thermometer," translates daily air pollutant concentrations into numbers on a scale between 0 and 500. The numbers on the scale are divided into the following six color-coded ranges:

- **Green (0–50)** indicates "good" air quality. No health impacts are expected when air quality is in the green range.
- **Yellow (51–100)** indicates that air quality is "moderate." Unusually sensitive people should consider limiting prolonged outdoor exertion.
- **Orange (101–150)** indicates that air quality is "unhealthy for sensitive groups." Active children and adults, and people with respiratory disease, such as asthma, should limit outdoor exertion.

- **Red (151–200)** indicates that air quality is "unhealthy." Active children and adults, and people with respiratory disease, such as asthma, should avoid prolonged outdoor exertion; everyone else, especially children, should limit prolonged outdoor exertion.
- **Purple (201–300)** indicates that air quality is "very unhealthy." Active children and adults, and people with respiratory disease, such as asthma, should avoid prolonged outdoor exertion; everyone else, especially children, should limit outdoor exertion.
- **Maroon (301–500)** indicates that air quality is "hazardous." This AQI level triggers health warnings of emergency conditions, and the entire population is more likely to be affected.

The AQI numbers refer to specific amounts of pollution in the air and are based on the federal air quality standards for ozone, CO, NO_2, SO_2, PM_{10}, and $PM_{2.5}$. In most cases, the federal standard for these air pollutants corresponds to the number 100 on the index chart. Thus, if the concentration of any of these pollutants rises above its respective standard, air quality can be unhealthy for the public. In determining the air quality forecast, local air districts use the anticipated concentration measurements for each major pollutant, convert them into index numbers, and determine the highest index for each zone in a district. A Spare the Air Alert is called for the Bay Area when air quality is expected to be unhealthy in any of the region's five reporting zones.

Table 3.3-2 shows the AQI statistics for the SFBAAB. AQI statistics compiled in recent years indicate that air quality in the Bay Area region is predominantly in the "Good" or "Moderate" categories and healthy on most days for most people. Historical Air District data indicates that the SFBAAB experienced air quality in the orange-level (unhealthy for sensitive groups) for 47 days between 2019 and 2023. The SFBAAB had a total of 14 red-level (unhealthy) days between 2020 and 2021. The AQI readings for a number of these red- or orange-level days are attributable to the increasing frequency of wildfires. The table shows that the SFBAAB experienced one purple-level (very unhealthy) day in 2020 and no maroon-level (hazardous) days between 2019 and 2023.

TABLE 3.3-2
AIR QUALITY INDEX STATISTICS FOR THE SAN FRANCISCO BAY AREA AIR BASIN

AQI Statistics	Number of Days per Year				
	2019	2020	2021	2022	2023
Unhealthy for Sensitive Groups (Orange) AQI: 101–150	10	13	9	8	7
Unhealthy (Red) AQI: 151–200	0	13	1	0	0
Very Unhealthy (Purple) AQI: 201–300	0	1	0	0	0
Hazardous (Maroon) AQI: 301–500	0	0	0	0	0

NOTE: AQI = Air Quality Index

SOURCE: Air District (Bay Area Air District), 2025. *Public Records Request No. 2024-11-0210 CRM:0444227*. January 29, 2025.

Toxic Air Contaminants

In addition to monitoring criteria air pollutants, both the Air District and CARB operate TAC monitoring networks in the SFBAAB. These stations measure 10 to 15 TACs depending on the specific station. The monitoring stations are located in areas where the highest concentrations of TACs can be expected, and

the TACs selected for monitoring at these stations are those that have traditionally been found in the highest concentrations in ambient air and therefore tend to produce the most substantial risk.

Sensitive Receptors

Air quality does not affect every individual in the population in the same way. Some groups are more sensitive than others to air pollution. Reasons for greater sensitivity can include existing health problems, duration of exposure to air pollutants, or certain people's increased susceptibility to pollution-related health problems because of factors such as age. Population subgroups sensitive to the health effects of air pollutants include elderly people and children; population subgroups with higher rates of respiratory disease, such as asthma and chronic obstructive pulmonary disease; and populations with other environmental or occupational health exposures (e.g., to poor indoor air quality) that affect cardiovascular or respiratory diseases.[7]

Table 3.3-3 presents the locations and distances of sensitive receptors closest to each Project component. The Air District 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, elderly people, and people with illnesses. Examples include land uses such as schools, hospitals, and residential areas. Land uses such as schools, day care centers, hospitals, and nursing and convalescent homes are considered sensitive to poor air quality because the population groups associated with these uses have increased susceptibility to respiratory distress. Residential uses are considered sensitive because these individuals could be present there and are often at home for extended periods of time, so they can be exposed to pollutants in the area for long periods.

The community of East Palo Alto is one of 62 consistently nominated communities that have been nominated for CARB's Community Air Protection Program, but have not been selected for participation. Efforts are underway to conduct mobile air monitoring in response to air quality issues identified by community outreach in East Palo Alto to inform future plans and community actions.

Odors

Odors are generally regarded as an annoyance rather than a health hazard. The ability to detect odors varies considerably among the population and is subjective. The occurrence and the severity of odor impacts depend on the nature, frequency, and intensity of the source; wind speed and direction; and the sensitivity of receptors. Odor impacts should be considered for any proposed new odor sources located near existing receptors, and for any new sensitive receptors located near existing odor sources. Odor sources typically include wastewater treatment plants, landfills, confined animal facilities, composing stations, food manufacturing plants, refineries, and chemical plants.[8]

[7] The factors responsible for variations in exposure are also often similar to factors associated with greater susceptibility to air quality health effects. For example, lower income residents may be more likely to live in substandard housing and live near industrial or roadway sources of pollution.

[8] BAAQMD (Bay Area Air Quality Management District, now called the Bay Area Air District [Air District]), 2023. *2022 California Environmental Quality Act Update. Chapter 5 Project-Level Air Quality Impacts*. Available online at www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa-guidelines-2022/ceqa-guidelines-chapter-5-project-air-quality-impacts_final-pdf.pdf?rev=de582fe349e545989239cbbc0d62c37a&sc_lang=en.

TABLE 3.3-3
DISTANCE BETWEEN PROJECT COMPONENTS AND SENSITIVE RECEPTORS

Component	Reach	Sensitive Receptors		Distance from Nearest Sensitive Receptor (feet)
		Location	Jurisdiction	
Shoreline Protection, Recreational Features	South of Bay Road	Runnymede Street Residences	East Palo Alto	45
		East Palo Alto Charter School		170
	North of Bay Road	Illinois Street Residences		90
	Dumbarton Approach	Fordham Street Residences		530
	Substation and Marsh Restoration	Tulane Avenue Residences		2,700
	Tech Campus	777 Hamilton Apartments	Menlo Park	960
	Bayfront Expressway	777 Hamilton Apartments		840
	Bedwell Bayfront Park	ROEN Menlo Park Apartments		600
	Marsh Road	Anton Menlo Apartments		150
		Bayshore Villa Mobile Home Park	Redwood City	220
Habitat Improvements	Tidal Marsh Restoration in Ponds R1 and R2	Tulane Avenue Residences	Menlo Park	2,790
	Western Snowy Plover Breeding Habitat Enhancement (Pond SF2)	Tulane Avenue Residences		340
	Western Snowy Plover Breeding Habitat Enhancement (Pond R3)	777 Hamilton Apartments		900

SOURCE: Data compiled by Environmental Science Associates in 2025.

3.3.2 Regulatory Framework

Federal

Clean Air Act and National Ambient Air Quality Standards

The 1970 Clean Air Act (CAA) (most recently amended in 1990) [9] requires each regional planning or air pollution control agency to prepare a regional air quality plan outlining the measures through which both stationary and mobile sources of pollutants will be controlled to achieve all ambient air quality standards by the deadlines specified in the CAA. These ambient air quality standards are intended to protect the public health and welfare, and they specify the concentration of pollutants (with an adequate margin of safety) to which the public can be exposed without adverse health effects. They are designed to protect the segments of the public most susceptible to respiratory distress: asthmatics, the very young, the elderly, people weakened from other illness or disease, and persons engaged in strenuous work or exercise. Healthy adults can tolerate occasional exposure to air pollution levels that somewhat exceed ambient air quality standards before adverse health effects are observed. **Table 3.3-4** identifies the current NAAQS.

[9] 42 U.S.C. section 7401 et seq.

TABLE 3.3-4
STATE AND FEDERAL AMBIENT AIR QUALITY STANDARDS AND ATTAINMENT STATUS FOR THE SAN FRANCISCO BAY AREA AIR BASIN

Pollutant	Averaging Time	State (CAAQS[a])		Federal (NAAQS[b])	
		Standard	Attainment Status	Standard	Attainment Status
Ozone	1-hour	0.09 ppm	N	NA	See Note c
	8-hour	0.070 ppm	N	0.070 ppm[d]	N
Carbon Monoxide (CO)	1-hour	20 ppm	A	35 ppm	A
	8-hour	9 ppm	A	9 ppm	A
Nitrogen Dioxide (NO_2)	1-hour	0.18 ppm	A	0.100 ppm	U
	Annual	0.030 ppm	NA	0.053 ppm	A
Sulfur Dioxide (SO_2)	1-hour	0.25 ppm	A	0.075 ppm	A
	24-hour	0.04 ppm	A	0.14 ppm	A
	Annual	NA	NA	0.03 ppm	A
Particulate Matter (PM_{10})	24-hour	50 µg/m^3	N	150 µg/m^3	U
	Annual[e]	20 µg/m^3 [f]	N	NA	NA
Fine Particulate Matter ($PM_{2.5}$)	24-hour	NA	NA	35 µg/m^3	N
	Annual	12 µg/m^3	N	9 µg/m^3 [g]	U
Sulfates	24-hour	25 µg/m^3	A	NA	NA
Lead	30-day	1.5 µg/m^3	A	NA	NA
	Cal. Quarter	NA	NA	1.5 µg/m^3	A
	Rolling 3-month average	NA	NA	0.15	U
Hydrogen Sulfide	1-hour	0.03 ppm	U	NA	NA
Visibility-Reducing Particles	8-hour	See Note h	U	NA	NA

NOTES: µg/m^3 = micrograms per cubic meter; A = Attainment; N = Nonattainment; NA = Not Applicable, no applicable standard; $PM_{2.5}$ = particulate matter less than or equal to 2.5 microns in diameter; PM_{10} = particulate matter less than or equal to 10 microns in diameter; ppm = parts per million; U = Unclassified.

a. CAAQS = California ambient air quality standards. CAAQS for ozone, CO (except Lake Tahoe), SO_2 (1-hour and 24-hour), NO_2, PM, and visibility-reducing particles are values that are not to be exceeded. All other state standards shown are values not to be equaled or exceeded.
b. NAAQS = national ambient air quality standards. NAAQS, other than ozone and particulates, and those based on annual averages or annual arithmetic means, are not to be exceeded more than once a year. The 8-hour ozone standard is attained when the 3-year average of the fourth highest daily concentration is 0.08 ppm or less. The 24-hour PM_{10} standard is attained when the 3-year average of the 99th percentile of monitored concentrations is less than the standard. The 24-hour $PM_{2.5}$ standard is attained when the 3-year average of the 98th percentile is less than the standard.
c. The U.S. Environmental Protection Agency (EPA) revoked the national 1-hour ozone standard on June 15, 2005.
d. This federal 8-hour ozone standard was approved by EPA in October 2015 and became effective on December 28, 2015.
e. State standard = annual geometric mean; national standard = annual arithmetic mean.
f. In June 2002, California Air Resources Board established new annual standards for $PM_{2.5}$ and PM_{10}.
g. In February 2024, EPA lowered the federal $PM_{2.5}$ annual average standard to 9.0 µg/m^3 from the 12.0 µg/m^3 standard set in 2012.
h. Statewide visibility-reducing particle standard (except Lake Tahoe Air Basin): Particles in sufficient amount to produce an extinction coefficient of 0.23 per kilometer when the relative humidity is less than 70 percent. This standard is intended to limit the frequency and severity of visibility impairment due to regional haze and is equivalent to a 10-mile nominal visual range.

SOURCE: Air District (Bay Area Air District), 2017. "Air Quality Standards and Attainment Status." Available online at www.baaqmd.gov/en/about-air-quality/research-and-data/air-quality-standards-and-attainment-status?sclang=. Accessed January 2025.

The NAAQS are statutorily required to be set by the EPA at levels that are "requisite to protect the public health."[10] Therefore, the closer a region is to attaining a particular ambient air quality standard, the lower the human health impact is from that pollutant. Pursuant to the 1990 federal CAA Amendments, the EPA classifies air basins (or portions thereof) as "attainment," "nonattainment," or "unclassified" for each criteria air pollutant, based on whether the NAAQS have been achieved. [11] An unclassified designation indicates that air quality and other relevant information is insufficient to determine whether the area is attainment or nonattainment. As shown in Table 3.3-4, at the federal level, the SFBAAB is designated as a nonattainment area for the federal 8-hour ozone standard and the federal 24-hour $PM_{2.5}$ standard. The SFBAAB is in attainment for all other federal ambient air quality standards. Attainment status of the SFBAAB with respect to the CAAQS is discussed further below.

The federal CAA Amendments require each state to prepare an air quality control plan referred to as the State Implementation Plan (SIP). The federal CAA Amendments added a requirement for states containing areas that violate the national standards to revise their SIPs to incorporate additional control measures to reduce air pollution. The SIP is a living document that is modified periodically to reflect the latest emissions inventories, planning documents, and rules and regulations of air basins as reported by the agencies with jurisdiction over them. EPA reviews SIPs to determine whether they conform to the mandates of the federal CAA Amendments and will achieve air quality goals when implemented. [12]

State

California Clean Air Act and Ambient Air Quality Standards

Although the federal CAA established the NAAQS, individual states retain the option to adopt more stringent standards and to include other pollution sources. California had already established its own air quality standards when the federal standards were established, and because of California's unique meteorological challenges, there are differences between the NAAQS and CAAQS. The current CAAQS are shown in Table 3.3-4. Most of the CAAQS are at least as protective as the corresponding NAAQS.

The California CAA (see California Health and Safety Code section 39000 et seq.), like its federal counterpart, calls for designation of areas as "attainment," "nonattainment," or "unclassified" with respect to the ambient air quality standards. The Project area is currently designated as nonattainment for the 1-hour and 8-hour ozone, and 24-hour and annual average PM_{10}. The Project area is designated as attainment or unclassified with respect to the other CAAQS.

In 2003, the California Legislature enacted Senate Bill (SB) 656 (Chapter 738, Statutes of 2003), codified as Health and Safety Code section 39614, to reduce public exposure to PM_{10} and $PM_{2.5}$. SB 656 required CARB, in consultation with local air districts, to develop and adopt by January 1, 2005, a list of the most readily available, feasible, and cost-effective control measures that CARB and the air districts could employ to reduce PM_{10} and $PM_{2.5}$ (referred collectively as "PM"). The legislation established a process for achieving near-term reductions in PM emissions throughout California ahead of federally required

[10] 42 U.S.C. section 7409. Available online at https://www.govinfo.gov/content/pkg/USCODE-2023-title42/html/USCODE-2023-title42-chap85-subchapI-partA-sec7409.htm. Accessed November 24, 2025.

[11] 42 U.S.C. § 7407. Available online at https://www.govinfo.gov/content/pkg/USCODE-2023-title42/html/USCODE-2023-title42-chap85-subchapI-partA-sec7407.htm. Accessed November 24, 2025.

[12] 42 U.S.C. section 7410. Available online at https://www.govinfo.gov/content/pkg/USCODE-2023-title42/html/USCODE-2023-title42-chap85-subchapI-partA-sec7410.htm. Accessed November 24, 2025.

deadlines for reducing $PM_{2.5}$ emissions and provided new direction on PM emissions reductions in areas not subject to federal requirements. Measures adopted as part of SB 656 complement and support those required for federal $PM_{2.5}$ attainment plans, as well as for state ozone plans. This ensures continuing focus on PM reduction and progress toward attaining California's more health-protective standards. While SB 656 was repealed by its own terms in 2011, the list of Air District control measures was adopted by CARB on November 18, 2004 and continue to be implemented.

Toxic Air Contaminants

The Health and Safety Code defines TACs as air pollutants that may cause or contribute to an increase in mortality or in serious illness, or which may pose a present or potential hazard to human health. The state Air Toxics Program was established in 1983 under Assembly Bill 1807 (Tanner). The program involves a two-step process: risk identification and risk management. A total of 243 substances have been designated as TACs under California law, including the 189 (federal) Hazardous Air Pollutants. [13]

Off-Road Diesel Emissions

This regulation applies to all self-propelled off-road diesel vehicles 25 horsepower or greater used in California and most two-engine vehicles (exceptions include, but are not limited to, on-road two-engine sweepers).[14] CARB's goal is to reduce particulate matter (PM_{10} and $PM_{2.5}$) and NO_X emissions from off-road heavy-duty diesel vehicles by gradually reducing the statewide construction vehicle fleet's emissions through turnover, repower, or retrofits.[15] New engine emissions requirements were grouped into tiers based on the year in which the engine was built.[16] In 2014, new engines were required to meet Tier 4 Final standards which, to date, are the most stringent emissions standards for off-road vehicle engines. This regulation also contains limits for idling.[17]

Mobile Source Strategy

In May 2016, CARB released the updated Mobile Source Strategy that demonstrates how the state can simultaneously meet air quality standards, achieve greenhouse gas (GHG) emission reduction targets, decrease health risk from transportation emissions, and reduce petroleum consumption over the next 15 years. The strategy promotes a transition to zero-emission and low-emission vehicles, cleaner transit systems, and reduction of vehicle miles traveled. The Mobile Source Strategy calls for 1.5 million Zero Emission Vehicles (ZEVs) (including plug-in hybrid electric, battery-electric, and hydrogen fuel cell vehicles) by 2025 and 4.2 million ZEVs by 2030. The strategy also calls for more stringent GHG requirements for light-duty vehicles beyond 2025, GHG reductions for medium-duty and heavy-duty vehicles, and increased deployment of zero emission trucks—primarily for class 3 through 7 "last mile"

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[13] CARB, 2025. *California Identified Toxic Air Contaminants*. Available online at ww2.arb.ca.gov/resources/documents/carb-identified-toxic-air-contaminants. Accessed November 2025.

[14] 13 CCR section 2449 et seq. Available at online at https://govt.westlaw.com/calregs/Browse/Home/California/CaliforniaCodeofRegulations?guid=I9AAB29705A1E11EC8227000D3A7C4BC3&originationContext=documenttoc&transitionType=Default&contextData=(sc.Default). Accessed November 2025.

[15] CARB, 2025. "In-Use Off-Road Diesel-Fueled Fleets Regulation." Available online at ww2.arb.ca.gov/our-work/programs/use-road-diesel-fueled-fleets-regulation/about. Accessed March 2025.

[16] CARB, 2025. *Non-road Diesel Engine Certification Tier Chart*. Available online at ww2.arb.ca.gov/sites/default/files/2020-03/Tier_Color_Chart_Off_Road_Diesel_Stds_R.pdf. Accessed March 2025.

[17] CARB, 2025. *In-Use Off-Road Diesel-Fueled Fleets Regulation, General Requirements*. Available online at ww2.arb.ca.gov/our-work/programs/use-road-diesel-fueled-fleets-regulation/about. Accessed November 2025.

delivery trucks in California. Statewide, the Mobile Source Strategy would result in a 45 percent reduction in GHG emissions from mobile sources and a 50 percent reduction in the consumption of petroleum-based fuels.[18]

Similar to the 2016 Mobile Source Strategy, the 2020 Mobile Source Strategy is a framework that identifies the levels of cleaner technologies necessary to meet the many goals and high-level regulatory concepts that would allow the state to achieve the levels of cleaner technology. The 2020 Mobile Source Strategy will inform the development of other planning efforts, including the SIP, which will translate the concepts into concrete measures and commitments for specific levels of emissions reductions; the 2022 Climate Change Scoping Plan; and Community Emissions Reduction Plans for communities selected under CARB's Community Air Protection Program. Central to all of these planning efforts, and CARB's actions on mobile sources, is a commitment to environmental justice as CARB strives to address longstanding environmental and health inequities from elevated levels of toxics, criteria pollutants, and secondary impacts of climate change.[19] The 2020 Mobile Source Strategy illustrates that an aggressive deployment of ZEVs will be needed for the state to meet federal air quality requirements and the state's climate change targets.

Advanced Clean Trucks Regulation

This regulation requires manufacturers to sell zero-emission trucks as an increasing percentage of their annual California sales from 2024 to 2035. By 2035, zero-emission truck sales would need to be 55 to 75 percent of truck sales, depending on truck category, and 40 percent of truck tractor sales. The goal of this regulation is to achieve NOx and GHG emission reductions through advanced clean technology. [20]

Advanced Clean Fleets Regulation[21]

This regulation requires select fleets to transition to ZEVs through requirements to both phase-in the use of ZEVs for targeted fleets and requirements that manufacturers only manufacture ZEV trucks starting in the 2036 model year.

[18] CARB, 2016. *Mobile Source Strategy*. May 2016. Available online at ww2.arb.ca.gov/sites/default/files/classic/planning/sip/2016sip/2016mobsrc.pdf. Accessed March 2025.

[19] CARB, 2021. *2020 Mobile Source Strategy*. October 28, 2021. Available online at ww2.arb.ca.gov/sites/default/files/2021-12/2020_Mobile_Source_Strategy.pdf. Accessed March 2025.

[20] CARB, 2025. *Advanced Clean Trucks*. Available online at ww2.arb.ca.gov/our-work/programs/advanced-clean-trucks/about. Accessed November 2025.

[21] In November 2023, CARB had applied to the EPA for a federal waiver to enforce this regulation, but in January 2025, CARB withdrew its waiver application. Although CARB will not be enforcing the portions of this regulation that require a federal waiver or authorization, such as those that apply to high priority and drayage fleets, not all elements of the regulation require a federal waiver or authorization. The portions of the regulation applicable to state and local government fleets remain unaffected and will continue to contribute to CARB's efforts to reduce air pollution to protect public health. (CARB, 2025. *Withdrawal of California's Request for a Waiver, Pursuant to Clean Air Act Section 209(b), and Request for Authorization, Pursuant to Clean Air Act Section 209(e)(2), for the Advanced Clean Fleets (ACF) Regulation, Docket ID EPA-HQ-OAR-2023-0589*. January 13, 2025. Available online at www.epa.gov/system/files/documents/2025-01/ca-acf-carb-withdrawal-ltr-2025-1-13.pdf. Accessed November 2025.)

Airborne Toxic Control Measure to Limit Diesel-Fueled Commercial Motor Vehicle Idling

This measure applies to diesel-fueled commercial vehicles with gross vehicle weight ratings greater than 10,000 pounds that are licensed to operate on highways and prohibit these vehicles from idling for more than 5 minutes at any given location.[22]

Airborne Toxic Control Measure for Stationary Compression Ignition Engines

This measure applies to any person who owns or operates a stationary compression ignition engine in California with a rated brake horsepower greater than 50, or to anyone who either sells, offers for sale, leases, or purchases a stationary compression ignition engine. This measure outlines fuel and fuel additive requirements; emissions standards; recordkeeping; reporting and monitoring requirements; and compliance schedules for compression ignition engines.[23]

Regional

The Air District is responsible for attaining and/or maintaining air quality in the region within federal and state air quality standards.

Air District Clean Air Plan[24]

The Air District, in cooperation with the Metropolitan Transportation Commission, the San Francisco Bay Conservation and Development Commission, and the Association of Bay Area Governments, developed the *2017 Clean Air Plan: Spare the Air, Cool the Climate* (2017 Clean Air Plan) to provide a regional strategy to improve air quality within the SFBAAB. The 2017 Clean Air Plan addresses the following four categories of pollutants: ground-level ozone and its key precursors, ROG and NOX; particulate matter, primarily $PM_{2.5}$, and precursors to secondary $PM_{2.5}$; TACs; and GHG emissions. The 2017 Clean Air Plan is a road map that demonstrates how the Bay Area will achieve compliance with the state ozone standards and reduce the transport of ozone and ozone precursors to neighboring air basins. The strategy described in the 2017 Clean Air Plan includes a wide range of control measures designed to reduce emissions and lower 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.

Air District Rules and Regulations

The Air District has permit authority over most types of stationary emission sources and can require stationary sources to obtain permits, impose emission limits, set fuel or material specifications, or establish operational limits to reduce air emissions. The Air District also regulates new or expanding stationary sources of TACs and requires air toxic control measures for many sources emitting TACs. It also establishes and enforces local air quality rules and regulations for these purposes. A non-

[22] CARB, 2025. *Airborne Toxic Control Measure to Limit Diesel-Fueled Commercial Motor Vehicle Idling*. Available online at ww2.arb.ca.gov/our-work/programs/atcm-to-limit-vehicle-idling. Accessed November 2025.

[23] CARB, 2011. *Final Regulation Order – Amendments to the Airborne Toxic Control Measure for Stationary Compression Ignition Engines*. Available online at ww2.arb.ca.gov/sites/default/files/classic/diesel/documents/finalreg2011.pdf. Accessed November 2025.

[24] BAAQMD, 2017. *Final 2017 Clean Air Plan: Spare the Air, Cool the Climate: A Blueprint for Clean Air and Climate Protection in the Bay Area*. Adopted April 19, 2017. Available online at www.baaqmd.gov/~/media/files/planning-and-research/plans/2017-clean-air-plan/attachment-a_-proposed-final-cap-vol-1-pdf.pdf?la=en.

comprehensive list of the Air District rules applicable to construction and operation of land development projects is provided below:[25]

- **Regulation 6, Rule 1 (General Requirements 2018 Amendment [Current]).** This regulation limits the quantity of particulate matter in the atmosphere by establishing limitations on emissions rates, emissions concentrations, visible emissions, and opacity.
- **Regulation 6, Rule 6 (Prohibition of Trackout):** This regulation limits the quantity of particulate matter in the atmosphere through control of trackout of solid materials onto paved public roads.
- **Regulation 8, Rule 3 (Architectural Coatings).** Regulates the quantity of VOCs in architectural coatings supplied, sold, offered for sale, applied, solicited for application, or manufactured.
- **Regulation 11, Rule 2 (Asbestos Demolition, Renovation and Manufacturing):** This regulation limits emissions of asbestos during demolition, renovation, milling, and manufacturing and establishes appropriate waste disposal procedures.

Regulation of Odors

Air District Regulation 7 places general limitations on odorous substances and specific emission limitations on certain odorous compounds. The regulation limits the "discharge [of] any odorous substance which causes the ambient air at or beyond the property line … to be odorous and to remain odorous after dilution with four parts of odor-free air." [26] The Air District must receive odor complaints from 10 or more complainants within a 90-day period in order for the limitations of this regulation to go into effect.[27] If this criterion has been met, an odor violation can be issued by the Air District if a test panel of people can detect an odor in samples collected periodically from the source. [28]

Air District CEQA Guidelines and Thresholds of Significance

The Air District's *California Environmental Quality Act Air Quality Guidelines* (CEQA Air Quality Guidelines) is an advisory document that provides lead agencies, consultants, and project proponents with procedures for assessing air quality impacts and preparing environmental review documents. The document describes the criteria that the Air District uses when reviewing and commenting on the adequacy of environmental documents. It recommends thresholds for use in determining whether projects and plans would have significant adverse environmental impacts, describes methods for predicting project emissions and impacts, and identifies measures that can be used to avoid or reduce air quality impacts. The Air District's most recent update to its CEQA Air Quality Guidelines (2022 CEQA Air Quality Guidelines) was adopted in April 2023.[29] These guidelines provide recommended quantitative significance thresholds along with direction on recommended analysis methods and are used in the analyses presented in this section.

[25] Air District (Bay Area Air District), 2025. *Current Rules*. Available online at www.baaqmd.gov/rules-and-compliance/current-rules. Accessed January 2025.

[26] BAAQMD. 2025. Reg. 7, section 7-302.

[27] BAAQMD. 2025. Reg. 7, section 7-102.

[28] BAAQMD. 2025. Reg. 7, section 7-404–7-405.

[29] BAAQMD, 2023. *2022 California Environmental Quality Act Air Quality Guidelines*. April 2023. Available online at www.baaqmd.gov/plans-and-climate/california-environmental-quality-act-ceqa/updated-ceqa-guidelines.

Local

General Plans

Table 3.3-5 presents policies from the general plans of East Palo Alto, Menlo Park, and Redwood City pertaining to air quality.

3.3.3 Impacts and Mitigation Measures

Significance Criteria

In accordance with CEQA, the Project could have a significant impact if it were to do any of the following:

- Conflict with or obstruct implementation of the applicable air quality plan;
- 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
- Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.

The Air District's 2022 CEQA Air Quality Guidelines include significance thresholds and recommended methods of analysis. The Air District's emission thresholds represent the levels above which a project's individual emissions would result in a considerable contribution (i.e., significant) to the SFBAAB's existing nonattainment of NAAQS and CAAQS, and thus, establish a nexus to regional air quality impacts. An analysis of a project's emissions relative to the Air District's thresholds also addresses whether the project would lead to or contribute to violations of NAAQS and CAAQS. **Table 3.3-6** summarizes the significance thresholds as described in the Air District's *2022 CEQA Air Quality Guidelines* and used in this analysis.

Methodology

The air quality analysis conducted for this impact assessment uses the emissions factors, models, and tools developed by a variety of industry experts and agencies including CARB, the California Air Pollution Control Officers Association, the Office of Environmental Health Hazard Assessment (OEHHA), and EPA. The analysis also uses methods identified in the Air District's 2022 CEQA Air Quality Guidelines.

Because air pollution is a regional impact, conducting a separate impact evaluation for each reach within the Project's study area is not appropriate. Therefore, emissions associated with all Project components are considered together for comparison with the appropriate thresholds.

TABLE 3.3-5
LOCAL PLANS AND POLICIES RELEVANT TO THE PROJECT – AIR QUALITY

CITY OF EAST PALO ALTO VISTA 2035 GENERAL PLAN
Goal HE-4: Safely and systemically address toxics, legacy pollutants, and hazardous materials.
Goal HE-10: Improve respiratory health throughout the City and strive to reduce incidence of asthma and other respiratory illnesses.
Policy HE-10-4: No new truck routes. Prohibit the designation of new truck routes on residential and collector streets in East Palo Alto
CITY OF MENLO PARK GENERAL PLAN
Goal LU-6: Preserve open-space lands for recreation; protect natural resources and air and water quality; and protect and enhance scenic qualities
Policy LU-6.6: Public Bay Access. Protect and support public access to the Bay for the scenic enjoyment of open water, sloughs, and marshes, including restoration efforts, and completion of the Bay Trail.
Policy LU-6.7: Habitat Preservation. Collaborate with neighboring jurisdictions to preserve and enhance the Bay, shoreline, San Francisquito Creek, and other wildlife habitat and ecologically fragile areas to the maximum extent possible
Goal LU-7: Promote the implementation and maintenance of sustainable development, facilities and services to meet the needs of Menlo Park's residents, businesses, workers, and visitors.
Program LU-7.D: Performance Standards: Establish performance standards in the Zoning Ordinance that requires new development to employ environmentally friendly technology and design to conserve energy and water, and minimize the generation of indoor and outdoor pollutants.
Goal CIRC-4: Improve Menlo Park's overall health, wellness, and quality of life through transportation enhancements.
Policy CIRC-4.2: Local Air Pollution: Promote non-motorized transportation to reduce exposure to local air pollution, thereby reducing risks of respiratory diseases, other chronic illnesses, and premature death.
REDWOOD CITY GENERAL PLAN
Goal PS-1: Maintain good local air quality, and reduce the local contributions of airborne pollutants to the air basin.
Policy PS-1.5. Require projects that generate potentially significant levels of air pollutants to incorporate the most effective air quality mitigation into project design, as feasible.
Goal PS-2. Minimize the potential impacts from land uses that may pollute proximate to sensitive receptors, including Environmental Justice communities.
Policy PS-2.1. Consider surrounding land uses when locating sensitive receptors such as schools, hospitals, and residential uses, particularly in Environmental Justice communities, so they are not unreasonably exposed to uses that generate pollutants considered detrimental to human health.
Policy PS-2.3. Consider re-routing truck routes and high volumes of non- residential traffic away from residential neighborhoods, particularly high-density residential neighborhoods and Environmental Justice communities.
Policy PS-2.6. Minimize potential impacts from air pollution on sensitive uses near freeways, truck routes, high-volume arterials and sources of toxic air contaminants. Both throughout Redwood City, and in particular, in the Environmental Justice communities.
Goal PS-3: Reduce the volume of pollutants generated by motorized vehicles.
Policy PS-3.1. Support programs that increase ridesharing, reduce pollutants generated by vehicle use, and meet the transportation control measures recommended by [the Air District] in the most recent Clean Air Plan.
Goal NR-6: Preserve and enhance the baylands, natural wetlands, and ecosystem to assist with improved air quality and carbon dioxide sequestration.
Policy NR-6.2. Restore and maintain marshlands including tidal flats, tidal marshes, and salt marshes as appropriate.
Policy NR-6.4. Allow for appropriate public access to bayfront open space lands for recreation activities while protecting and restoring the bayfront's natural ecosystem and minimizing environmental damage, as appropriate.

Notes: Bay = San Francisco Bay; Bay Trail = San Francisco Bay Trail

Source: City of East Palo Alto, 2017. *Vista 2035 General Plan*. Adopted October 4, 2016; Final Version March 2017. Available online at www.ci.east-palo-alto.ca.us/planning/page/vista-2035-general-plan; City of Menlo Park, 2016. *General Plan, City of Menlo Park*. Adopted November 2016. Available online at www.menlopark.gov/files/sharedassets/public/v/1/community-development/documents/general-plan/land-use-and-circulation-element-adopted-20161129.pdf; City of Redwood City, 2023. *Redwood City General Plan. Public Safety Element*. Adopted October 11, 2010; Amended August 2023. Available online at www.redwoodcity.org/departments/community-development-department/planning-housing/planning-services/environmental-documents/general-plan-eir

TABLE 3.3-6
AIR DISTRICT 2022 CEQA AIR QUALITY GUIDELINES SIGNIFICANCE THRESHOLDS

Pollutant	Construction Thresholds – Average Daily Emissions (pounds per day)	Operational Thresholds	
		Average Daily Emissions (pounds per day)	Maximum Annual Emissions (tons per year)
ROG	54	54	10
NOx	54	54	10
PM_{10}	82 (exhaust)	82	15
$PM_{2.5}$	54 (exhaust)	54	10
Fugitive Dust	Construction Dust Ordinance or other best management practices	Not applicable	
CO	Not applicable	9.0 ppm (8-hour average) or 20.0 ppm (1-hour average)	
Risks and Hazards for New Sources and Receptors (Project)	Same as operational thresholds	• Increased cancer risk of > 10.0 in 1 million • Increased non-cancer risk of > 1.0 Hazard Index (chronic or acute) • Ambient $PM_{2.5}$ increase > 0.3 $\mu g/m^3$ annual average (Zone of influence: 1,000-foot radius from property line of source or receptor)	
Risks and Hazards for New Sources and Receptors (Cumulative)	Same as operational thresholds	• Increased cancer risk of > 100 in 1 million • Increased non-cancer risk of > 10.0 Hazard Index (chronic or acute) • Ambient $PM_{2.5}$ increase > 0.8 $\mu g/m^3$ annual average (Zone of influence: 1,000-foot radius from property line of source or receptor)	

NOTES: $\mu g/m^3$ = micrograms per cubic meter; CEQA = California Environmental Quality Act; CO = carbon monoxide; NOx = oxides of nitrogen; $PM_{2.5}$ = particulate matter 2.5 microns or less in diameter; PM_{10} = particulate matter 10 microns or less in diameter; ppm = parts per million; ROG = reactive organic gases

SOURCE: BAAQMD (Bay Area Air Quality Management District, now called the Bay Area Air District [Air District]), *2023. 2022 California Environmental Quality Act Air Quality Guidelines.* April 2023. Available online at www.baaqmd.gov/plans-and-climate/california-environmental-quality-act-ceqa/updated-ceqa-guidelines. Accessed January 2025.

This Draft EIR evaluates Project activities at a level of detail consistent with the best available information and specificity available at the time of EIR preparation. To the extent that activities necessary for Project completion are known, they are described in Chapter 2, *Project Description*, and evaluated in the impact analysis below. Key information needed for the evaluation of air quality impacts includes detailed construction assumptions, such as worker trips, vehicle trips, and equipment usage. Those reaches for which conceptual (generally 10-percent) design information is available, depicted with dashed lines on Figure 2-1 in Chapter 2, *Project Description*, lack information for certain components (e.g., ramps, relocation of the pedestrian bridge at Bay Road). Appendix INFRA identifies those changes to infrastructure and other encroachments that are evaluated programmatically. Air quality impacts from these changes cannot be evaluated since there is little to no siting or design information available on which to base the evaluations. The need for additional CEQA documentation would be evaluated once these design details are developed as discussed in greater detail in Section 1.2.5, Program–Project EIR and Supplemental CEQA.

Consistency with Clean Air Plan (Impact AIR-1)

As described in Section 3.3.1.8, the most recently adopted air quality plan for the SFBAAB is the 2017 Clean Air Plan.[30] Consistency with the 2017 Clean Air Plan is the basis for determining whether the Project would conflict with or obstruct implementation of an applicable air quality plan.

Criteria Air Pollutants (Impact AIR-2)

Project construction and operation would result in emissions of criteria air pollutants, which result in impacts that are generally regional in nature.

Construction

Construction emissions were estimated using methods consistent with California Emissions Estimator Model (CalEEMod) and found in the User Guide for CalEEMod version 2022.1 (refer to Appendix AIR for calculations).[31] Total estimated annual construction emissions from construction equipment and vehicles were divided by the total number of workdays in each construction year (taking into account any overlapping phases) to derive average daily emissions. Estimated average daily construction-related emissions of criteria air pollutants were then compared to the Air District's significance thresholds to determine the significance of impacts.

Operation

Operational emissions from the Project would be generated primarily by the use of off-road equipment and on-road vehicle activity during operation and maintenance activities. These activities would take place for a maximum of 2 days per month. Off-road equipment and vehicle activity operating for a few hours per month would not be likely to result in emissions that would exceed the Air District's daily and annual significance thresholds for operation; consequently, this analysis has been conducted qualitatively.

Toxic Air Contaminants and Health Risk (Impact AIR-3)

Construction

Construction-related TAC emissions, including DPM and $PM_{2.5}$, can result in localized health impacts, expressed as annual average $PM_{2.5}$ concentrations, the increased probability of contracting cancer per 1 million persons exposed to TAC concentrations, and the chronic Hazard Index. DPM results in very negligible acute chronic risk, and OEHHA does not provide a reference exposure level for the estimation of acute chronic risk from DPM. Therefore, the analysis presented below focuses on chronic Hazard Index from DPM.

An HRA was completed to evaluate the increase in health risks and hazards to nearby receptors from exposure to DPM and $PM_{2.5}$ emissions associated with Project construction activities. The construction HRA estimated $PM_{2.5}$ concentrations at nearby residential receptors located within 1,000 feet of the Project sites, cancer risks, and chronic health hazards. The HRA focused on the contribution of emissions from construction activities along the South of Bay Road and North of Bay Road reaches and portions of

[30] BAAQMD, 2017. *Final 2017 Clean Air Plan: Spare the Air, Cool the Climate: A Blueprint for Clean Air and Climate Protection in the Bay Area*. Adopted April 19, 2017. Available online at www.baaqmd.gov/~/media/files/planning-and-research/plans/2017-clean-air-plan/attachment-a_-proposed-final-cap-vol-1-pdf.pdf?la=en.

[31] CAPCOA and ICF (California Air Pollution Control Officers Association and ICF), 2022. *CalEEMod User Guide Version 2022.1*. April 2022. Available online at www.caleemod.com/documents/user-guide/01_User%20Guide.pdf. Accessed January 2025.

the Dumbarton Approach and Marsh Road reaches as sensitive receptors are located closest to these reaches. In addition, the HRA evaluates the potential for emissions from restoration activities at Pond SF2 to result in health risks to nearby receptors. Although sensitive receptors are present within 1,000 feet of the Substation Marsh Restoration, Tech Campus, Bayfront Expressway, and Bedwell Bayfront Park reaches (as shown in Table 3.3-3), these receptors are located farther from construction activities and would likely experience lower impacts than the receptors chosen for the analysis. As health risk impacts are cumulative, the combined impact of construction associated with these Project components is evaluated, and one maximally impacted individual receptor (MEIR) for the Project is identified.

The HRA was prepared using technical information and HRA guidance and protocol from the Air District,[32] CARB,[33] and OEHHA.[34] Appendix AIR presents health impact calculations. The HRA evaluated the estimated incremental increase in lifetime cancer risk from exposure to emissions of DPM and the annual average $PM_{2.5}$ concentrations associated with diesel fuel combustion in construction equipment and heavy-duty trucks during construction activities. Fugitive construction dust emissions at construction areas were not included in the $PM_{2.5}$ concentration analysis. Earthwork during construction would involve material with adequate moisture content that would not result in fugitive dust emissions.

The HRA includes DPM and $PM_{2.5}$ emissions from vendor and hauling trucks but not from construction worker vehicle trips, which would be primarily gasoline-fueled and are therefore not a substantial source of DPM and $PM_{2.5}$ exhaust emissions. In addition to exhaust, the $PM_{2.5}$ analysis includes emissions from tire wear, brake wear, and entrained road dust.

The HRA focuses on the pollutants of concern ($PM_{2.5}$ and DPM) because these pollutants pose substantial health impacts at the local level, more so than other types of air pollutants. For construction activities, DPM exposure represents the primary health hazard. The operation of off-road construction equipment (e.g., excavators, loaders, cranes, graders) and on-road diesel-fueled heavy-duty vehicles would emit DPM. DPM is a complex mixture of gases and fine particles containing over 40 substances that are listed by EPA as hazardous air pollutants and by the Air District as TACs. In accordance with OEHHA and Air District health risk guidance, the DPM analysis uses exhaust PM_{10} emissions as a surrogate for DPM emissions.[35] This is a conservative approach because DPM is a subset of exhaust PM_{10}, and therefore, the fraction of DPM emissions is expected to be lower.

[32] BAAQMD, 2023. *Air Quality Guidelines Appendix E: Recommended Methods for Screening and Modeling Local Risks and Hazards*. Available online at www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa-guidelines-2022/appendix-e-recommended-methods-for-screening-and-modeling-local-risks-and-hazards_final-pdf.pdf?rev=b8917a27345a4a629fc18fc8650951e4.

[33] CARB, 2023. *Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values*. Last updated August 4, 2023. Available online at ww2.arb.ca.gov/sites/default/files/classic/toxics/healthval/contable08042023.pdf. Accessed March 2025.

[34] OEHHA (Office of Environmental Health Hazard Assessment), 2015. *Air Toxics Hot Spots Program, Risk Assessment Guidelines—Guidance Manual for Preparation of Health Risk Assessments*. February 2015. Available online at oehha.ca.gov/media/downloads/crnr/2015guidancemanual.pdf. Accessed March 2025.

[35] OEHHA (Office of Environmental Health Hazard Assessment), 1998. "*Proposed Identification of Diesel Exhaust as a Toxic Air Contaminant." Part B: Health Risk Assessment for Diesel Exhaust*. May 1998. Available online at www.arb.ca.gov/toxics/dieseltac/part_b.pdf. Accessed March 2025.

Construction schedule, activity, and phasing data for the various Project components in conjunction with emission factors from EMFAC2021[36] and OFFROAD[37] models were used to derive annual DPM emissions for each construction year and averaged over the number of construction workdays in each year to generate an annual rate of DPM emissions for each construction year. Similarly, rates of exhaust $PM_{2.5}$ emissions were calculated by construction year and Project component.

Unit concentrations were modeled using the American Meteorological Society/Environmental Protection Agency Regulatory Model Improvement Committee regulatory air dispersion model (AERMOD version 24142)[38] across a 20 meter by 20-meter receptor grid that covers all receptors within 1,000 feet of the Project construction areas and truck routes chosen for evaluation. Receptors included residences, childcare centers, and schools. Due to the linear nature of construction activities, construction areas associated with the South of Bay Road, North of Bay Road, and portions of the Dumbarton Approach and Marsh Road reaches were modeled as line volume sources. Construction associated with SF2 Pond Restoration was modeled as an area source. Truck routes to and from the North of Bay Road and South of Bay Road reaches were also modeled as line volume sources consistent with Air District guidance. Truck routes to other reaches modeled do not have sensitive receptors along them or have direct access from SR 84 and were therefore not analyzed. Detailed modeling inputs and assumptions for the AERMOD run can be found in Appendix AIR. The annual concentration resulting from the dispersion modeling was applied to the annual DPM and $PM_{2.5}$ emissions rates estimated to derive the concentrations of DPM and $PM_{2.5}$ at each receptor for each construction year. These concentrations were then used to calculate health risks using health risk parameters and equations from the OEHHA and Air District guidelines for HRAs.[39,40] The DPM concentrations at the receptors calculated for each construction year were applied to the unit risk methodologies from OEHHA to calculate the potential increase in lifetime cancer risk, chronic non-cancer risk, and $PM_{2.5}$ concentrations from activities over the duration of construction.[41] The MEIR was identified for each receptor type and the estimated increase in lifetime cancer risk was compared to the Air District's project-level threshold of 10 in 1 million.

Non-cancer health hazards for chronic diseases are expressed in terms of a Hazard Index, a ratio of TAC concentration to the reference exposure level—the level below which no adverse health effects are expected, even for sensitive individuals. OEHHA has recommended an ambient concentration of 5 $\mu g/m^3$ as the chronic inhalation reference exposure level for DPM exhaust. The maximum Hazard Index, calculated as the ratio of maximum annual DPM concentration to the reference exposure level, was

[36] EMFAC2021 is the latest emission inventory model used by CARB to estimate emissions rates of air pollutants for on-road mobile sources, such as motor vehicles, for a range of past and future calendar years, that are operating in California.

[37] CARB's OFFROAD model estimates emissions from off-road sources, such as construction equipment.

[38] EPA (U.S. Environmental Protection Agency), 2024. *AERMOD Implementation Guide*. November 2024. Available online at gaftp.epa.gov/Air/aqmg/SCRAM/models/preferred/aermod/aermod_implementation_guide.pdf. Accessed March 2025.

[39] OEHHA (Office of Environmental Health Hazard Assessment), 2015. *Air Toxics Hot Spots Program, Risk Assessment Guidelines—Guidance Manual for Preparation of Health Risk Assessments.* February 2015. Available online at oehha.ca.gov/media/downloads/crnr/2015guidancemanual.pdf.

[40] BAAQMD, 2023. *Air Quality Guidelines Appendix E: Recommended Methods for Screening and Modeling Local Risks and Hazards*. April 2023. Available online at www.baaqmd.gov/plans-and-climate/california-environmental-quality-act-ceqa/updated-ceqa-guidelines.

[41] OEHHA (Office of Environmental Health Hazard Assessment), 2015. *Air Toxics Hot Spots Program, Risk Assessment Guidelines—Guidance Manual for Preparation of Health Risk Assessments*. February 2015. Available online at oehha.ca.gov/media/downloads/crnr/2015guidancemanual.pdf.

compared to the Air District's threshold of 1.0 to determine significance. The estimated maximum annual $PM_{2.5}$ concentration was compared to the Air District's threshold of 0.3 $\mu g/m^3$ to evaluate impacts.

Operation

Emissions of TACs from long-term operational activities are expected to be minimal. These activities would be conducted using existing staff. DPM emissions from any heavy-duty truck trips and operation of off-road equipment would be minimal and would be subject to CARB idling regulations. The Project would not install any new emergency generators or other stationary sources of air pollutants that would contribute to operational health risks. Therefore, operational health risks from the Project would be less than significant and are not discussed further in the following impact analysis.

Odors

With respect to odors, the Air District's CEQA Guidelines provide guidance in the form of screening distances, to help evaluate potential odor impacts. They identify potential odor sources of particular concern, such as wastewater treatment plants, oil refineries, asphalt plants, chemical manufacturing, painting/coating operations, coffee roasters, food processing facilities, recycling operations, and metal smelters, and recommend buffer zones around them to avoid potential odor conflicts. As the Project would not include any of these types of sources, a qualitative analysis was conducted and is presented in Impact AIR-4, which addresses the fourth significance criterion.

Cumulative Impacts

Criteria Air Pollutants

By its nature, air pollution is largely a cumulative impact. No single project is sufficient in size to, by itself, cause a geographic area to be in nonattainment of ambient air quality standards. Instead, in a nonattainment area, a project's individual emissions contribute to existing cumulatively significant adverse air quality impacts. Past, present, and future development projects contribute to the region's adverse air quality impacts on a cumulative basis.

As it relates to the Project's study area, Table 3.3-4 reflects the SFBAAB's attainment status. The nonattainment status is considered an existing cumulatively significant adverse air quality impact for each criteria air pollutant, against which the Air District must determine whether emissions of these pollutants with Project implementation would have a cumulatively considerable effect. In developing thresholds of significance for air pollutants, the Air District considered the levels at which a project's individual emissions would be cumulatively considerable. Therefore, if a project would exceed the identified project-level significance thresholds, its emissions would have a cumulatively considerable effect.[42]

Cumulative Health Risk Assessment

The cumulative HRA tabulates the impact of Project-related risks plus risks from offsite sources in the MEIR vicinity. The Air District recommends that the cumulative health risk analysis include other air

[42] BAAQMD, 2023. *2022 California Environmental Quality Act Air Quality Guidelines*. April 2023. Available online at www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa-guidelines-2022/ceqa-guidelines-chapter-0-cover-page-pdf.pdf?la=en.

pollutant emissions sources within a "zone of influence" of 1,000 feet surrounding a project site.[43] As such, this evaluation includes combined health risks from all sources of TACs and $PM_{2.5}$ within 1,000 feet of the Project MEIR. The Air District provides tools for screening background health risk impacts for permitted stationary sources, major roadways and highways, and rail. The cumulative impact analysis relies on these tools. The Air District's Health Risk Calculator with Distance Multipliers was used to determine the impact of each permitted source on the MEIR. The total cumulative risks to the MEIR were compared to the Air District's cumulative health risk thresholds to determine the significance of impacts.

Impacts and Mitigation Measures

Table 3.3-7 summarizes the impact conclusions presented in this section.

TABLE 3.3-7
AIR QUALITY IMPACT CONCLUSIONS

Impact	Level of Significance
Impact AIR-1: Conflict with or obstruct implementation of the applicable air quality plan.	LSM
Impact AIR-2: Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in nonattainment under an applicable federal or state ambient air quality standard.	LSM
Impact AIR-3: Expose sensitive receptors to substantial pollutant concentrations.	LTS
Impact AIR-4: Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.	LTS
Impact C-AIR-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse impacts related to air quality.	LTS

Note: LSM = Less than Significant with Mitigation; LTS = Less than Significant

Impact AIR-1: Conflict with or obstruct implementation of the applicable air quality plan. *(Less than Significant with Mitigation)*

The 2017 Clean Air Plan is the applicable air quality plan for the SFBAAB within which the Project area is located. The Air District's 2022 CEQA Air Quality Guidelines recommend that a project's consistency with the current air quality plan be evaluated using the following three criteria:

1) The Project supports the goals of the air quality plan;

2) The Project includes applicable control measures from the air quality plan; and

3) The Project does not disrupt or hinder implementation of any control measures from the air quality plan.

The primary goals of the 2017 Clean Air Plan are to protect air quality and public health at the regional and local scale and protect the climate by reducing regional criteria air pollutant emissions and reducing local air quality-related health risks (by meeting CAAQS and NAAQS). As detailed under 3.3.1.11, Methodology, the Air District recommends conducting a quantitative comparison of a project's emissions with the recommended Air District thresholds and a qualitative evaluation of a project's consistency with

[43] BAAQMD, 2023. *2022 California Environmental Quality Act Air Quality Guidelines*. April 2023. Available online at www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa-guidelines-2022/ceqa-guidelines-chapter-0-cover-page-pdf.pdf?la=en.

applicable 2017 Clean Air Plan control measures to show consistency with the applicable clean air plan. As indicated below under Impact AIR-2, the Project would result in a less-than-significant impact related to construction emissions with the implementation of **Mitigation Measure AIR-1** (Best Management Practices for Construction-Related Fugitive Dust Emissions), which includes the Air District's recommended basic and enhanced fugitive dust control measures. The Project would also generate emissions at levels less than the significance thresholds during long-term operations. Therefore, the Project would support the primary goals of the 2017 Clean Air Plan.

The control measures in the 2017 Clean Air Plan aimed at reducing air pollution in the Bay Area applicable to the Project[44] are primarily those that address emissions from construction equipment and handling of construction and demolition waste. Therefore, applicable control measures include:

- TR22, which addresses emissions from construction equipment;
- SS36, which addresses particulate matter from trackout of solid materials onto paved public roads;
- SS38, which addresses fugitive dust emissions from traffic and other operations on construction sites, large disturbed surfaces, and other sources of fugitive particulate matter emissions; and
- WA4, which is a waste reduction measure that requires jurisdictions to develop and promote model ordinances on community-wide zero-waste goals, including recycling of construction and demolition materials in commercial and public construction projects.

TR22 uses various strategies to reduce emissions from construction and farming equipment (e.g., incentives for equipment upgrades). Since 2009, the Air District has provided more than $38 million to replace and/or upgrade hundreds of pieces of older, often uncontrolled equipment used in construction, cargo handling, and agricultural operations with newer units that have engines certified to the cleanest available standards. The Project would benefit from this ongoing program and would not conflict with its implementation. Control measures SS36 and SS38 are implemented at the Air District level through amendments to its Regulation 6: Particulate Matter; Rule 1: General Requirements (Rule 6-1); and Rule 6: Trackout (Rule 6-6), which address mud and dirt that can be "tracked out" from construction sites, bulk material storage areas, and disturbed surfaces onto public paved roads. Implementing Mitigation Measure AIR-1 would ensure Project consistency with these rules and regulations. Control measure WA4 is implemented through local requirements for construction and demolition waste tracking to meet waste reduction and diversion goals. For these reasons, the Project would neither be inconsistent with nor hinder implementation of the 2017 Clean Air Plan's control measures.

In summary, Project implementation would not conflict with or obstruct implementation of the 2017 Clean Air Plan, and the impact would be **less than significant with mitigation** during the construction phase and less than significant during the operational phase.

[44] The 2017 Clean Air Plan includes 85 control measures aimed at reducing air pollutants. However, the vast majority of the control measures do not apply directly to the Project because they target facilities or land uses that do not currently exist and are not proposed by the Project (e.g., energy generation, waste management); vehicles or equipment that would not be employed in the Project area (e.g., airplanes, farming equipment); and/or involve rulemaking or other actions under the jurisdiction of agencies not directly involved with design and approval of the Project and its related actions. In addition, 40 of these measures address stationary sources (e.g., oil refineries and cement kilns) and will be implemented by the Air District using its permit authority and are therefore not suited for implementation through local planning efforts.

Mitigation Measure AIR-1: Best Management Practices for Construction-Related Fugitive Dust Emissions. (refer to Impact AIR-2)

Impact AIR-2: Result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is in nonattainment under an applicable federal or state ambient air quality standard. ***(Less than Significant with Mitigation)***

Construction

Criteria air pollutant emissions generated by Project construction activities would include the following:

- Exhaust emissions from fuel combustion by mobile heavy-duty diesel and gasoline-powered equipment (construction equipment, on-road haul trucks and vendor trucks, and employee vehicles);
- Particulate matter from soil disturbance during site preparation and grading activities (also known as *fugitive dust*); and
- Evaporative emissions of ROG from paving activity and the application of architectural coatings.

Table 3.3-8 presents criteria pollutant emissions estimates from construction activities associated with the Project. These estimates account for the use of diesel-powered construction equipment with engines meeting the EPA's Tier 4 Final emissions standards. The overall Project emissions by construction year are compared to the Air District's significance thresholds to determine impact significance. As shown in Table 3.3-8, the Project's average daily emissions of ROG, NO_X, exhaust PM_{10}, and exhaust $PM_{2.5}$ would be below significance thresholds for all years of construction. Additionally, none of the average daily emissions associated with individual Project components would exceed the Air District's construction thresholds.

In addition to criteria air pollutants emitted in combustion exhaust of construction equipment and vehicles, construction-related activities, such as soil disturbance, grading, and material hauling, can also result in fugitive dust emissions (e.g., $PM_{2.5}$ and PM_{10}). The Air District considers a project to have a less-than-significant criteria air pollutant impact related to construction-related fugitive dust emissions if it implements Air District's basic best management practices listed in Table 5-2 of the 2022 CEQA Air Quality Guidelines. The Air District recommends implementing these best management practices whether construction-related emissions exceed the applicable significance thresholds. These measures are included as **Mitigation Measure AIR-1**, and reduce particulate emissions primarily during soil movement, grading, and demolition activities, but also during vehicle and equipment movement on unpaved project areas. With implementation of Mitigation Measure AIR-1, construction activities associated with the Project would not 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, and the impact would be **less than significant with mitigation**.

TABLE 3.3-8
PROJECT CONSTRUCTION EMISSIONS OF CRITERIA AIR POLLUTANTS

Component	Reach	Construction Year	Average Daily Emissions (pounds per day)[a]			
			ROG	NOx	Exhaust PM_{10}[b]	Exhaust $PM_{2.5}$[b]
Shoreline Protection, Recreational Features	South of Bay Road	2030	0.7	6.8	0.1	0.1
		2031	0.9	8.1	0.1	0.1
	North of Bay Road	2031	0.7	12.4	0.2	0.2
		2032	0.3	1.5	<0.1	<0.1
	Dumbarton Approach (Railroad to SR 84)	2029	0.2	2.8	<0.1	<0.1
		2030	0.9	12.8	0.2	0.2
	Dumbarton Approach (SR 84 Crossing)	2032	0.3	1.9	<0.1	<0.1
		2033	0.7	7.3	0.1	0.1
	Substation and Marsh Restoration	2029	0.7	9.2	0.2	0.2
		2030	1.8	27.9	0.4	0.4
	Tech Campus	2031	0.9	11.6	0.2	0.2
		2032	2.9	37.9	0.3	0.3
	Bayfront Expressway	2032	0.6	4.6	<0.1	<0.1
	Bedwell Bayfront Park	2032	0.2	3.4	<0.1	<0.1
		2033	0.3	2.8	<0.1	<0.1
	Marsh Road	2033	0.2	2.5	<0.1	<0.1
		2034	<0.1	<0.1	<0.1	<0.1
	Average over All Reaches[c]	2029	0.9	12.0	0.2	0.2
		2030	2.0	29.1	0.4	0.4
		2031	1.5	20.2	0.3	0.3
		2032	0.7	6.1	0.1	0.1
		2033	0.7	7.0	0.1	0.1
		2034	0.2	3.9	0.1	0.1
Habitat Improvements	Tidal Marsh Restoration in Ponds R1 and R2, Western Snowy Plover Breeding Habitat Enhancement in Ponds SF2 and R3	2029	1.8	20.0	0.4	0.4
		2030	0.9	6.8	0.2	0.2
		2031	7.3	40.1	1.4	1.4
Overall Project Average[d]		2029	2.5	28.5	0.5	0.5
		2030	2.9	36.0	0.6	0.6
		2031	2.7	26.7	0.5	0.5
		2032	0.7	6.1	0.1	0.1
		2033	0.7	7.0	0.1	0.1
		2034	0.2	3.9	0.1	0.1
Air District Significance Thresholds for Construction			54	54	82	54
Significant?			No	No	No	No

NOTES: Air District = Bay Area Air District; NO_X = nitrogen oxides; $PM_{2.5}$ = particulate matter 2.5 microns or less in diameter; PM_{10} = particulate matter 10 microns or less in diameter; ROG = reactive organic gases; SR = State Route

Bold values show exceedance of thresholds.

a. Emissions presented assume the use of Tier 4 engines for all construction equipment.
b. Pursuant to Air District methodology, PM_{10} and $PM_{2.5}$ emissions presented include only exhaust emissions, and not emissions from tire wear, brake wear, and fugitive dust.
c. Daily average over all reaches is calculated by dividing the total emissions generated at all reaches during each construction year divided by the total number of workdays in each year, accounting for overlapping construction activities, and is not equal to the sum of the average daily emissions from the different reaches in a given construction year.
d. Overall Project average is calculated by dividing the total emissions generated by constructing shoreline protection and recreational features at all reaches and habitat improvements during each construction year divided by the total number of workdays in each year, accounting for overlapping construction activities, and is not equal to the sum of the average daily emissions from the different reaches and habitat improvements in any given construction year.

SOURCE: Table compiled by Environmental Science Associates in 2025 based on Appendix AIR of this EIR.

Operation

Operational activities would primarily include routine inspections of the shoreline protection facilities, operating flood gates, managing interior drainage, and maintaining levee vegetation and the San Francisco Bay Trail. Existing landowners would be responsible for maintaining public trails on their property. Both equipment use and vehicular activity for these activities would be minimal, and average daily emissions would not exceed the Air District's operational thresholds. Maintenance activities would be completed by existing staff; no new staff would be hired for operation and maintenance of the Project. Maintenance activities are expected to result in an estimated two truck trips per month, except during high-water events, which may require daily inspections. Therefore, long-term Project operation would not result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is nonattainment, and this impact would be **less than significant**.

Mitigation Measure AIR-1: Best Management Practices for Construction-Related Fugitive Dust Emissions.

This measure applies to all reaches. To reduce impacts from fugitive dust emissions during construction, the Project Proponent shall require construction contractors to implement the following Best Management Practices during activities involving soil disturbance, grading, and material hauling:

- All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered up to two times per day during dry weather when winds are greater than 8 to 12 miles per hour.
- All haul trucks transporting soil, sand, or other loose material offsite shall be covered completely with no loose flaps.
- All visible mud or dirt trackout onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
- All vehicle speeds on unpaved roads shall be limited to 15 miles per hour.
- Temporary unpaved construction roads onsite shall be stabilized with soil binders such as dust palliatives or chemical stabilizers to reduce airborne dust from vehicle travel over unpaved surfaces. All roadways, driveways, and sidewalks to be paved shall otherwise be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.
- All excavation, grading, and/or demolition activities shall be suspended when average wind speeds exceed 20 miles per hour.

- All haul trucks, including their tires, shall be washed off prior to leaving the site.
- Construction entrances and unpaved roads providing access to sites located 100 feet or further from a paved road shall be treated with a 6- to 12-inch layer of compacted wood chips, mulch, or gravel.
- Publicly visible signs shall be posted with the telephone number and name of the person to contact at the lead agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The Air District's General Air Pollution Complaints number shall also be visible to ensure compliance with applicable regulations.

Impact AIR-3: Expose sensitive receptors to substantial pollutant concentrations. ***(Less than Significant)***

Table 3.3-9 presents the results of the construction HRA for the Project, which modeled health risk for receptors in the vicinity of the South of Bay Road Reach, North of Bay Road Reach, portions of the Dumbarton Approach Reach, and Marsh Road Reach close to sensitive receptors and Restoration Pond SF2. As indicated under Section 3.3.1, other Project components are located farther away from sensitive receptors and were therefore excluded from the HRA.

TABLE 3.3-9
HEALTH RISKS FROM PROJECT CONSTRUCTION

Receptor Type/ Emissions Source	Cancer Risk (# in 1 million)	Chronic HI (unitless)	Annual Average $PM_{2.5}$ Concentration ($\mu g/m^3$)
MEIR – Resident Infant Receptor[a]			
Project Construction	1.93	0.01	0.05
Significance Threshold	10.0	1.0	0.3
MEIR – School Child Receptor[b]			
Project Construction	0.17	0.001	0.004
Significance Threshold	10.0	1.0	0.3
MEIR – Daycare Infant Receptor[c]			
Project Construction	0.83	0.001	0.004
Significance Threshold	10.0	1.0	0.3

NOTES: $\mu g/m^3$ = micrograms per cubic meter; Bay Trail = San Francisco Bay Trail; HI = Hazard Index; MEIR = Maximally Exposed Individual Resident; $PM_{2.5}$ = particulate matter 2.5 microns or less in diameter; NA = not applicable

a. The resident infant MEIR for cancer risk, chronic HI and annual average $PM_{2.5}$ concentration is located approximately 340 feet south of Pond SF2 along Tulane Avenue. Exposure is assumed to begin in the third trimester of an unborn child.
b. The school MEIR for cancer risk, chronic HI, and annual average $PM_{2.5}$ concentration is located at the East Palo Alto Charter School approximately 300 feet west of the Project alignment. Exposure is assumed to begin at the age of 5.
c. The daycare MEIR for cancer risk, chronic HI and annual average $PM_{2.5}$ concentration is located at the Edith's Daycare along University Avenue. Daycare exposure is assumed to begin at 6 weeks of age.

SOURCE: Table compiled by Environmental Science Associates in 2025 based on Appendix AIR of this EIR.

As shown, the unmitigated incremental lifetime cancer risk at the residential, school, and daycare MEIRs would be well below the Air District's project-level threshold of 10 in 1 million. The Hazard Index and annual average $PM_{2.5}$ concentrations at the residential, school, and daycare MEIRs would also be below the respective Air District thresholds of 1.0 and 0.3 $\mu g/m^3$. DPM emissions used to estimate incremental

lifetime cancer risk assume the use of engines meeting the EPA's Tier 4 Final standard in all construction equipment. As shown in Table 3.3-8, the scale and duration of DPM and $PM_{2.5}$ emission levels associated with the construction of Substation Marsh Restoration, Tech Campus, Bayfront Expressway, and Bedwell Bayfront Park reaches would be similar to the reaches analyzed. The associated health impacts on receptors located farther away would also be less than the Air District thresholds for incremental lifetime cancer risk, Hazard Index, and annual average $PM_{2.5}$ concentration. Therefore, DPM and $PM_{2.5}$ emissions from Project construction would result in health risk and hazard impacts to nearby sensitive receptors that would be **less than significant**.

Impact AIR-4: Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people. (*Less than Significant*)

No existing uses on the Project sites are considered major sources of odors by the Air District, and the Project would not introduce any land uses or sources to the Project sites that would be considered a major source of odors. During construction, the various diesel-powered vehicles and equipment would create localized odors while in use. These odors would be temporary and intermittent and are not likely to be noticeable for extended periods of time beyond the boundaries of the Project sites. Therefore, the potential for diesel odor impacts during construction would be **less than significant**. Once operational, there would be no sources of odor associated with the Project; therefore, **no impact** would occur.

Cumulative Impacts

Impact C-AIR-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse impacts related to air quality. (*Less than Significant*)

The SFBAAB is a nonattainment area for both the federal and state ozone standards; therefore, an air quality impact already exists. Additional emissions of ozone precursors NO_X or ROG over threshold amounts would further degrade air quality related to ozone. Impact AIR-2 evaluates whether the Project's contribution to this significant impact would be considerable. The Air District's project-level criteria air pollutant thresholds are based on levels below which new sources would not result in a cumulatively considerable net increase in criteria air pollutants for which the region is in nonattainment. The potential for the Project to result in significant criteria air pollutant emissions, and therefore a cumulatively considerable contribution to nonattainment criteria pollutants, is addressed under Impact AIR-2. Therefore, no separate cumulative criteria air pollutant analysis is required.

Impact AIR-1 addresses potential impacts related to consistency with the Air District's 2017 Clean Air Plan. Because the 2017 Clean Air Plan focuses on reducing population exposure to air pollutants throughout the region, the assessment in Impact AIR-1 is a cumulative analysis as it assesses consistency with a region-wide air quality plan. Therefore, a separate cumulative assessment of consistency with the 2017 Clean Air Plan is not required.

Table 3.3-10 shows the Project's health risks in combination with other permitted stationary sources within 1,000 feet of the Project MEIR identified in Table 3.3-9 and background health risks from mobile

sources on highways, major streets, and rail. As shown in Table 3.3-10, the estimated cumulative incremental lifetime cancer risk, chronic Hazard Index, and annual average $PM_{2.5}$ concentration would be below the Air District's cumulative thresholds, which are 100 in a million for incremental lifetime cancer risk, 10.0 for non-cancer Hazard Index (acute or chronic), and 0.8 $\mu g/m^3$ for annual average $PM_{2.5}$ concentration. Table 3.1-2 in Section 3.1, Overview, lists projects included in the cumulative analysis (generally within 0.25 mile of Project components). However, only one of these projects (1990 Bay Road, The Landing) is located within 1,000 feet of the Project's MEIR. This cumulative project includes mixed-use development with a variety of uses including a 95-unit housing development, commercial office and life-science space, subsidized ground-floor retail space dedicated to businesses, and approximately 7 acres of open space and recreational amenities; the project is currently paused by the developer as of December 2024. Construction of 1990 Bay Road, The Landing, is expected to take approximately 24 months and could coincide with Project construction adding to cumulative health risks at the Project MEIR. However, as the cumulative risks at the MEIR are well below the Air District thresholds, the addition of construction health risks from this cumulative project, if developed simultaneously with the SAFER Bay Project, would not result in an exceedance of any of the cumulative health risk thresholds. Therefore, the cumulative health risk impact would be **less than significant**.

TABLE 3.3-10
SUMMARY OF CUMULATIVE EXCESS LIFETIME CANCER RISK, NON-CANCER CHRONIC RISK, AND ANNUAL AVERAGE $PM_{2.5}$ CONCENTRATION AT THE EXISTING OFFSITE MEIR

Emissions Source/Receptor Type	Excess Lifetime Cancer Risk (per million)[a,b]	Non-Cancer Chronic Hazard Index (unitless)[a,b]	Annual Average $PM_{2.5}$ Concentration ($\mu g/m^3$)[a,b,c]
Project Contribution			
Project Construction	1.93	0.01	0.08
Background Cumulative Contributions from Sources within 1,000 feet of MEIR			
Existing Stationary Sources[d]	--	--	--
Roadways, Highways, and Major Streets[e]	4.64	0.016	0.12
Railways[e]	--	--	--
Total Background Cumulative	*4.64*	*0.016*	*0.12*
Project Plus Cumulative			
Cumulative Total	6.6	0.026	0.17
Cumulative Significance Thresholds	100	10.0	0.8
Significant?	No	No	No

NOTES: $\mu g/m^3$ = micrograms per cubic meter; Air District = Bay Area Air District; MEIR = maximally exposed individual receptor; $PM_{2.5}$ = particulate matter that is 2.5 microns or less in diameter

a. **Bold values** = threshold exceedance
b. Health risks estimated assuming use of Tier 4 Final engines in all construction equipment.
c. For onsite construction, $PM_{2.5}$ concentrations include only exhaust emissions. Material handled is expected to have adequate moisture content to not result in fugitive dust emissions of $PM_{2.5}$.
d. Based on health risk data from the Air District's Stationary Source Screening Map, no Air District permitted stationary sources are within 1,000 feet of the Project MEIR.
e. Background health risks from mobile sources are derived from the Air District's Mobile Source Screening Map. ArcGIS, 2025. "Mobile Source Screening Map." Available online at experience.arcgis.com/experience/89ba715c4dc7427f85e2d2fc5b8175ff/page/Mobile-Source-Screening-Tool?draft=true. Accessed October 24, 2025.

SOURCE: Table compiled by Environmental Science Associates in 2025 based on Appendix AIR of this EIR.

3.4 Biological Resources

This section evaluates the potential impacts of the SAFER Bay Project (Project) on existing conditions for biological resources in the Project area and the potential for the Project to adversely affect such resources. Biological resources evaluated include sensitive and special-status species, natural communities/wildlife habitats, and waters of the U.S. and state (including wetlands). This section presents information about the environmental and regulatory setting and identifies the criteria used to evaluate the significance of potential impacts, the methods used in evaluating these impacts, and the results of the impact assessment. The Project evaluated is described in Chapter 2, *Project Description*, of this EIR. Mitigation measures are identified that, when implemented, would avoid or reduce potential significant impacts on biological resources.

3.4.1 Environmental Setting

Biological Resources Study Area

A Biological Study Area (BSA) was defined for the purpose of evaluating biological resources within and in the Project site vicinity and includes a buffer in adjacent areas that are relevant to biological resources (**Figure 3.4-1**).

Background Reports and Surveys

The following primary studies were used in the preparation of this section:

- H. T. Harvey & Associates, 2024. *SAFER Bay Biological Resources Existing Conditions Report*. January 2024. Included as Appendix BIO1.
- H. T. Harvey & Associates, 2024. *Special-Status Animal Species Potentially Occurring in the Study Area*. January 2024. Included as Appendix BIO2.
- H. T. Harvey & Associates, 2024. *SAFER Bay Project – Aquatic Resources Delineation Report*. April 2024.
- H. T. Harvey & Associates, 2025. *SAFER Bay Project Habitat Restoration Basis of Design Report (Habitat Restoration BOD)*. February 2025. Included as Appendix BIO3.

Appendix BIO1 describes surveys and other methods for characterizing the environmental setting with respect to biological resources.

Climate and Soils

Climate conditions in the BSA include a 30-year average of approximately 17 inches of annual precipitation, and an average temperature range of 50 to 67 degrees Fahrenheit.[1]

[1] PRISM Climate Group, 2025. "Data Explorer: Time Series Values for Individual Locations." Oregon State University. Available online at www.prism.oregonstate.edu/explorer/. Accessed March 2025.



SOURCE: H.T. Harvey & Associates, March 2025

SAFER Bay Project

Figure 3.4-1
Biological Study Area

ESA
H. T. HARVEY & ASSOCIATES
Ecological Consultants

The Natural Resources Conservation Service maps the following soil units in the BSA:

(1) Botella-Urban land complex, 0 to 5percent slopes;

(2) Novato clay, 0 to 1 percent slopes;

(3) Novato clay, 0 to 1 percent slopes, ponded;

(4) Aquic Xerorthents, bay mud substratum, 0 to 2 percent slopes;

(5) Pits and Dumps;

(6) Urban land-Orthents, cut and fill complex, 0 to 5 percent slopes;

(7) Urban land-Orthents, reclaimed complex, 0 to 2 percent slopes; and

(8) Novato clay, 0 to 1 percent slopes, tidally flooded.[2]

For additional information on soils within the BSA, refer to Appendix BIO1.

Natural Communities and Land Cover Types

Land cover/habitat types in the BSA were designated based on the California Department of Fish and Wildlife's (CDFW's) List of California Terrestrial Natural Communities.[3] Reconnaissance-level surveys identified 17 land cover/habitat types in the BSA: tidal northern coastal salt marsh, non-tidal/muted tidal northern coastal salt marsh, managed pond, intertidal mudflat, saline seasonal wetland, non-tidal saline pond, tidal open water, muted tidal open water, tidal brackish marsh, non-tidal brackish marsh, detention basin/canal, landscaped/developed, ruderal levee slope, ruderal upland, culvert/riprap, ornamental woodland (riparian), and ornamental woodland (upland). Appendix BIO1 presents detailed descriptions of these habitat types; **Figures 3.4-2, 3.4-3, and 3.4-4** (presented at the end of Section 3.4) depict their locations.

Invasive Species and Pathogens

Many non-native, invasive plant species occur in the BSA. Species with a "high" invasive rating by the California Invasive Plant Council (Cal-IPC) have the potential to cause severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment.[4] In the BSA, yellow star-thistle (*Centaurea solstitialis*), perennial pepperweed (*Lepidium latifolium*), common wild oat (*Avena fatua*), smooth cordgrass (*Spartina alterniflora*), and red brome (*Bromus rubens*) were observed. Five species in the BSA have a "moderate" rating by Cal-IPC, indicating that they have substantial and apparent—but generally not severe—ecological impacts on physical processes, plant and animal communities, and vegetation structure, and that their reproductive biology and other attributes are conducive to moderate to high rates of dispersal with ecological disturbance. The species in the BSA with a moderate rating include black mustard (*Brassica nigra*), Italian thistle (*Carduus pycnocephalus*),

[2] NRCS (Natural Resources Conservation Service), 2025. "Web Soil Survey." U.S. Department of Agriculture. websoilsurvey.nrcs.usda.gov. Accessed March 2025.

[3] Holland, R.F., 1986. *Preliminary Descriptions of the Terrestrial Natural Communities of California*. Unpublished report. California Department of Fish and Game, Natural Heritage Division, Sacramento.

[4] California Invasive Plant Council, 2025. California Invasive Plant Inventory Database. Available online at www.cal-ipc.org/plants/inventory/. Accessed March 2025.

seaside barley (*Hordeum murinum*), ripgut brome (*Bromus diandrus*), and dissected geranium (*Geranium dissectum)*. Species with a "limited" invasive rating by the Cal-IPC indicate that they are invasive by their ecological impact are minor on a statewide level.[4] The most common species in the BSA with a limited rating include brass buttons, rabbitsfoot grass, wild radish, English plantain (*Plantago lanceolata*), and soft brome (*Bromus hordeaceus*).

Appendix BIO1 further defines invasive species.

Special-Status Plant and Animal Species

Special-Status Plants

Only one special-status plant species, Congdon's tarplant (*Centromadia parryi* ssp. *congdonii*), has the potential to occur in the BSA. Congdon's tarplant is a plant ranked by the California Native Plant Society as "List 1B.2" (meaning that it is rare in California and elsewhere), with no legal protective status under the federal Endangered Species Act (FESA) or California Endangered Species Act (CESA). Plants with this status are rare throughout their range with the majority of them endemic to California. Most of the plants that are ranked 1B have declined significantly over the last century. Congdon's tarplant is known from eight Central California coastal counties, including San Mateo County. The species occurs in alkaline soils in valley and foothill grasslands, typically in sumps and disturbed sites where water collects. Congdon's tarplant is often associated with non-native grassland species, including mustard (*Brassica* spp.) and star-thistle (*Centaurea* spp.). The closest record for Congdon's tarplant consists of a small population of 17 plants observed in the BSA directly west of the Ravenswood Open Space Preserve, north of Bay Road, in non-native grassland. Suitable habitat for the species is present in the BSA in saline seasonal wetlands and ruderal levee slopes adjacent to wetlands.

Special-Status Animals

Numerous special-status bird and mammal species occur in or in the immediate vicinity of the BSA. These species include the Alameda song sparrow (*Melospiza melodia pusillula*), black skimmer (*Rynchops niger*), Bryant's savannah sparrow (*Passerculus sandwichensis alaudinus*), burrowing owl (*Athene cunicularia*), California black rail (*Laterallus jamaicensis coturniculus*), California Ridgway's rail (*Rallus obsoletus obsoletus*), northern harrier (*Circus hudsonius*), San Francisco common yellowthroat (*Geothlypis trichas sinuosa*), western snowy plover (*Charadrius nivosus nivosus*), salt marsh harvest mouse (*Reithrodontomys raviventris*), and salt marsh wandering shrew (*Sorex vagrans halicoetes*), all of which may breed on or close to the site. Special-status fish species that may be present in tidal waters of the BSA include Central California Coast steelhead (*Oncorhynchus mykiss*), green sturgeon (*Acipenser medirostris*), white sturgeon (*Acipenser transmontanus*), longfin smelt (*Spirinchus thaleichthys*), Central Valley fall-run evolutionary significant unit (ESU) Chinook salmon (*Oncorhynchus tshawytscha*), and Pacific lamprey (*Entosphenus tridentatus*). Numerous other special-status bird and mammal species can occasionally occur in the BSA as non-breeding foragers, but they do not breed or occur in large numbers in the BSA. These species include the bald eagle (*Haliaeetus leucocephalus*), burrowing owl (*Athene cunicularia*), California least tern (*Sternula antillarum browni*), golden eagle (*Aquila chrysaetos*), loggerhead shrike (*Lanius ludovicianus*), tricolored blackbird (*Agelaius tricolor*), white-tailed kite (*Elanus leucurus*), yellow rail (*Coturnicops noveboracensis*), yellow warbler (*Setophaga petechia*), pallid bat (*Antrozous pallidus*), Townsend's big-eared bat (*Corynorhinus townsendii*), western red bat (*Lasiurus blossevillii*), harbor seal (*Phoca vitulina*), and California sea lion (*Zalophus californianus*).

The potential for these species to occur is summarized in **Table 3.4-1** and described in more detail in Appendix BIO2.

Sensitive Natural Communities, Vegetation Alliances, and Habitats

California Department of Fish and Wildlife Sensitive Habitats

The BSA supports the following sensitive natural communities:

- Tidal/non-tidal/muted brackish marsh, which corresponds to coastal brackish marsh and is defined as being densely dominated by perennial, emergent, and herbaceous monocots that can reach 2 meters in height.
- Seasonal wetlands, which correspond to vernal marsh and are defined as being dominated by annual herbs and containing standing water following winter rains but are greatly reduced or completely dry by summer.

The BSA does not support any upland sensitive natural communities (e.g., grasslands dominated by native perennial grasses).

California Department of Fish and Wildlife Sensitive Vegetation Alliances

The BSA supports three of the following sensitive vegetation alliances:

- Northern coastal salt marsh habitat in the BSA is dominated by pickleweed and would therefore be characterized as *Sarcocornia pacifica* (*Salicornia depressa*) Herbaceous Alliance.[5]
- Tidal/non-tidal/muted brackish marshes onsite are dominated by cattails and would therefore be characterized as *Typha* (*angustifolia, domingensis, latifolia*) Herbaceous Alliance.[6,7]
- Saline seasonal wetlands onsite are co-dominated with alkali heath, pickleweed, and saltgrass and would therefore be characterized as *Frankenia salina* Herbaceous Alliance.[8]

For additional information on sensitive vegetation alliances, see Appendix BIO1.

Waters of the U.S./Waters of the State

Wetlands and other waters of the U.S./state occur in the BSA. The tidal/non-tidal northern coastal marsh salt marsh, tidal/non-tidal brackish marsh and seasonal wetlands mapped in the BSA would likely be regulated by the United States Army Corps of Engineers (USACE) and waters of the U.S. and waters of

[5] Sawyer, J.O., T. Keeler-Wolf, and J.M. Evens, 2009. "A Manual of California Vegetation [online]. Second edition." California Native Plant Society. Available online at vegetation.cnps.org/.

[6] Buck-Diaz, J., K. Sikes, and J.M. Evens, 2021. *Vegetation Classification of Alliances and Associations in Marin County, California.* California Native Plant Society. Available online at www.cnps.org/wp-content/uploads/2021/09/marin_co-_veg_classification-2021.pdf.

[7] Sikes, K., J. Buck-Diaz, and J.M. Evens, 2021. *Vegetation Classification of Alliances and Associations in San Mateo County, California.* California Native Plant Society. Available online at www.cnps.org/wp-content/uploads/2022/02/veg-sanmateo_county-classification-2021.pdf.

[8] Keeler-Wolf, T., and M. Vaghti, 2000. *Vegetation Mapping of Suisun Marsh, Solano County, California.* A report to the California Department of Water Resources. California Department of Fish and Game, California Natural Diversity Database, Sacramento, CA.

TABLE 3.4-1
SPECIAL-STATUS ANIMAL SPECIES POTENTIALLY OCCURRING IN THE BIOLOGICAL RESOURCES STUDY AREA

Name	Status	Habitat	Potential for Occurrence in or Adjacent to the BSA		
			Present	Potentially Present	Absent as Breeder
Federal or State Endangered, Threatened, or Candidate Species					
Green sturgeon (*Acipenser medirostris*)	FT, CSSC	Spawns in large river systems, such as the Sacramento River; forages in nearshore oceanic waters, bays, and estuaries.		X	
White sturgeon (*Acipenser transmontanus*)	SC, CSSC	Spawns in large river systems, such as the Sacramento River; forages in nearshore oceanic waters, bays, and estuaries.			X
Longfin smelt (*Spirinchus thaleichthys*)	FP, ST	Spawns in freshwater in the upper end of the bay; occurs year-round in the south San Francsico Bay.	X		
Central California Coast ESU steelhead (*Oncorhynchus mykiss irideus*)	FT	Occurs in cool streams with suitable spawning habitat and conditions allowing migration between spawning and marine habitats.	X		
Bald eagle (*Haliaeetus leucocephalus*)	SE, SP	Occurs mainly along seacoasts, rivers, and lakes; nests in tall trees or in cliffs, occasionally on electrical towers. Feeds mostly on fish.			X
Burrowing owl (*Athene cunicularia*)	SC, CSSC	Nests and roosts in open grasslands and ruderal habitats with suitable burrows, usually those made by California ground squirrels.			X
Western snowy plover (*Charadrius nivosus nivosus*)	FT	Occurs in sandy beaches on marine and estuarine shores and salt pannes in bay saline-managed ponds.	X		
California black rail (*Laterallus jamaicensis coturniculus*)	ST, SP	Breeds in fresh, brackish, and tidal salt marsh.	X		
California Ridgway's rail (*Rallus obsoletus obsoletus*)	FE, SE, SP	Occurs in salt marsh habitat dominated by pickleweed and cordgrass (*Spartina* spp.).	X		
California least tern (*Sternula antillarum browni*)	FE, SE, SP	Nests along coast on bare/sparsely vegetated, flat substrates. In south San Francisco Bay nests in salt pannes, islands, and on an old airport runway. Forages for fish in open waters.			X
Tricolored blackbird (*Agelaius tricolor*)	ST	Nests near freshwater in dense emergent vegetation.			X
Salt marsh harvest mouse (*Reithrodontomys raviventris*)	FE, SE, SP	Occurs in salt marsh habitat dominated by common pickleweed or alkali bulrush.	X		
Monarch butterfly (*Danaus plexippus*)	FPT	Requires milkweeds (*Asclepias* spp.) for egg-laying and larval development, but adults obtain nectar from a wide variety of flowering plants in many habitats. Individuals congregate in winter roosts, primarily in Mexico and in widely scattered locations on the Central and Southern California coast.	X		

Name	Status	Habitat	Potential for Occurrence in or Adjacent to the BSA		
			Present	Potentially Present	Absent as Breeder
Crotch's bumble bee *(Bombus crotchii)*	SC	Occurs in open grassland and scrub habitats with abundant flowers and with subterranean nest sites (e.g., animal burrows).		X	
California Species of Special Concern					
Central Valley fall-run evolutionary significant unit (ESU) Chinook Salmon (*Oncorhynchus tshawytscha*)	CSSC	Occurs in cool rivers and large streams that reach the ocean and that have shallow, partly shaded pools, riffles, and runs for spawning; adults forage in marine habitats.	X		
Pacific lamprey (*Entosphenus tridentatus*)	CSSC	Occurs in medium- and large-sized, low-gradient cold rivers and streams, with a wide range of habitats (e.g., gravel, low-gradient riffles).	X		
Golden eagle (*Aquila chrysaetos*)	SP	Breeds on cliffs or in large trees (rarely on electrical towers); forages in open areas.			X
Black skimmer (*Rynchops nigra*)	CSSC (nesting)	Nests and roosts on bare ground on isolated islands, forages for fish in freshwater, brackish, and marine waters.	X		
Alameda song sparrow (*Melospiza melodia pusillula*)	CSSC	Nests in salt marsh, primarily in marsh gumplant and cordgrass along channels.	X		
Bryant's savannah sparrow (*Passerculus sandwichensis alaudinus*)	CSSC	Nests in pickleweed-dominant salt marsh and adjacent ruderal habitat.	X		
Northern harrier (*Circus hudsonius*)	CSSC (nesting)	Nests in marshes and moist fields with tall vegetation and sufficient moisture to inhibit accessibility of nest sites to predators. Forages over open areas.	X		
Loggerhead shrike (*Lanius ludovicianus*)	CSSC (nesting)	Nests in tall shrubs and dense trees; forages in grasslands, marshes, and ruderal habitats.			X
San Francisco common yellowthroat (*Geothlypis trichas sinuosa*)	CSSC	Nests in herbaceous vegetation, usually in wetlands or moist floodplains.	X		
Yellow warbler (*Setophaga petechia*)	CSSC (nesting)	Nests in riparian woodlands.			X
Yellow rail (*Coturnicops noveboracensis*)	CSSC	Nests in freshwater sedge marshes with moist soil or shallow standing water.			X
Pallid bat (*Antrozous pallidus*)	CSSC	Forages over many habitats; roosts in caves, rock outcrops, buildings, and hollow trees.			X
Townsend's big-eared bat (*Corynorhinus townsendii*)	CSSC	Roosts in caves and mine tunnels, and occasionally in deep crevices in trees, such as redwoods or in abandoned buildings, in a variety of habitats.			X

Name	Status	Habitat	Potential for Occurrence in or Adjacent to the BSA		
			Present	Potentially Present	Absent as Breeder
Western red bat (*Lasiurus blossevillii*)	CSSC	Roosts in foliage in forest or woodlands, especially in or near riparian habitat.			X
Salt marsh wandering shrew (*Sorex vagrans halicoetes*)	CSSC	Occurs in medium to high marsh 6 to 8 feet above sea level with abundant driftwood and common pickleweed.		X	
State Fully Protected Species					
White-tailed kite (*Elanus leucurus*)	SP	Nests in tall shrubs and trees; forages in grasslands, marshes, and ruderal habitats.			X
Marin Mammal Protection Act Protected Species					
Harbor seal (*Phoca vitulina*)	MMPA	Widely distributed across Northern Hemisphere in coastal waters and on rocky islands, sandy beaches, and mudflats for haul-out sites.			X
California sea lion (*Zalophus californianus*)	MMPA	Found along the West Coast of North America in coastal waters and on beaches, docks, buoys, and jetties for haul-out sites.		X	

Key to Status Abbreviations: CSSC = California Species of Special Concern; FC = Candidate for Federal Listing; FE = Federally Endangered; FPT = Proposed for Federal Listing as Threatened; FT = Federally Threatened; MMPA = Marine Mammal Protection Act; SC = Proposed for State Listing; SE = State Endangered; SP = State Fully Protected; ST = State Threatened.

SOURCE: H.T. Harvey & Associates 2025

the state would be regulated by the regional water quality control board (RWQCB) based on the presence of hydrophytic vegetation, direct observations of hydrology (i.e., flowing surface water), and their location between the ordinary high water marks (OHWM). The channels are considered other waters of the U.S. based on the presence of an OHWM, regular flow, perennial hydrology in most years, and direct hydrologic connectivity to the San Francisco Bay. The RWQCB may also claim the banks of these creeks, and riparian habitat rooted below the top of bank, as waters of the state.

Beds and Banks Regulated Under California Fish and Game Code Section 1600 et seq.

Section 1602 of the Fish and Game Code establishes jurisdiction over the bed, channel, or bank of any river, stream, or lake. CDFW typically extends its riparian jurisdiction to the outer extent of the riparian tree or shrub canopy. Due to its rarity and disproportionately high habitat values and functions to wildlife, CDFW considers riparian habitat to be sensitive. Potentially jurisdictional channels include Runnymede Canal north of San Francisquito Creek, Ravenswood Slough, Bayfront Canal, and Flood Slough.

Essential Fish Habitat

San Francisco Bay is designated as Essential Fish Habitat (EFH) for the Pacific Coast Salmon, Coastal Pelagics, and Pacific Groundfish fishery management plans (FMPs). All tidal aquatic habitats associated with the San Francisco Bay along the Project alignment, including managed ponds, are considered EFH under these FMPs, and a number of fish species managed per these FMPs occur in tidal waters in the BSA.

Wildlife Movement and Habitat Connectivity

Wildlife movement within and in the Project site vicinity takes many forms and is different for the various suites of species associated with these lands. Bird and bat species move readily over the landscape in the Project vicinity, foraging over and within both natural lands and landscaped areas. Mammals of different species move within their home ranges but also disperse between patches of habitat. Generally, reptiles and amphibians similarly settle within home ranges, sometimes moving to central breeding areas, upland refugia, or hibernacula in a predictable manner, but also dispersing to new areas. Some species, especially among birds and bats, are migratory, moving into or through the Project vicinity during specific seasons. Aside from bats, no other mammal species are in the vicinity of the site that are truly migratory. However, the young of many mammal species disperse from their natal home ranges, sometimes moving over relatively long distances in search of new areas in which to establish.

Movement corridors are segments of habitat that provide linkage for wildlife through the mosaic of suitable and unsuitable habitat types found within a landscape while also providing cover. On a broader level, corridors also function as paths along which wide-ranging animals can travel, populations can move in response to environmental changes and natural disasters, and genetic interchange can occur. In California, environmental corridors often consist of riparian areas along streams, rivers, or other natural features.

Due to the density of development in the Project region and the lack of continuous, well-vegetated pathways through the nearby urban areas, there are currently no well-defined movement corridors for animals within or through the Project site. Wildlife species may move through the area using cover and refugia as they find them available, and mammals and reptiles may move along the Bayshore. However, connectivity between the BSA and upland habitats is interrupted by significant commercial development, United States Route 101 (U.S. Route 101), State Route (SR) 84, and other roads and culverted areas.

Migratory birds, including waterbirds associated with the bay and terrestrial species, migrate along the edge of San Francisco Bay. For example, nocturnal migrant birds that find themselves over the bay in the morning would seek roosting and foraging areas along the edge of the bay. As a result, the numbers of migrant birds on the Project site would be high during the fall, winter, and spring.

In summary, the Project site is not a particularly important area for movement by non-flying wildlife and lacks high-quality corridors allowing dispersal of such animals. However, migratory birds are expected to occur on, or at least fly through or past, the Project site in high abundance.

3.4.2 Regulatory Framework

Federal

Clean Water Act Section 404[9]

The Clean Water Act (CWA) (U.S. Code title 33, section 1251 et seq. [33 U.S. Code 1251 et seq]) functions to maintain and restore the physical, chemical, and biological integrity of waters of the U.S., which include, but are not limited to, tributaries to traditionally navigable waters currently or historically used for interstate or foreign commerce, and adjacent wetlands. Historically, in non-tidal waters, USACE jurisdiction extends to the OHWM,[10] which is defined in title 33, section 328.3 of the Code of Federal Regulations. If there are wetlands adjacent to channelized features, the limits of USACE jurisdiction extend beyond the OHWM to the outer edges of the wetlands. In tidal waters, USACE jurisdiction extends to the landward extent of vegetation associated with salt or brackish water or the high-tide line. The high-tide line is defined in 33 Code of Federal Regulations section 328.3 in part as "the line of intersection of the land with the water's surface at the maximum height reached by a rising tide." A May 25, 2023, U.S. Supreme Court decision in *Sackett v. Environmental Protection Agency* limited the definition of jurisdictional wetlands that are considered waters of the U.S. to those wetlands having a continuous surface connection with waters of the U.S.[11]

Section 404 of the CWA authorizes USACE to issue permits to regulate the discharge of dredged or fill material into waters of the U.S. Much of the BSA is located within jurisdictional aquatic or managed pond habitat, tidal salt marsh below the high-tide line, and non-tidal wetlands that are expected to be considered waters of the U.S. by USACE. Project activities would require a 404 permit from USACE.

Clean Water Act Section 401

Under CWA section 401, applicants for a federal license or permit to conduct activities that may result in the discharge of dredged and fill materials into surface waters of the U.S. (including wetlands) must obtain section 401 Water Quality Certification so that any such discharge would comply with the applicable provisions of the CWA and state water quality standards. Therefore, all projects that have a federal component and may affect state water quality (including projects that require federal agency approval, such as issuance of a CWA section 404 permit) must also comply with CWA section 401. The

[9] USACE (United States Army Corps of Engineers), 2025. "Scope of Corps' Regulatory Jurisdiction." Definition of Waters of the U.S. Available online at www.spn.usace.army.mil/Missions/Regulatory/Regulatory-Overview/Scope-of-Corps-Regulatory-Jurisdiction/.

[10] USACE (United States Army Corps of Engineers), 2025. "Scope of Corps' Regulatory Jurisdiction." Definition of Waters of the U.S. Available online at www.spn.usace.army.mil/Missions/Regulatory/Regulatory-Overview/Scope-of-Corps-Regulatory-Jurisdiction/.

[11] 598 U.S. Code 651, 684 (2023).

goal of CWA section 401 is to include evaluation of water quality when considering activities associated with placement of fill materials into waters of the U.S. The State Water Resources Control Board (State Water Board) together with the RWQCBs are charged with implementing water quality certification in California.

The Project would require a section 401 Water Quality Certification from the State Water Board and RWQCB.

Rivers and Harbors Act Section 10

Section 10 of the Rivers and Harbors Act of 1899 prohibits the creation of any obstruction to navigable waters of the U.S.,[12] including discharge of fill and the building of any wharfs, piers, jetties, and other structures without congressional approval or authorization by the Chief of Engineers and Secretary of the Army (33 U.S. Code 403). The USACE does not regulate wetlands under section 10, only the aquatic or open waters component of bay habitat, and there is overlap between section 10 jurisdiction and section 404 jurisdiction. According to 33 Code of Federal Regulations section 329.9, a waterbody that was once navigable in its natural or improved state retains its character as "navigable in law" even though it is not presently used for commerce because of changed conditions and/or the presence of obstructions. Historical section 10 waters (e.g., remnant sloughs) may occur behind levees in areas that are not currently exposed to tidal or muted tidal influence and meet the following criteria:

(1) The area is presently at or below the mean high water (MHW) line;

(2) The area was historically at or below the MHW in its "unobstructed, natural state"; and

(3) There is no evidence that the area was ever above the MHW.[13]

If a project also proposes to discharge dredged or fill material and/or introduce other potential obstructions in navigable waters of the U.S., a Letter of Permission authorizing these impacts must be obtained from USACE under section 10 of the Rivers and Harbors Act.[14]

The BSA overlaps with current section 10 Waters as portions of the work areas are within the jurisdictional limit of tidal waters (below MHW). The BSA also overlaps with historical section 10 Waters as portions of the BSA are behind levees that are presently below MHW. Therefore, the Project would require a Letter of Permission.

[12] Navigable waters of the U.S., which are defined in 33 Code of Federal Regulations section 329.4, include all "waters that are subject to the ebb and flow of the tide, and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce." The shoreward jurisdictional limit of tidal waters is further defined in 33 Code of Federal Regulations section 329.12 in part as "the line on the shore reached by the plane of the mean (average) high water."

[13] USACE (United States Army Corps of Engineers), 2013. Administrative Appeal Decision Clean Water Act Zeneca Lagoons, Contra Costa County, California San Francisco District File Number SPN-2003-282520S. December 19, 2013

[14] USACE (United States Army Corps of Engineers), 2024. *Letter of Permission Procedure for Discharges of Dredged or Fill Material into Waters of The United States with Less Than Significant Impacts on The Human Environment*. Available online at www.spk.usace.army.mil/Portals/12/documents/regulatory/public_notices/FY2024/EXP-SEP-24/2024.09.20-Regional-CWA-404-LOP-202400011.pdf.

Federal Endangered Species Act Section 7[15]

FESA (16 U.S. Code 1531 et seq.) protects federally listed 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."[16] Take can also include habitat modification or degradation that directly results in death or injury of a listed wildlife species. An activity can be defined as take even if it is unintentional or accidental. Listed plant species are also legally protected from take under FESA in certain circumstances, such as if they occur on federal lands or effects are in violation of state law.

As indicated in Table 3.4-1, numerous federally listed threatened and endangered species occur in the BSA. Consequently, the Project must comply with FESA. The federally endangered California Ridgway's rail and salt marsh harvest mouse are known to occur in the BSA in tidal marshes located immediately east of the San Francisco Bay Trail (Bay Trail) in the South of Bay Road and North of Bay Road reaches of the Project, and within Ravenswood Slough in the Substation and Marsh Restoration and Tech Campus reaches (Figure 3.4-1). The federally threatened western snowy plover is known to breed in salt ponds within the BSA, including Ponds R1 and R2 in the Substation and Marsh Restoration Reach, Pond SF2 within the Dumbarton Approach Reach, and Ponds R3, R4, and R5/S5 within the Tech Campus and Bayfront Expressway reaches (Figure 3.4-1). Foraging western snowy plovers are occasionally found on tidal mudflats on the outboard side of ponds R1, R4, and SF2.[17] The federally endangered California least tern does not breed in the BSA, but it may occur in small numbers as a forager from April through August, in open waters that support fish. The federally threatened Central California Coast steelhead ESU and green sturgeon southern distinct population segment, and the proposed endangered longfin smelt may occur in tidal sloughs and channels within the BSA, though they are not expected to breed in the BSA. The federally proposed species monarch butterfly could breed in the BSA if milkweed (*Asclepias* spp.) is present, but it is more likely to occur as a migrant. The northwestern pond turtle (*Actinemys marmorata*), federally proposed as threatened, is not found in the BSA due to the lack of suitable habitat.

Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (16 U.S. Code 1801 et seq.) governs all fishery management activities that occur in federal waters within the U.S.'s 200-nautical-mile limit. The law establishes eight Regional Fishery Management Councils responsible for the preparation of FMPs to achieve the optimum yield from U.S. fisheries in their regions. These councils, with assistance from National Marine Fisheries Service (NMFS), establish EFH in FMPs for all managed species. Federal agencies that fund, permit, or implement activities that may adversely affect EFH are required to consult with the NMFS regarding potential adverse effects of their actions on EFH, and respond in writing to recommendations by the NMFS.

San Francisco Bay is designated as EFH for the Pacific Coast Salmon, Coastal Pelagics, and Pacific Groundfish FMPs. All tidal aquatic habitats associated with the San Francisco Bay along the Project alignment are considered EFH under these FMPs, and a number of fish species managed by these FMPs occur in tidal waters in the BSA. Consequently, a federal agency with authority over the Project, such as

[15] Information in this section is from 16 U.S. Code 1531–1544.

[16] U.S. Congress. 1973. U.S. Code: Endangered Species. 16 U.S. Code 1531–1544.

[17] B. Pearl, pers. obs. [2013–2022]

USACE, would be required to consult with NMFS regarding compliance with the Magnuson-Stevens Fishery Conservation and Management Act.

Migratory Bird Treaty Act

The federal Migratory Bird Treaty Act (16 U.S. Code 703 et seq.) prohibits the killing, possessing, or trading of migratory birds except in accordance with regulations prescribed by the Secretary of the Interior. The Migratory Bird Treaty Act protects whole birds, parts of birds, and bird eggs and nests, and it prohibits the possession of all nests of protected bird species whether they are active or inactive. An active nest is defined as having eggs or young, as described by the U.S. Fish and Wildlife Service (USFWS) in its June 14, 2018, memorandum: "Destruction and Relocation of Migratory Bird Nest Contents." Nest starts (nests that are under construction and do not yet contain eggs) and inactive nests are not protected from destruction.[18]

All native bird species that occur within the BSA are protected under the Migratory Bird Treaty Act (refer to discussions under Impact BIO-1 in Section 3.4.3).

Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (16 U.S. Code 668–668d) makes it unlawful to import, export, take, sell, purchase, or barter any bald eagle or golden eagle, or their parts, products, nests, or eggs, among other acts. Take includes pursuing, shooting, poisoning, wounding, killing, capturing, trapping, collecting, molesting, or disturbance. The Department of the Interior has interpreted the Bald and Golden Eagle Protection Act to authorize issuance of regulations to permit the taking of eagles for various purposes, provided the taking is compatible with the preservation of the bald eagle or the golden eagle.

Project implementation would not adversely affect nesting bald eagles and golden eagles or otherwise result in take of these species; therefore, a Bald and Golden Eagle Protection Act incidental take permit would not be necessary.

Marine Mammal Protection Act[19]

The Marine Mammal Protection Act (16 U.S. Code 1361 et seq.) prohibits the take of marine mammals, with certain exceptions, in waters under the jurisdiction of the U.S. or by citizens of the U.S. on the high seas, as well as the importation of marine mammals and marine mammal products into the U.S. *Take* is defined as "to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal."[20] *Harassment* is defined as "any act of pursuit, torment, or annoyance which has the potential to injure a marine mammal or marine mammal stock in the wild; or has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering."

Pacific harbor seals (*Phoca vitulina richardsi*) and California sea lions (*Zalophus californianus*), which are protected under the Marine Mammal Protection Act, are known to occur in open bay waters in the Project site vicinity. One of six recognized Pacific harbor seal haul-out sites in the South San Francisco

[18] USFWS (U.S. Fish and Wildlife Service), 2018. *Migratory Bird Permit Memorandum: Destruction and Relocation of Migratory Bird Nest Contents.* FWS/DMBM/AMB/068029, 4 pages.

[19] Information in this section is from 16 U.S. Code 1361–1423h.

[20] U.S. Congress. 1972. Marine Mammal Protection Act. 16 U.S. Code 1361–1423h.

Bay is located at Bair Island approximately 3.5 miles northwest of the Project site,[21] and harbor seals may occasionally forage in open water in Flood Slough, Ravenswood Slough, and large tidal channels within marshes in the BSA, and regularly within the open bay along Pond R1. California sea lions do not breed in San Francisco Bay but occasionally occur as common residents of the bay year-round. The Project is required to comply with the Marine Mammal Protection Act.

Don Edwards San Francisco Bay National Wildlife Refuge: Final Comprehensive Plan

The National Wildlife Refuge System Improvement Act of 1997 (16 U.S. Code 668dd–668ee; 1997 Improvement Act) required all refuges within the National Wildlife Refuge System to be managed in accordance with an approved Comprehensive Conservation Plan by 2012.[22] The Don Edwards San Francisco Bay National Wildlife Refuge (Refuge) prepared the *Don Edwards San Francisco Bay National Wildlife Refuge Final Comprehensive Conservation Plan and Environmental Assessment* (*Don Edwards SFB NWR Final CCP/EA*)[23] to guide refuge management for a 15-year period from 2012 through 2027. Management goals identified in the *Don Edwards SFB NWR Final CCP/EA* that relate to species and habitats in the BSA are described below.

Goal 1 of the *Don Edwards SFB NWR Final CCP/EA* is to "Protect and contribute to the recovery of endangered, threatened, and other special-status species on the Refuge by conservation and management of the habitats on which these species depend." Applicable objectives for this goal are as follows:

1.1 Conduct standardized monitoring efforts and research projects in coordination with other regional efforts for salt marsh harvest mouse and California Ridgway's rail [California clapper rail in the *Don Edwards SFB NWR Final CCP/EA*] within five years. Improve high tide refugia for these species.

1.2 Maintain a 15-year average of one fledged chick per male western snowy plover. Provide appropriate substrate for at least 125 western snowy plover nests annually within five years of implementing the nest site enhancements.

1.4 Improve ecological function of tidal and managed marsh, especially at La Riviere Marsh, Mayhews Landing, and New Chicago Marsh units in order to enhance tidal marsh habitat.

1.5 Upon Plan approval, implement the mammalian predator management and the avian predator management plans.

Goal 2 of the *Don Edwards SFB NWR Final CCP/EA* is to "Conserve, restore, enhance, create, and acquire habitats to support the diversity and abundance of migratory birds and other native flora and fauna that depend on the South San Francisco Bay Ecosystem." Applicable objectives for this goal are as follows:

2.5 Within the life of the Plan, enhance and restore marsh-upland ecotone, especially at Faber-Laumeister, La Riviere Marsh, EEC, Pond A6, Pond A8, and 75 miles of levee by

[21] Fox, K.S, 2008. "Harbor seal behavioral response to boaters at Bair Island reserve." Master's thesis in Environmental Studies, San Jose State University.

[22] 16 U.S. Code 668dd(e).

[23] USFWS (U.S. Fish and Wildlife Service), 2012. *Don Edwards San Francisco Bay National Wildlife Refuge: Final Comprehensive Conservation Plan and Environmental Assessment*.

establishing a dominance (>50 percent) of native plants along the levees or transitional uplands of the Refuge.

2.9 Within five years, investigate and respond to current and future climate change impacts to Refuge properties and resources.

Project implementation would affect species and habitats subject to the management goals of the *Don Edwards SFB NWR Final CCP/EA*. Refer to Impact BIO-5 in Section 3.4.3.

State

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act (California Water Code section 13000 et seq.) provides for protection of the quality of waters of the state for use and enjoyment by the people of California. The law broadly defines waters of the state as "any surface water or groundwater, including saline waters, within the boundaries of the state."[24] Because the law applies more broadly to waters of the state,[25] whereas CWA applies only to waters of the U.S., California's jurisdictional reach overlaps and may exceed the boundaries of waters of the U.S. Refer to Section 3.11, Hydrology and Water Quality, for information on the Porter-Cologne Water Quality Control Act and water quality regulations that limit impacts on aquatic and riparian habitats from a variety of urban sources.

All wetlands and other waters described in Section 3.1.1 as being regulated by USACE under section 404 of the CWA would also be considered waters of the state by RWQCB. In addition, RWQCB could potentially regulate some features that would not be considered waters of the U.S., such as wetlands, that lack a continuous surface connection to navigable waters and the banks of San Francisquito Creek between the OHWM and the top of bank. Porter-Cologne Waste Discharge Requirements may also be necessary.

Clean Water Section 401 Certification

CWA section 401 (discussed previously) also requires compliance with state water quality standards for actions within state waters. Under CWA section 401, every applicant for a federal permit or license for any activity that may result in a discharge to a waterbody must obtain a State Water Quality Certification that the proposed activity would comply with state water quality standards.

Because the Project would result in fill of features that are considered both waters of the U.S. and waters of the state, a section 401 Water Quality Certification would be necessary.

McAteer-Petris Act

Section 3.2, Aesthetic Resources, discusses the establishment and authority of the San Francisco Bay Conservation and Development Commission (BCDC) pursuant to the McAteer-Petris Act. BCDC is authorized to control both bay filling and dredging and bay-related shoreline development and manages

[24] California Water Code section 13000 et seq.

[25] On April 2, 2019, the State Water Board adopted the *State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State*. In these guidelines, riparian habitats are not specifically described as waters of the state but instead as important buffer habitats to streams that conform to the State Wetland Definition. The *Procedures* describe riparian habitat buffers as both important resources that may be included in required mitigation packages for permits for impacts on waters of the state, as well as areas requiring permit authorization from the RWQCBs.

its jurisdiction through the *San Francisco Bay Plan* (Bay Plan) and the Suisun Marsh Protection Plan.[26] BCDC jurisdiction includes a 100-foot-wide band along the shoreline[27] of the San Francisco Bay. BCDC will claim all sloughs (specifically, marshlands lying between mean high tide and up to 5 feet above mean sea level [AMSL] where marsh vegetation is present); tidelands (lands between mean high tide and mean low tide); and submerged lands (land lying below mean low tide) in this region.[28]

Because tidal waters and marshlands occur in the BSA, the Bay Shoreline would be located 5 feet AMSL, and this elevation line would be used to demarcate the limit of BCDC bay jurisdiction. A 100-foot area extending laterally landward of this Bay Shoreline would be jurisdictional as Shoreline Band. Within the BSA, the Shoreline Band extends laterally landward either to its 100-foot extent or until it intersects another Bay Shoreline (e.g., tidal habitats occur to both the north and south of the access roads, in some cases within less than 100 feet). An AMSL elevation of 3.48 feet relative to the North American Vertical Datum of 1988 (NAVD88) was obtained from the nearest National Oceanic and Atmospheric Administration tidal benchmark station at Dumbarton Bridge (Station #9414509), and thus the Bay Shoreline, shoreward limit of BCDC Bay jurisdiction, and bayward limit of BCDC Shoreline Band jurisdiction is approximately 8.48 feet NAVD88. Ponds R1, R2, R3, R4, R5, S5, and SF2 are former salt production ponds, and therefore these ponds and their levees would continue to have the Salt Pond jurisdictional designation under BCDC. The portion of the Ravenswood Open Space Preserve within the BSA is a fully tidal, restored salt pond, and would therefore have both bay and Salt Pond jurisdiction. Because Project implementation would occur within BCDC jurisdiction, a BCDC permit would be necessary. It is the policy of the Bay Plan (Policy 7 from Plan Map 6) that in the vicinity of Pond R1, projects are allowed only if they are protective of harbor seals and other sensitive wildlife.

California Endangered Species Act[29]

CESA (Fish and Game Code chapter 1.5, section 2050 et seq.) prohibits the take of any plant or animal listed or proposed for listing as rare (plants only), threatened, or endangered. In accordance with CESA, CDFW has jurisdiction over state-listed species (Fish and Game Code 2070). CDFW regulates activities that may result in take of individuals (i.e., "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill").[30] Habitat degradation or modification is not expressly included in the definition of take under the Fish and Game Code. CDFW, however, has interpreted take to include the "killing of a member of a species which is the proximate result of habitat modification."

As indicated in Table 3.4-1, numerous state-listed species are within the BSA; consequently, Project implementation would require compliance with CESA. The state endangered California Ridgway's rail and salt marsh harvest mouse, and the threatened California black rail, are known or expected to occur in the BSA in the Faber and Laumeister marshes, in the South of Bay Road and North of Bay Road reaches, and within Ravenswood Slough in the Substation and Marsh Restoration and Tech Campus reaches (refer

[26] BCDC (San Francisco Bay Conservation and Development Commission), 2020. *San Francisco Bay Plan*, May 5, 2020. The Bay Plan was completed and adopted by BCDC in 1968 and was transmitted to the California Legislature and the Governor in 1969; the Bay Plan has since been amended, with the most recent document released in May 2020.

[27] The *shoreline* is defined as all areas that are subject to tidal action from the south end of the San Francisco Bay to the Golden Gate (Point Bonita–Point Lobos), and to the Sacramento River line (a line between Stake Point and Simmons Point, extended northeasterly to the mouth of Marwill Cut).

[28] Government Code section 66600 et seq.

[29] Information in this section is from Fish and Game Code chapter 1.5, sections 2050 et seq.

[30] Fish and Game Code chapter 1.5, sections 2050 et seq.

to Figure 3.4-1). The state candidate Crotch's bumble bee is known to occur near the BSA as close as 1.3 miles to the southeast in the Palo Alto Baylands and may occur as a breeder and forager in the BSA where ruderal upland and ruderal levee slope habitat is present. The state endangered California least tern and bald eagle do not breed in the BSA but may occur as foragers in all reaches that support fish populations. The state threatened tricolored blackbird does not breed in the BSA, but it may occur as a forager in non-tidal brackish marsh, ruderal upland, or ruderal levee slope habitats. The state threatened longfin smelt is not expected to breed in the BSA but may occur in tidal sloughs and channels within the BSA. The state candidate burrowing owl is not expected to breed in the BSA but may occur as a wintering visitor or migrant where suitable burrows are present.

California Fish and Game Code

Fish and Game Code Section 1600 et seq. – Lake and Streambed Alteration Program

Pursuant to Fish and Game Code section 1600 et seq., CDFW regulates any project proposed by any person that would "substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any river, stream, or lake designated by the department, or use any material from the streambeds."[31] Fish and Game Code section 1602 requires an entity to notify CDFW of any proposed activity that may modify a river, stream, or lake. If CDFW determines that proposed activities may substantially adversely affect fish and wildlife resources, a Lake and Streambed Alteration Agreement must be prepared.

Project implementation would affect the bed and banks of streams regulated by CDFW under Fish and Game Code section 1600 et seq. Therefore, the Project would require a Lake and Streambed Alteration Agreement.

Fish and Game Code – Fully Protected Species

California statutes[32] afford fully protected status to numerous specifically identified birds, mammals, reptiles, and amphibians. These species cannot be taken, even with an incidental take permit, unless authorized by a Natural Communities Conservation Plan.

Fully protected species that may be affected by the Project are California Ridgway's rail, California black rail, salt marsh harvest mouse, and white-tailed kite. Refer to the discussion under Impact BIO-1 in Section 3.4.3 for more information.

Fish and Game Code Sections 3503, 3513, and 3800

Fish and Game Code sections 3503, 3513, and 3800 (and other sections and subsections) protect native birds, including their nests and eggs, from all forms of take. CDFW considers disturbance that causes nest abandonment and/or loss of reproductive effort as take. Raptors (e.g., eagles, hawks, and owls) and their nests are specifically protected in California under Fish and Game Code sections 3503.5, which states that it is "unlawful to take, possess, or destroy any birds in the order Falconiformes or Strigiformes (birds of

[31] Regarding the definition of a river or stream or lake, at a minimum, CDFW claims jurisdiction over the waterbody's bed and bank. Where riparian habitat is present, the outer edge of riparian vegetation is generally used as the line of demarcation between riparian and upland habitats (Fish and Game Code section 1602).

[32] See Fish and Game Code sections 3505, 3511, 4700, 5050, and 5515.

prey) or to take, possess, or destroy the nest or eggs of any such bird except as otherwise provided by this code or any regulation adopted pursuant thereto."

All native birds in the study area, and some non-native birds, are protected by these Fish and Game Code sections. Refer to discussion under Impact BIO-1 for more information.

Fish and Game Code Section 4150

Bats and other non-game mammals are protected by Fish and Game Code section 4150, which states that all non-game mammals or parts thereof may not be taken or possessed except as provided otherwise in the code or in accordance with regulations adopted by the commission. Activities resulting in mortality of non-game mammals (e.g., destruction of an occupied non-breeding bat roost, resulting in the death of bats), or disturbance that causes the loss of a maternity colony of bats (resulting in the death of young), may be considered take by CDFW.[33]

The BSA does not provide suitable habitat to support a maternity colony or large non-maternity roost of bats. Refer to the discussion under Impact BIO-4 for more information.

Local

General Plans

The Project would be subject to local plans and policies of the jurisdictions in which it is located, including East Palo Alto, Menlo Park, and Redwood City. **Table 3.4-2** presents local plans and policies regarding biological resources to support consideration of Project consistency with general plan policies.

3.4.3 Impacts and Mitigation Measures

Significance Criteria

In accordance with CEQA, CEQA Guidelines (including Appendix G), relevant plans, policies, and/or guidelines, and agency standards, the Project would have a significant impact if it were to do 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 the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service;
- Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means;
- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service;

[33] Fish and Game Code section 4150.

- 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, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

TABLE 3.4-2
LOCAL PLANS AND POLICIES RELEVANT TO THE PROJECT – BIOLOGICAL RESOURCES

CITY OF EAST PALO ALTO REVISED TREE ORDINANCE (02-2022)
The East Palo Alto tree ordinance defines protected trees as follows: • Protected public trees: Any tree within the public right-of-way or on public property, regardless of size. • Protected private trees: Any tree on private property having a main stem or trunk of 8" or greater in diameter at a height of 54" above grade; any tree required to be preserved as a condition of a development approval; any tree required to be planted as a condition of a development approval. The public works director may remove or cause the removal of any protected public tree found to be dead, damaged beyond repair, having a compromised root system that cannot adequately support the tree, causing storm drain or sanitary sewer stoppages which cannot be remedied, causing structural damage that cannot be mitigated by pruning limbs or roots, or hazardous to the public safety or welfare. A protected public tree may be removed when it interferes with proposed development, repair, alteration, or improvement of a site and preservation of the tree would be considered a taking of real property, so long as the proper permit is obtained. Tree removal, if approved, may only occur once building permits are issued. A protected public tree may be removed when removal is requested by a utility, public transportation agency, or other governmental agency due to a health or safety risk resulting from the tree's interference with existing or planned public infrastructure and preservation of the tree would add unreasonable cost to the project. Removal or pruning of a protected public tree by a private project or entity other than the city requires a permit. Removal of protected private trees requires a permit. Criteria for removal of a protected private tree are specified in the ordinance and briefly summarized as follows: the tree is dead, expected to die within 5 years, poses a high or extreme risk, is classified as invasive by Cal-IPC, is structurally unsound and cannot be corrected, is causing visible damage to property which cannot be corrected, interferes with necessary/thoughtfully-designed development, or conflicts with resolution of a public safety risk by a government agency and preservation would add unreasonable cost to the project.
CITY OF EAST PALO ALTO GENERAL PLAN POLICIES
Policy POC-1.9: With the financial and administrative support of Mid-Peninsula Regional Open Space, build new Bayfront trails and City-Bay trails. Support wetland restoration and science education exhibits.
Policy POC-1.10: Construct new trails or multi-use paths, particularly along the San Francisquito Creek or in the Baylands.
Policy POC-2.7: Encourage public recreational use and access to the Baylands, South Bay Salt Pond, and other nearby open space, in coordination with the Don Edwards San Francisco Bay National Wildlife Refuge and other partners and in a manner that does not adversely impact the natural environment.
Policy POC-4.1: Ensure that public access to the Bay is designed, developed, and maintained in a manner that protects the existing natural resources and habitats.
Policy POC-4.2: Protect wildlife from adverse impacts caused by human activities.
Policy POC-4.3: Coordinate with federal agencies and neighboring cities to manage the Don Edwards San Francisco Bay National Wildlife Refuge in a manner consistent with the Conservation Plan, including increased survey efforts on native fauna/flora, additional improvements to tidal marsh areas, enhanced visitor service and expanding the volunteer program and adopt ’15 Comprehensive Conservation Plan’.
Policy POC-4.6: Ensure that new development and landscaping adjacent to tidal marshes and other Bayfront areas avoids tall perches for raptors or other predatory birds. Protect the salt-marsh harvest mouse from feral cat predation.

CITY OF MENLO PARK MUNICIPAL CODE
City Code Section 13.24.040: It is unlawful for any person to remove, or cause to be removed, any heritage tree from any parcel of property in the city, or perform major pruning on a heritage tree, without obtaining a permit. The removal of trees other than oaks with a trunk that measures 47.1 inches in circumference (15 inches in diameter) or more 54 inches above the natural grade, oak trees (*Quercus*) native to California with trunks that measure 31.4 inches in circumference (10 inches in diameter) or more 54 inches above natural grade, or a tree or group of trees of historical significance, special character or community benefit, or specifically designated by resolution of the city council, are considered heritage trees and require the issuance of a permit by the City's Public Works department.
CITY OF MENLO PARK GENERAL PLAN POLICIES
Policy LU-6.6: Protect and support public access to the Bay for the scenic enjoyment of open water, sloughs, and marshes, including restoration efforts, and completion of the Bay Trail.
Policy LU-6.7. Collaborate with neighboring jurisdictions to preserve and enhance the Bay, shoreline, San Francisquito Creek, and other wildlife habitat and ecologically fragile areas to the maximum extent possible.
Policy LU-7.G: Coordinate with the SAFER Bay process to ensure that the Menlo Park community's objectives for sea level rise/flood protection, ecosystem enhancement, and recreational trails are adequately taken into consideration.
CITY OF REDWOOD CITY MUNICIPAL CODE
City Code Section 35.2: The Commission may declare any tree, regardless of size, to be a heritage tree under this Chapter if said tree is healthy and has adapted well to the climatic conditions of the area, if said tree is visually accessible from a public right-of-way and if the Commission finds that at least one of the following conditions exist: That said tree has historical significance, is indigenous to the area, or said tree is one of a group of tree and that each is depended on the other tree for survival. Section 35.3 states that it is unlawful for any person to cut, move, or remove or cause to be cut, moved or removed any tree, unless such person first obtains a permit from the Parks and Recreation Director to do so in a manner prescribed by him for such removal.
NOTES: Bay = San Francisco Bay; Bay Trail = San Francisco Bay Trail; Cal-IPC = California Invasive Plant Council
SOURCES: City of East Palo Alto, 2022. Ordinance No. 02-2022. Adopted May 3, 2022; Effective October 1, 2022; City of East Palo Alto, 2017. *Vista 2035 General Plan*. Adopted October 4, 2016; Final Version March 2017. Available online at www.ci.east-palo-alto.ca.us/planning/page/vista-2035-general-plan; City of Menlo Park, 2016. *General Plan, City of Menlo Park*. Adopted November 29, 2016. Available online at www.menlopark.gov/files/sharedassets/public/v/1/community-development/documents/general-plan/land-use-and-circulation-element-adopted-20161129.pdf; City of Redwood City, 2023. *Redwood City General Plan*. Adopted October 11, 2010; Amended August 2023. Available online at www.redwoodcity.org/departments/community-development-department/planning-housing/planning-services/environmental-documents/general-plan-eir; PlaceWorks, 2016. *ConnectMenlo: General Plan Land Use & Circulation Elements and M-2 Area Zoning Update for the City of Menlo Park Final Environmental Impact Report*. Prepared for the City of Menlo Park

Methodology

Potential impacts on biological resources were systematically evaluated based on the conditions described in Section 3.4.1, Environmental Setting, information presented in Chapter 2, *Project Description,* associated appendices, and design information. Section 2 in Appendix BIO1 describes methods used to characterize the environmental setting with respect to biological resources.

This Draft EIR evaluates Project activities at a level of detail consistent with the best available information and specificity available at the time of EIR preparation. To the extent that activities necessary for Project completion are known, they are described in Chapter 2, *Project Description*, and evaluated in the impact analysis below. Key Project information needed for the evaluation of biological resources impacts includes the footprints of shoreline protection and recreational components. Appendix INFRA identifies those changes to infrastructure and other encroachments that are evaluated programmatically. Most key information needed for the biological resources impact analysis is generally known: this section has been structured to facilitate review of project- and program-level components. However, the need for additional CEQA documentation would be evaluated once additional design details are developed as discussed in greater detail in Section 1.2.5. Refer also to Appendix PGE, which presents a brief description of possible reinforcements to the footings of PG&E transmission towers in Ponds R1 and R2 following the restoration of tidal action, and possible environmental effects of such changes.

The analysis presented in this section is quantitative where possible. In some instances (e.g., Impact BIO-4, which addresses interference with the wildlife movement or migratory wildlife corridors), the analysis is qualitative because of the nature of the impact.

For the analyses of impacts on habitats, acreages are provided for construction-phase impacts, including those that are temporary (disturbance of areas that can be restored to pre-Project conditions after construction is complete) and permanent (e.g., conversion of habitats to shoreline protection levees). Assumptions regarding operation and maintenance activities are qualitative; consequently, the analysis of impacts associated with operation and maintenance are also qualitative.

Refer to the impact discussions below for additional information regarding methodology used in specific evaluations.

Impacts and Mitigation Measures

Table 3.4-3 summarizes the impact conclusions presented in this section. **Table 3.4-4** summarizes impacts of program-level components activities on habitats, and **Table 3.4-5** summarizes impacts of Project-level activities on habitats and are referenced throughout Section 3.4.3. Refer to Appendix BIO4 for a breakdown of impacts on habitats by reach.

TABLE 3.4-3
BIOLOGICAL RESOURCES IMPACT CONCLUSIONS

Impact	Level of Significance
Impact BIO-1: 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 the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service.	LSM
Impact BIO-2: Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.	LSM
Impact BIO-3: Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service.	LSM
Impact BIO-4: 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.	LTS
Impact BIO-5: Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.	LSM
Impact BIO-6: Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.	LTS
Impact C-BIO-1: The Project, in combination with past, present, and probable future projects in the Project area, would result in significant adverse impacts related to biological resources.	LSM

NOTES: LSM = Less than Significant with Mitigation; LTS = Less than Significant

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TABLE 3.4-4
IMPACTS ON HABITAT – PROGRAM-LEVEL COMPONENTS

Jurisdictional Habitat	Habitat Type	Construction-Phase Temporary Impacts Associated with Shoreline Protection Infrastructure (acres)	Permanent Impacts (acres)					
			Flood Protection Infrastructure	Operation and Maintenance Road	Loss of Tidal Action	Total[a]	Tidal Marsh to Reestablish After 50 Years SLR[b] on Bay Edge	Net loss of Wetland and Aquatic Habitats[c]
Open Water	Culvert/Riprap	0.05	0.14	--	--	0.14	0.02	0.12
	Detention Basin/Canal	0.24	0.09	0.02	--	0.10	--	0.10
	Intertidal Mudflats	0.15	0.00	--	--	0.00	--	0.00
	Muted Tidal Open Water	0.14	0.38	0.01	--	0.40	--	0.40
Managed Pond	Managed Pond	5.31	8.10	--	--	8.10	0.03	8.07
Non-tidal wetlands	Saline Seasonal Wetland	0.02	0.25	0.05	0.02	0.32	--	0.32
	Non-Tidal/Muted Tidal Northern Coastal Salt Marsh	0.65	2.23	0.09	--	2.32	0.00	2.32
Upland	Landscaped/Developed	3.82	4.96	0.53	--	5.49	0.01	--
	Ornamental Woodland (Riparian)	0.04	0.02	--	--	0.02	--	--
	Ornamental Woodland (Upland)	0.00	--	--	--	0.00	--	--
	Ruderal Levee Slope	2.55	8.23	0.05	0.01	8.29	0.11	--
	Ruderal Upland	3.76	9.41	2.83	0.00	12.24	0.21	--
Tidal wetlands	Tidal Brackish Marsh	0.11	0.33	--	2.00	2.33	0.01	0.32
	Tidal Northern Coastal Salt Marsh	7.76	11.00	1.22	2.63	14.85	2.55	9.67
	Tidal Open Water	1.29	1.69	0.16	0.28	2.12	0.65	1.20
Total Impacts on Wetland/Aquatic Habitats[d]		**15.72**	**24.21**	**1.56**	**4.93**	**30.69**	**3.26**	**22.18**
Total Impacts		**25.89**	**46.81**	**4.97**	**4.94**	**56.72**	**3.59**	**NA**

NOTES:

a. Numbers may not sum due to rounding.
b. SLR = Sea Level Rise
c. Net loss is calculated as follows: (Total Permanent Impacts) – (Tidal Marsh to Reestablish after 50 Years SLR on the Bay Edge) – (Loss of Tidal Action) = Net Loss of Wetland and Aquatic Habitats. This is because tidal marsh to reestablish after 50 years would constitute wetland or aquatic habitat in the long term, and because non-tidal wetlands are expected to persist in the areas assessed as Loss of Tidal Action.
d. Open water, managed pond, non-tidal wetlands, and tidal wetlands.

SOURCE: H.T. Harvey & Associates 2025

TABLE 3.4-5
IMPACTS ON HABITAT – PROJECT-LEVEL COMPONENTS

Jurisdictional Habitat	Habitat Type	Construction-Phase Temporary Impacts (acres)					Permanent Impacts (acres)						
		Flood Protection Infrastructure Construction-Phase Impacts	Fill due to Tidal Habitat Restoration in Ponds R1/R2 (No Change from Wetland/ Aquatic to Upland Type)	Excavation due to Tidal Habitat Restoration in Ponds R1/R2 (No Change from Wetland/ Aquatic to Upland Type)	Managed Pond Enhancement: Regrading in Ponds SF2 and R3	Total[a]	Flood Protection Infrastructure	Operation and Maintenance Access Road	Loss of Tidal Action	Fill due to Restoration (Ecotone and Nesting Islands Construction)	Total[a]	Tidal Marsh to Reestablish After 50 Years SLR[b] on Bayward Levee Slope	Net Loss of Wetland and Aquatic Habitats[c]
Open Water	Culvert/Riprap	0.02		0.01	0.06	0.09	0.01	0.00			0.01		0.01
	Detention Basin/Canal	0.25				0.25	0.03	0.06			0.09		0.09
	Intertidal Mudflats			3.10		3.10					0.00		0.00
	Muted Tidal Open Water	0.09				0.09	0.03				0.03		0.03
Managed Pond	Managed Pond	13.63	47.45	11.99	164.97	238.04	10.72			15.11	25.83	7.85	17.98
Non-tidal wetlands	Saline Seasonal Wetland	0.29				0.29	1.02	0.26			1.28		1.28
	Non-Tidal Saline Pond	0.11				0.11	0.26	0.04			0.30		0.30
	Non-Tidal/Muted Tidal Northern Coastal Salt Marsh	0.33	0.43	0.13	2.06	2.96	0.58	0.06			0.64		0.64
Upland	Landscaped/Developed	5.77	0.02	0.13	0.00	5.93	1.22	0.12			1.34		
	Ruderal Levee Slope	0.61	1.15	0.58	0.97	3.31	1.60	0.23		0.08	1.91	0.28	
	Ruderal Upland	5.35	0.26	0.17	7.82	13.60	4.18	1.19		0.19	5.55	0.00	
Tidal wetlands	Tidal Northern Coastal Salt Marsh	2.97		1.55		4.52	3.09	0.55	0.09		3.73	0.78	2.86
	Tidal Open Water	0.17		3.99		4.16	0.21	0.03	0.02		0.26	0.05	0.19
Total Impacts on Wetland/Aquatic Habitats[d]		**17.87**	**47.89**	**20.76**	**167.09**	**253.60**	**15.94**	**1.02**	**0.11**	**15.11**	**32.18**	**8.68**	**23.11**
Total Impacts		**29.60**	**49.31**	**21.64**	**175.88**	**276.43**	**22.94**	**2.56**	**0.11**	**15.38**	**40.99**	**8.96**	**NA**

Notes:
a. Numbers may not sum due to rounding.
b. SLR=Sea Level Rise
c. Net loss is calculated as follows: (Total Permanent Impacts) – (Tidal Marsh to Reestablish after 50 Years SLR on the Bay Edge) – (Loss of Tidal Action) = Net Loss of Wetland and Aquatic Habitats. This is because tidal marsh to reestablish after 50 years would constitute wetland or aquatic habitat in the long term, and because non-tidal wetlands are expected to persist in the areas assessed as Loss of Tidal Action
d. Open water, managed pond, non-tidal wetlands, and tidal wetlands
Source: H.T. Harvey & Associates 2025

Impact BIO-1: 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 the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service. ***(Less than Significant with Mitigation)***

To sufficiently address each candidate, sensitive, or special-status species in the Project area, this impact is broken down into "subtopics" 1a through 1k, which each address the impact and relevant mitigation measures applicable to each individual species.

1a: Congdon's Tarplant

Impact Assessment

Surveys and analysis have identified Congdon's tarplant as the only special-status plant species with the potential to occur in Project area.

Program-Level Components[34]

Congdon's tarplant may occur in alkaline soils in sumps and disturbed areas often associated with non-native plants, such as mustard and star-thistle. Within the Program area, it may be found in saline seasonal wetlands and ruderal levee slopes adjacent to wetlands found throughout all Program area reaches (Figures 3.4-2). During the construction phase, a total of approximately 0.02 acre of saline seasonal wetlands and 2.55 acres of ruderal level slope would be temporarily affected within the Program area but then restored to pre-Project conditions (Table 3.4-4). In addition, a total of approximately 0.32 acre of saline seasonal wetlands and 8.29 acres of ruderal levee slope would be permanently affected within the Program area (Table 3.4-4).

Construction activities, such as preparation/mobilization, demolition, grading, drainage/water control, shoreline protection construction, or paving for trail, could affect Congdon's tarplant. Following construction, levee operation and maintenance activities, including implementation of the Habitat Restoration Management Plan (HRMP; included as part of Mitigation Measure BIO-25 under Impact BIO-2), shoreline protection activities, such as vegetation control and levee inspection, and various recreational activities, all may result in additional impacts on Congdon's tarplant. Program activities may affect Congdon's tarplant through direct disturbance of plants; disturbance, modification, or destruction of habitat; and damage to underground root structures. In addition, equipment use, vehicular traffic, worker foot traffic, off-trail pedestrian foot traffic, mowing, and weed whacking may result in the injury, mortality, altered growth, or reduced seed set of individual Congdon's tarplant. Creation of access routes and staging areas may result in the mechanical or physical removal of vegetation and modification of the seed bank due to grading. Movement of earth, vegetation, water (e.g., runoff), equipment, vehicles, and personnel could spread invasive plant propagules and pathogens such as *Phytophthora*. Invasive plants could reduce habitat quality for Congdon's tarplant, or directly affect their health, in areas immediately outside the footprint of the Program area. *Phytophthora* could impair the health of plants, spreading through root systems and resulting in the loss of individuals.

All direct impacts on Congdon's tarplant are considered permanent because the individuals present in the Program area could all be lost. However, it is likely that conditions in some construction areas, such as

[34] Includes the North of Bay Road Reach, portions of the Dumbarton Approach Reach, and the Tech Campus, Bayfront Expressway, Bedwell Bayfront Park, and Marsh Road reaches (refer to Figure 3.4-2a).

along operation and maintenance roads, would be suitable for natural recolonization of Congdon's tarplant following completion of construction. As a result, some natural recovery of affected populations would likely occur.

Due to the scarcity of the species, Program construction activity impacts on Congdon's tarplant would be considered **significant** due to the direct disturbance of Congdon's tarplant; disturbance, modification, or destruction of habitat; and injury, mortality, altered growth, or reduced seed set of individual Congdon's tarplants.

Project-Level Components[35]

Congdon's tarplant may occur within the Project area in saline seasonal wetland and ruderal levee slope habitats in Faber and Laumeister marshes in the South of Bay Road Reach, Pond SF2 in the Dumbarton Approach Reach, and Ponds R1 and R2 in the Substation and Marsh Restoration Reach (Figures 3.4-3).

Project-level activities could affect Congdon's tarplant in the same ways described above for program-level components. Construction-phase temporary impacts would occur in 0.29 acre of saline seasonal wetlands and 3.31 acres of ruderal levee within the construction limits but then restored to pre-Project conditions (Table 3.4-5). A total of 1.28 acres of saline seasonal wetlands and 1.91 acres of ruderal levee would be permanently affected by construction of flood protection infrastructure and the operation and maintenance access road (Table 3.4-5). Due to the scarcity of the species, Project construction activity impacts on Congdon's tarplant would be considered **significant** due to the direct disturbance of Congdon's tarplant; disturbance, modification, or destruction of habitat; and injury, mortality, altered growth, or reduced seed set of individual Congdon's tarplants.

Impact Conclusion

With implementation of the following mitigation measures, impacts on Congdon's tarplant would be **less than significant**.

> **Mitigation Measure BIO-1: Worker Environmental Awareness Training.** This measure applies to all reaches and the following impacts: all subtopics under BIO-1 and C-BIO-1. The Project Proponent will ensure that all construction personnel are trained by a qualified biologist to identify the special-status animals and plants, their habitats, and other sensitive habitats that may occur in or near the Project area; and the environmental protection measures put in place to prevent impacts on these sensitive biological resources. The training shall include, at a minimum, the following:
>
> - A review of the special-status species and sensitive habitats that could be found in or adjacent to work areas.
> - Measures to avoid and minimize impacts on sensitive species and habitats, including measures to be taken by construction personnel if a sensitive species is detected during Project activities.
> - A review of all conditions and requirements of environmental permits, reports, and plans that pertain to sensitive species and habitats.

[35] Includes the South of Bay Road Reach, a portion of the Dumbarton Approach Reach, the Substation and Marsh Restoration Reach, and habitat improvements within Ponds SF2 (U2 and U3), R1 and R2, and R3 (refer to Figure 3.4-3a).

Mitigation Measure BIO-2: Preconstruction Survey. This measure applies to all reaches and the following subtopics under Impact BIO-1: 1a and 1b. Prior to the initiation of any construction activities in each Project reach, the Project Proponent will retain a qualified biologist to conduct a focused survey during the appropriate bloom season for Congdon's tarplant (June through October, and possibly later if conducted prior to the first heavy rains of the fall). The survey will include all undeveloped areas that are to be affected by the Project, and that are within 50 feet of Project impacts. The survey shall take place no more than 3 years before ground disturbance and should be conducted in a year with near-average or above-average precipitation. Alternatively, these surveys may be conducted in a year of below-average precipitation if the biologist verifies that the species is flowering and detectable at a South Bay reference population despite the below-average rainfall. If no Congdon's tarplants are detected, then Mitigation Measures BIO-3 and BIO-4 would be unnecessary.

During the same survey, the qualified biologist will also conduct a focused survey for milkweeds (*Asclepias* spp.) during the appropriate bloom season (May through October) that may support monarch butterfly eggs or larvae.

Mitigation Measure BIO-3: Congdon's Tarplant Avoidance and Minimization. This measure applies to all reaches. If Congdon's tarplant is found in the impact area or 50-foot survey buffer, then in consultation with a qualified plant ecologist, the Project Proponent shall ensure that the Project is designed to avoid direct and indirect impacts on the species to the extent feasible. For example, avoidance of impacts might be feasible if the species is found on San Francisco Public Utilities Commission (SFPUC) lands south of Pond SF2 Cell U3, where construction will be more limited. If the plant ecologist determines that direct and indirect impacts will be avoided, then Mitigation Measure BIO-3 would be unnecessary. During operation and maintenance activities, areas where Congdon's tarplant occurs will not be mowed or weed whacked until late fall when seed has set.

Mitigation Measure BIO-4: Compensatory Mitigation for Congdon's Tarplant. This measure is applicable to all reaches where Congdon's tarplant is observed. If Congdon's tarplant is found in the impact area or 50-foot survey buffer and the Project cannot avoid impacts, compensatory mitigation shall be provided by the Project Proponent via the management of currently occupied habitat or the establishment of a new population for the species affected. The mitigation habitat shall be of equal or greater habitat quality compared to the affected areas, as determined by a qualified plant ecologist, in terms of soil features, extent of disturbance, vegetation structure, and dominant species composition, and shall contain at least as many individuals of the species as are affected by Project activities. Habitat occupied by the affected species will be preserved and managed in perpetuity at a minimum 1:1 mitigation ratio (at least one plant preserved for each plant affected, and at least 1 occupied acre preserved for each occupied acre affected). Alternatively, seed from the affected population may be harvested and used either to expand an existing population (by a similar number/occupied area to compensate for impacts) or establish a new population in suitable habitat. The area to be landscaped around the wetland in the southeastern part of the site could potentially serve as an onsite mitigation area.

The Project Proponent will retain a qualified plant biologist or restoration ecologist to develop a Congdon's Tarplant Habitat Mitigation and Management Plan (CTHMMP) to be implemented for the mitigation lands. Separate CTHMMPs may be prepared by each Project Proponent, as appropriate, based on location and/or construction responsibilities. The CTHMMP shall be

approved by the Project Proponent prior to the start of ground-disturbing activities and shall include, at a minimum, the following information:

- Summary of habitat impacts and the proposed mitigation;
- Description of the location and boundaries of the mitigation site and description of existing site conditions;
- Description of measures to be undertaken to enhance (e.g., through focused management that may include removal of invasive species in adjacent suitable but currently unoccupied habitat) the mitigation site for Congdon's tarplant;
- Description of measures to transplant individual plants or seeds from the impact area to the mitigation site, if appropriate (which will be determined by a qualified plant or restoration ecologist);
- Proposed management activities to maintain high-quality habitat conditions for Congdon's tarplant;
- Description of habitat and species monitoring measures on the mitigation site, including specific, objective final and performance criteria, monitoring methods, data analysis, reporting requirements, monitoring schedule, etc. At a minimum, performance criteria shall include demonstration that any Congdon's tarplant population fluctuations over the monitoring period do not indicate a downward trajectory in terms of reduction in numbers and/or occupied area for the preserved mitigation population that can be attributed to management (e.g., that are not the result of local weather patterns, as determined by monitoring of a nearby reference population, or other factors unrelated to management); and
- Annual monitoring should be conducted for a period of 5 years following seeding or the initiation of monitoring (e.g., for a mitigation site where the species is already present) to ensure that the population is healthy.
- Description of the management plan's adaptive component, including potential contingency measures for mitigation elements that do not meet performance criteria.

Mitigation Measure BIO-5: Prevention of Spread or Mobilization of Pathogens and Invasive Plants. This measure applies to all reaches and the following subtopics under Impact BIO-1: 1b, 1d, 1e, 1f, 1g, 1h, 1j, and 1k. To prevent the spread/introduction of non-native invasive plant species and pathogens, such as sudden oak death syndrome (*Phytophthora ramorum*) and other soil-based *Phytophthora* species, the Project Proponent will implement the following procedures:

- Heavy equipment (e.g., excavators, drill rigs, track-mounted rigs), vehicles, and large tools must be cleaned (i.e., thoroughly washed) and free of soil and debris prior to entering the construction area from outside locations (i.e., arriving from other projects). Vehicles that only travel and park on paved roads do not require external cleaning.
- The interior of vehicles and heavy equipment will be free of dirt/debris and other potentially contaminated materials. Interiors should be vacuumed, washed, and/or treated with sanitizing agents to minimize the introduction of invasive plants and pathogens. The exterior of large equipment, such as bucket loaders, tracks or wheels, undercarriage, and anything that accumulates soil and debris, will be thoroughly cleaned.
- Spray bottles containing either 70 to 90 percent ethyl/isopropyl alcohol or a solution containing a 1:20 bleach-to-water ratio and boot brushes or hoof picks will be present at all

entry points for personnel to decontaminate their shoes, PPE, small tools, and other equipment prior to entering the construction area when arriving from outside locations (i.e., arriving from other projects or areas outside of the Project area). The spray will be liberally applied (i.e., until thoroughly soaked) to all small equipment and tools (e.g., shovels, screens, boots) and allowed to air dry prior to entry.

- To minimize the potential for introduction or spread of *Phytophthora* during revegetation work, container stock used at revegetation sites will be sourced from approved nurseries and will be installed in compliance with the latest guidance at www.Calphytos.org, which include the Guidelines to Minimize Phytophthora Pathogens in Restoration Nurseries,[36] Guidance for Plant Pathogen Prevention when Working at Contaminated Restoration Sites or Sites with Rare Plants and Sensitive Habitat,[37] and Guidelines to Minimize Phytophthora Contamination in Restoration Projects.[38.]

1b: Crotch's Bumble Bee and Monarch Butterfly

Impact Assessment

Two special-status invertebrates, the monarch butterfly and Crotch's bumble bee, could occur in areas where they could be adversely affected by construction activities. These species are assessed together because they occur within similar areas and impacts are expected to be similar.

Program-Level Components

Monarch butterflies are known to occur in small numbers in the Program area as migrants, where they forage on floral resources from various wildflowers. If milkweeds are present, females may lay eggs on leaves to provide food for the caterpillars which rely solely upon these plants. Foraging adults may occur anywhere in the Program area where abundant floral resources are present within landscaped/developed, ruderal levee slope, and ruderal uplands habitats (Figures 3.4-2). Milkweeds are not known to occur in the Program area; however, they have been observed in the vicinity and could occur within detention basin/ canal, landscaped/developed, ruderal levee slope, or ruderal upland habitats throughout all Program reaches (Figures 3.4-2). Therefore, this species could possibly breed in small numbers in the Program area. This species is not known to form winter roosts in the area.

Program area construction activities could affect monarch butterflies by killing adults; removing milkweed, the larval host plant; killing eggs, larvae, or pupae on that milkweed; removing a variety of flowering plants that serve as adult nectar sources; and affecting nectar sources through dust mobilization or changes in drainage patterns. The accidental introduction of plant pathogens, particularly *Phytophthora*, could cause a number of plant diseases in larval host and flowering plants, including root rots, stem cankers, and leaf blights. As a result, the ability of the monarch butterfly to forage and reproduce in the Program area would be reduced. Following construction, sections of the levee that allow pedestrian access may experience increased erosion, thereby limiting regeneration of milkweeds and flowering plants. In addition, operation and maintenance activities, including implementation of the HRMP, vegetation control, and levee inspection, as well as off-trail trespassing associated with recreational activities may

[36] Working Group for *Phytophthoras* in Native Habitats, 2016. Guidelines to Minimize *Phytophthora* Pathogens in Restoration Nurseries.

[37] Working Group for *Phytophthoras* in Native Habitats, 2016. Guidance for Plant Pathogen Prevention when Working at Contaminated Restoration Sites or Sites with Rare Plants and Sensitive Habitat.

[38] Working Group for *Phytophthoras* in Native Habitats, 2016. Guidelines to Minimize Phytophthora Contamination in Restoration Projects.

result in trampling of milkweed and flowering plants used by these species. During the construction phase, a total of approximately 0.24 acre of detention basin/canal, 3.82 acres of landscaped/developed, 2.55 acres of ruderal levee slope, and 3.76 acres of ruderal upland habitats that provide potential monarch butterfly habitat throughout all Program area reaches would be affected by construction activities (Table 3.4-4). A total of approximately 0.10 acre of detention basin/canal, 5.49 acres of landscaped/developed, 8.29 acres of ruderal levee slope, and 12.24 acres of ruderal upland habitats that provide potential monarch butterfly habitat throughout all Program area reaches would be permanently affected (Table 3.4-4). If milkweed is present in the Program area, grading and clearing for levee and operation and maintenance road construction would result in the removal of this plant. Although milkweed removal would reduce the availability of the larval host plant, this would have only very limited impacts on local breeding populations of the monarch butterfly.

Crotch's bumble bee has not been recorded in the Program area, or anywhere in San Mateo County in recent years, but it has been recorded in nearby Santa Clara County in the Palo Alto Baylands in Palo Alto and Google Bay View Campus in Mountain View. In these areas, the species has been observed on a range of floral resources, including California poppy (*Escholzia californica*), California buckwheat (*Erigonum fasciculatum*), showy milkweed (*Asclepias speciosa*), and buttercup oxalis (*Oxalis pes-caprae*). The Palo Alto Baylands observations are along the edge of the bay in a large natural area, whereas the Google Bay View Campus observation is within a recently developed area among a small, landscaped area. This species could occur in landscaped/developed or ruderal habitats in the Program area (Figures 3.4-2), both when foraging and possibly when nesting (e.g., in small mammal burrows or rock crevices).

Program area construction could destroy subterranean nests and their occupants, clear vegetation that serves as pollen and nectar sources, and affect pollen and nectar sources through dust mobilization or changes in drainage patterns. The accidental introduction of plant pathogens, particularly *Phytophthora*, could cause a number of plant diseases in flowering plants, including root rots, stem cankers, and leaf blights. As a result, the ability of the Crotch’s bumble bee to collect nectar and pollen would be reduced, potentially affecting reproductive success. During the construction phase, a total of approximately 3.82 acres of landscaped/developed habitat, 2.55 acres of ruderal levee slope, and 3.76 acres of ruderal upland habitats that provide potential Crotch’s bumble bee habitat throughout all Program area reaches would be affected by construction activities (Table 3.4-4). Permanent impacts would occur in a total of 5.49 acres of landscaped/developed habitat, 8.29 acres of ruderal levee slope, and 12.24 acres of ruderal upland habitats in these same areas that provide potential Crotch’s bumble bee habitat. This species likely occurs in the Program area only in low densities, and therefore the likelihood and magnitude of impacts by Program activities would be low.

Due to these species’ relatively scarce nature and possible population declines, the impact related to implementation of program-level components on monarch butterfly and Crotch’s bumble bee would be considered significant due to the loss of floral resources that support foraging by these species; loss of milkweeds supporting monarch eggs or larvae; destruction of Crotch’s bumble bee nests located inside inactive burrows or underground crevices; or death of individual Crotch’s bumble bees or monarch butterflies during vegetation clearing activities.

Project-Level Components

Monarch butterflies may occur anywhere in the Project area where abundant floral resources are present within landscaped/developed, ruderal levee slope, and ruderal uplands habitats (3.4-3). Milkweeds are not known to occur in the Project area; however, they have been observed in the vicinity and could occur within detention basin/canal, landscaped/developed, and ruderal habitats (Figures 3.4-3b-j). Therefore, this species could possibly breed in small numbers in the Project area. This species is not known or expected to form winter roosts in the area.

Crotch's bumble bee has not been recorded in the Project area but has been observed in the vicinity in Palo Alto and could occur in landscaped/developed, ruderal levee slope, or ruderal upland habitats in the Project area (Figures 3.4-2), when foraging and possibly when nesting (e.g., in small mammal burrows or rock crevices).

Project-level activities could affect monarch butterflies and Crotch's bumble bees in the same ways previously described under program-level components. Within the Project area, construction-phase temporary impacts would occur in suitable habitat for these species consisting of 0.25 acre of detention basin/canal, 5.93 acres of landscaped/developed habitat, 3.31 acres of ruderal levee slope, and 13.60 acres of ruderal upland habitats (Table 3.4-5), including detention basin/canal, landscaped developed, ruderal levee slope, and ruderal upland habitats found along and west of the existing trail along Faber and Laumeister marshes in the South of Bay Road Reach (Figures 3.4-3b-g); ruderal levee slope habitat directly south of Pond SF2 in the Dumbarton Approach Reach (Figure 3.4-3h); and ruderal levee slope and ruderal upland habitat between Pond R2 and SR 84 and on the berms surrounding and between Ponds R1 and R2 in the Substation and Marsh Restoration Reach (Figure 3.4-3i). Permanent impacts on 0.09 acre of detention basin/canal, 1.34 acres of landscaped/developed, 1.28 acres of saline seasonal wetland, 1.91 acres of ruderal levee slope, and 5.55 acres of ruderal upland habitats providing potentially suitable habitat for these species would occur in the aforementioned locations within the Project area (Table 3.4-5).

Impacts on monarch butterfly and Crotch's bumble bee are considered **significant** due to the loss of floral resources that support foraging by these species; loss of milkweeds supporting monarch eggs or larvae; destruction of Crotch's bumble bee nests located inside inactive burrows or underground crevices; or death of individual Crotch's bumble bees or monarch butterflies during vegetation clearing activities.

Impact Conclusion

With implementation of the following mitigation measures, impacts on the Crotch's bumble bee and monarch butterfly would be **less than significant.**

> **Mitigation Measures BIO-1, BIO-2, and BIO-5** (refer to text above).
>
> **Mitigation Measure BIO-6: Crotch's Bumble Bee and Monarch Butterfly Avoidance and Minimization.** This measure applies to all reaches. The Project Proponent will implement the following best management practices to avoid and/or minimize impacts on the monarch butterfly, Crotch's bumble bee, and their habitats:
>
> - The area of disturbance will be minimized to ensure that the footprint of soil disturbance is kept to the minimum area necessary to complete the maintenance work.

- A preactivity survey for milkweed plants will be conducted during the same growing season that construction will begin to identify potential host plants for breeding monarchs. If feasible, impacts on milkweed plants will be avoided. If avoidance of milkweed plants is infeasible, a qualified biologist will survey those plants for monarch butterfly eggs, larvae, or pupae within 7 days prior to impacts on those plants. If those life stages are present, they should be avoided if feasible until an adult has emerged. If avoidance is infeasible, the USFWS will be consulted to determine appropriate measures. For example, the monarchs can be raised to adulthood in captivity and then released.
- A qualified biologist will conduct a preactivity survey for foraging or nesting Crotch's bumble bees. The survey will be conducted within 7 days prior to the start of early tree removal and will occur at least 2 hours after sunrise and at least 2 hours before sunset during suitable conditions, with temperatures between 60 and 90°F and no rain. The survey will cover the entire Project site and a surrounding 100-foot buffer area. The survey duration will be based on the metric of a minimum of 1 person-hour of searching per 3 acres of suitable habitat. This survey will be a visual encounter survey, with identification aided by photographs. No bees will be captured or handled. During the survey, the qualified biologist will do the following:
    - Search areas with flowering plants for foraging Crotch's bumble bees.
    - Survey burrows and other possible nesting habitat.
    - Look and listen for concentrated bumble bee activity.
    - If bumble bees are observed, obtain photos of the bees for documentation and to determine if the bees are or are not Crotch's bumble bees. Photographs will be taken with an appropriate camera (e.g., a digital camera with a macro or telephoto lens or other cameras equipped with a view finder, continuous shooting mode, and macro or telephoto lens) from multiple angles to capture key features to aid identification, if possible, and will be in focus.
- If Crotch's bumble bees and/or Crotch's bumble bee nests are detected, surveyors will record the location of the nest; nest substrate, slope, aspect, and distance to nearest forage if known; number of individuals observed; and vegetation used by individuals.
- If Crotch's bumble bees are observed during the preconstruction survey, a qualified biologist will monitor all construction activities that, in the opinion of the biologist, could potentially result in take of individuals.
- If a Crotch’s bumble bee nest is detected, the nest will be avoided by a buffer (preferably of at least 50 feet) until late fall, when it is no longer active, unless the Project is covered by an Incidental Take Permit or Restoration Management Permit from CDFW allowing the nest to be affected.
- Measures to minimize impacts on natural habitat areas due to staging and stockpiling of materials will be implemented, including locating staging areas in previously disturbed areas and incorporating erosion control measures during the wet season.
- Dust management measures will be implemented to reduce dust within and adjacent to work areas, including watering exposed surfaces, covering haul trucks, sweeping streets, and limiting vehicle speeds.
- Exposed soils will be revegetated with native seed to stabilize soils and prevent erosion. Operation and maintenance activities in areas where milkweed and/or Crotch’s bumble bee nests may occur will be implemented November–January when milkweed have not yet

emerged and Crotch's bumble bee nests are not active, outside the Crotch's bumble bee flight season.

1c: Special-Status Fish and Essential Fish Habitat

Impact Assessment

Six special-status fish species, including the green sturgeon, white sturgeon, longfin smelt, Central Coast steelhead, Central Valley fall-run Chinook salmon, and Pacific lamprey, could occur in areas where they could be affected by Program area construction activities. In addition, all tidal aquatic habitats associated with the San Francisco Bay along the levee alignment are considered EFH, which may also be affected by Program area construction activities. These species are assessed together because they occur within similar areas, and impacts on these species and their habitats are expected to be similar.

Program-Level Components

Several special-status fish species are known to or could possibly occur within tidal areas of the Program area, including green sturgeon, white sturgeon, longfin smelt, Central Coast steelhead, Central Valley fall-run Chinook salmon, and Pacific lamprey. These species do not spawn within the Program area but may occur as foragers, while migrating to and from suitable spawning habitat within the Program vicinity, or using cover provided by tidal marsh adjacent to tidal open water as nursery habitat. These species may be found within tidal open water, muted tidal open water, and managed pond habitats found within the North of Bay Road, Dumbarton Approach, Tech Campus, Bayfront Expressway, and Bedwell Bayfront Park reaches (refer to Figures 3.4-2a through 3.4-2v).

In addition, San Francisco Bay is designated as EFH for the Pacific Coast Salmon, Coastal Pelagics, and Pacific Groundfish FMPs. All tidal aquatic habitats associated with the San Francisco Bay in the Program area, including managed ponds, are considered EFH under these FMPs, and a number of fish species managed per these FMPs occur in tidal waters in the Program area. The San Francisco Bay is also designated as critical habitat for steelhead and green sturgeon.

Program area construction activities could affect special-status fish species or EFH within the Program area. Installation of sheet pile walls has the potential to result in fish stranding if fish are trapped in excavated areas or within coffer dams around work areas; rescue and relocation efforts for stranded fish may result in physiological stress, including injury or mortality for some individual fish; noise and vibration disturbance could occur during use of heavy equipment in or near aquatic habitats, potentially leading to injury or mortality to fish in the area; reduction in water quality in ponds, sloughs, and bay waters due to mobilization of sediments or contaminants (e.g., leaks from construction equipment) during construction may also result in injury or mortality to fish; and permanent loss of fish habitat would occur. Following construction, sections of the levee that allow pedestrian access may experience high use from recreational activities, leading to increased erosion and contributing to water quality impacts. In addition, operation and maintenance activities, including operation of pumps, flood gates, and interior drainage systems could result in incidental intake of fish into pumps or stranding in ponds when water levels have been drawn down. Use of lighting at night during construction, operation, or maintenance activities may attract some fish, including Central California Coast steelhead and longfin smelt, causing disruption to their migration. Night lighting may also attract predators, resulting in increased predation risk to special-status fish species. Thus, EFH and designated critical habitat for Central California Coast steelhead and

southern green sturgeon would be affected, and there is some potential (albeit very low) for individual special-status fish to be affected.

During the construction phase, a total of approximately 1.29 acres of tidal open water, 5.31 acres of managed pond, and 0.14 acre of muted tidal open water that could support special-status fish or EFH would be affected within the Program area (Table 3.4-4), including within the North of Bay Road, Dumbarton Approach, Tech Campus, Bayfront Expressway, and Bedwell Bayfront Park reaches (Figures 3.4-2b-u). Permanent impacts on 2.12 acres of tidal open water, 8.10 acres of managed pond, and 0.40 acre of muted tidal open water in these same areas could be permanently affected by program activities.

Due to the low populations of special-status fish and ecological importance of EFH, program-level components on special-status fish species and EFH would be considered **significant** due to the potential for injury or mortality of individuals; impacts on critical habitat for steelhead, green sturgeon, and longfin smelt (if finalized by the time Program impacts occur); and impacts on EFH.

Project-Level Components

Within the Project area, special-status fish and EFH may occur within tidal open water habitat found in Faber and Laumeister marshes in the South of Bay Road Reach (Figures 3.4-3b-g); managed pond habitat found in Pond SF2 in the Dumbarton Approach Reach (Figure 3.4-3h); and managed pond habitat found within Ponds R1 and R2 in the Substation and Marsh Restoration Reach (Figure 3.4-3i).

Project-level activities could affect special-status fish species and EFH in the same ways previously described under program-level components. Within the Project area, construction-phase temporary impacts on aquatic habitats potentially supporting special-status fish or EFH may occur in 4.16 acres of tidal open water and 238.04 acres of managed pond (Table 3.4-5), including bayward of the berm along Faber and Laumeister marshes in the South of Bay Road Reach (Figures 3.4-3b-g); within Pond SF2 in the Dumbarton Approach Reach (Figure 3.4-3h); and within Ponds R1 and R2 in the Substation and Marsh Restoration Reach (Figure 3.4-3i). Permanent impacts would occur in these areas within 0.26 acre of tidal open water habitat and 25.83 acres of managed pond habitat (Table 3.4-5).

Although all direct impacts on critical habitat and EFH are considered permanent, the quality of critical habitat and EFH within managed ponds in the Project area that are restored to tidal action would be improved considerably for fish. As a result, the qualitative impacts on critical habitat and EFH would be minimal, and with tidal restoration in Ponds R1 and R2, the Project would result in a substantial net benefit to special-status fish and EFH by making those ponds much more accessible to fish and increasing habitat quality through tidal marsh restoration.

Nevertheless, due to low populations of these species, impacts on special-status fish species and EFH are considered **significant** due to the potential for injury or mortality of individuals; impacts on critical habitat for steelhead and green sturgeon; and impacts on EFH. Regarding impacts on beneficial uses including special-status fish species and EFH due to water quality impairment, refer to Section 3.11, Hydrology and Water Quality.

Impact Conclusion

With implementation of following mitigation measures, impacts on special-status fish species and EFH would be **less than significant**.

Mitigation Measure BIO-1 (refer to text above) and **BIO-14** (refer to text below).

Mitigation Measure BIO-7: Minimize Underwater Noise Impacts. This measure applies to all reaches. During construction, the following noise minimization and avoidance measures shall be implemented by the Project Proponent:

- Levee construction occurring in marsh and aquatic habitats will occur in dewatered work areas unless otherwise approved by regulatory agencies.
- To the extent feasible, if sheet piles are necessary for dewatering, all sheet piles shall be installed and removed with a vibratory pile driver hammer.
- Vibratory pile driving shall be conducted following the United States Army Corps of Engineers 2018 "U.S. Army Corps of Engineers Proposed Additional Procedures and Criteria for Permitting Projects under a Programmatic Determination of Not Likely to Adversely Affect Select Listed Species in California (the 2018 NLAA Program)", or as otherwise approved by regulatory agencies.
- An impact pile driver may only be used where necessary to complete installation of larger steel pilings in accordance with seismic safety or other engineering criteria.
- If an impact pile driver is used, it will be cushioned using a 12-inch-thick wood cushion block.
- A Hydroacoustic Monitoring Plan shall be prepared and approved by NMFS to be implemented in the event that an impact hammer is used. The sound monitoring results will be made available to CDFW, NMFS, and USFWS.
- The plan will provide detail on the sound attenuation system, the methods used to monitor and verify sound levels during impact pile-driving activities.
- The plan will include the use of a bubble curtain during any impact pile driving of piles in the water. The bubble curtain will be operated in a manner consistent with the following performance standards:
    - The bubble curtain will distribute air bubbles around 100 percent of the piling perimeter for the full depth of the water column.
    - The lowest bubble ring will be in contact with the mudline for the full circumference of the ring, and the weight attached to the bottom ring shall ensure 100 percent mudline contact. No parts of the ring or other objects shall prevent full mudline contact.
    - Air flow to the bubblers must be balanced around the circumference of the pile.
    - A "soft start" technique shall be employed in all pile driving to give fish and other aquatic species an opportunity to vacate the area. When initiating pile driving, or when there has been downtime of 30 minutes or more without pile driving, the contractor will initiate the driving with ramp-up procedures described below.
        - For vibratory hammers, the contractor will initiate the driving for 15 seconds at reduced energy, followed by a 30-second waiting period. This procedure will be repeated two additional times before continuous driving is started.
        - For impact driving, an initial set of three strikes would be made by the hammer at 40 percent energy, followed by a 30-second waiting period, then two subsequent three-strike sets at 40 percent energy, with 30-second waiting periods, before initiating continuous driving.

- A biological monitor will be present during all pile driving to observe the work area before, during, and after pile driving. The monitor will be present as specified by NMFS during the impact pile-driving phases of construction.

Mitigation Measure BIO-8: Seasonal Restrictions. This measure applies to all reaches. The Project Proponent will require that in-water work in tidal open water, intertidal mudflat, muted tidal open water, and managed pond (Ponds R1, R2, R3, R5/S5, and SF2) habitats, where fish may be present, will be conducted between June 1 through November 30, based on the standard work windows for green sturgeon and steelhead. If completion of in-water work within this period is not feasible due to scheduling issues, the Project Proponent will prepare and submit new timing guidelines to NMFS and CDFW for approval prior to initiation of in-water work.

Mitigation Measure BIO-9: Fish Exclusion at Dewatering Sites. This measure applies to all reaches. Prior to levee construction, the Project Proponent will install cofferdams as necessary to dewater the work areas, unless otherwise approved by regulatory agencies. Cofferdams will be constructed in a manner that effectively dewaters the work area. Within areas determined by a qualified biologist to potentially support special-status fish or EFH, sheet piles or other suitable materials will be placed in such a way as to reduce the likelihood of fish being stranded. The final wall will be placed at low tide to minimize the amount and depth of water present within the cofferdam. Just before the final wall is installed, if water is present within the coffer dam, qualified biologists will use nets (with a maximum mesh size of 9.5 millimeters) to exclude fish from the construction area. At low tide, qualified biologists will walk from the upper edge of the work area to the lower edge of the work area with a seine stretched across any wetted portion of the work area to encourage fish to move out of the construction area (without catching the fish) through the gap where the final wall would be installed. When the lower end of the construction area is reached, a block net would be installed in that gap to prevent fish from moving back into the cofferdam. This procedure would be repeated as necessary to minimize the potential for fish to remain in the dewatered area. The final sheet pile or other suitable dewatering material would then be installed. If any water that may still contain fish remains within the cofferdams following these procedures, a qualified biologist would use a dipnet or seine to capture the fish. The fish would be placed in buckets and immediately transported to suitable habitat outside the work area. Upon completion of in-water work activities, coffer dams shall be removed in a manner that would allow flow to resume with the least disturbance to the substrate. Cofferdams will be installed using vibratory hammers to minimize underwater vibratory impacts.

Mitigation Measure BIO-10: Minimize Dredging Impacts. This measure applies to the Substation and Marsh Restoration Reach. If dredging a "bayward channel" at the mouth of Ravenswood Slough between the proposed primary breach at Pond R1 and the San Francisco Bay occurs, the Project Proponent will implement the following minimization and avoidance measures:

- All dredging will be conducted between September 1 and November 30.
- Impermeable silt curtains and/or gunderbooms, a tool similar to a silt curtain that is made of permeable material that allows water to flow through but traps sediment within the curtain, will be used to contain sediments within a limited area until it resettles.
- Operational controls will be implemented for dredges to limit the amount of sediment released while dredging.
- Use of clamshell dredges with a bucket ≤ 10 cubic yards will reduce the occurrence of fish and mobile invertebrate entrainment.

Mitigation Measure BIO-11: Minimize Operation and Maintenance Impacts. This measure applies to the Dumbarton Approach, Tech Campus, Bayfront Expressway, and Bedwell Bayfront Park reaches. Where water control structures are present, the Project Proponent will implement the following minimization and avoidance measures:

- A fish screen will be installed on pumps to prevent fish from being pumped into managed ponds during operations intended to support targeted water level management.
- If managed ponds with passive water control structures are dewatered for maintenance activities, a qualified biologist will survey the area during and after dewatering to ensure that fish species are not stranded. Any fish species observed to be stranded will be collected and brought to the nearest body of water.

1d: Western Snowy Plover

Impact Assessment

Program-Level Components

Federally threatened western snowy plovers are known to occur year-round in the Program area in managed pond, non-tidal saline pond, and intertidal mudflat habitats in the North of Bay Road, Dumbarton Approach, Tech Campus, Bayfront Expressway, Bedwell Bayfront Park, and Marsh Road Program area reaches (Figures 3.4-2). They breed regularly within managed pond habitat in Refuge Pond R3, may nest in managed pond habitat in Redwood City Salt Ponds, and may possibly nest in non-tidal saline pond habitat, during the breeding season of March 1–September 15. As a semi-colonial species, they require large areas of suitable habitat with adjacent foraging habitat that includes standing water to support their primary prey in the San Francisco Bay, the brine fly (*Ephydra millbrae*).[39]

Program area construction activities could affect western snowy plovers and their habitat in several ways. Use of heavy equipment for site preparation/mobilization, demolition, and shoreline protection construction could result in injury or mortality of adults, eggs, and/or chicks. All construction activities could cause disruption of adult and brood foraging behavior, and increased disturbance to breeding adults could result in abandonment of active nests and/or chicks. Increased disturbance from construction activities may also attract predators to the movement and/or vocalization of distressed adult western snowy plovers, resulting in increased mortality of adults, eggs, and/or chicks. Following construction, western snowy plovers nesting in managed pond habitat may face increased disturbance along pedestrian trails due to increased traffic, possibly including trespass onto managed pond habitat. Similarly, operation and maintenance activities, such as implementation of the HRMP, vegetation control, and levee inspection, may result in increased disturbance to breeding western snowy plovers. Increased disturbance may result in abandonment of active nests and/or chicks, and the movement or vocalization of distressed adults may also attract predators, resulting in increased mortality of adults, eggs, and/or chicks. With less overall suitable nesting habitat in the BSA, western snowy plovers may nest in higher densities, which may in turn result in increased predation pressure and lower hatching and fledging success and adult survival. The flood protection infrastructure may limit the viewshed of western snowy plovers, reducing their ability to detect approaching predators when near these features. A reduction in managed pond habitat in the Program area could limit the number of western snowy plovers breeding in the area due to their semi-colonial nature and need for large expanses and could possibly reduce breeding success by

[39] Tokatlian, K., Y. Wang, B. Pearl, and J. Scullen, 2015. *Oyster Shell Habitat Enhancement for Breeding Snowy Plovers in Pond E14, Eden Landing Ecological Reserve.* San Francisco Bay Bird Observatory. Milpitas, CA.

reducing the efficacy of their crypsis. Where floodwalls and/or levee/floodwall hybrids are constructed, the concrete cap may provide a perch for predators from which to hunt western snowy plovers. In addition, operation of pumps, flood gates, and interior drainage systems that results in inundation of the dry pond bottom where western snowy plovers nest could result in egg mortality due to flooding of nests, displacement of precocial chicks from suitable habitat that could lead to injury or mortality from thermoregulation or predation, and could also cause injury or mortality of adult western snowy plovers due to predation. Use of lighting at night during construction, operations, or maintenance activities may cause western snowy plovers to avoid using illuminated habitat for roosting, foraging, and nesting. Night lighting may both attract predators and increase their ability to hunt, resulting in increased predation risk to adults, eggs, and/or chicks. During the construction phase, a total of approximately 5.31 acres of managed pond and 0.15 acre of intertidal mudflat habitat where the western snowy plover may occur would be affected in the Program area (Table 3.4-4), including within the North of Bay Road, Dumbarton Approach, Bayfront Expressway, Bedwell Bayfront Park, and Marsh Road reaches (Figures 3.4-2e, f-i, n-v). Permanent impacts would occur within a total of 8.10 acres of managed pond habitat in these reaches.

Impacts on the western snowy plover from program-level activities would be offset by the Project's conservation actions, as discussed in detail under Project-level components, below. Nevertheless, due to the species' scarcity, Program construction activity impacts on western snowy plovers would be considered **significant** due to the potential for direct injury or mortality of adults, eggs, or chicks; increased disturbance that may lead to abandonment of eggs or chicks or increased predation; and reduction in size and possibly quality of suitable breeding habitat.

Project-Level Components

Western snowy plovers are known to occur year-round in the Project area in managed pond habitat in Refuge Pond SF2 and non-tidal saline pond south of Pond SF2 in the Dumbarton Approach Reach (Figure 3.4-3h); manage pond habitat in Ponds R1 and R2 and intertidal mudflat habitat bayward of the Pond R1 berm in the Substation and Marsh Restoration Reach (Figure 3.4-3i), and managed pond habitat in Pond R3 in the Bayfront Expressway Reach (Figure 3.4-3j).

Project-level activities could affect western snowy plovers in the same ways previously described under program-level components. Construction-phase temporary impacts in the Project area would occur in 238.04 acres of managed pond, 3.10 acres of intertidal mudflats, and 0.11 acre of non-tidal saline pond, including in and directly south of Pond SF2 in the Dumbarton Approach Reach (Figure 3.4-3h) and Ponds R1 and R2 in the Substation and Marsh Restoration Reach (Figure 3.4-3i), that provide potential western snowy plover habitat. Permanent impacts in the Project area would occur in 25.83 acres of managed pond and 0.30 acre of non-tidal saline pond in the two areas where flood protection infrastructure is built. In addition, opening Ponds R1 and R2 to tidal action would result in the loss of 476.1 acres of pond bottom within 572.1 acres of managed pond habitat. The amount of suitable western snowy plover habitat provided by Ponds R1 and R2 has varied annually because the ponds do not currently have the ability to discharge water and instead rely upon evaporation to expose pond bottom that provides suitable western snowy plover nesting habitat. On average, from 2015 to 2022, Ponds R1 and R2 have provided approximately 222.6 acres of suitable nesting habitat per year, but have supported low-density nesting with an average of 12.2±10.8 nests supported per year (**Table 3.4-6**). Loss of Ponds R1 and R2 would result in the loss of an average of approximately 12 nests per year, but up to approximately 34 potential

nests per year, which represents the sum of the maximum number of nests documented in these two ponds (Table 3.4-6).[40,41]

TABLE 3.4-6
WESTERN SNOWY PLOVER NESTS BY POND

Pond	Average Nests Supported/Year 2011–2023[a]	Potential Nests/Year Lost	Post-Project Estimate of Nests Supported/Year	Net Change in Nests/Year
SF2	11.5±10.2	0	42	42
R1	9.8±8.4	11	0	-11
R2	2.4±3.5	23	0	-23
R3	12.1±11.2	4	63	59
R4[b]	18.1±11.7	0	0	0
R5[b]	2.2±2.6	0	0	0
Total	**56.0±27.9**	**38**	**105**	**67**

NOTES: Totals may not add due to rounding. WSP = western snowy plover.

a. Ravenswood Complex was not adequately surveyed in 2020 due to COVID-19 access restrictions, and is therefore excluded from data.
b. Pond R4 and R5 were breached by the South Bay Salt Pond Restoration Project at the end of 2023 and no longer provide WSP nesting habitat. They were included to show past level of WSP nesting activity in the pond complex. Some WSP that formerly nested in these ponds may now nest in Ponds SF2, R1, R2, and R3.

SOURCE: H.T. Harvey & Associates 2025

Habitat quality within the Project area in Pond SF2 would be enhanced by connecting the cells of the pond together and filling some remnant slough channels to make more contiguous habitat; reducing the depth and width of remnant slough channels in the pond to create more suitable foraging habitat; spreading crypsis enhancement plots on salt panne habitat in the pond; installing anti-perching equipment on power transmission towers in and adjacent to the pond; and excavating a deeper and wider borrow ditch around the pond. Creating a larger contiguous area of salt panne habitat in Pond SF2 would increase the extent of suitable nesting habitat and improve the ability of western snowy plover broods to move within the pond in response to disturbance, predation pressure, and availability of foraging habitat. Reducing the depth and width of remnant slough channels would make the remaining slough channels more suitable for foraging western snowy plover adults and chicks. Spreading crypsis enhancement plots throughout much of the area would increase the ability of adults, chicks, and eggs to evade detection by predators. Installing anti-perching equipment on power transmission towers would reduce the ability of corvids and raptors to effectively hunt western snowy plover adults, eggs, and chicks, thereby contributing to improved hatching and fledging success of adult survival. Excavating a deeper and wider borrow ditch around the pond would reduce the ability of mammalian predators to access the pond, contributing to improved hatching and fledging success (refer to the Habitat Restoration BOD in Appendix BIO3 for more information).

[40] Pearl, B., P. Kaye, and J. Scullen, 2023. *Western Snowy Plover Monitoring in the San Francisco Bay. Annual Report 2022.* Prepared by the San Francisco Bay Bird Observatory for the Don Edwards San Francisco Bay National Wildlife Refuge and the California Department of Fish and Wildlife.

[41] Schwarz, M., K. LaBarbera, and J. Scullen, 2023. *Western Snowy Plover and California Least Tern Monitoring in the San Francisco Bay Annual Report 2023.* Prepared by the San Francisco Bay Bird Observatory for the Don Edwards San Francisco Bay National Wildlife Refuge and the California Department of Fish and Wildlife.

In addition, the Project would fund increased predator management within these ponds and adjacent areas within the Refuge, further reducing predation pressure on western snowy plovers that may lead to increased breeding success. Habitat quality in Pond R3 would be enhanced by Project-level actions, including spreading crypsis enhancement plots on salt panne habitat in the pond and excavating a deeper and wider borrow ditch between the levee and salt panne habitat in the pond. These actions would have the same benefits to breeding western snowy plovers as similar actions implemented in Pond SF2. Details of the western snowy plover habitat enhancement design in Pond R3 are presented in Appendix BIO3.

Since 2012 (the first breeding season after pond reconfiguration and island construction under the South Bay Salt Pond Restoration Project was completed), Pond SF2 on average has supported a moderate amount of nesting activity (11.5±10.2 nests per year from 2011–2023). After implementing the SF2 western snowy plover habitat enhancements, Pond SF2 would provide approximately 110 acres of high-quality western snowy plover nesting habitat (refer to **Table 3.4-7**). This estimate assumes that western snowy plovers avoid nesting both within 300 feet of the levee top constructed between Pond SF2 cells U1 and U2 (due to human disturbance and reduced viewshed), or the power transmission towers near the berm that separates Pond SF2 cells U2 and U3 (due to predator perching). We expect that this would result in a high nesting density in the pond (0.13 nests/acre), similar to that observed in 2015 at Pond E14 in Eden Landing Ecological Reserve nearby in Hayward when 55.0 acres of oyster shell enhancement were added to 7.4 acres of preexisting oyster shell plots.[42] Although this is a higher nesting density than has been previously reported in Pond SF2, in 2017, cell U3 supported 32 nests with a nesting density of 0.10 nests/acre.[43] This calculation did not exclude 11.4 acres of habitat within 300 feet of the transmission power towers where western snowy plover nests have never been located, and thus the functional nesting density in Pond SF2 cell U3 in 2017 likely exceeded 0.13\ nests/acre. Assuming this nesting density, Pond SF2 would support approximately 14 active nests at a given time. Females may successfully re-nest up to three times per season, and may re-nest up to five times in a season if nests are unsuccessful.[44] Therefore, this equates to a conservative estimate of approximately 45 nests supported in Pond SF2 compared to 11.5±10.2 nests prior to the Project (Table 3.4-6). The enhanced habitat quality and elevated amount of western snowy plover nesting would offset both Project-level and program-level components in Pond SF2.

[42] Pearl, B., K. Tokatlian, and J. Scullen, 2016. *Western Snowy Plover Monitoring in the San Francisco Bay.* Annual Report 2015. Prepared by the San Francisco Bay Bird Observatory for the Don Edwards San Francisco Bay National Wildlife Refuge and the California Department of Fish and Wildlife.

[43] Pearl, B., and A. Chen, 2018. *Western Snowy Plover Monitoring in the San Francisco Bay.* Annual Report 2017. Prepared by the San Francisco Bay Bird Observatory for the Don Edwards San Francisco Bay National Wildlife Refuge and the California Department of Fish and Wildlife.

[44] Warriner, J.S., J.C. Warriner, G.W. Page, and L.E. Stenzel, 1986. "Mating system and reproductive success of a small population of polygamous snowy plovers." *Wilson Bulletin* 98(1):15–37.

TABLE 3.4-7
IMPACTS ON WESTERN SNOWY PLOVER NESTING HABITAT

Pond[a]	Available WSP Habitat (acres)		
	Pre-Project Average 2015–2022[b]	Post-Project	Change in Habitat Extent
SF2 U2	0	51.8	51.8
SF2 U3	51.1	50.8	-0.3
SF2 U4	0	7.6	7.6
R1[a]	164.5	0	-164.5
R2[a]	58.1	0	-58.1
R3	214.9	160.4	-54.5
Redwood City Salt Ponds	17.8	0	-17.8
Total	**506.4**	**270.3**	**-236.1**

NOTES: Totals may not add due to rounding. WSP = western snowy plover

a. Refer to Figure 3.4-1 for the locations of ponds by reach.
b. Based upon weekly or bi-weekly habitat availability surveys conducted by the San Francisco Bay Bird Observatory to account for wide variation in water management levels.

SOURCE: H.T. Harvey & Associates 2025

Due to reduced ability to detect predators, western snowy plover may also avoid nesting within 300 feet of flood control infrastructure south of Pond R3 in an area measuring approximately 17.4 acres. Direct and indirect impacts of the levee in Pond R3 would result in the loss of 24.6 acres, an area which may have supported approximately four nests per year. This area of the pond has historically experienced minimal nesting activity, likely due to a combination of experiencing high levels of human disturbance owing to its location along the Bay Trail and Bayfront Expressway and it being the easiest area of the pond for mammalian predators to access. Multiple oyster shell and/or gravel enhancement plots would be placed to attract western snowy plover and improve crypsis at all life stages, resulting in approximately 160.5 acres of high-quality western snowy plover nesting habitat in the pond. As a result, this area could support high density nesting at 0.13 nests/acre. Although a nesting density this high has not been observed in Pond R3, a nesting density of 1.3 nests/acre was observed in adjacent Pond R4 in April 2017, when 14 WSP nests were concurrently active within an area measuring approximately 10.6 acres.[45] Therefore, with enhancement, Pond R3 should be able to support much higher nesting densities than have been previously observed. Over the course of the season, Pond R3 could support up to approximately 63 nests compared to an average of 12.1±11.2 nests per year (Table 3.4-6). The enhanced habitat quality and elevated amount of western snowy plover nesting would offset both Project-level and program-level components in Pond R3.

Impact Conclusion

In summary, Program and Project activities would result in the net loss of western snowy plover habitat (Table 3.4-7), but the habitat enhancement and predator management proposed by the Project is expected

[45] Pearl, B., and A. Chen, 2018. *Western Snowy Plover Monitoring in the San Francisco Bay.* Annual Report 2017. Prepared by the San Francisco Bay Bird Observatory for the Don Edwards San Francisco Bay National Wildlife Refuge and the California Department of Fish and Wildlife.

to result in a net increase in the number of nests supported in the Project area (Table 3.4-6), as well as in survival and reproductive success. Therefore, the net effect of the Project on western snowy plover populations would be beneficial. Nevertheless, Project construction impacts on western snowy plovers would be considered significant due to the potential for direct injury or mortality of adults, eggs, or chicks, and increased disturbance that may lead to the abandonment of eggs or chicks or increased predation. With implementation of following mitigation measures, impacts on the western snowy plover would be **less than significant**.

Mitigation Measures BIO-1 and BIO-5 (refer to text above).

Mitigation Measure BIO-12: Western Snowy Plover Weekly Surveys and Nest Avoidance Buffers. This measure applies to the Dumbarton Approach, Substation and Marsh Restoration, Bayfront Expressway, and Marsh Road reaches. During western snowy plover breeding season (March 1–September 15), for construction activities that occur within 600 feet of potential western snowy plover breeding habitat, the Project Proponent will retain a qualified biologist to conduct a thorough survey of all suitable habitat in the construction area and adjacent suitable western snowy plover habitat within 600 feet of all potential work areas on a weekly basis. The survey will identify the location of western snowy plover adults, nests, and broods within the construction area and adjacent areas. The qualified biologist will then coordinate with Project construction personnel regarding appropriate avoidance of construction activities in areas where they could disturb nests and broods. A buffer of at least 600 feet, free from any construction activities that were not ongoing when the nests were initiated, will be established around the nests until they are no longer active. This buffer may be reduced if a qualified biologist, in consultation with the USFWS, determines that a reduced buffer would still adequately avoid disturbance of plover nests.

Mitigation Measure BIO-13: Western Snowy Plover Daily Preactivity Surveys and Monitoring. This measure applies to the Dumbarton Approach, Substation and Marsh Restoration, Bayfront Expressway, and Marsh Road reaches. During western snowy plover breeding season (March 1–September 15), for construction and/or operation and maintenance activities that occur within 600 feet of potential western snowy plover breeding habitat, the Project Proponent will retain a qualified biologist to conduct daily preactivity clearance surveys where construction or maintenance activities, including walking, are planned prior to the start of these activities. The preactivity clearance surveys will ensure that nests have not been established in the construction/operation and maintenance area or adjacent areas, and western snowy plover adults and broods have not moved into these areas, where they may be disturbed by construction/operation and maintenance activities. If an active nest is observed, work in the area will stop and a 600 feet buffer will be implemented to protect the nest while it remains active. This buffer may be reduced if a qualified biologist, in consultation with the USFWS, determines that a reduced buffer would still adequately avoid disturbance of plover nests. If adults or broods are present in work areas, work will stop, and they will be allowed to leave on their own prior to work occurring. A qualified biologist will be present to monitor construction and/or operation and maintenance activities and determine when work may occur in these areas. If work activities change during the day to a different location, a qualified biologist will re-survey that area to ensure broods have not moved into the area. Prior to adjusting water levels in managed ponds that may support breeding western snowy plovers, a qualified biologist will conduct a complete survey of the pond where water management will occur. If active nests and/or broods are observed in the pond, water intake will be limited to refilling borrow ditches and foraging channels to prevent inundating nesting areas, and discharge will be limited to ensure that the borrow ditch remains inundated to reduce mammalian and pedestrian access.

Mitigation Measure BIO-14: General Wildlife Impact Minimization Measures. The Project Proponent will ensure that the following measures are applied to all Project activities:

- No nighttime construction will occur unless otherwise approved by agencies.
- No permanent night lighting will be installed for operations, and lighting will be avoided during construction and maintenance to the extent feasible. If lighting must be used during construction or maintenance activities (e.g., security lighting in staging areas), it shall be shielded and angled downward and away from sensitive marsh and aquatic habitats (including managed ponds) to avoid direct illumination of such habitats and to avoid having the luminaires visible from marsh and aquatic habitats. The lighting shall be as close to the ground as possible (i.e., light poles will be short), and the illumination magnitude shall be as low as possible while still achieving the purpose of the lighting.
- Signage prohibiting access to sensitive habitats and areas that are closed to the public and indicating the importance of protection of sensitive biological resources, will be placed in key locations, such as along trails near sensitive habitats. All signs will be conspicuous but low in stature so they do not provide high-quality perches for avian predators.
- Public benches installed will be backless to reduce opportunities for predatory bird perching, unless a qualified biologist determines that due to the presence of other perches in the area, the presence of a bench with a back would not provide predatory birds with increased hunting opportunities, and agencies approve this variance.
- No dogs will be allowed on trails (or elsewhere) on Refuge lands. Elsewhere, all dogs must be on leashes and must remain on established trails, and signage indicating these requirements will be placed in key locations.
- Any permanent fencing near habitat for sensitive species will incorporate raptor perch deterrents and, as necessary, mammal climbing deterrents (such as coyote rollers).
- Construction, maintenance, and management activities (including mowing) within or adjacent to tidal marsh habitat will not occur within 2 hours before or after extreme high tides (6.5 feet or above, as measured at the Golden Gate Bridge and adjusted to the timing of local high tides), when the marsh plain is inundated, because protective cover for tidal marsh species is limited and activities could prevent them from reaching available cover.
- Viewing platforms, kiosks, benches, interpretive displays, and other focal areas for public use will be located a minimum of 300 feet from high-quality western snowy plover nesting habitat.

1e: Special-Status Marsh Birds

Impact Assessment

Six special-status marsh birds, including the California Ridgway's rail, California black rail, Alameda song sparrow, Bryant's savannah sparrow, San Francisco common yellowthroat, and northern harrier, may occur in areas where they could be affected by Program and/or Project construction activities. These species are assessed together because they occur within similar areas, and impacts on these species and their habitats from program- and Project-level activities are expected to be similar.

Program-Level Components

The California Ridgway's rail and California black rail are secretive marsh birds that rely upon highly vegetated tidal marshes within the San Francisco Bay for cover throughout their life histories. The

Alameda song sparrow, a subspecies of the more widely distributed song sparrow, is endemic to the South San Francisco Bay. Although individuals prefer the edges of sloughs within tidal salt marshes, where they establish territories for breeding and foraging, they may also occasionally use non-tidal marsh habitats. The Bryant's savannah sparrow is found along a narrow coastal strip throughout California, although the San Francisco Bay supports the most abundant population of this species. They use low-lying vegetated areas in pickleweed marsh, adjacent ruderal areas, and wet grasslands. The San Francisco common yellowthroat is endemic to the San Francisco Bay and adjacent coastal areas, where they use freshwater marsh, riparian woodland, and brackish marsh, in decreasing amounts. They prefer dense low-lying vegetative cover in which to conceal nests. Northern harriers may be found in a wide variety of habitats in California, and in the South San Francisco Bay they use tidal marshes for both foraging and nesting. They also frequently forage in adjacent habitats, such as managed ponds and tidal open water.

All of these species may be found in tidal northern coastal salt marsh and tidal brackish marsh in the North of Bay Road Reach (Figures 3.4-2b-e), Dumbarton Approach Reach (Figure 3.4-2i), Tech Campus Reach (Figures 3.4-2j-n), and Bedwell Bayfront Park Reach (Figure 3.4-2t). The Alameda song sparrow, Bryant's savannah sparrow, San Francisco common yellowthroat, and northern harrier may also be found in non-tidal northern coastal salt marsh and ruderal levee slope habitats in the North of Bay Road reach (Figures 3.4-2b-e), Dumbarton Approach Reach (Figures 3.4-2f-h), Tech Campus Reach (Figures 3.4-2j-n), Bayfront Expressway Reach (Figures 3.4-2n-s), Bedwell Bayfront Park Reach (Figure 3.4-2t), and Marsh Road Reach (Figures 3.4-2t-v). In addition, nesting Bryant's savannah sparrows and foraging northern harrier may be found in managed pond habitats in the Bayfront Expressway Reach (Figures 3.4-2n-s) and Marsh Road Reach (Figures 3.4-2t-v). During the construction phase, a total of approximately 7.76 acres of tidal northern coastal salt marsh, 0.65 acre of non-tidal/muted tidal northern coastal salt marsh, 0.11 acre of tidal brackish marsh, 5.31 acres of managed pond, and 2.55 acres of ruderal levee slope habitat that provide potential habitat for these marsh birds would be affected in the Program area (Table 3.4-4). Permanent impacts would occur to approximately 14.85 acres of tidal northern coastal salt marsh, 2.33 acres of tidal brackish marsh, 2.32 acres of non-tidal/muted tidal northern coastal salt marsh, 8.10 acres of managed pond, and 8.29 acres of ruderal levee slope within these areas.

Program area construction activities could directly affect these special-status marsh birds and the habitats that they rely upon. Use of heavy equipment for site preparation/mobilization, demolition, and shoreline protection construction could result in injury or mortality of adults, eggs, and/or chicks. All construction activities could cause disruption of foraging behavior, and may also cause disturbance to breeding adults, potentially resulting in abandonment of active nests and/or chicks. Increased disturbance from construction activities may also attract predators, resulting in increased mortality of adults, eggs, and/or chicks. Disturbance of marsh habitats during construction could facilitate invasion by non-native plants, such as perennial pepperweed, which may exclude native vegetation and reduce vegetative cover and habitat quality for marsh birds. Following construction, marsh birds may face increased disturbance in habitats adjacent to public trails, possibly including off-trail trespass into the transition zone and high marsh, resulting in avoidance of these areas and functional loss of these habitats. Operation and maintenance activities, such as implementation of the HRMP and levee inspection, may result in similar avoidance impacts. Use of lighting at night during construction, operations, or maintenance activities may cause special-status marsh birds to avoid using illuminated habitat for roosting, foraging, and nesting. Night lighting may both attract predators and increase their ability to hunt, resulting in increased predation risk

to adults, eggs, and/or chicks. Where floodwalls and/or levee/floodwall hybrids are constructed, the concrete cap may provide a perch for predators from which to hunt marsh birds. Mowing of levee slopes for inspection, if conducted during the breeding season, could affect breeding savannah sparrows.

Even with the implementation of conservation measures to minimize disturbance in the tidal marsh during the breeding season, Ridgway's rails, black rails, song sparrows, savannah sparrows, common yellowthroats, and northern harriers that disperse away from disturbance may not successfully establish new breeding territories and breed. Individuals forced to disperse would need to either maintain existing pair bonds or develop new pair bonds and establish new breeding territories in other suitable habitat areas. The ability of these individuals to reestablish new breeding territories would be hampered by the fact that many of these species, including Ridgway's rails, black rails, song sparrows, and northern harriers, maintain year-round home ranges and defend established breeding territories from intrusions by other conspecifics. Loss of any females of these species would be compounded by the loss of potential future progeny. Reduced survival of adults of these species would affect the long-term viability of their populations.

Disturbance that occurs during the non-breeding season could also result in harassment, harm, or mortality of these species. Individuals could be forced to adjust the boundaries of their territories or to disperse to other habitat areas. Displaced individuals and their eggs or young could be subjected to injury or mortality from starvation, physiological stress, and increased predation. Individuals disturbed by work activities could also be subjected to predation if they increase their movements within their home range or disperse to other nearby or distant tidal wetlands.

Impacts on marsh birds from program-level activities would be offset by the Project's conservation actions, as discussed in detail under Project-level components below. Nevertheless, due to the relatively low population sizes of these marsh bird species, Program construction activity impacts on special-status marsh birds would be considered **significant** due to the potential for direct injury or mortality of adults, eggs, or chicks; increased disturbance that may lead to abandonment of eggs or chicks or increased predation; and reduction in size of suitable breeding and foraging habitat.

Project-Level Components

Within the Project area, all of these species may be found in tidal northern coastal salt marsh bayward of the berm in Faber and Laumeister marshes in the South of Bay Road Reach (Figures 3.4-3b-g), and along Ravenswood Slough and in the Moseley Tract Marsh within the Substation and Marsh Restoration Reach (Figure 3.4-3h). The Alameda song sparrow, Bryant's savannah sparrow, San Francisco common yellowthroat, and northern harrier may also be found in non-tidal northern coastal salt marsh and ruderal levee slope habitats along and landward of the berm in the South of Bay Road Reach (Figures 3.4-3b-g); along berms separating cells in Pond SF2 in the Dumbarton Approach Reach (Figure 3.4-3h); along berms surrounding and within the interior of Ponds R1 and R2 in the Substation and Marsh Restoration Reach (Figure 3.4-3i), and along the berm separating Pond R3 and SR 84 in the Bayfront Expressway Reach (Figure 3.4-3j). In addition, breeding Bryant's savannah sparrows and foraging northern harriers may be found in managed pond habitat in Pond SF2 in the Dumbarton Approach Reach (Figure 3.4-3h); Pond R1 and R2 in the Substation and Marsh Restoration Reach (Figure 3.4-3i); and in Pond R3 in the Bayfront Expressway Reach (Figure 3.4-3j).

Project-level activities could affect special-status marsh birds in the same ways previously described under program-level components. As indicated in Table 3.4-5, construction-phase temporary impacts in the Project area would occur in 4.52 acres of tidal northern coastal salt marsh, 2.96 acre of non-tidal/ muted tidal northern coastal salt marsh, 238.04 acres of managed pond, and 3.31 acres of ruderal levee slope habitats that provide potential habitat for these marsh birds, including along both sides of the trail adjacent to Faber and Laumeister marshes in the South of Bay Road Reach (Figures 3.4-3b-g); in Pond SF2 and along berms separating cells within the pond in the Dumbarton Approach Reach (Figure 3.4-3h); in Ponds R1 and R2 and along the berms around and within the pond in the Substation and Marsh Restoration Reach (Figure 3.4-3i), and within Pond R3 and along the open land between the south side of Pond R3 and SR 84 Dumbarton Approach Reach (Figure 3.4-3j). Permanent impacts would occur in 3.73 acres of tidal northern coastal salt marsh, 0.64 acre of non-tidal/muted tidal northern coastal salt marsh, 25.83 acres of managed pond, and 1.91 acres of ruderal levee slope habitats in these same areas.

Restoration of tidal action in Ponds R1 and R2 and installation of high-tide refugia would provide considerable benefits for all of these species once tidal northern coastal salt marsh has reestablished, which is estimated to be approximately 10 to 20 years from the date that the ponds are breached. Restoring tidal action to these ponds would allow tidal northern coastal salt marsh to naturally reestablish, creating approximately 576 acres of suitable tidal northern coastal salt marsh habitat for these species. Thus, although approximately 18.4 acres of tidal northern coastal salt marsh would be permanently affected by both Program and Project-level actions, restoration of tidal marsh in these two ponds would produce far more tidal marsh than is affected, more than compensating for impacts. Because there is tidal marsh located directly adjacent to these ponds at the Moseley Tract Marsh and Ravenswood Slough, extensive tidal marsh is currently present 0.75 mile to the west at Greco Island, and nearby Pond R4 was opened to tidal action in 2023, restoration of Ponds R1 and R2 to tidal marsh would contribute substantially to the formation of a large, contiguous marsh complex that allows for greater movement of marsh species across the landscape. Construction of approximately 0.8 acre of in-marsh refugia berms along sloughs throughout these ponds and 4 acres of transition zone habitat along the flood control infrastructure and the retired berm surrounding Pond R1 would provide important high-tide refugia for Ridgway's rails and black rails to evade predators. These same berms would also provide nesting habitat for song sparrows, savannah sparrows, and common yellowthroats. The Project proposes a variance to USACE levee guidelines concerning mowing, including not conducting routine levee mowing (or otherwise trimming, such as via grazing) in transitional zone habitats, and only conducting routine mowing 1–2 times per year in grassland habitats, and only outside of the avian breeding season.

Nevertheless, due to the relatively low population sizes of these marsh bird species, Project construction activity impacts on special-status marsh birds would be considered **significant** due to the potential for direct injury or mortality of adults, eggs, or chicks; increased disturbance that may lead to abandonment of eggs or chicks or increased predation; and reduction in size of suitable breeding and foraging habitat.

Impact Conclusion

With implementation of the following mitigation measures, impacts on special-status marsh birds would be **less than significant.**

Mitigation Measures BIO-1, BIO-5, and BIO-14 (refer to text above).

Mitigation Measure BIO-15: Preconstruction Surveys for Special-Status Marsh Birds. This measure applies within the South of Bay Road, North of Bay Road, Substation and Marsh Restoration, Tech Campus, Bayfront Expressway, and Bedwell Bayfront Park reaches. If construction activities occur between February 1 and August 31, the Project Proponent will retain a qualified biologist to conduct a preconstruction survey for special-status marsh birds prior to the initiation of vegetation clearing, demolition, earth moving, or other activities that could affect adults, eggs, or chicks of these species. Surveys for the California Ridgway's rail and California black rail will be conducted in accordance with the latest USFWS/CDFW protocols for determining presence/absence of these species. The most recent protocol for the California Ridgway's rail requires conducting passive surveys (without broadcast vocalizations) followed by active surveys using broadcast vocalizations if the species is not detected during passage surveys; the first survey must occur between January 15 and January 31, so advance planning is necessary to conduct protocol-level surveys for the California Ridgway's rail during a construction year.

Surveys for the other marsh birds will be conducted within 7 days prior to the initiation of Project activities. If there is a lull in construction activities of at least 7 days during this time period, a qualified biologist will conduct another preconstruction survey for non-rail marsh birds prior to the resumption of construction activities. If an active nest is located, the qualified biologist will maintain an appropriate buffer to protect the nest until it is no longer active, as described in Mitigation Measure BIO-16.

It should be noted that California Ridgway's rails are sufficiently abundant and widespread in Faber and Laumeister marshes, and presence of this species may be assumed in lieu of needing to conduct surveys, in which case no construction will occur within 700 feet of this species' breeding habitat during the breeding season.

Mitigation Measure BIO-16: Breeding Season Habitat Buffers. This measure applies within the South of Bay Road, North of Bay Road, Substation and Marsh Restoration, Tech Campus, Bayfront Expressway, and Bedwell Bayfront Park reaches. To avoid causing the abandonment of an active California Ridgway's rail or California black rail nest, the Project Proponent will ensure that Project/operation and maintenance activities aside from recreational uses and maintenance activities using light duty vehicles within 700 feet of salt marsh habitats suitable for these species within or adjacent to the Program or Project area will be avoided during the rail breeding season (from February 1 through August 31) unless:

(1) A qualified biologist in coordination with USFWS and CDFW determines that a reduced buffer (but no less than 200 feet) is appropriate due to intervening development or obstructions, the level of disturbance by the activity (in terms of noise and equipment), or other factors that will reduce the potential for the activity to disturb nesting rails; or

(2) Protocol-level surveys conducted by a qualified biologist pursuant to Mitigation Measure BIO-15 verifies the absence of these species from nearby areas. If breeding rails are determined to be present, construction activities will not occur within 700 feet of an identified California Ridgway's rail calling center, or within 300 feet of a California black rail calling center, during the breeding season unless the USFWS and CDFW provide guidance regarding the types of activities that may occur within lesser distances from calling centers, in which case USFWS and CDFW guidance shall be followed.

Buffers around nests of the other marsh birds will be determined by a qualified biologist; such buffers will typically be at least 100 feet for non-raptors and 300 feet for raptors, such as the northern harrier, although the qualified biologist may determine that reduced buffers are

appropriate. Buffers around individual nests will be maintained until nests are no longer active (i.e., until young have fledged or the nesting attempt has failed).

1f: Colonial Nesting Birds

Impact Assessment

The Program area and Project area would include activities in or near habitats that could be used by the following colonial nesting birds: the black skimmer, a California species of special concern, American avocet (*Recurvirostra americana*), black-necked stilt (*Himantopus mexicanus*), Forster's tern (*Sterna forsteri*), Caspian tern (*Hydroprogne caspia*), elegant tern (*Thalasseus elegans*), and cliff swallow (*Petrochelidon pyrrhonota*). These species are assessed together because they occur within similar areas and, impacts on these species and their habitats from program- and Project-level activities are expected to be similar.

Program-Level Components

The American avocet and black-necked stilt occur in the Program area year-round as foragers and breeders. They forage in shallow water and on exposed mudflats by using their long bills to probe and sweep for small invertebrates. The other species addressed in this impact section may forage in the Program area, but they are not known or expected to nest there. The American avocet and black-necked stilt can be found in muted tidal open water in the Dumbarton Approach Reach (Figure 3.4-2g), in tidal northern coastal salt marsh at the southern terminus of Ravenswood Slough adjacent to Pond R3 in the Tech Campus Reach (Figure 3.4-2n), non-tidal/muted tidal northern coastal salt marsh, managed pond, and landscaped/develop habitat (along the All-American Canal Levee between Pond R3 and tidal Pond R4) in the Bayfront Expressway Reach (Figures 3.4-2n-s), non-tidal/muted tidal northern coastal salt marsh, muted tidal open water, and ruderal upland habitats (only if surrounded by muted tidal open water) in the Bedwell Bayfront Park Reach (Figure 3.4-2t), and in non-tidal/muted tidal northern coastal salt marsh and managed pond habitat in the Marsh Road Reach (Figures 3.4-2t-v). During the construction phase, a total of approximately 7.76 acres of tidal northern coastal salt marsh, 0.65 acre of non-tidal/muted tidal northern coastal salt marsh, 5.31 acres of managed pond, 0.14 acre of muted tidal open water, and 2.55 acres of ruderal levee slope habitat for these two species would be affected in the Program area (Table 3.4-4), including within the Dumbarton Approach Reach (Figure 3.4-2g), the southern terminus of Ravenswood Slough adjacent to Pond R3 in the Tech Campus Reach (Figure 3.4-2n), Bayfront Expressway Reach (Figures 3.4-2n-s), and the Marsh Road Reach (Figures 3.4-2t-v). Permanent impacts would occur within a total of 14.85 acres of tidal northern coastal salt marsh, 2.32 acres of non-tidal northern coastal salt marsh, 8.10 acres of managed pond, and 8.29 acres of ruderal levee slope habitats within these areas (Table 3.4-4).

Program area construction activities could affect the American avocet and black-necked stilt and the habitats they rely upon. Use of heavy equipment during site preparation/mobilization, demolition, and shoreline protection construction could result in injury or mortality of adults, eggs, and/or chicks. All construction activities could cause disruption of foraging behavior, and may also cause disturbance to breeding adults, potentially resulting in abandonment of active nests and/or chicks. Increased disturbance from construction activities may result in vulnerable eggs and chicks in colonies being left unattended, and simultaneously attract predators, resulting in increased mortality of adults, eggs, and/or chicks. Where floodwalls and/or levee/floodwall hybrids are constructed, the concrete cap may provide a perch for predators from which to hunt marsh birds. Following construction, the American avocet and black-necked

stilt may face increased human disturbance due to increased traffic on public trails adjacent to their habits, potentially including trespass into seasonally closed trail spurs and off-trail into sensitive habitats where these species breed. Operation and maintenance activities, such as implementation of the HRMP, vegetation control, and levee inspection may also result in increased disturbance to breeding American avocet and black-necked stilt. Use of lighting at night during construction, operations, or maintenance activities may cause colonial nesting birds to avoid using illuminated habitat for roosting, foraging, and nesting. Night lighting may both attract predators and increase their ability to hunt, resulting in increased predation risk to adults, eggs, and/or chicks. As with construction disturbance, recreational, and operation and maintenance-related disturbance may result in vulnerable eggs and chicks in colonies being left unattended, and simultaneously attract predators, resulting in increased mortality of adults, eggs, and/or chicks.

Due to the potentially large numbers of individuals that could be affected, impacts on colonial nesting birds from program-level activities would be considered **significant** due to the potential for direct injury or mortality of adults, eggs, or chicks; increased disturbance that may lead to abandonment of eggs or chicks or increased predation; and reduction in size of suitable breeding and foraging habitat.

Project-Level Components

In addition to American avocet and black-necked stilts that occur in the Program area, five additional species of colonial nesters occur in the Project area, including the Forster's tern, Caspian tern, elegant tern, black skimmer, and cliff swallow. The cliff swallow is a small-migratory bird that builds mud nests underneath structures, often near water, a source of mud for building nests, and open fields for foraging. The cliff swallow regularly forms a nesting colony underneath a viewing platform in Pond SF2 cell U4 in the Dumbarton Approach Reach (Figure 3.4-3h). The Forster's tern, Caspian tern, elegant tern, black skimmer are medium to large migratory piscivorus birds that use isolated nesting islands and other isolated areas for nesting to provide protection from mammalian predators. These species form dense colonies for safety, using mobbing behavior and vocalizations to deter predators. They nest in Pond SF2 in ruderal upland and non-tidal/muted tidal northern coastal salt marsh habitat on islands completely surrounded by managed pond in the Dumbarton Approach Reach (Figure 3.4-3h); these same species occur in ruderal upland and ruderal levee slope habitat on islands surrounded by managed pond habitat in Pond R1 in the Substation and Marsh Restoration Reach (Figure 3.4-3i). American avocets and black-necked stilts also nest in managed pond habitat in Ponds SF2, as well as saline seasonal wetland and non-tidal saline pond habitats south of Pond SF2 in the Dumbarton Approach Reach (Figure 3.4-3h).

Project-level activities may affect these seven colonial nesting birds in the ways previously described under program-level components. Construction-phase temporary impacts in the Project area would occur in 238.04 acres of managed pond, 2.96 acres of non-tidal/muted tidal northern coastal salt marsh, 13.60 acres of ruderal upland, 3.31 acres of ruderal levee slope, 0.29 acre of saline seasonal wetland, 0.11 acres of non-tidal saline pond, and 5.93 acres of landscaped/developed habitat (Table 3.4-5), including throughout Pond SF2 and directly south of the pond along the levee alignment in the Dumbarton Approach Reach (Figure 3.4-3h) and throughout Ponds R1 and R2 in the Substation and Marsh Restoration Reach (Figure 3.4-3i). Permanent impacts in the Project area would occur in 25.83 acres of managed pond, 0.64 acre of non-tidal/muted tidal northern coastal salt marsh, 5.55 acres of ruderal upland, 1.91 acres of ruderal levee slope, 1.28 acres of saline seasonal wetland, 0.30 acre of non-tidal saline pond, and 1.34 acres of landscaped/developed habitat in these same areas.

Restoration actions designed to support western snowy plovers in Ponds R3 and SF2, which are outlined in Appendix BIO3, would also benefit American avocet and black-necked stilt, both of which already nest on these ponds and use salt panne habitat. However, removal of nesting islands in Pond SF2 cell U2 as part of these efforts could negatively affect the Caspian tern, elegant tern, and black skimmer. These impacts would be offset by construction of two nesting islands in Pond R1 that equal the area of three gravel enhanced islands and one unenhanced island that these species have used for colonial nesting. Details of the design of these islands can be found in Appendix BIO3. The Forster's tern, which in the Project area nests primarily on islands in Pond SF2 cell U1, and only sparsely on constructed islands in Pond SF2 cell U2, would continue to nest on islands in cell U1.

Due to the potentially large numbers of individuals that could be affected, impacts on colonial nesting birds from Project-level activities would be considered **significant** due to the potential for direct injury or mortality of adults, eggs, or chicks; increased disturbance that may lead to abandonment of eggs or chicks or increased predation; and reduction in size of suitable breeding and foraging habitat.

Impact Conclusion

With implementation of the following mitigation measures, impacts on colonial nesting birds would be **less than significant.**

> **Mitigation Measures BIO-1 and BIO-14** (refer to text above).
>
> **Mitigation Measure BIO-17: Preconstruction Surveys for Colonial Nesting Birds.** This measure applies within the Dumbarton Approach, Substation and Marsh Restoration, Tech Campus, Bayfront Expressway, Bedwell Bayfront Park, and Marsh Road reaches. During the breeding season for colonial nesting birds (March 1 through August 31), the Project Proponent will retain a qualified biologist to conduct a survey for colonial nesting birds in all suitable habitats within 300 feet of construction or operation and maintenance activities within 5 days before activities begin. If a colony is observed to be active, Mitigation Measure BIO-18 will be implemented.
>
> **Mitigation Measure BIO-18: Breeding Season Colony Buffers for Colonial Nesting Birds.** This measure applies within the Dumbarton Approach, Substation and Marsh Restoration, Tech Campus, Bayfront Expressway, Bedwell Bayfront Park, and Marsh Road reaches. The Project Proponent will ensure that no construction or operation and maintenance activities occur within 100 feet of an active American avocet or black-necked stilt nest; within 100 feet of an active cliff swallow colony; or within 300 feet of an active tern or skimmer colony during the breeding season (March 1 through August 31) unless a qualified biologist determines that reduced buffers are appropriate. These buffers will be maintained until nests are no longer active (i.e., until young have fledged or all nests have failed).

1g: Other Nesting Birds

Impact Assessment

The Program area and Project area would include activities in or near habitats that could be used by a number of other nesting birds, including special-status species, such as the fully protected white-tailed kite, and common species, such as the peregrine falcon (*Falco peregrinus*), red-tailed hawk (*Buteo jamaicensis*), black oystercatcher (*Haematopus bachmani*), Canada goose (*Branta canadensis*), mallard (*Anas platyrhynchos*), California scrub-jay (*Aphelocoma californica*), red-winged blackbird (*Agelaius*

phoeniceus), marsh wren (*Cistothorus palustris*), and various other species. These species are assessed together because they may occur within similar areas, and impacts on these species and their habitats from program- and Project-level activities are expected to be similar.

Program-Level Components

The white-tailed kite, red-tailed hawk, and a number of other species may nest in ornamental woodland (riparian) found in the Tech Campus, Bedwell Bayfront Park, and Marsh Road reaches (Figures 3.4-2k, t-v); ornamental woodland (upland) found within the Bedwell Bayfront Park and Marsh Road reaches (Figures 3.4-2t-v); and landscaped/developed habitat throughout all Program area reaches (Figures 3.4-2); and may forage in all other habitats found within the Program area (Figures 3.4-2). The black oystercatcher may occur as a forager in riprap found in the Dumbarton Approach Reach (Figure 3.4-2i). Other common species may nest in culvert/riprap, detention basin/canal, landscaped/developed, managed pond, non-tidal/muted tidal northern coastal salt marsh, ornamental woodland (riparian), ornamental woodland (upland), ruderal levee slope, ruderal upland, saline seasonal wetland, tidal brackish marsh, or tidal northern coastal salt marsh habitats throughout the Program area, and may forage in these habitats as well as intertidal mudflat, muted tidal open water, or tidal open water throughout the Program areas (Figure 3.4-2). During the construction phase, a total of approximately 25.89 acres that are used by birds for nesting or foraging would be affected in the Program area (Table 3.4-4) throughout all Program area reaches (Figure 3.4-2). Permanent impacts would occur in approximately 56.72 acres that are used by birds for nesting or foraging in the Program area (Table 3.4-4) throughout all Program area reaches (Figure 3.4-2).

Program area construction activities could affect these nesting birds in several ways. Use of heavy equipment during site preparation/mobilization, demolition, and shoreline protection construction could result in injury or mortality of eggs and chicks. All construction activities could cause disruption of foraging behavior, and may also cause disturbance to breeding adults, potentially resulting in abandonment of active nests and/or chicks. Increased disturbance from construction activities may result in eggs and chicks being left unattended, and simultaneously attract predators, resulting in increased mortality of adults, eggs, and/or chicks. Following construction, nesting birds may face increased human disturbance due to increased traffic on public trails adjacent to their habitats, potentially including trespass into seasonally closed trail spurs and off-trail into sensitive habitats where these species may nest. Where floodwalls and/or levee/floodwall hybrids are constructed, the concrete cap may provide a perch for predators from which to hunt nesting birds. Operation and maintenance activities, such as implementation of the HRMP, vegetation control, and levee inspection, may also result in an increased disturbance to breeding birds. Use of lighting at night during construction, operations, or maintenance activities may cause nesting birds to avoid using illuminated habitat for roosting, foraging, and nesting. Night lighting may both attract predators and increase their ability to hunt, resulting in increased predation risk to adults, eggs, and/or chicks. As with construction disturbance, recreational and operation and maintenance-related disturbance may result in vulnerable eggs and chicks being left unattended, and simultaneously attract predators, resulting in increased mortality of adults, eggs, and/or chicks.

Due to the large number of nesting birds that could be affected, impacts on other nesting birds from program-level activities would be considered **significant** due to the potential for direct injury or mortality of adults, eggs, or chicks, disrupted foraging behavior that may affect survival, and increased disturbance that may lead to abandonment of eggs or chicks or increased predation.

Project-Level Components

The white-tailed kite, red-tailed hawk, and a number of other species may nest within the South of Bay Road Reach in ornamental woodland (riparian) found along the O'Connor Pump Detention Basin (Figure 3.4-3b); ornamental woodland (upland) found along the O'Connor Pump Detention Basin and south of the Cooley Landing Substation (Figure 3.4-3b,f); and landscaped/developed habitat, particularly power transmission towers and power poles, found in the South of Bay Road, Dumbarton Approach, and Substation and Marsh Restoration reaches (Figure 3.4-3b-i), and may forage in all other habitats found within the Project area (Figures 3.4-3). The black oystercatcher may nest in ruderal upland found on islands within Pond SF2 cell U2 in the Dumbarton Approach Reach and may forage in managed pond and culvert/riprap habitat in Pond SF2 in the Dumbarton Approach Reach (Figure 3.4-3h) and Ponds R1 and R2 in the Substation and Marsh Restoration Reach (Figure 3.4-3i). Other common species may nest in culvert/riprap, detention basin/canal, landscaped/developed, managed pond, non-tidal/muted tidal northern coastal salt marsh, non-tidal brackish marsh, non-tidal saline pond, ornamental woodland (riparian), ornamental woodland (upland), ruderal levee slope, ruderal upland, saline seasonal wetland, tidal brackish marsh, or tidal northern coastal salt marsh habitats throughout the Project area, and may forage in these habitats as well as intertidal mudflat, muted tidal open water, or tidal open water throughout the Project area (Figures 3.4-3).

Construction-phase temporary impacts in the Project area would occur in a total of approximately 276.4 acres of habitats (Table 3.4-5) that are used by birds for nesting or foraging along the flood protection infrastructure work area throughout all Program area reaches (Figures 3.4-3), and throughout Pond SF2 in the Dumbarton Approach Reach and Ponds R1 and R2 in the Substation and Marsh Restoration Reach (Figure 3.4-3h, i), and along the southern edge of Pond R3 in the Bayfront Expressway Reach (Figure 3.4-3j). Permanent impacts in the Project area would occur in approximately 39.7 acres of habitats (Table 3.4-5) that are used by birds for nesting or foraging in these same areas.

Project-level activities could affect these species in the ways described above for program-level components. Due to the large number of nesting birds that could be affected, impacts on other nesting birds would be considered **significant** due to the potential for direct injury or mortality of adults, eggs, or chicks, disrupted foraging behavior that may affect survival, and increased disturbance that may lead to abandonment of eggs or chicks or increased predation.

Impact Conclusion

With implementation of the following mitigation measures, impacts on other nesting birds would be **less than significant**.

> **Mitigation Measures BIO-1, BIO-5, BIO-14** (refer to text above).
>
> **Mitigation Measure BIO-19: Preconstruction Surveys for Other Nesting Birds.** This measure applies to all reaches. During the breeding season, February through August 31, the Project Proponent will retain a qualified biologist to conduct a survey for raptors, such as white-tailed kites and red-tailed hawks, in all suitable habitats within 300 feet, and for all other nesting birds within 100 feet of construction and operation and maintenance activities within 7 days before activities begin. If there is a lull in construction activities for at least 7 days during this time period, a qualified biologist will conduct another preconstruction survey for nesting birds prior to the resumption of construction activities.

Mitigation Measure BIO-20: Breeding Season Nest Buffers for Other Nesting Birds. This measure applies to all reaches. If an active nest (i.e., a nest with eggs or young, or any completed raptor nest attended by adults) of a protected bird species is found sufficiently close to work areas to be disturbed by these activities, the Project Proponent will retain a qualified biologist to determine the extent of a buffer zone to be established around the nest to ensure that the nesting birds will not be disturbed during the Project. No Project activities that were not ongoing when the nest was established may occur within the buffer zone. Typical buffers are 300 feet for nests of raptors and 100 feet for nests of other birds, although the qualified biologist may determine that reduced buffers are appropriate. Buffers around individual nests will be maintained until nests are no longer active (i.e., until young have fledged or the nesting attempt has failed).

1h: Burrowing Owls

Impact Assessment

The burrowing owl may occur as a non-breeding visitor in the BSA, but is not expected to breed within it due to lack of extensive suitable habitat and high levels of human disturbance where suitable habitat is present.

Program-Level Components

The burrowing owl roosts underground in crevices and mammal burrows. It may occur as a winter visitor and migrant in more extensive ruderal upland habitat where ground squirrel burrows are present, including in the SFPUC lands south of Pond SF2 in the Dumbarton Approach Reach and Bedwell Bayfront Park in the Bayfront Expressway and Bedwell Bayfront Park reaches (Figures 3.4-2e-g, t). It may also occasionally occur in dry managed ponds where the pond bottom has formed crevices that provide suitable roosting habitat, including at Pond R3 and possibly the Redwood City Salt Ponds (Figures 3.4-2n-r, t-v).

During the construction phase, a total of approximately 3.76 acres of ruderal upland and 5.31 acres of managed pond providing roosting and/or foraging habitat for the burrowing owl would be affected in the Program area (Table 3.4-4), including within areas where these species may be found throughout the Program area reaches (Figures 3.4-2). A total of 12.24 acres of ruderal upland and 8.10 acres of managed pond would be permanently affected by Program activities (Table 3.4-4) in these same areas.

Program area construction activity may cause burrowing owls to avoid foraging or roosting within the Program area, or if already present, to depart from the Program area due to increased disturbance. Because burrowing owls roost in underground burrows and crevices, ground disturbance could result in injury or mortality to adult burrowing owls if owls are underground when ground disturbance occurs. Following construction, burrowing owls may face increased human disturbance where habitats are adjacent to public trails, potentially including off-trail trespass into ruderal upland, ruderal levee slope, culvert/riprap, and managed pond habitats where this species is found. Where floodwalls and/or levee/floodwall hybrids are constructed, the concrete cap may provide a perch for predators from which to hunt burrowing owls. Operation and maintenance activities, such as implementation of the HRMP, operation of pumps, flood gates, and interior drainage systems, vegetation control, and levee inspection may also result in increased disturbance to burrowing owls. As a result, burrowing owls may avoid roosting and foraging in these areas, or if flushed from occupied burrows or crevices in these habitats, may face increased predation risk due to distraction. Use of lighting at night during construction, operations, or maintenance activities may cause burrowing owls to avoid using illuminated habitat for

roosting and foraging. Night lighting may both attract predators and increase their ability to hunt, resulting in increased predation risk to burrowing owls. Due to the low regional populations of burrowing owls, such impacts on burrowing owls would be considered **significant**.

Project-Level Components

The burrowing owl may occur as a winter visitor and migrant in large ruderal upland habitat where ground squirrel burrows are present, including in the SFPUC lands south of Pond SF2 in the Dumbarton Approach Reach (Figure 3.4-3h). The species is also known to occur in dry managed ponds where the pond bottom has formed crevices that provide suitable roosting habitat, including Pond R3 in the Bayfront Expressway Reach (Figure 3.4-3j).

Project-level activities may affect burrowing owls in the ways described for program-level components. During the construction phase, a total of 13.60 acres of ruderal upland and 238.04 acres of managed pond would be affected (Table 3.4-5). A total of 5.55 acres of ruderal upland and 25.83 acres of managed pond would be permanently affected by Program activities in all reaches throughout the Project area (Table 3.4-5).

Impact Conclusion

With implementation of the following mitigation measures, impacts on burrowing owls would be **less than significant.**

> **Mitigation Measures BIO-1, BIO-5, and BIO-14** (refer to text above).
>
> **Mitigation Measure BIO-21: Preconstruction Surveys for Burrowing Owl.** This measure applies to ruderal upland, ruderal levee slope, and culvert/riprap habitats throughout all reaches, as well as managed ponds in the Dumbarton Approach, Substation and Marsh Restoration, Bayfront Expressway, and Marsh Road reaches. Prior to Project activities, the Project Proponent will implement the following measures to ensure that individual burrowing owls are not injured or killed:
>
> Prior to initiation of construction activities (including demolition, vegetation clearing, or ground disturbance) associated with the Project in any given part of the Project area, a qualified biologist shall conduct preconstruction surveys in all potentially suitable burrowing owl habitat on and within 250 feet of the area in which ground disturbance is proposed. To maximize the likelihood of detecting owls, the preconstruction survey shall last a minimum of 3 hours. The survey shall begin 1 hour before sunrise and continue until 2 hours after sunrise (3 hours total) or begin 2 hours before sunset and continue until 1 hour after sunset. A minimum of two surveys shall be conducted (if owls are detected on the first survey, a second survey is not needed). Owls observed shall be counted and their location shall be mapped. Surveys shall conclude no more than 2 calendar days prior to construction; thus, surveys must begin no less than 4 days prior to the start of construction, operations, or reclamation activities (2 days of surveying plus up to 2 days between surveys and construction).
>
> To avoid last-minute changes in schedule that may occur if burrowing owls are found, a preliminary survey may be conducted up to 14 days before construction. This preliminary survey may count as the first of the two required surveys, as long as the second survey concludes no more than 2 calendar days in advance of construction. If the preconstruction survey does not identify the presence of burrowing owls on or within 250 feet of the site, no further measures are necessary. However, should the preconstruction survey determine the presence of burrowing owls

on or within 250 feet the site, then the Project Proponent shall implement the following avoidance measures.

Mitigation Measure BIO-22: Burrowing Owl Buffers and Monitoring. This measure applies to ruderal upland, ruderal levee slope, and culvert/riprap habitats throughout all reaches, as well as managed ponds in the Dumbarton Approach, Substation and Marsh Restoration, Bayfront Expressway, and Marsh Road reaches.

1. *Avoidance during the breeding season.* If evidence of burrowing owls is found during the breeding season (February 1 to August 31), the Project Proponent shall ensure that all nesting or roosting sites that could be disturbed by Project demolition or construction shall be avoided during the remainder of the breeding season (if owls remain throughout the breeding season) or while the nest (i.e., a burrow occupied during the period from February 1 to August 31) is occupied by adults or young (occupation includes individuals or family groups foraging on or near the site following fledging). Although burrowing owls are unlikely to nest on the Project site, there is a remote possibility that nesting may occur. Wintering owls in San Mateo County often remain past February 1, at which time they cannot be distinguished from breeding birds. As a result, any owl present between February 1 and August 31 will be considered a potential breeder unless and until it leaves the site.

   Avoidance shall include establishment of a 250-foot non-disturbance buffer zone around nests. Demolition and construction may occur outside of the 250-foot non-disturbance buffer zone. Demolition and construction may occur inside of the 250-foot non-disturbance buffer during the breeding season only if the nest is not disturbed, and a qualified biologist develops an avoidance, minimization, and monitoring plan prior to Project construction that includes all of the following criteria:

   - A qualified biologist monitors the owls for at least 3 days prior to construction to determine baseline nesting and foraging behavior (i.e., behavior without construction).
   - The same qualified biologist monitors the owls during construction and finds no change in owl nesting and foraging behavior in response to construction activities.
   - If there is any change in owl nesting and foraging behavior as a result of construction activities, all disturbance activities shall cease within the 250-foot buffer. Construction shall not resume within the 250-foot buffer until the adults and juveniles from the occupied burrows have moved out of the Project area and 250-foot buffer.
   - If monitoring indicates that the nest is abandoned prior to the end of the nesting season (as would occur if a wintering owl lingered past February 1 and then eventually migrated to its breeding areas outside the region), and the burrow is no longer in use by owls, the non-disturbance buffer zone may be removed. The qualified biologist will excavate the burrow to ensure that no owls are present and to prevent reoccupation after receiving approval from CDFW.

2. *Avoidance during the non-breeding season.* During the non-breeding season (September 1 through January 31), the Project Proponent shall ensure that a 250-foot non-disturbance buffer shall be established around occupied burrows as determined by a qualified biologist. Construction activities outside of this 250-foot buffer are allowed. Construction activities within the 250-foot buffer are allowed if all of the following criteria are met to prevent owls from abandoning important overwintering sites:

- A qualified biologist monitors the owls for at least 3 days prior to construction to determine baseline foraging behavior (i.e., behavior without construction).
- The same qualified biologist monitors the owls during construction and finds no change in owl foraging behavior in response to construction activities.
- If there is any change in owl nesting and foraging behavior as a result of construction activities, all disturbance activities shall cease within the 250-foot buffer.
- If the owls are gone for at least 1 week, the Project Proponent may request approval from the CDFW that a qualified biologist excavate or block usable burrows to prevent owls from reoccupying the site. After all usable burrows are excavated, the buffer zone will be removed, and construction may continue. Monitoring must continue as described above for the non-breeding season as long as the burrow remains active.

3. *Construction monitoring.* Based on the avoidance, minimization, and monitoring plan developed during construction, all non-disturbance buffer zones shall be established and maintained. A qualified biologist shall monitor the site consistent with the requirements described above to ensure that buffers are enforced and owls are not disturbed. The biological monitor shall also conduct training of construction personnel on the avoidance procedures, buffer zones, and protocols in the event that a burrowing owl flies into an active construction zone or within 250 feet of such zone.

Mitigation Measure BIO-23: Passive Relocation Burrowing Owl. This measure applies to ruderal upland, ruderal levee slope, and culvert/riprap habitats throughout all reaches, as well as managed ponds in the Dumbarton Approach, Substation and Marsh Restoration, Bayfront Expressway, and Marsh Road reaches. Passive relocation shall only be allowed, with the approval of CDFW, during the non-breeding season (September 1 through January 31), and may only occur if the burrow needs to be removed or could collapse from construction activities. If passive relocation is allowed by CDFW, the Project Proponent shall have a qualified biologist passively exclude birds from their burrows during non-breeding season only by installing one-way doors in burrow entrances. These doors shall be in place for at least 48 hours to ensure owls have left the burrow, and then the qualified biologist shall excavate the burrow to prevent reoccupation. Burrows shall be excavated using hand tools. During excavation an escape route shall be maintained at all times. This may include inserting an artificial structure into the burrow to avoid having the overburden collapse into the burrow and trap owls inside.

1i: Non-breeding Birds

Impact Assessment

Numerous special-status birds that do not nest in the Project area, including the bald eagle, California least tern, tricolored blackbird, yellow rail, yellow warbler, loggerhead shrike, and golden eagle, may occur as non-breeding visitors. In addition, numerous species of non-special-status birds, including waterbirds, such as ducks, grebes, waders, and shorebirds, occur in the Program area and Project area. These species are assessed together because many of them occur within similar areas, and impacts on these species from program- and Project-level activities are expected to be similar.

Program-Level Components

The bald eagle may occur as a rare forager for waterfowl, seabirds, or terrestrial mammals in tidal open water, muted tidal open water, managed pond, detention basin/canal, intertidal mudflat, tidal northern coastal salt marsh, non-tidal/muted tidal northern coastal salt marsh, and ruderal upland habitat in the

North of Bay Road, Dumbarton Approach, Tech Campus, Bayfront Expressway, Bedwell Bayfront Park, and Marsh Road reaches (Figures 3.4-2). The California least tern may occur very occasionally in April and May when migrating from wintering grounds to San Francisco Bay Area (Bay Area) breeding colonies, and in July and August when dispersing from breeding colonies before migrating. Individuals may occur as foragers in tidal open water, muted tidal open water, managed pond, and detention basin/canal habitats that support fish throughout all Program area reaches (Figures 3.4-2). The tricolored blackbird may occur as individuals or in mixed species flocks of other blackbird species, roosting or foraging in ruderal upland, ruderal levee slope, ornamental woodland (upland), ornamental woodland (riparian), or tidal brackish marsh habitat throughout all Program area reaches (Figures 3.4-2). The yellow rail is a very scarce winter visitor to the Bay Area and could possibly occur in larger tracts of tidal northern coastal salt marsh, non-tidal/muted tidal northern coastal salt marsh, or tidal brackish marsh in the North of Bay Road, Dumbarton Approach, Tech Campus, and Bedwell Bayfront Park reaches (Figures 3.4-2b-n,t). The yellow warbler may occur throughout the Program area as a spring and fall migrant where trees and other vegetation provides suitable foraging habitat in ornamental woodland (upland) and ornamental woodland (riparian) habitats (Figures 3.4-2k,t-v). It may also occur in landscaped/developed habitats within the Tech Campus Reach, Bedwell Bayfront Park Reach, and Marsh Road Reach (Figures 3.4-2k-n,t,u), as well as in fennel patches within ruderal upland habitat at Bedwell Bayfront Park (Figures 3.4-2t). The loggerhead shrike hunts in open spaces for mice, lizards, and small birds, frequently hunting from perches. It may occur as a rare fall and spring migrant in ornamental woodland (upland), ornamental woodland (riparian), and landscaped/developed habitats in the North of Bay Road, Dumbarton Approach, Tech Campus, Bayfront Expressway, and Bedwell Bayfront Park reaches that provide suitable perches from which to hunt in ruderal uplands in the Dumbarton Approach and Bedwell Bayfront Park reaches and managed pond habitat in Pond R3 in the Bayfront Expressway and Bedwell Bayfront Park reaches (Figures 3.4-2b-t). The golden eagle primarily forages in large open spaces for small mammals. It may occur as a very rare forager in larger tracts of ruderal upland habitat in SFPUC lands south of Pond SF2 in the Dumbarton Approach Reach and at Bedwell Bayfront Park in the Bayfront Expressway and Bedwell Bayfront Park reaches; it may also occasionally forage in managed pond habitat in Pond R3 in the Bedwell Bayfront Expressway Reach (Figures 3.4-2f-g, n-s).

In addition to the special-status non-breeding birds described above, a number of non-special-status bird species occur in the Program area. These include numerous species of migratory ducks, including divers, such as the ruddy duck (*Oxyura jamaicensis*), lesser scaup (*Aythya affinis*), and canvasback (*Aythya valisineria*); and dabblers, such as the northern shoveler (*Spatula clypeata*), American wigeon (*Anas americana*), and gadwall (*Mareca strepera*), among others. These species may be found in managed pond, detention basin/canal, landscaped/developed, tidal open water, muted tidal open water, tidal northern coastal salt marsh, non-tidal/muted tidal northern coastal salt marsh, and ruderal upland habitats (at the edge of aquatic habitats) within the Program area (Figures 3.4-2). Many migratory shorebirds are found in the Program area, including small shorebirds, such as western sandpiper (*Calidris mauri*), least sandpiper (*Calidris minutilla*), and dunlin (*Calidris alpina*); and medium shorebirds, such as the marbled godwit (*Limosa fedoa*), willet (*Tringa semipalmata*), and long-billed curlew (*Numenius americanus*). Shorebird species may be found in managed pond, detention basin/canal, saline seasonal wetland, tidal northern coastal salt marsh, non-tidal/muted tidal northern coastal salt marsh, and ruderal upland habitats (at the edge of aquatic habitats) within the Program area (Figures 3.4-2). Piscivorus birds, including the American white pelican (*Pelecanus erythrorhynchos*), brown pelican (*Pelicanus occidentalis*), and common merganser (*Mergus merganser*), are found in the Program area. They may occur in managed

pond, tidal open water, and muted tidal open water habitats throughout the Program area, although American white pelicans are uncommon outside of managed pond habitat (Figures 3.4-2). Primarily pisvicorous species, such as the great egret (*Ardea alba*), snowy egret (*Egretta thula*), and great blue heron (*Ardea herodias*), are also found in the Program area, although the great egret and great blue heron are more generalists and will also hunt in terrestrial habitats for small rodents and bird eggs and chicks. They may occur in managed pond, intertidal mudflat, tidal open water, muted tidal open water, tidal northern coastal salt marsh, non-tidal/muted tidal northern coastal salt marsh, ruderal levee slope, and ruderal upland habitats throughout the Program area (Figures 3.4-2). Numerous other migratory waterbird species also occur in the Program area, such as the eared grebe (*Podiceps nigricollis*), red-necked phalarope (*Phalaropus lobatus*), and Wilson's phalarope (*Phalaropus tricolor*). These three species are primarily found in managed pond habitat but may also occasionally be found in tidal open water and non-tidal/muted tidal open water throughout the Program area (Figure 3.4-2).

Most duck species found within the Program area would use a wide range of habitats; however, systematic salt pond waterbird surveys have found that the ruddy duck is a pond-dependent species in the South San Francisco Bay.[46] Shorebirds forage on intertidal mudflats when they are exposed, and although they may forage in managed pond habitats, they are used extensively as a high-tide roost, supporting thousands of birds at a time. As previously noted, phalaropes strongly prefer high-salinity managed ponds, and during their brief stopover in the Program area during migration, these species rely heavily upon the high concentration of San Francisco brine shrimp (*Artemia franciscana*) and brine flies found in managed ponds to fuel their migration.

During the construction phase, a total of approximately 25.89 acres that are used by non-breeding special-status and non-special-status bird species for foraging or roosting would be affected in the Program area (Table 3.4-4), including within areas where these species may be found throughout the Program area reaches (Figure 3.4-2). A total of approximately 56.72 acres would be permanently affected by Program activities (Table 3.4-4) in these same areas.

Program area construction activity may cause non-breeding special-status bird species to avoid foraging or roosting within the Program area, or if already present, to depart from the Program area due to increased disturbance. However, construction would not result in injury or mortality of individuals of these species. Following construction, these species may experience increased human disturbance where public trails are found adjacent to their habitats due to increased traffic. Operation and maintenance activities, such as implementation of the HRMP, operation of pumps, flood gates, and interior drainage systems, vegetation control, and levee inspection, may also result in increased disturbance to non-breeding birds. However, these species may instead use foraging habitats in the Program area vicinity that have lower levels of human disturbance. Also, the Program area provides only limited habitat for these species relative to the regional availability of foraging habitat for these species. As a result, Program activities would not result in any reduction in regional populations of these species, and impacts on these species would be **less than significant**.

Program area construction activity may cause non-breeding non-special-status bird species to avoid foraging or roosting within the Program area, or if already present, to depart from the Program area due to increased

[46] Tarjan, M., and G. Burns, 2021. *South Bay Salt Pond Waterbird Surveys September 2019–February 2021*. San Francisco Bay Bird Observatory. Milpitas, California.

disturbance. However, construction would not result in injury or mortality of individuals of these species. The Program area provides only limited habitat for these species relative to the regional availability of foraging habitat for these species. As a result, Program activities would not result in any reduction in regional populations of these species, and impacts on these species would be **less than significant**.

Project-Level Components

The bald eagle may occur as a rare forager throughout the Project area in tidal open water, managed pond, detention basin/canal, intertidal mudflat, tidal northern coastal salt marsh, non-tidal/muted tidal northern coastal salt marsh, and ruderal upland habitat in Ponds R1 and R2 in the Substation and Marsh Restoration Reach, Pond SF2 in the Dumbarton Approach Reach, Pond R3 in the Bayfront Expressway Reach, Faber and Laumeister marshes, and the O'Connor Pump Detention Basin and surrounding areas in the South of Bay Road Reach (Figure 3.4-3). California least terns may occur as foragers in tidal open water and managed pond habitats in Pond R3 in the Bayfront Expressway Reach; Ponds R1 and R2 and Ravenswood Slough in the Substation and Marsh Restoration Reach; Pond SF2 cells U1, U2, and U4 in the Dumbarton Approach Reach; and in Faber and Laumeister marshes in the South of Bay Road Reach (Figures 3.4-2b-j). The tricolored blackbird may occur as individuals or in mixed species flocks, roosting or foraging in ruderal upland, ruderal levee slope, ornamental woodland (upland), ornamental woodland (riparian), or tidal brackish marsh habitat in the Project area (Figures 3.4-2). The yellow rail could possibly occur in tidal northern coastal salt marsh, tidal brackish marsh, or non-tidal brackish marsh throughout the Program area (Figures 3.4-2b-e, h-n, t). The yellow warbler may occur in ornamental woodland (upland) and ornamental woodland (riparian) habitats (Figure 3.4-2k, t-v). They may also occur in landscaped/developed habitat within the Tech Campus Reach, Bedwell Bayfront Park Reach, and Marsh Road Reach (Figures 3.4-2k-n, t, u), as well as within fennel patches within ruderal upland habitat at Bedwell Bayfront Park (Figure 3.4-2t). The loggerhead shrike may occur as a rare fall and spring migrant in ornamental woodland (upland), ornamental woodland (riparian), and landscaped/developed habitats that provide suitable perches from which to hunt in more open habitats, such as ruderal upland habitat in Bedwell Bayfront Park and managed pond habitat in Pond R3 (Figures 3.4-2r-t). The golden eagle may occur as a very rare forager in larger tracts of ruderal upland habitat south of Pond SF2 and at Bedwell Bayfront Park and managed pond habitat in Pond R3 and the Redwood City Salt Ponds (Figures 3.4-2f-g, n-v).

In addition to the special-status non-breeding birds previously described, a number of non-special-status bird species occur in the Project area. Similar species of ducks are found in the Project area as those found in the Program area. These species may be found in managed pond, landscaped/developed, detention basin/canal, tidal open water, muted tidal open water, tidal northern coastal salt marsh, non-tidal/muted tidal northern coastal salt marsh, and ruderal upland habitats (on islands) within the Project area (Figures 3.4-3). Many migratory shorebirds are found in the Project area, including similar species as those that are found in the Program area. Shorebird species may be found in managed pond, detention basin/canal, non-tidal saline pond, saline seasonal wetland, tidal northern coastal salt marsh, non-tidal/muted tidal northern coastal salt marsh, and ruderal upland habitats (on islands within Ponds R1, R2, and SF2) within the Program area (Figures 3.4-3). Piscivorus birds are also found in the Project area, where they may occur in managed pond, tidal open water, and muted tidal open water habitats throughout the Project area (Figures 3.4-3). Egrets and herons are also found in the Project area, and may occur in managed pond, intertidal mudflat, tidal open water, muted tidal open water, tidal northern coastal salt marsh, non-tidal/muted tidal northern coastal salt marsh, non-tidal saline pond, saline seasonal wetland, ruderal levee slope, and ruderal upland habitats throughout the Project area (Figures 3.4-3). Large numbers of American white

pelicans and smaller numbers of brown pelicans may be found roosting and foraging in Pond SF2 in the Dumbarton Approach Reach and Ponds R1 and R2 in the Substation and Marsh Restoration Reach. The eared grebe, red-necked phalarope, and Wilson's phalarope are also found within the Project area. The eared grebe frequently forages in managed pond habitat in Pond SF2 in the Dumbarton Approach Reach, Ponds R1 and R2 in the Substation and Marsh Restoration Reach, and Pond R3 in the Bayfront Expressway Reach (Figures 3.4-3h and 3.4-3j), but may also occasionally be found in tidal open water and non-tidal/muted tidal open water throughout the Project area (Figure 3.4-3). The two phalarope species prefer to forage in high-salinity managed pond, and are found primarily in managed pond habitat, although they may also occur in tidal open water, muted tidal/non-tidal open water, and non-tidal saline pond habitat throughout the Project area (Figure 3.4-3).

Most duck species found within the Project area would use a wide range of habitats; however, midwinter waterfowl surveys have found that the ruddy duck is a pond-dependent species in the San Francisco Bay, with the majority of their wintering population found in South San Francisco Bay salt ponds.[47] Shorebirds forage on intertidal mudflats when they are exposed, and although they may forage in managed pond habitats, they are used extensively as a high-tide roost, supporting thousands of birds at a time. As previously noted, phalaropes strongly prefer high-salinity managed ponds, and during their brief stopover in the Program area during migration, these species rely heavily upon the high concentration of San Francisco brine shrimp and brine flies found in managed ponds to fuel their migration.

Project-level activities may affect non-breeding special-status bird species in the ways described for program-level components. During the construction phase, a total of 5.93 acres of landscaped/developed, 3.31 acres of ruderal levee slope, 13.60 acres of ruderal upland, 0.25 acre of detention basin/canal, 3.10 acres of intertidal mudflat, 4.52 acres of tidal northern coastal salt marsh, 2.96 acres of non-tidal/muted tidal northern coastal salt marsh, 238.04 acres of managed pond, 4.16 acres of tidal open water, and 0.09 acre of muted tidal open water habitat that provide foraging habitat for these species would be affected (Table 3.4-5). A total of 1.34 acres of landscaped/developed, 1.91 acres of ruderal levee slope, 5.55 acres of ruderal upland, 0.09 acre of detention basin/canal, 3.73 acres of tidal northern coastal salt marsh, 0.64 acre of non-tidal/muted tidal northern coastal salt marsh, 25.83 acres of managed pond, 0.26 acre of tidal open water, and 0.03 acre of muted tidal open water habitat would be permanently affected by activities in all reaches throughout the Project area (Table 3.4-5).

Project area construction activity may cause non-breeding special-status bird species to avoid foraging or roosting within the Program area, or if already present, to depart from the Project area due to increased disturbance. However, construction would not result in injury or mortality of individuals of these species. Following construction, these species may experience increased human disturbance where public trails are found adjacent to their habitats due to increased traffic. However, these species may instead use foraging habitats in the Project area vicinity that have lower levels of human disturbance. Also, the Project area provides only limited habitat for these species relative to the regional availability of foraging habitat for these species. As a result, Project activities would not result in any reduction in regional populations of these species, and impacts on these species would be **less than significant**.

[47] Richmond, O.M.W., S. Dulava, C.M. Strong, and J.D. Albertston, 2014. *San Francisco Estuary Midwinter Waterfowl Survey: 2012 Survey Results and Trend Analysis (1981–2012).* U.S. Fish and Wildlife Service, Pacific Southwest Region. San Francisco Bay National Wildlife Refuge Complex, Fremont, CA, March 27, 2014.

Project area construction activity would result in the loss of foraging and high-tide roosting habitat for non-breeding non-special-status bird species within Pond SF2 cells U2, U3, and U4 (U2-U4) due to dewatering and construction disturbance, and in Ponds R1 and R2, these species may avoid using large areas of these ponds due to construction disturbance. Construction activity may cause these species to avoid roosting and foraging in managed pond habitat at the southern end of Pond R3 where Project actions would occur, but most of this pond would be outside the area of construction disturbance and would continue to support these species. However, construction would not result in injury or mortality of individuals of these species. Following construction, non-breeding non-special-status bird species would have more limited use of Pond SF2 due to the conversion of cells U2-U4 to one large cell and change in water management from muted tidal using flap gate and weir water control structures to non-tidal using a pump. As a result, Pond SF2 cells U2-U4 would become more saline, which would result in this part of the pond no longer supporting piscivorous bird species, likely resulting in decreased use of the pond for foraging by diving ducks, small and medium shorebirds,[48] and possibly dabbling duck as well.[49] However, ruddy duck, eared grebe, and phalarope abundance is likely to increase in these ponds, as the species abundance in ponds is associated with increasing salinity.[50,51,52] Ruddy duck abundance is also associated with increasing pond depth,[53] and thus, Project-level actions to expand and excavate the borrow ditch surrounding Pond SF2 would improve foraging habitat for the ruddy duck, and likely the eared grebe as well. Phalaropes prefer slightly shallower foraging habitat, which may be provided in Pond SF2 in the remnant tidal sloughs that would be made more shallow as part of Project-level actions. Dabbling ducks and small and medium shorebird species, as well as small numbers of piscivorous bird species, may continue to use Ponds SF2 cell U1 for foraging and roosting habitat. In addition, most diving ducks and dabbling duck species would readily use tidal open water habitat for foraging, and similarly, small and medium shorebirds preferred foraging habitat is intertidal mudflats. Following construction, Ponds R1 and R2 would provide a large amount of tidal open water and intertidal mudflat to support diving ducks, dabbling ducks, and small and medium shorebirds. Although the dry pond bottoms of Ponds R1 and R2 would no longer provide high-tide foraging and roosting habitat for small and medium shorebirds or piscivorous birds, the seabird islands and in-marsh refugia constructed in the pond would provide a large amount of high-tide roosting habitat for these species. Similarly, the transition zones constructed in these ponds would provide roosting habitats for dabbling duck species. American white pelicans are unlikely to forage in Ponds R1 and R2 following their opening to tidal action but may continue to use Pond R3 for foraging. Herons and egrets, which are piscivorous but have a more varied diet, would have ample foraging habitat in intertidal mudflat, managed pond, ruderal upland, ruderal levee slope, and saline

[48] Van Schmidt, N.D., and A. Parsons, 2024. *Effects of Pond Management, Tidal Restoration, and Annual Weather on Waterbird Population Change in Salt Ponds of South San Francisco Bay*. San Francisco Bay Bird Observatory, Milpitas, CA.

[49] De La Cruz, S.E., L.M. Smith, S.M. Moskal, C. Strong, J. Krause, Y. Wang, and J.Y. Takekawa, 2018. *Trends and Habitat Associations of Waterbirds Using the South Bay Salt Pond Restoration Project, San Francisco Bay, California (No. 2018-1040).* U.S. Geological Survey.

[50] Richmond, O.M.W., S. Dulava, C.M. Strong, and J.D. Albertston, 2014. *San Francisco Estuary Midwinter Waterfowl Survey: 2012 Survey Results and Trend Analysis (1981–2012).* U.S. Fish and Wildlife Service, Pacific Southwest Region. San Francisco Bay National Wildlife Refuge Complex, Fremont, CA, March 27, 2014.

[51] Van Schmidt, N.D., and A. Parsons, 2024. *Effects of Pond Management, Tidal Restoration, and Annual Weather on Waterbird Population Change in Salt Ponds of South San Francisco Bay*. San Francisco Bay Bird Observatory, Milpitas, CA.

[52] Tarjan, M., and G. Burns, 2021.*South Bay Salt Pond Waterbird Surveys September 2019–February 2021.* San Francisco Bay Bird Observatory, Milpitas, CA.

[53] Pearl, B. and A. Chen. 2018. Western Snowy Plover Monitoring in the San Francisco Bay. Annual Report 2017. Prepared by the San Francisco Bay Bird Observatory for the Don Edwards San Francisco Bay National Wildlife Refuge and the California Department of Fish and Wildlife.

seasonal wetland in the Project area, and thus, would not be significantly affected by Project-level actions. In addition, the South Bay Salt Pond Restoration Project would continue to monitor populations of all these species through targeted salt pond waterbird surveys. Using baseline numbers gathered prior to the implementation of Phase 1 and Phase 2 of that project as benchmarks, the adaptive management program would address any population declines observed among these species throughout the South Bay Salt Pond Restoration Project site, which includes the Ravenswood Ponds as well as the Alviso Pond Complex and CDFW's Eden Landing Pond Complex. Thus, Project activities would not result in any reduction in regional populations of these species, and impacts on these species would be **less than significant**.

Impact Conclusion

Impacts on non-breeding birds would be **less than significant**.

1j: Salt Marsh Harvest Mouse and Salt Marsh Wandering Shrew

Impact Assessment

The salt marsh harvest mouse and salt marsh wandering shrew are assessed together because they occur within similar areas, and impacts on these species and their habitats from program- and Project-level activities are expected to be similar.

Program-Level Components

The salt marsh harvest mouse and salt marsh wandering shrew are known to occur year-round in pickleweed dominated habitats, including tidal northern coastal salt marsh and non-tidal/muted tidal northern coastal salt marsh found throughout all Program reaches (Figures 3.4-2b-n, t), with the exception of small patches or narrow strips of non-tidal/muted tidal northern coastal salt marsh habitat found along the edge of, and/or within, managed ponds that are too small and/or isolated to support these species. These species may also occur in tidal brackish marsh in the Bedwell Bayfront Park Reach where heavily thatched alkali bulrush and halophytic vegetation provide suitable habitat (Figure 3.4-2k).

During the construction phase, a total of approximately 0.11 acre of tidal brackish marsh, 7.76 acres of tidal northern coastal salt marsh, and 0.65 acre of non-tidal northern coastal salt marsh potentially suitable for these species would be affected in the Program area (Table 3.4-4). A total of 2.33 acres of tidal brackish marsh, 14.85 acres of tidal northern coastal salt marsh, and 2.32 acres of non-tidal northern coastal salt marsh would be permanently affected by Program activities (Table 3.4-4).

Program area construction activities, including site preparation/mobilization, demolition, grading, drainage/water control, and shoreline protection construction, may cause both direct and indirect impacts on the salt marsh harvest mouse and salt marsh wandering shrew. Use of heavy equipment may result in injury or mortality to individuals present within suitable habitat. In addition, installation of sheet piles to dewater work areas and construction of flood control features could either temporarily or permanently alter hydrology in marshes and eliminate high-tide refugia needed to evade predation, reducing habitat quality for these species and affecting their ability to survive. Disturbance, such as loud noise, the presence and movement of people and heavy equipment, or night lighting in or near salt marsh harvest mouse habitat may alter mouse behavior in ways that result in injury, mortality, or reduced breeding success as previously described for the Ridgway's rail and black rail. Disturbance would result in displacement of harvest mice from protective cover and their territories/home ranges (through noise and vibrations) and/or direct injury or mortality (through crushing). These disturbances are likely to disrupt

normal behavior patterns of breeding, foraging, sheltering, and dispersal, and are likely to result in the displacement of harvest mice from their territory/home range in the areas where their habitat is destroyed. Displaced harvest mice may have to compete for resources in occupied habitat and may be more vulnerable to predators. Disturbance of females, particularly during the period of March through November, may cause abandonment or failure of the current litter. Thus, displaced harvest mice may suffer from increased predation, competition, mortality, and reduced reproductive success.

Construction activities associated with the flood protection infrastructure would be located close to areas of unaffected habitat that could support small numbers of salt marsh harvest mice, thereby resulting in these indirect disturbance effects. Harvest mice may be similarly disturbed during excavation of pilot channels, preparation of ponds for breaching (e.g., construction of ditch blocks), and access of construction areas by heavy equipment along existing levee roads. Where floodwalls and/or levee/floodwall hybrids are constructed, the concrete cap may provide a perch for predators from which to hunt marsh birds.

Operation and maintenance activities, such as vegetation control and levee inspection, may also result in increased disturbance to non-breeding birds. Mowing of the levees may result in disturbance of harvest mice. However, the Project proposes that no mowing be conducted in alkali meadow/T-zone habitats with the exception of mowing an approximately 1-foot-wide strip from the top hinge point of the levee, which would prevent overgrowth of trails and maintenance roads. On levee slopes with grassland or short stature, moderate density grassland above salt marsh habitat, it is recommended that mowing occur only to the upper extent of marsh vegetation. In the latter case, this would protect sensitive wildlife species while allowing sufficient mowing to conduct levee inspections. Disturbance of harvest mice from recreational trail use may occur, due to the expected occurrence of mice in ecotones and vegetated lower levee slopes and in the salt marsh harvest mouse habitat adjacent to northern coastal salt marsh habitat, where the levee trail connection to the existing Bay Trail segment would be provided. However, such disturbance would be minimized by the physical separation of the bare-topped trail and the vegetated slopes where harvest mice may occur. Trail use may also result in indirect effects, such as increased trash (which may attract predators) and increased invasive plants, which may adversely affect habitat quality. Salt marsh harvest mice could also be affected by levee inspections in these same areas. Use of lighting at night during operation or maintenance activities may cause disturbance to salt marsh harvest mice, altering behavior and causing impacts as previously described.

Impacts on salt marsh harvest mice and salt marsh wandering shrews from program-level activities would be offset by the Project's conservation actions, as discussed in detail under Project-level components, below. Nevertheless, due to the relatively low population sizes of these species, impacts on these species would be considered **significant** due to the potential for direct injury or mortality.

Project-Level Components

The salt marsh harvest mouse and salt marsh wandering shrew are known to occur in the Project area in tidal northern coastal salt marsh habitat in Faber and Laumeister marshes in the South of Bay Road Reach (Figures 3.4-3b-g) and Ravenswood Slough and the Moseley Tract Marsh in the Substation and Marsh Restoration Reach (Figure 3.4-3i). They may also occur in non-tidal/muted tidal northern coastal salt marsh and non-tidal brackish marsh in the O'Connor Detention Pump Basin in the South of Bay Road Reach (Figure 3.4-3b).

During the construction phase, 4.52 acres of tidal northern coastal salt marsh and 2.96 acres of non-tidal northern coastal salt marsh would be affected in the Project area (Table 3.4-5), including within Faber and Laumeister marshes in the South of Bay Road Reach and Ravenswood Slough in the Substation and Marsh Restoration Reach. A total of 3.73 acres of tidal northern coastal salt marsh and 0.64 acre of non-tidal northern coastal salt marsh would be permanently affected by Project activities (Table 3.4-5) in these same areas.

Restoration of tidal action in Ponds R1 and R2 and installation of high-tide refugia would provide considerable benefits for the salt marsh harvest mouse and salt marsh wandering shrew once tidal northern coastal salt marsh has reestablished, which is estimated to be approximately 10 to 20 years from the date that the ponds are breached. Restoring tidal action to these ponds would allow tidal northern coastal salt marsh to naturally reestablish, creating approximately 576 acres of suitable tidal northern coastal salt marsh habitat for these species. Thus, although approximately 18.4 acres of tidal northern coastal salt marsh would be permanently affected by both Program and Project-level actions, restoration of tidal marsh in these two ponds would produce far more tidal marsh than is affected, more than compensating for impacts. Because tidal marsh is located directly adjacent to these ponds at the Moseley Tract Marsh and Ravenswood Slough, extensive tidal marsh is currently present 0.75 mile to the west at Greco Island, and nearby Pond R4 was opened to tidal action in 2023, restoration of Ponds R1 and R2 to tidal marsh would contribute substantially to the formation of a large, contiguous marsh complex that allows for greater movement of marsh species across the landscape. Construction of approximately 0.8 acre of in-marsh refugia berms along sloughs throughout these ponds and 4 acres of transition zone habitat along the flood control infrastructure and the retired berm surrounding Pond R1 would provide important high-tide refugia close enough for the salt marsh harvest mouse and salt marsh wandering shrew to access to evade predators. Project-level activities could affect the salt marsh harvest mouse and salt marsh wandering shrew in the ways described for program-level components. Project impacts on these species would be considered **significant** due to the potential for direct injury or mortality.

Impact Conclusion

With implementation of the following mitigation measures, impacts on the salt marsh harvest mouse and salt marsh wandering shrews would be **less than significant.**

Mitigation Measures BIO-1, BIO-5, and BIO-14 (refer to text above).

Mitigation Measure BIO-24: Vegetation Removal. This measure applies to the South of Bay Road, North of Bay Road, Dumbarton Approach, Substation and Marsh Restoration, and Bedwell Bayfront Park reaches. Where vegetation removal occurs, the Project Proponent will ensure that vegetation and debris that could provide cover for salt marsh harvest mice will be removed under the supervision of a qualified biologist using only hand tools (which may include line trimmers) at least 1 week prior to the commencement of construction activities. Vegetation removal will be limited to the minimum amount necessary to permit the activity to occur. Vegetation will be removed on a progressive basis, such that the advancing front of vegetation removal moves toward vegetation that would not be disturbed. A qualified biologist will monitor the vegetation removal and make specific recommendations with respect to the rate of vegetation removal (to ensure that any small mammals present are able to escape to cover that would not be affected), and whether vegetation needs to remain in a certain area temporarily to facilitate dispersal of individuals into habitat outside the impact area.

During mowing of vegetation along the levee, mowing will start from the top (the area of least suitable habitat) and proceed downslope toward more suitable habitat so any mice present in the narrow swath to be mown can move away from the disturbance of the mower and out of the mowing area. Below the zone at the top of the levee that will be mown, any woody plant removal that becomes necessary will be performed by hand; such hand-removal is expected to be necessary very infrequently (e.g., once every few years, at most).

Mitigation Measure BIO-25: Wildlife Exclusion Fencing. This measure applies to the South of Bay Road, North of Bay Road, Dumbarton Approach, Substation and Marsh Restoration, and Bedwell Bayfront Park reaches. Once vegetation has been removed, where work occurs adjacent to suitable habitat, the Project Proponent will ensure that wildlife exclusion fencing is installed in a configuration that minimizes potential for small mammals to move from unaffected habitat into the work area. A qualified biologist will be present during initial vegetation removal and exclusion fence installation, then periodically inspect the site during construction activities to ensure that the exclusion fencing is functioning appropriately. This fencing will consist of material that cannot be climbed by harvest mice, buried at least 4 inches below the ground's surface, and with at least 1 foot (but no more than 4 feet) above the ground. All supports for the fencing will be placed on the inside of the work area. A buffer will be maintained free of vegetation around the outside of the exclusion fencing; this buffer will be the minimum width necessary to prevent vegetation from leaning against the fencing in a way that would allow small mammals to climb the fencing. Fencing will not be placed in areas where it would prevent small mammals from reaching refugial habitat during very high tides.

1k: Marine Mammals

Impact Assessment

Two species of marine mammals, the Pacific harbor seal and California sea lion, are assessed together because they occur within similar areas, and impacts on these species and their habitats from program- and Project-level activities are expected to be similar.

Program-Level Components

The Pacific harbor seal and California sea lion may occur within the Program area as foragers, but do not breed or haul out within it. The Pacific harbor seal is known to form pupping sites at Bair Island and Mowry Slough, approximately 3.0 miles northwest and 4.1 miles east from the Program area, respectively. It is a commonly observed species throughout tidal aquatic habitats in the South San Francisco Bay. Conversely, the California sea lion breeds on offshore islands far from the Program area, with the two closest locations found at Año Nuevo Island and the Farallon Islands more than 60 miles away. It is a common species within the central bay but is rarely found in the South San Francisco Bay (South Bay). Both species may use tidal open water for foraging and tidal northern coastal salt marsh and tidal mudflat habitats for hauling out in the North of Bay Road, Dumbarton Approach, Tech Campus, and Bedwell Bayfront Park reaches (Figures 3.4-2b-e, h-n, s-t). Though unlikely, these two species could also occur in managed pond, muted tidal open water, and non-tidal/muted tidal northern coastal salt marsh habitats in the Dumbarton Approach, Tech Campus, Bayfront Expressway, and Marsh Road reaches (Figures 3.4-2e-g, k, n-s, t-v).

During the construction phase, a total of 1.29 acres of tidal open water, 0.15 acre of intertidal mudflat, 7.76 acres of tidal northern coastal salt marsh, 5.31 acres of managed pond, and 0.65 acre of non-tidal northern coastal salt marsh habitats providing potential habitat for the Pacific harbor seal and California

sea lion would be affected in the Program area (Table 3.4-4). A total of 2.12 acres of tidal open water, 14.85 acres of tidal northern coastal salt marsh, 8.10 acres of managed pond, and 2.32 acres of non-tidal northern coastal salt marsh would be permanently affected by Program activities (Table 3.4-4).

No direct, physical injury or mortality of Pacific harbor seals or California sea lions would result from Program activities, as individuals would simply move away from heavy equipment. However, Program area construction activities, including site preparation/mobilization, demolition, grading, drainage/water control, and shoreline protection construction may cause both direct and indirect impacts on the Pacific harbor seal and California sea lion. In-water work, such as installation of sheet piles and dredging, could cause auditory injury in the absence of sound reduction measures. Construction activities could result in a reduction in water quality in Flood Slough, San Francisco Bay, or managed ponds due to the mobilization of sediments or contaminants (e.g., leaks from construction equipment) during construction. Noise and other disturbance from construction activities may also prevent these species from foraging and/or hauling out in the Program area. Use of lighting at night during construction, operations, or maintenance activities may attract marine mammals to hunt in illuminated areas, disrupting normal foraging behavior. Otherwise, operation and maintenance activities would be unlikely to result in additional impacts on these species. Program impacts on these species would be considered **significant** due to the potential for indirect injury from loud noise during in-water work or mortality and alteration of foraging and hauling out behavior.

Project-Level Components

The Pacific harbor seal and California sea lion may occur within the Project area as foragers, but do not breed within the Project area. They use tidal open water habitat for foraging and tidal northern coastal salt marsh and tidal mudflat habitats for hauling out in Faber and Laumeister marshes in the South of Bay Road Reach (Figures 3.4-3b-g), bayward of Pond SF2 in the Dumbarton Approach Reach (Figure 3.4-3h), and Ravenswood Slough and bayward of Pond R1 in the Substation and Marsh Restoration Reach (Figure 3.4-3i). Though unlikely, these two species could also occur in managed pond and non-tidal/muted tidal northern coastal salt marsh habitats in Pond SF2 in the Dumbarton Approach Reach and Ponds R1 and R2 in the Substation and Marsh Restoration reaches.

During the construction phase, a total of 4.16 acres of tidal open water, 4.52 acres of tidal northern coastal salt marsh, 238.04 acres of managed pond, and 2.96 acres of non-tidal/muted tidal northern coastal salt marsh habitats would be affected in the Project area (Table 3.4-5). A total of 0.26 acre of tidal open water, 3.73 acres of tidal northern coastal salt marsh, 25.83 acres of managed pond, and 0.64 acre of non-tidal/muted tidal northern coastal salt marsh would be permanently affected by activities (Table 3.4-5).

Project-level activities could affect the Pacific harbor seal and California sea lion in the ways described for program-level components. Project impacts on these species would be considered **significant** due to the potential for direct injury or mortality and alteration of foraging and hauling out behavior.

Impact Conclusion

With implementation of the following mitigation measures, impacts on the Pacific harbor seal and California sea lion would be **less than significant**.

Mitigation Measures BIO-1, BIO-7, BIO-10, and BIO-14 (refer to text above).

Impact BIO-2: Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means (Less than Significant with Mitigation).

Methodology

Sensitive wetland and aquatic habitats are located throughout the Project area. Due to the nature and purpose of the flood protection infrastructure, wetland or aquatic habitats are located on the bayward side of the Project footprint in most areas; wetland and aquatic habitats are present along the landward side in some areas (Figures 3.4-2). The Project would adversely affect state and federally protected wetland and aquatic habitats and includes habitat restoration and enhancement efforts to address those effects.

Quantifying Impacts by Habitat Type. The surface area of impacts on wetland and aquatic habitats was quantified for the following major habitat types, which are composed of the sub-habitat types noted in parentheses and mapped on Figures 3.4-2 and 3.4-3:

- ***Tidal wetlands*** (tidal northern coastal salt marsh, tidal brackish marsh, and tidal open water). Tidal open water consists of tidal channels within the marsh and is included in tidal wetlands because dendritic tidal slough channels within existing tidal wetlands are a key feature of the ecology of these habitats—all other types of open water are incorporated under "open water," below;
- ***Non-tidal wetlands*** (non-tidal/muted tidal northern coastal salt marsh and seasonal wetland);
- ***Managed ponds***; and
- ***Open water*** (muted tidal open water [such as slough channels that receive muted tidal action], detention basin/canal, and intertidal mudflats).

Assessing Impacts from Program-Level and Project-Level Components. To assess impacts from program-level components, the expected locations and potential magnitude of expected impacts on wetland and aquatic habitats were determined by overlaying 10 percent design plans on mapped regulated habitats. Impacts from components evaluated at a project level of detail were determined by overlaying 30 percent design plans and proposed habitat restoration (summarized in Chapter 2, *Project Description*, and presented in more detail in Appendix BIO3) on mapped regulated habitats.

Determining Permanent and Temporary Construction-Phase Impacts. Permanent impacts are those that would result in a permanent loss or alteration of the sensitive habitat type. Construction-phase temporary impacts are those that would alter the nature of these habitat types while construction is underway, but that would be deliberately restored by the Project to their preexisting condition following completion of construction. Construction-phase temporary impacts would be located within the construction buffer adjacent to the footprint of flood protection infrastructure; the Program-level biotic resource impact figures show the footprint of the construction-phase impacts zone.

Long-Term Recovery of Tidal Wetland Habitat. In addition to the Project's large-scale tidal habitat restoration in Ponds R1 and R2, a portion of the affected tidal wetlands are expected to reestablish on the bayward levee slope (i.e., be below the HTL) within 50 years of construction due to sea level rise (SLR). As such, levee slope soil substrate design is geared to facilitate recovery of tidal wetland habitat. This recovery would reduce the net loss of wetland acreage. The 50-year HTL was mapped in all tidal areas to quantify the surface area of recovery with SLR. The 50-year HTL elevation was determined based on the

current mapped HTL combined with the estimated SLR for 50 years after the end of construction (2081, or 50 years after 2031, the estimated construction completion date) using an intermediate-high SLR scenario.[54,55] Therefore, the calculation for total impacts includes all impact areas, while calculations for net loss assume that areas within the 50-year HTL would not constitute net loss.

Impact Assessment

Program-Level Components

Impacts Prior to Consideration of Proposed Tidal Marsh Restoration and Managed Pond Enhancement

Implementation of program-level components would result in permanent and temporary construction- and operations-phase effects on state and federally protected wetland and aquatic habitats.

Permanent impacts on sensitive wetland and aquatic habitats would result from grading and fill placement to construct the flood protection infrastructure. Impact quantities are provided in Table 3.4-4. Flood protection infrastructure consists of levees, floodwalls, and levee/floodwall hybrids. Levee, floodwall, and levee/floodwall hybrids would result in permanent fill, and these areas would be maintained as upland habitats. Therefore, functions and values of wetland and aquatic habitats of these areas would be permanently lost. However, tidal marsh habitat would recover over time on levee slopes on the bayward side in tidal areas as sea levels rise, because the Project would restore conditions on the levee slopes to support this habitat type. Although Table 3.4-4 also documents the area of the levee slope that is estimated to fall below the HTL within 50 years of the completion of construction of program-level components, net loss of wetland and aquatic habitat due to impacts from program-level components subtracts this recovered area from total impacts. These areas are still included as permanent impacts due to the significant temporal loss represented by the recovery period of up to 50 years.

Permanent operation and maintenance access roads would be installed on the landward side of the levees, floodwalls, and levee/floodwall hybrids in most program-level impact areas (Figures 3.4-2). Construction would consist of grading and soil compaction and may also include placement of aggregate base rock. Where permanent access roads are proposed in wetland/aquatic habitats, construction would result in conversion of wetland and/or aquatic habitat to upland habitat with low or minimal vegetation cover. Therefore, functions and values of wetland and aquatic habitats in these areas would be permanently lost.

Permanent impacts would occur on the landward side of the flood protection infrastructure resulting from alteration of surface water flow patterns. Specifically, some tidal wetlands would not be affected directly by the footprint of flood protection infrastructure but would be disconnected by the flood protection infrastructure from tidal flows; these impact areas are denoted as “loss of tidal action” in Figures 3.4-2.

Loss of tidal action would result in changes in habitat types, as follows:

- ***Tidal Wetlands***. Tidal salt marsh and tidal brackish marsh located on the landward side of flood protection infrastructure would become non-tidal. Existing tidal salt marsh that is converted to non-

[54] H. T. Harvey & Associates, 2024. *SAFER Bay Project – Aquatic Resources Delineation Report*. Prepared for San Francisquito Creek Joint Powers Authority. April.

[55] California Ocean Protection Council, 2024. *DRAFT: State of California Sea Level Rise Guidance: 2024 Science and Policy Update.* California Sea Level Rise Science Task Force, California Ocean Protection Council, California Ocean Science Trust. January 2024. Available online at opc.ca.gov/wp-content/uploads/2024/01/SLR-Guidance-DRAFT-Jan-2024-508.pdf.

tidal habitat would remain predominantly saline due to salts present in the soil. In addition, because these areas are low-lying and underlain by bay mud soils with a high proportion of clay, they are expected to remain predominantly wetland habitats. However, the primary driver of wetland hydrology in these areas would become incidental precipitation and stormwater inflows rather than tidal flows, resulting in conversion from tidal salt marsh to non-tidal marsh habitat. This may cause some seasonal saline wetlands to form as well. Habitat conversion to non-tidal marsh would result in reduced quality of habitat and the ecological functions and values they provide relative to the existing tidal salt marsh. For example, the much lower frequency of saturation and inundation would result in lost frequency of water quality improvement functions; loss of area and connectivity to adjacent wetland and aquatic habitats would reduce the ecological values; and the degradation of quality and connectivity would result in loss of functionality as habitat for tidal-marsh dependent wildlife species (refer to Impact BIO-1). In addition, accumulation of soil salinity due to repeated cycles of flooding and drying may result in some limited bare areas absent of vegetation. Because these areas would result in habitat change but would remain wetlands, they are counted as total permanent impacts but are subtracted from total impacts for the purpose of calculating net loss in Table 3.4-4.

- ***Non-tidal Wetlands***. Some existing non-tidal wetlands (non-tidal/muted tidal wetland) are located just landward of tidal salt marsh and likely receive occasional spring tide inundation. The functions of these non-tidal wetlands would likely be affected by disconnection of the adjacent tidal marsh from daily tidal flows similar to that described previously.

In total, up to 30.69 acres of wetland and aquatic habitats may be permanently affected due to program-level activities. However, 4.93 acres of these permanent impacts are expected to persist as non-tidal wetlands/aquatic habitat with reduced function due to the loss of tidal action. In addition, 3.59 acres of these permanently affected habitats are likely to reestablish to tidal marsh within 50 years following construction with SLR. Therefore, impacts from program-level components would result in a net loss of up to 22.18 acres of wetland and aquatic habitats in the long term.

Construction-phase temporary impacts on wetland and aquatic habitat from program-level components would result from soil disturbance and compaction due to truck access as well as dewatering and associated infrastructure (e.g., cofferdams and pumps). Soil disturbance in tidal areas can result in erosion that causes loss of vegetated marsh surface. Similarly, soil compaction can reduce the elevation of the affected area sufficiently to alter the hydroperiod, resulting in a change from high marsh to low marsh or unvegetated tidal waters.

In some locations, flood protection infrastructure or construction-phase work within 10 feet bayward of the levee toe would block and/or dewater tidal slough channels that help to distribute tidal waters throughout adjacent marsh habitats located bayward of the construction-phase temporary impact area. This could result in the degradation of up to 37.55 acres of tidal marsh due to muting of tidal action in Ravenswood Slough and Ravenswood Open Space Preserve. However, the Project avoids this impact because the Project's habitat restoration design incorporates grading of replacement tidal slough channels to maintain the existing tidal flows to the broader marsh. The design for the area and length of the tidal channels is based on providing sufficient hydraulic capacity to maintain the hydrologic regime. The tidal channels have also been designed to use existing channels where possible and maintain similar sinuosity, width, and depth as the affected channels, where feasible. Replacement tidal channels would be constructed as a first order of in-marsh work to provide alternative hydraulic connectivity pathways and

avoid hydrologic impacts on the tidal marsh. Replacement tidal channels would be monitored to verify their proper function as part of the post-construction habitat restoration monitoring program to be implemented as part of **Mitigation Measure BIO-26**. Affected channels are identified in Faber and Laumeister marshes, Ravenswood Open Space Preserve, and Ravenswood Slough. The locations of replacement tidal channel excavations are shown in Figures 3.4-2d and 3.4-2j. Nonetheless, impacts during construction would result from grading of these replacement tidal slough channels, which would convert some vegetated tidal salt marsh to unvegetated slough channel habitat.

Construction-phase temporary impacts are shown on Figures 3.4-2 and summarized in Table 3.4-4. In total, up to 15.72 acres of wetland and aquatic habitats may be affected during construction due to program-level Project activities.

Operation and maintenance activities would include implementation of the HRMP; vegetation control on shoreline protection; operation of pumps, flood gates, and interior drainage systems; levee inspections; and vegetation management on levees and within areas restored in accordance with the Habitat Restoration BOD. These activities are not expected to result in additional permanent or construction-phase temporary impacts on wetland and aquatic habitats. The purpose of the HRMP is protection of biological resources, including wetland and aquatic habitats. Vegetation maintenance would also be managed to protect wetland and aquatic resources, as described in the Habitat Restoration BOD. Operation and maintenance activities that would otherwise affect wetlands and aquatic habitats would do so by maintaining changes to hydrologic patterns in the Project area that are addressed as impacts above.

Tidal Marsh Restoration and Managed Pond Enhancement Proposed as Part of the Project

In addition to the flood protection infrastructure and construction that would cause the impacts, the Project also incorporates substantial tidal marsh habitat restoration and managed pond enhancement. Specifically, the Project would restore approximately 576 acres of former managed pond habitat to a high-quality tidal marsh ecosystem in Ponds R1 and R2. These managed ponds were constructed as salt ponds in the 1940s and converted historical tidal salt marsh to pond via elimination of tidal action and concentration of salts. The Project's tidal marsh restoration design includes the restoration of a "complete tidal marsh ecosystem," including restoration of full tidal action to historic dendritic slough channel networks, extensive vegetated marsh plain habitat, in-marsh high-tide refugial habitat berms, and salt marsh upland transition zone (T-zone) habitat along a horizontal levee in Pond R2. In addition, the Project would enhance approximately 456 acres of existing managed pond habitat to support increased numbers of breeding western snowy plover in Ponds SF2 and R3. The pond enhancement includes conversion of 90 acres of existing waterbird habitat to new western snowy plover breeding and foraging habitat in Pond SF2 (cells U2 and U4) and enhancement of 366 acres of existing western snowy plover habitat in Pond SF2 (cell U3) and Pond R3. Details on the conceptual design and ecological rationale for these restoration and enhancement components are documented in Appendix BIO3.

Tidal restoration and managed pond enhancements would be constructed concurrent with the Project's initial impacts on wetland habitat from construction of flood protection infrastructure. This construction timing is woven into the Project's schedule to minimize temporal loss of wetland habitat and to build the tidal restoration prior to the predicted acceleration in SLR, thereby increasing marsh restoration certainty (Appendix BIO3). The effective and timely restoration of such a large area of the region's historic dominant habitat more than offsets the impacts described above.

Ponds R1 and R2 are subsided because tidal action was eliminated by historic salt pond construction; the subsided pond bottom elevations are too low for establishment of tidal marsh vegetation. However, restored tidal action would result in rapid natural sediment accretion within Ponds R1/R2. The remnant marsh plain is expected to experience sufficient accretion to allow for substantial low marsh vegetation establishment in approximately 10 to 20 years. In the interim time frame prior to vegetated marsh establishment, Ponds R1 and R2 would provide extensive, high-quality intertidal mudflat habitat, which provides habitat for a diversity of shorebirds. After this time frame, the restored marsh would provide comparable habitat functions and values to the affected tidal marsh. The restored tidal marsh would provide substantially greater ecological value than affected non-tidal wetlands, because tidal marsh habitat provides greater habitat for rare/protected wildlife species, such as California Ridgway's rail and salt marsh harvest mouse, as well as greater connectivity to the bay via full tidal exchange. The restored tidal marsh would provide substantially greater ecological value than the existing R1/R2 pond habitat for the same reasons. In addition, the dense native vegetation cover in restored tidal marsh provides substantial ecological functions, and vegetation cover is lacking in managed pond and open water habitat. Although former salt pond habitat currently in Ponds R1/R2 provides habitat for western snowy plover, which would not be provided by restored tidal marsh, the loss of these services would be offset by the proposed managed pond enhancements in Ponds SF2 and R3. Similarly, intertidal mudflat within open water provides valuable foraging habitat for waterbirds, which would also be offset by habitat restoration actions in Ponds R1, R2, R3, and SF2. Refer to Impact BIO-1 for an assessment of Project impacts on special-status wildlife.

The Project's restoration of tidal marsh would provide a substantial net ecological lift in the Project area due to the high quality of the restored habitat as well as the much greater overall restored acreage relative to the area of impacts. The restoration of Ponds R1 and R2 to their former tidal marsh habitat also increases the overall ecological value in the region due to their connectivity and/or proximity to other valuable wetland and aquatic habitats along the bay shore in the Project vicinity (e.g., tidal marsh restored Pond R4 by the South Bay Salt Pond Restoration Project, and existing tidal marshes in Moseley Tract Marsh, Ravenswood Slough, and Greco Island). In contrast, impacts from program-level components are generally restricted to a relatively narrow strip of wetland and aquatic habitat along the existing bay edge, leaving large areas of the existing sensitive bayland habitats intact. Although there would be some temporal loss of habitat during the period when the restored tidal marshes in Ponds R1/R2 are recovering full habitat function after construction (estimated at 10–20 years), these temporal losses are also more than compensated for by the overall area and ecological value of the restored marsh ecosystem.

Impacts Incorporating Consideration of Proposed Habitat Restoration and Enhancement

In total, there are up to 30.69 acres of permanent impacts on wetland and aquatic habitats from program-level components, and another 15.72 acres would be temporarily affected during construction. Approximately 3.26 acres of the 30.78 acres of permanently affected habitat from program-level activities would revert to tidal marsh within 50 years of construction due to SLR. However, the Project includes restoration of 576 acres of tidal marsh, and restoration and enhancement of 456 acres of western snowy plover breeding habitat. Therefore, despite the approximately 10 to 20 years from restoration of tidal hydrology to establishment of tidal salt marsh, the restoration Project components would be more than enough to offset permanent impacts associated with program-level components.

Proposed habitat restoration design incorporates measures for restoration in place for construction-phase impacts, that would prevent such impacts from becoming permanent. These include restoration of tidal

marsh plain topography and substrate to the pre-impact condition and active revegetation with high-marsh species.

Impacts on wetlands and aquatic habitats from program-level components would be less than significant if the Project's restoration activities are successful. However, proposed habitat restoration does not include measures to monitor and verify the success of the restoration. Therefore, in the absence of mitigation measures, impacts on wetland and aquatic habitats from program-level components are **significant** due to the sensitivity of aquatic and wetland habitats and their multiple functions (e.g., fish and wildlife habitat, shoreline erosion protection, nutrient cycling, carbon sequestration).

Project-Level Components

Impacts Prior to Consideration of Proposed Habitat Restoration and Enhancement

Project-level permanent impacts and construction-phase temporary impacts would occur to state and federally protected wetland and aquatic habitats in addition to those described previously for program-level components.

Permanent impacts on sensitive wetland and aquatic habitats from Project-level activities would result from the same types of activities described above, including:

- Grading and fill placement during construction of the flood protection infrastructure.
- Installation of access roads for operation and maintenance.
- Alteration of surface water flow patterns landward of the levee.
- Additional permanent impacts would occur due to habitat restoration and enhancement activities in Ponds R1, R2, and SF2. Appendix BIO3 provides additional details on the design and rationale for habitat restoration and enhancement activities. Permanent impacts from these activities consist of the following:
  - Breaching of berms between Ponds R1 and R2 and between R1 and the San Francisco Bay would result in permanent conversion of Ponds R1 and R2 from managed pond to tidal salt marsh habitat. This would provide a substantial increase in ecological functions and services in this area.
  - In Pond R2, the constructed levee would be widened in one area to create additional salt marsh-upland T-zone habitat. This would result in additional conversion of managed pond habitat to upland habitat within Pond R2 beyond the footprint of the flood protection infrastructure. The widened ecotone would significantly enhance the value of the restored tidal marsh habitat in Ponds R1 and R2.
  - Seabird nesting islands would be constructed in Pond R1 to provide replacement seabird nesting habitat due to removal of seabird nesting islands in Pond SF2 cell U2 to convert cell U2 to western snowy plover breeding habitat. This would result in permanent conversion of managed pond habitat to upland habitat.
  - Grading of the berm between cells U2, U3, and U4 to create contiguous western snowy plover habitat, and removal of existing upland islands that have served as seabird nesting islands in U2 would result in a small amount of permanent impacts on non-tidal wetlands. Although the berms and existing nesting islands are both primarily upland, both types of features are lined with a very

narrow strip of non-tidal marsh. This non-tidal marsh would be permanently converted to managed pond habitat.

Table 3.4-5 presents impacts on wetland and aquatic habitats associated with implementation of Project-level components. In total, up to 32.18 acres of wetland and aquatic habitats may be permanently lost due to Project-level activities. Of these, 15.11 acres of impacts are due to habitat restoration actions. In addition, 8.68 acres of these permanently affected habitats are likely to revegetate to tidal marsh within 50 years following construction, and 0.11 acre would persist but with reduced function due to the loss of tidal action. Therefore, the implementation of Project-level components would result in a net loss of 23.11 acres of wetland and aquatic habitats in the long term.

Construction-phase temporary impacts on wetland and aquatic habitats in Project-specific areas would occur from activities described previously for programmatic Project areas, including:

- Soil disturbance and compaction due to construction access.
- Dewatering and associated infrastructure (e.g., cofferdams and pumps).
- Grading of replacement slough channels to maintain the conveyance of tidal flows to adjacent tidal salt marsh habitat.

Additional construction-phase temporary impacts in Project-level areas would occur due to construction of habitat restoration and enhancement in Ponds R1, R2, SF2, and R3. These impacts would temporarily disturb habitats during construction but not result in conversion of wetland/aquatic habitat to upland (see Appendix BIO3 for details). They are shown in Figure 3.4-3 and include the following:

- Grading in wetland and aquatic habitats (mostly managed pond) in Ponds R1, R2, SF2, and R3 that would not result in conversion from an aquatic habitat to upland habitats.
  - R1 and R2: Breaching of existing levees surrounding R1 and between R1 and R2, and grading of pilot channels, to reintroduce tidal action in these ponds. This includes potential dredging of a channel bayward from the primary breach in R1. This is a key action for restoration of tidal marsh habitat in Ponds R1 and R2.
  - R1and R2: Excavation of bay mud from the existing pond bottom and use of this material to construct in-marsh high-tide refugia berms (with crest elevations below HTL) along the edges of remnant dendritic slough channels to enable establishment of refugia habitat for resident marsh wildlife along slough channels within the restored tidal marsh following breaching.
  - SF2 and R3: Widening and deepening of existing borrow ditches to impede access to western snowy plover breeding habitat by mammalian predators.
  - SF2: Grading of the berms between cells U2, U3, and U4 to create contiguous western snowy plover habitat, and removal of existing upland islands that have served as seabird nesting islands in U2. In addition, aquatic habitat below the elevation of OHWM would be regraded throughout cells U2, U3, and U4 in SF2. The purpose of regrading is to provide improved function for western snowy plover with no loss of aquatic habitat.

- Placement of fill in wetland and aquatic habitats:
  - R1: Ditch blocks would be placed within historic borrow ditches to direct restored tidal flows into the historic network of dendritic slough channels. Ditch blocks would be situated below the HTL of the newly restored tidal marsh and would not result in a conversion of aquatic to upland habitats.
  - R1 and R2: Bay mud that would be excavated from construction of flood protection infrastructure is horticulturally and geotechnically suitable for tidal marsh restoration below the HTL but not suitable in substantial amounts for reuse in levee construction. Therefore, the restoration plan for Ponds R1 and R2 includes the beneficial reuse of bay mud for tidal marsh restoration. This excavated bay mud would be beneficially reused via placement within borrow ditches along the majority of the inner boundary of Pond R1 and southwestern boundary of Pond R2. This would augment the above-mentioned ditch blocks by preventing the tidal prism from being captured within the borrow ditches, distributing tidal flows more completely across the restored tidal marsh.

Construction-phase Project-level temporary impacts are shown on Figures 3.4-3 and summarized in Table 3.4-5. In total, up to 253.60 acres of wetland and aquatic habitats may be affected during construction due to Project-level activities. Of these, 17.87 acres are due to impacts in the construction buffer for construction of flood protection infrastructure and 235.73 acres of impacts are due to habitat restoration and enhancement activities.

Operation and maintenance activities would include implementation of the HRMP; vegetation control on shoreline protection; operation of pumps, flood gates, and interior drainage systems; levee inspections; and vegetation management on levees and within areas restored in accordance with the Habitat Restoration BOD. These activities are not expected to result in additional permanent or construction-phase temporary impacts on wetland and aquatic habitats, for the same reasons described above for program-level components.

Impacts Incorporating Consideration of Proposed Habitat Restoration and Enhancement

As described previously, the Project incorporates substantial habitat restoration and enhancement, including restoration of approximately 576 acres of managed pond habitat to a high-quality tidal marsh ecosystem and enhancement of approximately 456 acres of existing managed pond habitat to support western snowy plover breeding (Appendix BIO3). The substantial ecological lift in wetland and aquatic habitat functions from the Project's large-scale habitat restoration and enhancement elements is more than enough to offset the 31.28 acres of permanent impacts from Project-level components (which includes 23.11 acres of net wetland loss), 253.60 acres of construction period impacts from Project-level components, and impacts from program-level components, as described above.

Impacts on wetlands and aquatic habitats from Project-level activities would be less than significant if proposed restoration activities described in Chapter 2, *Project Description*, and Appendix BIO3 are successful. However, the proposed habitat restoration design does not include measures to monitor and verify the success of the restoration. Therefore, in the absence of mitigation measures, impacts on wetland and aquatic habitats from Project-level activities are considered **significant** due to the sensitivity of aquatic and wetland habitats and their multiple functions (e.g., fish and wildlife habitat, shoreline erosion protection, nutrient cycling, carbon sequestration).

Impact Conclusion

The Project incorporates restoration of 576 acres of tidal marsh habitat as well as restoration and enhancement of 456 acres of western snowy plover breeding habitat, which is more than sufficient to compensate for the 62.87 acres of total combined permanent impacts on wetland and aquatic habitats. In addition, the combined 269.32 acres of impacts associated with program- and Project-level activities during construction would be restored in place following construction. The majority of impacts during construction are due to restoration and enhancement activities. Habitat restoration and enhancement measures incorporated into the Project would also compensate for temporal impacts in these areas during construction. Therefore, with implementation of the following Mitigation Measure BIO-26, impacts on wetland and aquatic habitats would be **less than significant.**

Mitigation Measure BIO-26: Habitat Restoration Monitoring Plan. This measure applies to proposed habitat restoration activities in Ponds R1, R2, R3, and SF2 as well as temporarily affected areas in all reaches, including replacement secondary channels and levee slope revegetation areas. The Project Proponent will prepare and implement a habitat restoration monitoring plan (HRMP). The HRMP will include specific plans for the revegetation, restoration, and enhancement of habitat in Ponds R1, R2, R3, and SF2 as well as in areas within the Project site that are subject to temporary construction-phase impacts. The detailed restoration and enhancement approaches presented in the HRMP will be consistent with the approved habitat restoration design and will include the following key elements:

- A planting plan that specifies the use of locally obtained plant materials and includes detailed descriptions of installation methods, after-installation care, and weed control measures;
- A soil handling plan that identifies screening criteria pursuant to the Habitat Restoration BOD to confirm suitability of potential fill material for restoration purposes and processes to implement soil screening;
- A site maintenance plan, including elements such as invasive plant control, trash removal, plant mortality thresholds to trigger replanting (where appropriate such as for T-zone habitat), and an irrigation plan for T-zone habitat; and
- An ecological monitoring plan that includes 10 years of post-restoration ecological monitoring for permanent impact areas, habitat restoration areas, and habitat enhancement areas and 5 years of post-restoration ecological monitoring for areas temporarily disturbed during construction. The ecological monitoring plan will include at a minimum:
    - Vegetation success criteria based on quantifiable metrics including percent cover of native vegetation, percent cover of native wetland vegetation, and maximum percent cover of invasive species (<10 percent).
        - For example, construction-phase temporary impact areas in tidal salt marsh will have at least 70 percent cover of native tidal wetland salt marsh vegetation in Year 5.
    - Success criteria and associated metrics that reflect adequate conditions for use by target wildlife species.
    - Success criteria and associated metrics that document stability of graded areas, including replacement secondary channels, and allow for corrective measures if there is evidence of erosion, slumping, undercutting, or other signs of issues that may pose a risk to target habitat establishment.
    - Final success criteria will be written to target Year 5 for temporary impact areas and Year 10 for permanent impact areas and habitat restoration areas, but the monitoring period

may be extended if criteria are not met. In addition, if final performance criteria are not met, or if during monitoring it becomes clear that the restoration areas are not on a trajectory to meet final performance criteria, the plan will require preparation of remedial measures and may call for preparation of adapted final success criteria, which will be reviewed and approved by the regulatory agencies.

  - Repeat measurements of tidal hydrology, topography, and sedimentation throughout the monitoring period that document that tidal wetlands, managed ponds, created high-tide refugia, and seabird nesting islands are achieving target physical conditions for habitat establishment.

- The HRMP will also include an adaptive management plan.[56] The adaptive management plan will identify the management actions needed for attainment of the success criteria in the ecological monitoring plan. The performance period for the adaptive management plan will be the 10-year post-restoration monitoring period. Following this monitoring period, the habitat restoration sites within the Ravenswood Pond Complex will be adaptively managed in accordance with the South Bay Salt Pond Restoration Project's adaptive management plan.
- Prior to Project construction, the Project Proponent will submit the HRMP to the San Francisco Bay Restoration Regulatory Integrated Team (BRRIT) (including NMFS, USFWS, United States Army Corps of Engineers [USACE], CDFW, Regional Water Quality Control Board [RWQCB], and the San Francisco Bay Conservation and Development Commission [BCDC]) for approval pursuant to regulatory agency authorities.

Impact BIO-3: Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service. *(Less than Significant with Mitigation)*

Impact Assessment

The CDFW defines sensitive natural communities and vegetation alliances using NatureServe's standard heritage Program methodology, as described previously under *Sensitive Natural Communities, Vegetation Alliances, and Habitats*.[57] All wetlands in the BSA are identified as sensitive natural communities. Impacts on wetlands are discussed under Impact BIO-2. This impact discussion (BIO-3) addresses those sensitive natural communities and riparian areas that are outside wetlands.

Except for those impacts addressed under Impact BIO-2, the Project would not adversely affect riparian habitat or any other sensitive natural communities, vegetation alliances/associations, or other such communities identified in local or regional plans, policies, and regulations because none are present within the BSA (refer to Figure 3.4-2). Although one small area (0.06 acre) affected by program-level components is mapped as "Ornamental woodland (riparian)" (Figure 3.4-2k), the source of this mapping used the term "riparian" to reflect the presence of woody vegetation below top of bank.[58] The non-native,

[56] Adaptive management is a structured process that allows for taking action under uncertain conditions based on the best available science and information, closely monitoring and evaluating outcomes, and then re-evaluating and adjusting decisions as more information is learned.

[57] CDFW (California Department of Fish and Wildlife), 2025. "Natural Communities." Available online at www.wildlife.ca.gov/data/vegcamp/natural-communities. Accessed March 2025.

[58] H. T. Harvey & Associates, 2024. *SAFER Bay Project – Aquatic Resources Delineation Report*. Prepared for San Francisquito Creek Joint Powers Authority, April 2024.

ornamental nature of the woodland reflects that the woody vegetation in this case is planted and not hydrologically dependent on the adjacent aquatic resource. Therefore, this area was not considered riparian for the purposes of this assessment.

Impact Conclusion

With implementation of the Mitigation Measure BIO-26, this impact would be **less than significant**.

Mitigation Measure BIO-26 (refer to text above).

Impact BIO-4: 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. (*Less than Significant*)

Impact Assessment

Program-Level Components

Wildlife movement within and in the vicinity of the Program area takes many forms and is different for the various suites of species associated with these lands. Bird and bat species move readily over the landscape in the Program area vicinity, foraging over and within both natural lands and landscaped areas. Mammals of different species move within their home ranges but also disperse between patches of habitat. Generally, reptiles and amphibians similarly settle within home ranges, sometimes moving to central breeding areas, upland refugia, or hibernacula in a predictable manner, but also dispersing to new areas. Some species, especially among the birds and bats, are migratory, moving into or through the Program area vicinity during specific seasons. Aside from bats, there are no other mammal species in the vicinity of the Program area that are truly migratory. However, the young of many mammal species disperse from their natal home ranges, sometimes moving over relatively long distances in search of new areas in which to establish.

Movement corridors are segments of habitat that provide linkage for wildlife through the mosaic of suitable and unsuitable habitat types found within a landscape while also providing cover. On a broader level, corridors also function as paths along which wide-ranging animals can travel, populations can move in response to environmental changes and natural disasters, and genetic interchange can occur. In the Program area, the vegetation communities along the tidal marsh-upland ecotone function as environmental corridors in providing habitat for a variety of resident wildlife species. In addition, tidal open water and tidal marshes provide foraging habitat and nurseries for a range of resident and migratory fish species.

Wildlife nursery sites are locations where wildlife concentrate for hatching and/or raising young, including bird nesting colonies, spawning areas for fish, and maternal roosts for bats. In the Program area vicinity, double-crested cormorants (*Nannopterum auritum*) annually form a rookery on a power transmission tower located approximately 2,100 feet northeast of the Dumbarton Approach Reach. Other bird rookery sites that occur at Pond SF2 and Pond R1 are addressed in Impact BIO-1 under subtopic 1f.

The Program area does not provide habitat suitable for bat maternity roosts, and no fish spawning grounds, such as for Pacific herring (*Clupea pallasii*),[59] occur in the Program area.

Due to the density of development in the Project region and the lack of continuous, well-vegetated pathways through the nearby urban areas, well-defined movement corridors for animals within the BSA are limited. Wildlife species may move through the area along narrow strips of tidal marsh-upland ecotone, using cover and refugia as they find them available, and mammals and reptiles may also move along public trails adjacent to tidal marsh-upland ecotone at night when humans are not present. However, connectivity between the BSA and upland habitats is interrupted by significant commercial and residential development, SR 84, U.S. Route 101, and other roads and culverted areas.

Migratory birds, including waterbirds associated with the bay and terrestrial species, migrate along the edge of San Francisco Bay. For example, nocturnal migrant birds that find themselves over the bay in the morning would seek roosting and foraging areas along the edge of the bay. As a result, numbers of migrant birds in the Project area, or at least moving through these areas, are expected to be high due to the high-quality habitat provided within these areas.

Proposed program-level activities could alter these communities and corridors by breaking them into smaller, disjunct pieces, a process known as fragmentation. The impact of fragmentation on wildlife is twofold: first, as habitat patches become smaller, they are unable to support as many individuals (patch size); and second, the area between habitat patches may be unsuitable for wildlife species to traverse (connectivity). Program-level activities could affect connectivity where vegetation is removed over long reaches of tidal marsh-upland ecotone, trails are removed for levee construction, tidal channels are cut off from tidal action, or vegetation structure and composition is changed in a way that would create barriers to wildlife movement. By creating open areas or patches with unsuitable vegetation types, program-level activities could restrict some wildlife species from moving between distant patches. However, common wildlife species found in the Program area may be somewhat acclimated to, or may be particularly adaptable to, periodic disturbances encountered in the built environment. However, the impacts occurring during Program construction would be temporary, and post-construction, the quality of tidal marsh-upland ecotone movement corridors would be improved by increasing the width and cover of native vegetation. Operation and maintenance activities would only temporarily disrupt wildlife movement by disturbing wildlife that may be attempting to move through an area while the operation and maintenance activities are taking place. The connectivity of the tidal marsh-upland ecotone throughout the Program area would also be greatly increased, further improving the value of this wildlife corridor. As a result, impacts from program-level components within plant and wildlife communities would be limited. Thus, the impact of program-level activities would be temporary and would be **less than significant** under CEQA.

Project-Level Components

Impacts on wildlife movement within the Project area would be similar to those identified within the Program area. Similarly, these impacts would be temporary, and the quality and connectivity of the wildlife corridors would be improved following the completion of construction. Thus, the impact of Project-level activities would be temporary and **less than significant**.

[59] Watters, D., H. Brown, F. Griffin, E. Larson, and G. Cherr, 2004. "Pacific Herring Spawning Grounds in San Francisco Bay: 1973–2000." *American Fisheries Society Symposium* 39:3–14.

Impact Conclusion

The Project would not result in the loss of habitat connectivity for plants and animals. Therefore, impacts would be **less than significant**, and no mitigation is necessary.

Impact BIO-5: Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance. (*Less than Significant with Mitigation*)

Impact Assessment

Local policies and ordinances protecting biological resources of the jurisdictions in which it is located (shown in Table 3.4-2) consist of the following regulations that govern protected trees in the City of East Palo Alto, Menlo Park, and Redwood City:

- ***City of East Palo Alto***: Protected trees include any tree on private property having a main stem or trunk of 8 inches or greater in diameter at a height of 54 inches above grade; any tree required to be preserved as a condition of a development approval; any tree required to be planted as a condition of a development approval; any tree in the public right-of-way or easement; and any tree within a public park, trail, or other property owned by the city and dedicated to public use.
- ***City of Menlo Park***: Protected trees include any trees with a diameter at breast height of 15 or more inches, oak trees with a diameter at breast height of 10 or more inches, or a tree or group of trees of historical significance, community benefit, or specifically designated by resolution of the City Council.
- ***City of Redwood City***: Protected trees may include any healthy tree that is visually accessible from a public right-of-way and either has historical significance, is indigenous to the area, or is one of a group of trees that is each dependent on the other for survival.

Program-Level Components

As shown in Table 3.4-4, the Project would result in permanent and construction-phase temporary impacts on ornamental woodland (riparian), as well as to a small amount of ornamental woodland (upland) habitats. Therefore, trees would be removed as a result of the Project. In addition, trees occur sporadically in other habitats that might experience impacts from program-level activities, including landscaped/developed, ruderal levee slope, and ruderal upland. An estimated 227 trees are present in program-level areas, as estimated via desktop survey (aerial imagery), some of which may be protected by the policies and ordinances referenced above. The vast majority of these trees (approximately 201) are located in the Tech Campus Reach, including 60 protected trees.[60] A small number are also found in the North of Bay Road reach along the Bay Trail in Ravenswood Open Space Preserve, at the boundary between the North of Bay Road reach and the Dumbarton Approach Reach, and along the entrance road to Bedwell Bayfront Park. Project implementation could result in removal of some of these trees. Based on this information, the Project may conflict with the policies shown in Table 3.4-2. In the absence of mitigation measures, this impact would be **significant**.

[60] Rincon Consultants, Inc., 2025. Tree survey data collected for City of Menlo Park. March 24-26, 2025.

Project-Level Components

As shown in Table 3.4-5, there are no impacts on any woodland habitats mapped in the Project area (ornamental woodland [riparian] or ornamental woodland [upland]) from Project-level activities. However, both permanent and construction-phase temporary impacts would occur in landscaped/developed, ruderal levee slope, and ruderal upland habitats. As noted previously, trees sporadically occur in these habitats. H. T. Harvey & Associates' field work has identified a number of trees in the construction footprint in the following Project-level reaches: South of Bay Road and Substation and Marsh Restoration. Trees in the Substation and Marsh Restoration Reach are located within the staging area and would not be altered by the Project. In the South of Bay Road Reach, trees may be affected by Project-level components. The affected trees are all located in the South of Bay Road Reach, east of the proposed levee alignment and within the City of East Palo Alto. Three of these trees are public trees (located on land owned by the City of East Palo Alto) and are therefore protected trees under the City of East Palo Alto's tree ordinance. An additional approximately 16 trees are located on land belonging to the Ravenswood School District and are of sufficient size to be protected private trees. Therefore, because trees protected by the City of East Palo Alto's tree ordinance may be removed, the Project may conflict with the City of East Palo Alto's tree ordinance, shown in Table 3.4-2. In the absence of mitigation measures, this impact would be **significant**.

Impact Conclusion

With implementation of Mitigation Measure BIO-27, impacts related to conflicts with local tree ordinances would be **less than significant**.

> **Mitigation Measure BIO-27: Protected Trees.** This measure applies to the following reaches: South of Bay Road, North of Bay Road, Dumbarton Approach, Substation and Marsh Restoration, Tech Campus, Bayfront Expressway, and Bedwell Bayfront Park. South of Bay Road and North of Bay Road are subject to the City of East Palo Alto Tree Ordinance, while the remainder are subject to the City of Menlo Park Municipal Code Section 13.24.040. The Project Proponent will retain a qualified arborist to conduct a tree survey of the construction footprint. Any trees to be removed will be evaluated for whether they are protected under the applicable local policies (City of East Palo Alto Ordinance 02-2022, City of Menlo Park Municipal Code Section 13.24.040, City of Redwood City Municipal Code Section 35.2). If so, the Project Proponent will avoid affecting these trees, if possible to do so without unreasonable added Project cost, or otherwise obtain a tree removal permit from the applicable local municipality. The Project will comply with all permit conditions, including replacement planting of removed trees if required. No replacement trees will be planted or allowed to grow within shoreline protection features or areas designated for restoration. Removed protected trees will be replaced at the ratio(s) stipulated in the terms of the tree removal permit(s) from the applicable local municipality, through one of the following means:
>
> - Replanting of ecologically appropriate native tree species in locations suitable for tree establishment and long-term survival; and/or
> - Protecting naturally recruited seedlings through the sampling stage.
>
> The Project Proponent will monitor the replacement trees for a 5-year period. The replacement trees will achieve at least 80 percent survival after 5 years of monitoring or will be replanted until at least 80 percent of the original replacement quantity is surviving at 5 years after initial planting or as stipulated in the tree removal permit(s).

Impact BIO-6: Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan. (*Less than Significant*)

Impact Assessment

No Habitat Conservation Plan or Natural Community Conservation Plan governs the Project or is in effect within the Project area. However, much of the Project area is within the Refuge. The Refuge prepared the *Don Edwards SFB NWR Final CCP/EA* to guide refuge management for a 15-year period from 2012 through 2027. This impact addresses Project consistency with the *Don Edwards SFB NWR Final CCP/EA*.

Program-Level Components

Much of the area within which program-level components are proposed is in the Refuge, including Ponds R3, R5/S5. Management goals identified in the *Don Edwards SFB NWR Final CCP/EA* that relate to species and habitats that may be affected by Program activities are discussed in Section 3.4.2 and include Goal 1 Objective 1.1 and Goal 2 Objectives 2.5 and 2.9. Program area activities align with the *Don Edwards SFB NWR Final CCP/EA* Objectives as follows:

1.1 Program activities would improve high-tide refugia for these species along Ravenswood Slough and Flood Slough in the Tech Campus and Bedwell Bayfront Park reaches, respectively.

2.5 Program activities would improve marsh-upland ecotone along Ravenswood Slough and Flood Slough in the Tech Campus and Bedwell Bayfront Park reaches, respectively.

2.9 Program activities would respond to current and future climate change impacts on Refuge properties, including Pond R3 and R5/S5 in the Bayfront Expressway Reach, by constructing a flood protection levee to ensure continued management of these areas despite sea level rise.

Because program-level activities are consistent with, and would not conflict with, the *Don Edwards SFB NWR Final CCP/EA* and no other conservation plans are applicable, impacts associated with program-level components related to compliance with conservation plans are **less than significant**.

Project-Level Components

Management goals identified in the *Don Edwards SFB NWR Final CCP/EA* that relate to species and habitats that may be affected by Project activities are discussed in Section 3.4.2 and include Goal 1 Objectives 1.1, 1.2, 1.4, and 1.5 and Goal 2 Objectives 2.5 and 2.9. Project activities align with the *Don Edwards SFB NWR Final CCP/EA* Objectives as follows:

1.1 Project activities would improve in-marsh high tide refugia for these species in restored tidal Ponds R1 and R2 in the Substation and Marsh Restoration Reach and tidal marsh-upland transition zone high tide refugia along Faber and Laumeister marshes in the South of Bay Road Reach.

1.2 Project activities would enhance suitable nesting substrate for the western snowy plover in Pond R3 in the Bayfront Expressway Reach (Program-level reach with Project-level actions) and Pond SF2 in the Dumbarton Approach Reach. Pond enhancements would allow for these ponds to support many nests, contributing to the Refuge goal of supporting at least 125 western snowy plovers nests annually, and would contribute to improved fledging success for western snowy plover chicks in support of the goal of one fledged chick per male.

1.4 Project activities would improve the ecological function of tidal marsh within the Project area by restoring Ponds R1 and R2 to tidal action, allowing for the formation of a large, interconnected marsh complex with Ravenswood Slough and recently restored Pond R4.

2.5 Project activities would improve marsh-upland ecotone along Faber and Laumeister marshes in the South of Bay Road Reach and Ponds R1 and R2 and Ravenswood Slough in the Substation and Marsh Restoration Reach.

2.9 Project activities would respond to current and future climate change impacts on Refuge properties, including Pond SF2 in the Dumbarton Approach Reach, by constructing a flood protection levee to allow for continued management of western snowy plover nesting areas despite sea level rise.

Impact Conclusion

Because proposed activities are consistent with and would not conflict with the *Don Edwards SFB NWR Final CCP/EA* and no other conservation plans are applicable, this impact is **less than significant,** and no mitigation is necessary.

Impact C-BIO-1: The Project, in combination with cumulative projects, would result in significant cumulative impacts on biological resources (Less than Significant with Mitigation).

The appropriate geographic area for assessing cumulative impacts on biological resources varies to some extent by resource (e.g., because species vary in mobility). Unless otherwise noted below, the overall geographic range for cumulative projects considered in this analysis includes the BSA as well as Bay Area south of SR 92 because projects within that geographic area could generally affect the same populations of fish, waterbirds, other animals, and sensitive natural communities affected by the SAFER Bay Project. Table 3.1-2 and Figure 3.1-1 in Section 3.1.5, Approach to Cumulative Impact Analysis and Cumulative Projects, provide descriptions of projects considered in this cumulative impact analysis.

Congdon's Tarplant

Within the Project area, Congdon's tarplant occurs directly west of the Ravenswood Open Space Preserve and could occur elsewhere in the BSA in alkaline soils in sumps and disturbed areas, saline seasonal wetlands, and ruderal levee slopes. In the South Bay, the species' distribution is limited, and it occurs primarily in intermittently disturbed grassland and ruderal habitats near the edge of the Baylands. Much of the former habitat for this plant was lost to early agricultural conversion; more recently, urban expansion has threatened populations near San José, in the Livermore Valley, and in San Luis Obispo, the latter where restoration has been conducted.[61]

Cumulative projects considered for this impact are described in Table 3.1-2 in Section 3.1.2 and include the following:

- South San Francisco Bay Shoreline;

[61] Sanders, K., 2004. "A quantitative, vegetative, and reproductive comparison of *Centromadia parryi* ssp. *Congdonii* in two locations." Master's thesis, Cal Poly State University.

- South Bay Salt Ponds Restoration;
- Beneficial Reuse of Excavated Material in Tidal Marsh Restoration; and
- Dumbarton Corridor Project.

As described in Impact BIO-1, Project implementation could result in direct disturbance of Congdon's tarplant; disturbance, modification, or destruction of habitat; and injury, mortality, altered growth, or reduced seed set of individual Congdon's tarplants, resulting in a significant impact.

Activities of cumulative projects, such as the South San Francisco Bay Shoreline Project Phase 1, South Bay Salt Ponds Restoration Project, Beneficial Reuse of Excavated Material in Tidal Marsh Restoration Project, and Dumbarton Corridor Project (among others), could adversely affect Congdon's tarplant individuals and occurrences. Consequently, the Project in combination with cumulative projects could result in a significant cumulative impact on Congdon's tarplant. Due to the species' scarcity, the CEQA evaluations for these and other projects require surveys for the species and either avoidance, minimization, or compensatory mitigation, which would reduce further losses of the species moving forward. Unless otherwise exempt, all cumulative projects that would involve physical environmental effects are subject to CEQA review and would be required to implement measures or Project modifications to avoid or mitigate significant environmental effects, as feasible. All cumulative projects would also be required to comply with applicable regulatory requirements protecting biological resources.

The Project's contribution to this cumulative impact is considered cumulatively considerable. With implementation of Mitigation Measures BIO-1, BIO-2, BIO-3, BIO-4, and BIO-5, the Project's contribution to potentially significant cumulative impacts on Congdon's tarplant would be avoided, minimized, or compensated for; consequently, this impact is considered **less than significant with mitigation**.

Special-Status Fish and Essential Fish Habitat

Green sturgeon, white sturgeon, longfin smelt, Central California Coast steelhead, Central Valley fall-run Chinook salmon, and Pacific lamprey may occur within tidal and muted tidal aquatic habitats in the BSA and elsewhere in the South Bay, parts of which contain EFH for special-status fish species, are designated as critical habitat for the green sturgeon and Central Coast steelhead and are proposed as critical habitat for the longfin smelt.

Cumulative projects considered for this impact are described in Table 3.1-2 in Section 3.1.2 and include the following:

- South San Francisco Bay Shoreline;
- South Bay Salt Ponds Restoration;
- Beneficial Reuse of Excavated Material in Tidal Marsh Restoration;
- Dumbarton Corridor; and
- East Palo Alto Waterfront.

As described in subtopic 1a under Impact BIO, Project construction activities could adversely affect green sturgeon, white sturgeon, longfin smelt, Central Coast steelhead, Central Valley fall-run Chinook salmon, and Pacific lamprey or their habitats (including green sturgeon and steelhead critical habitat and proposed longfin smelt critical habitat), and EFH, resulting in a significant impact.

These species and their habitats have been affected by historical diking and filling of the bay, loss of hydrological connections to the upper watersheds of riverine and riparian habitats, degradation of remaining accessible riverine and riparian habitats, and pollution. EFH has been substantially altered by fragmentation and alteration of natural processes. Although most tidal and muted tidal aquatic habitats are not subject to development pressure, activities of projects, such as the South San Francisco Bay Shoreline Project Phase 1, South Bay Salt Ponds Restoration Project, Beneficial Reuse of Excavated Material in Tidal Marsh Restoration Project, Dumbarton Corridor Project, East Palo Alto Waterfront Project, and others, could potentially affect special-status fish species and EFH. Consequently, the Project in combination with cumulative projects could result in a significant cumulative impact on special-status fish species and EFH. However, many of these projects would restore or improve ecological function, supporting special-status fish populations and improving the quality of EFH. Permits from resource agencies, including BCDC, USACE, RWQCB, CDFW, USFWS, and NMFS, and compliance with the requirements of those permits, would reduce impacts on these species and EFH. In addition, the CEQA evaluations for most of those projects require avoidance or compensatory mitigation, which would reduce further impacts on these species and EFH moving forward.

The Project's contribution to this cumulative impact is considered cumulatively considerable. However, the Project-specific impact would occur only during construction and would be avoided or mitigated by measures identified in the EIR and the quality of critical habitat and EFH within Ponds R1 and R2 would be improved considerably for fish when those ponds are restored to tidal habitats. As a result, with tidal restoration in Ponds R1 and R2, the Project would result in a substantial net benefit to special-status fish and EFH by making those ponds much more accessible to fish and increasing habitat quality through tidal marsh restoration. Consequently, with implementation of Mitigation Measures BIO-1, BIO-7, BIO-8, BIO-9, BIO-10, and BIO-11, the Project's contribution to the cumulative impact would be **less than significant with mitigation**.

Other Animal Species and Their Habitats

Areas throughout the Project area and South Bay provide suitable habitat for numerous animals, including:

- **Terrestrial species** such as the federally proposed as threatened monarch butterfly, state candidate Crotch's bumble bee, and state candidate burrowing owl. These species occur primarily in upland grassland, ruderal, and scrub habitats, although the monarch butterfly would readily use floral resources and milkweed found in landscaped/developed habitats, and the Crotch's bumble bee occasionally occurs within landscaped areas.
- **Baylands/tidal species** such as the federally and state endangered California Ridgway's rail and salt marsh harvest mouse, federally threatened western snowy plover, state threatened California black rail, California species of special concern salt marsh wandering shrew, and two species protected under the Marine Mammal Protection Act, the Pacific harbor seal and California sea lion. Baylands/tidal species distribution is much more limited, and baylands species are only found in a

narrow band of marsh and managed pond habitats along the edge of the bay, while marine mammals occur in tidal open water.

- **Numerous non-breeding special-status and protected birds.**

The cumulative projects considered for this impact include development and restoration projects throughout the South Bay, including the following listed in Table 3.2-2:

- South San Francisco Bay Shoreline;
- South Bay Salt Ponds Restoration;
- Beneficial Reuse of Excavated Material in Tidal Marsh Restoration; and
- Dumbarton Corridor Project.

As indicated in Impact BIO-1, Project implementation could significantly affect these species due to the potential for direct injury or mortality of adults, eggs, chicks, or pups; disrupted foraging behavior that may affect survival; and increased disturbance that may lead to abandonment of eggs or chicks or increased predation.

Within the BSA and South Bay, causes of population decline for these species include nesting and foraging habitat loss, fragmentation, and/or degradation due to development, disturbance, and/or pollution; predation by non-native species and/or urban adapted native species with expanding populations; and for the western snowy plover, loss of habitat due to tidal marsh restoration. Past activities, and possibly some current and future activities, have resulted in a cumulative impact on these species. Baylands/tidal species habitats are not subject to development pressure but rather are slated for tidal restoration or managed to provide habitat. Nonetheless, activities of cumulative projects, such as the South San Francisco Bay Shoreline Project Phase 1, South Bay Salt Ponds Restoration Project, Beneficial Reuse of Excavated Material in Tidal Marsh Restoration Project, Dumbarton Corridor Project, and others, could potentially affect these species. Consequently, the Project in combination with cumulative projects could result in a significant cumulative impact on these species. Regional planning efforts within the South Bay help to reduce and offset these impacts:

- Within the BSA vicinity, the Santa Clara Valley Habitat Plan[62] covering much of adjacent Santa Clara County would benefit and offset impacts on many of these species, as well as to non-breeding special-status and protected birds.
- The South Bay Salt Pond Restoration Project's Adaptive Management Plan guides the planning and implementation of each phase, incorporating key uncertainties, monitoring, applied studies, and modeling to ensure that Project actions would not result in cumulative significant adverse impacts on these species. As the dominant Project affecting baylands species in the South Bay, the South Bay Salt Pond Restoration Project therefore helps to guide future restoration to avoid cumulative impacts on species associated with tidal and managed pond habitats through monitoring and restoration (or management) to avoid substantial impacts on baylands species.

[62] ICF International, 2012. *Final Santa Clara Valley Habitat Plan*. August. Prepared for the City of Gilroy, City of Morgan Hill, City of San José, County of Santa Clara, Santa Clara Valley Transportation Authority, and Santa Clara Valley Water District.

In addition, permits from resource agencies, including BCDC, USACE, RWQCB, CDFW, USFWS, and NMFS, and compliance with the requirements of those permits, would reduce impacts on these species. Furthermore, the CEQA evaluations for most of those projects require surveys for all aforementioned species and either avoidance or compensatory mitigation, which would reduce further losses of the species moving forward.

The Project's contribution to this impact is considered cumulatively considerable; however, the Project incorporates tidal habitat restoration to benefit tidal marsh species and focuses on habitat restoration and management to benefit the western snowy plover, thus resulting in a net benefit to these species. Consequently, with implementation of the mitigation measures to address Project-specific impacts on these species, including Measures BIO-1, BIO-6, and BIO-12 through BIO-26, this impact is considered **less than significant with mitigation**.

Jurisdictional Wetlands, Other Waters, and Riparian Habitats

Wetland and aquatic habitats affected by the Project include tidal wetlands, non-tidal wetlands, managed ponds, and open water. The geographic context for this impact includes the South Bay south of SR 92. Cumulative projects considered for this impact are described in Table 3.1-2 and include the following:

- South Bay Salt Ponds Restoration Project;
- Beneficial Reuse Project;
- South San Francisco Bay Shoreline Project; and
- Dumbarton Corridor Project.

Other projects that are also considered include Calabazas/San Tomas Aquino Creek-Marsh Connection Project, Redwood City Ferry Terminal, and Willow Village.

As explained in Impact BIO-4, although impacts on wetland and other aquatic habitats would be offset by restoration and enhancement efforts included in the Project, the impact is considered significant due to the lack of proposed monitoring and verification to ensure success of the restoration.

California has lost more than 90 percent of its historical wetlands with threats remaining to many existing wetlands. Wetlands continue to be drained for agriculture, filled for development, or disturbed by modifications to the watershed, such as dams or water diversions. Similarly, development in the region has resulted in extensive impacts on aquatic and riparian habitats. In the South Bay region, however, most of the aquatic habitats affected by the Project are not subject to development pressure but rather are slated for tidal restoration or are managed ponds, flood protection levees, or parkland. Nonetheless, activities of other cumulative projects, such as the South San Francisco Bay Shoreline Project, the Beneficial Reuse Project, and the Calabazas/San Tomas Aquino Creek-Marsh Connection Project, would likely have some impacts on wetland, aquatic, and riparian habitats, although these projects also include restoration or enhancement of large areas of wetland/aquatic habitats as a key element of their design. Other development projects in the region, such as the Redwood City Ferry Terminal, Willow Village, and the Dumbarton Corridor Project, may also result in permanent impacts on wetland habitats and do not incorporate substantial areas of restoration. Consequently, the Project in combination with cumulative projects could result in a significant cumulative impact on wetlands and aquatic habitats. CEQA

evaluations for current and future projects would require avoidance and minimization of these impacts, and compensatory mitigation for losses. In addition, projects that impact these habitats would require permits from resource agencies, such as BCDC, USACE, RWQCB, and CDFW.

The Project's contribution to this cumulative impact is considered cumulatively considerable. With implementation of Mitigation Measure BIO-26, SFCJPA and its member agencies would implement a Habitat Restoration and Monitoring Plan for proposed restoration that would ensure the long-term success of proposed restoration; consequently, this impact is considered **less than significant with mitigation**.

Interference with Wildlife Movement

Movement corridors and areas providing foraging habitat and nurseries for migratory species in the Project area are described under Impact BIO-4 and include (for example) vegetation communities along the tidal-marsh-upland ecotone, tidal marshes, and tidal open water. The cumulative projects considered for this impact include development projects along riparian areas and restoration projects in the South Bay south of SR 92, including the following projects described in Table 3.1-2:

- South Bay Salt Ponds Restoration;
- South San Francisco Bay Shoreline;
- Beneficial Reuse of Excavated Material in Tidal Marsh Restoration;
- Dumbarton Corridor; and
- East Palo Alto Waterfront.

As described in Impact BIO-4, construction and operation and maintenance activities would disrupt vegetation and habitat connectivity, temporarily restricting some wildlife species from moving between distant patches; however, implementation of restoration proposed as part of the Project would improve the quality and connectivity of tidal marsh-upland ecotone movement corridors by increasing the width and cover of native vegetation.

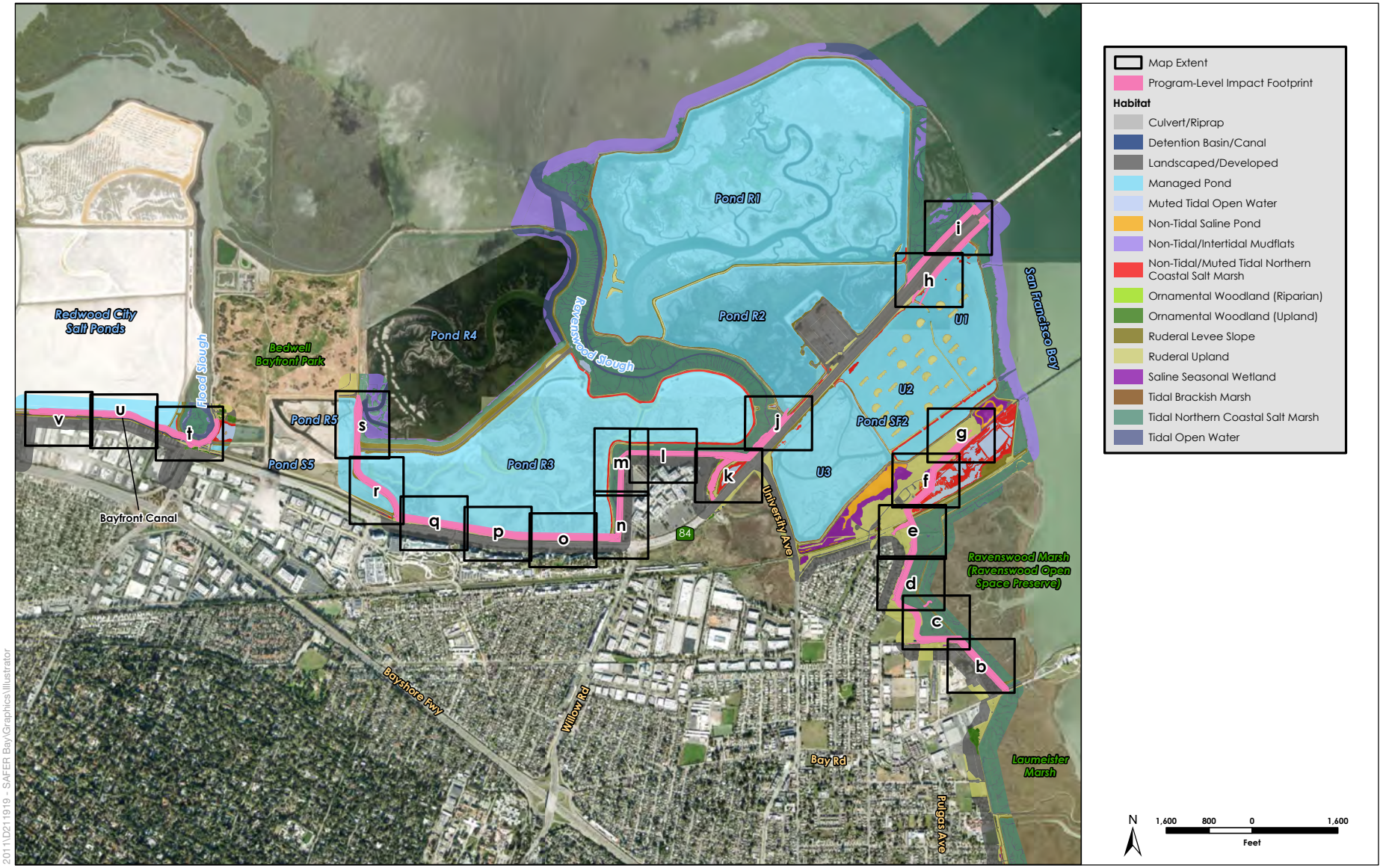
Past development in the South Bay has adversely affected movement corridors, especially in areas that lack appropriate vegetation communities, and more importantly, connectivity between these areas, that wildlife require for movement, and the fragmentation of these areas is further exacerbated by the high levels of artificial light at night and human and vehicular disturbance. Consequently, cumulative development has and would continue to fragment habitats and impede wildlife movement, resulting in a significant impact. Nonetheless, other projects would restore or improve the quality of wildlife habitat and connectivity by restoring habitats used by dispersing animals and by restoring more continuous habitat, thereby supporting wildlife movement through the landscape. In addition, the cumulative projects described in Table 3.1-2 would be required to comply with biological resource protection laws and regulations, including CESA and FESA, the Migratory Bird Act, and the Fish and Game Gode (as well as *Don Edwards SFB NWR Final CCP/EA* policies for actions within the Refuge) and mitigation measures adopted through CEQA processes. In this context, although cumulative development could significantly interfere with wildlife movement corridors, given the Project's short-term adverse effect and long-term benefit to movement corridors and areas providing foraging habitat and nurseries for migratory species, the Project's contribution is **not cumulatively considerable** (no mitigated required).

Conflict with Tree Ordinances

The geographic context for this impact is the cities of East Palo Alto, Menlo Park, and Redwood City. As explained in Impact BIO-5, the Project could require removal of trees protected by ordinances and municipal codes from these cities (City of East Palo Alto Ordinance 02-2022, City of Menlo Park Municipal Code section 13.24.040, City of Redwood City Municipal Code section 35.2). Figure 3.1-1 and Table 3.1-2 describe 17 projects located in these cities, some of which would also require removal of protected trees. Consequently, the Project in combination with cumulative projects could result in a significant impact on protected trees, and the Project's contribution to this cumulative impact is considered cumulatively considerable. However, like the Project, the cumulative projects would also be required to comply with ordinances and municipal code sections that require tree removal permits, which in turn require replacement or some other form of mitigation to compensate for the loss of protected trees. With implementation of Mitigation Measure BIO-27 to address Project-specific impacts on protected trees, the Project's contribution to this impact is considered **less than significant with mitigation**.

Conflict with Provisions of the *Don Edwards SFB NWR Final CCP/EA*

The geographic context for this impact is the Refuge. As explained in Impact BIO-6, the actions proposed as part of the Project align with the *Don Edwards SFB NWR Final CCP/EA* by contributing to the recovery of endangered, threatened, and other special-status species within the Refuge by conservation and management of the habitats on which these species depend, and enhancement and restoration of habitats to support the diversity and abundance of migratory birds and other native flora and fauna that depend on the South San Francisco Bay Ecosystem. For these reasons, the Project would not conflict with the *Don Edwards SFB NWR Final CCP/EA* or any other conservation plans and does not contribute to cumulative impacts related to conflict with the provisions of the *Don Edwards SFB NWR Final CCP/EA*. Therefore, **no impact** would occur.



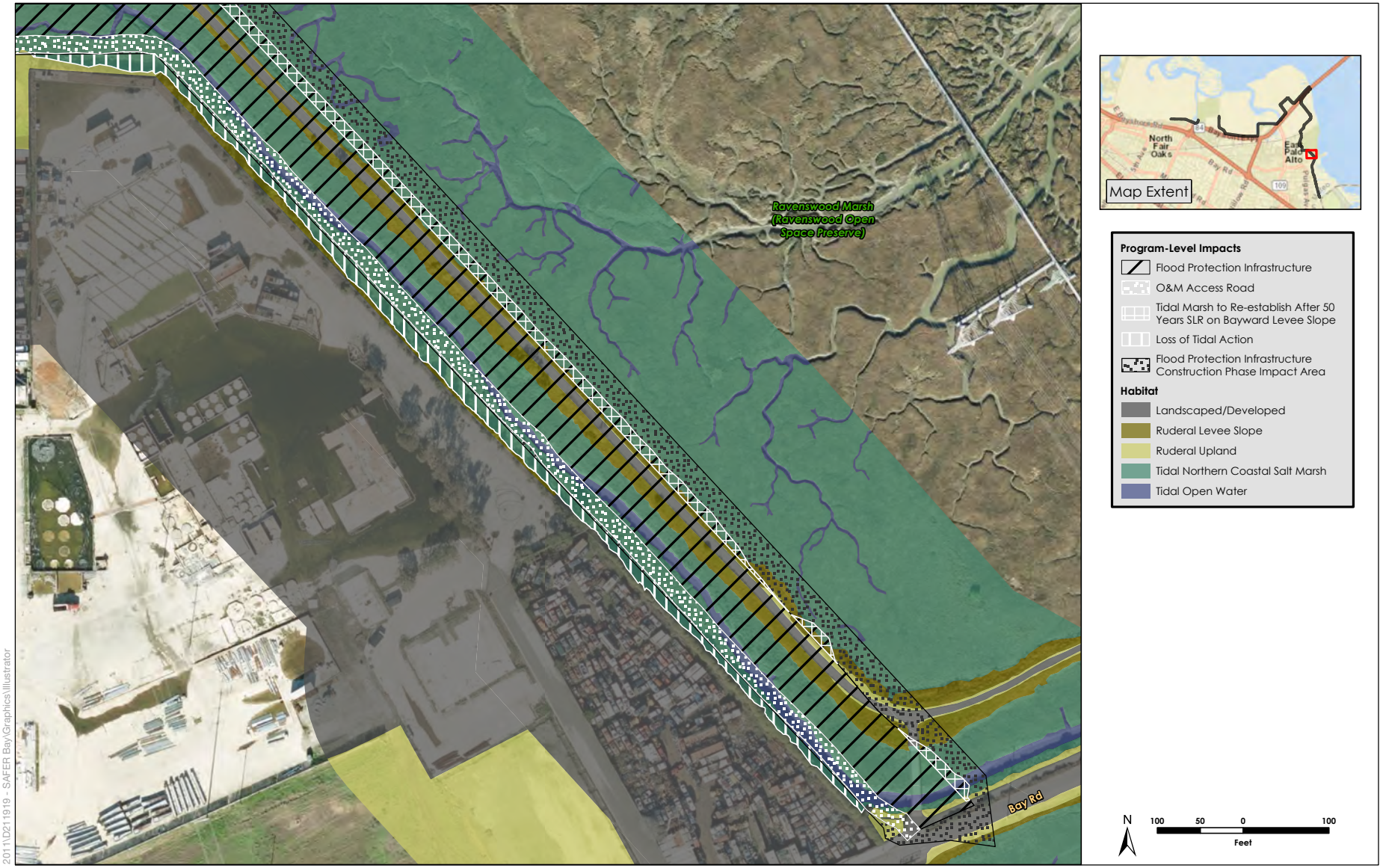
2011\D211919 - SAFER Bay\Graphics\Illustrator

SOURCE: H.T. Harvey & Associates, March 2025

SAFER Bay Project

Figure 3.4-2a
Program-Level Components - Existing Habitat Map Index

ESA
H. T. HARVEY & ASSOCIATES
Ecological Consultants

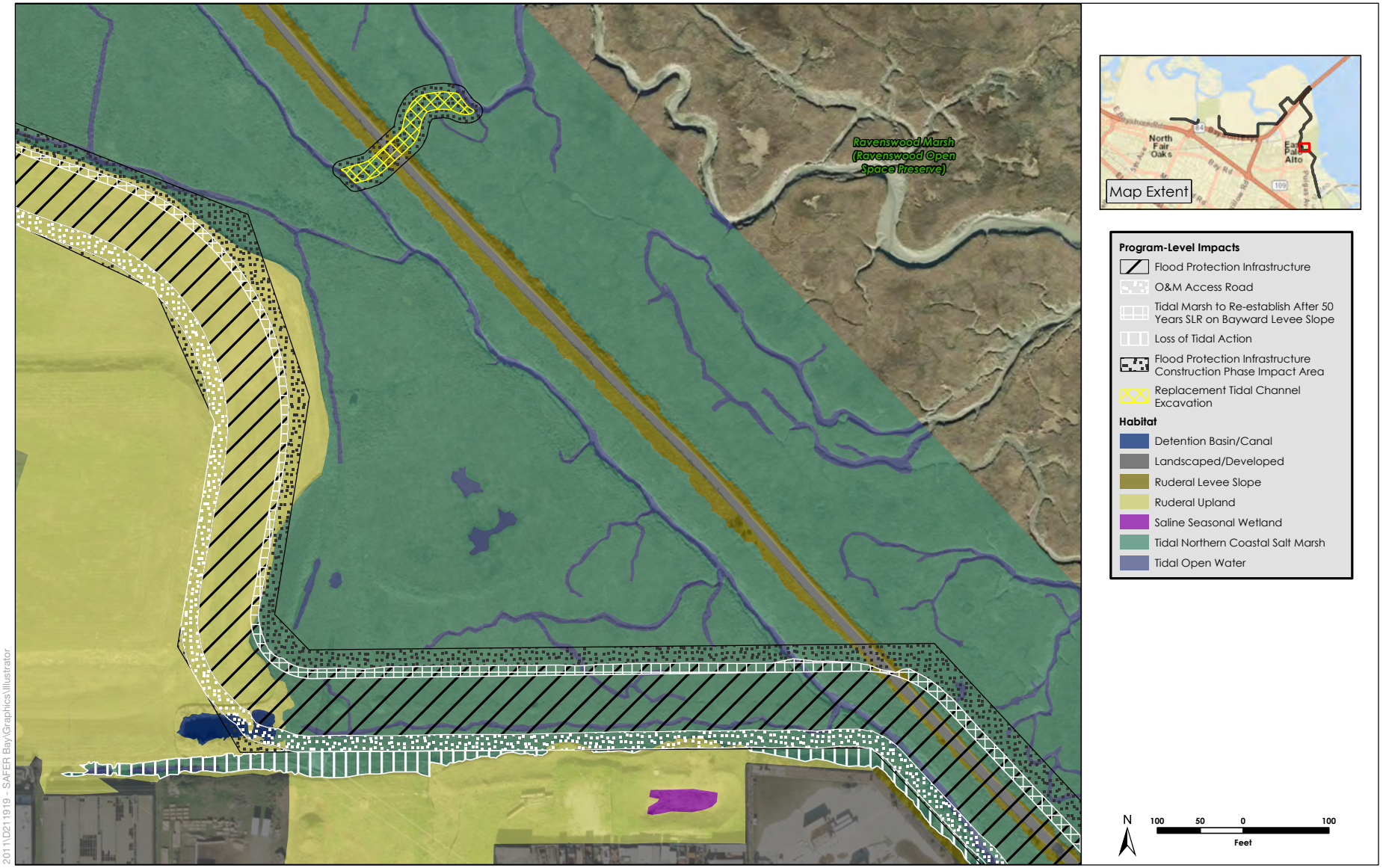


SOURCE: H.T. Harvey & Associates, March 2025

SAFER Bay Project

Figure 3.4-2b
Program-Level Reaches

ESA
H. T. HARVEY & ASSOCIATES
Ecological Consultants



2011\D211919 - SAFER Bay\Graphics\Illustrator

SOURCE: H.T. Harvey & Associates, March 2025

SAFER Bay Project

Figure 3.4-2c
Program-Level Reaches

ESA

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Ecological Consultants



2011\D211919 - SAFER Bay\Graphics\Illustrator

SOURCE: H.T. Harvey & Associates, March 2025

SAFER Bay Project

Figure 3.4-2d
Program-Level Reaches

ESA

H. T. HARVEY & ASSOCIATES
Ecological Consultants

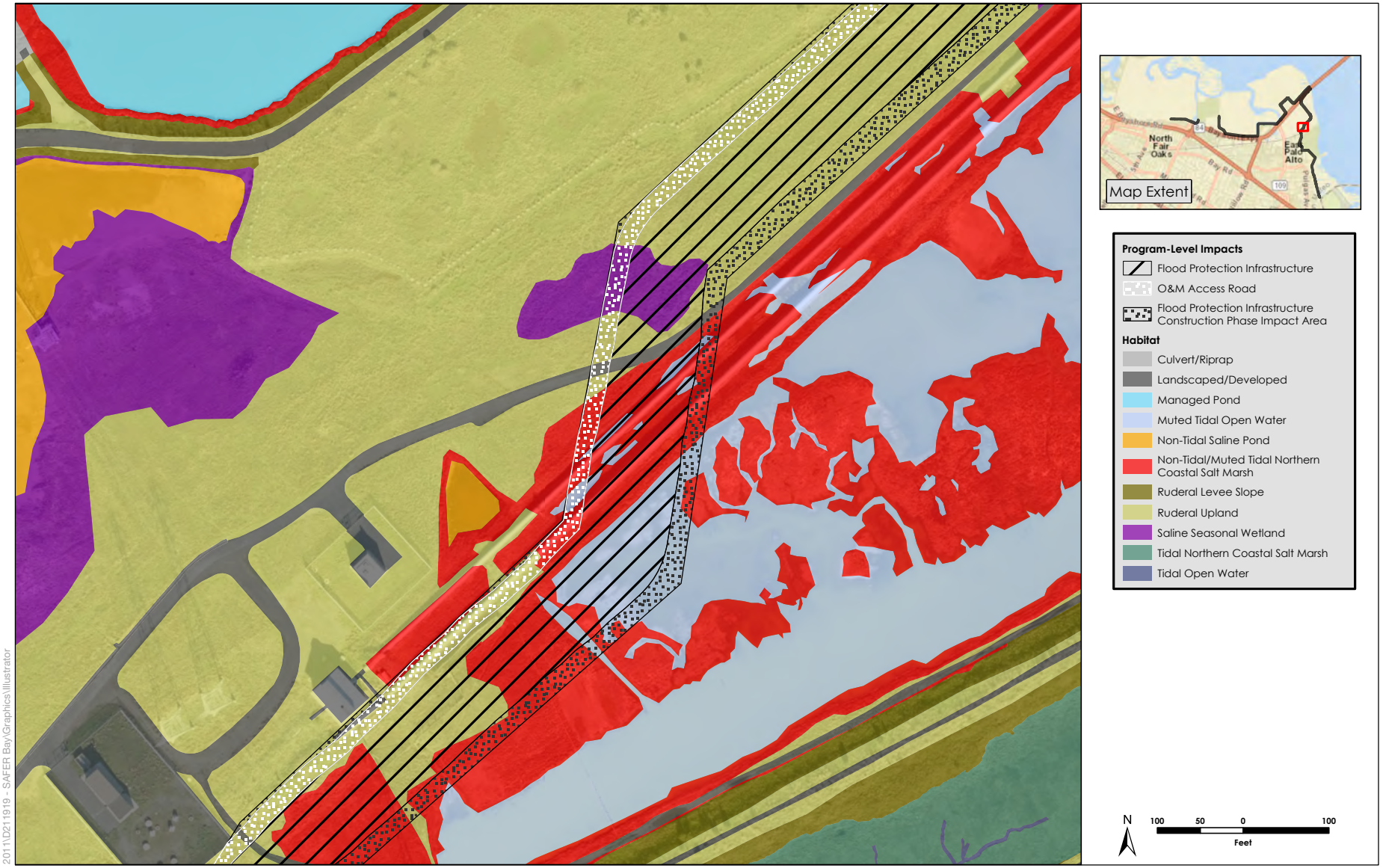


SOURCE: H.T. Harvey & Associates, March 2025

SAFER Bay Project

Figure 3.4-2e
Program-Level Reaches

ESA
H. T. HARVEY & ASSOCIATES
Ecological Consultants

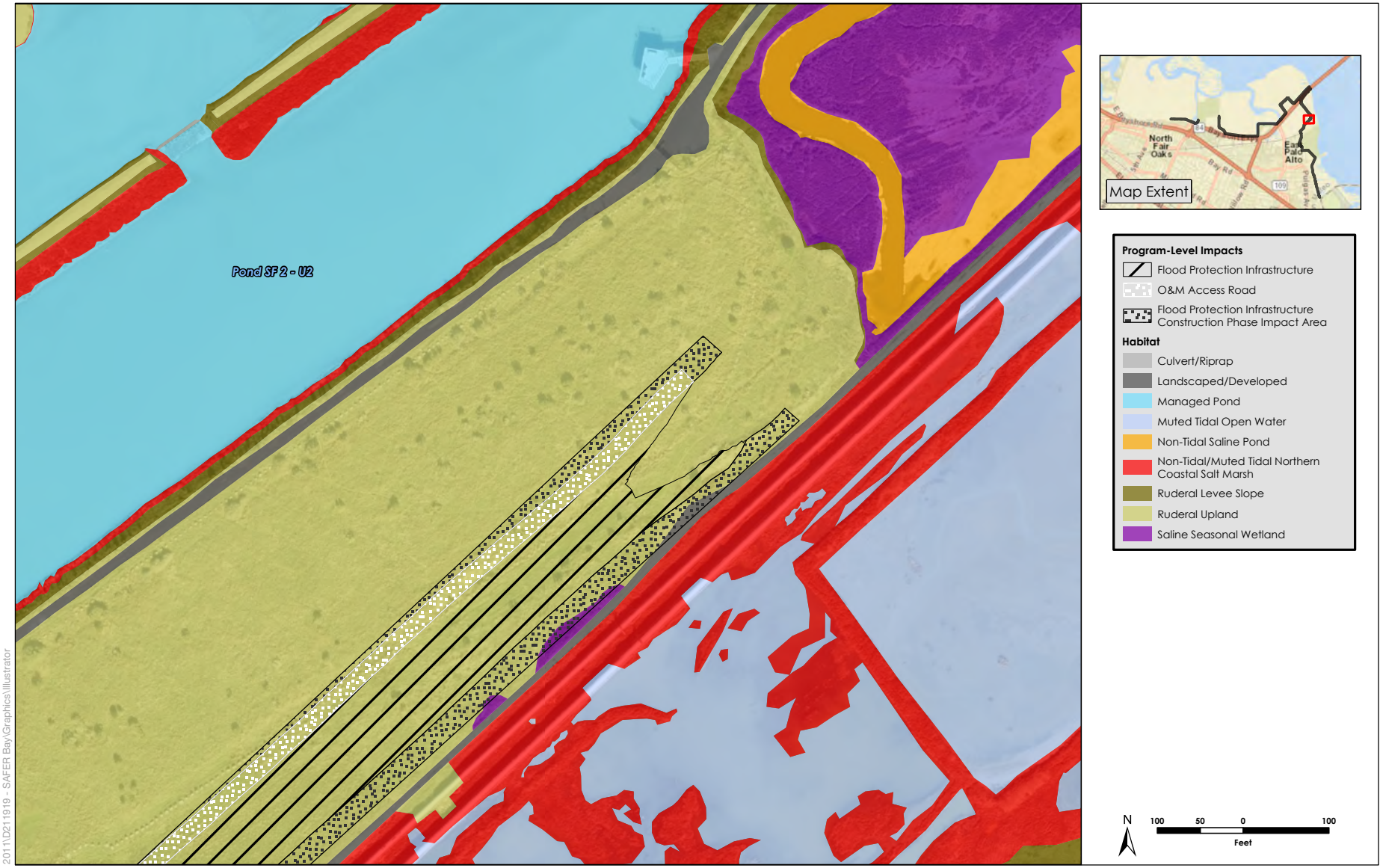


SOURCE: H.T. Harvey & Associates, March 2025

SAFER Bay Project

Figure 3.4-2f
Program-Level Reaches

ESA
H. T. HARVEY & ASSOCIATES
Ecological Consultants



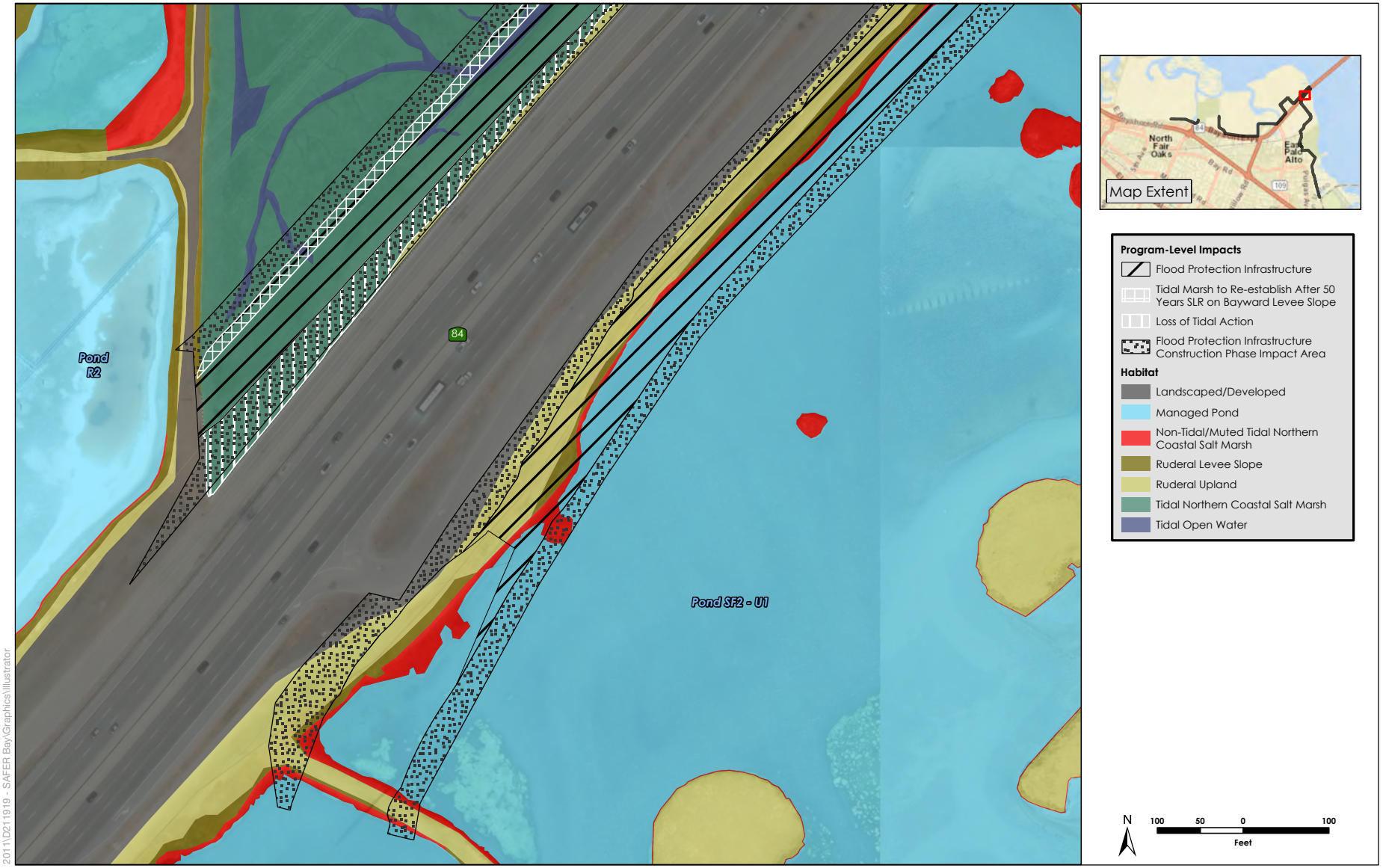
2011\D2119 19 - SAFER Bay\Graphics\Illustrator

SOURCE: H.T. Harvey & Associates, March 2025

SAFER Bay Project

Figure 3.4-2g
Program-Level Reaches

ESA
H. T. HARVEY & ASSOCIATES
Ecological Consultants



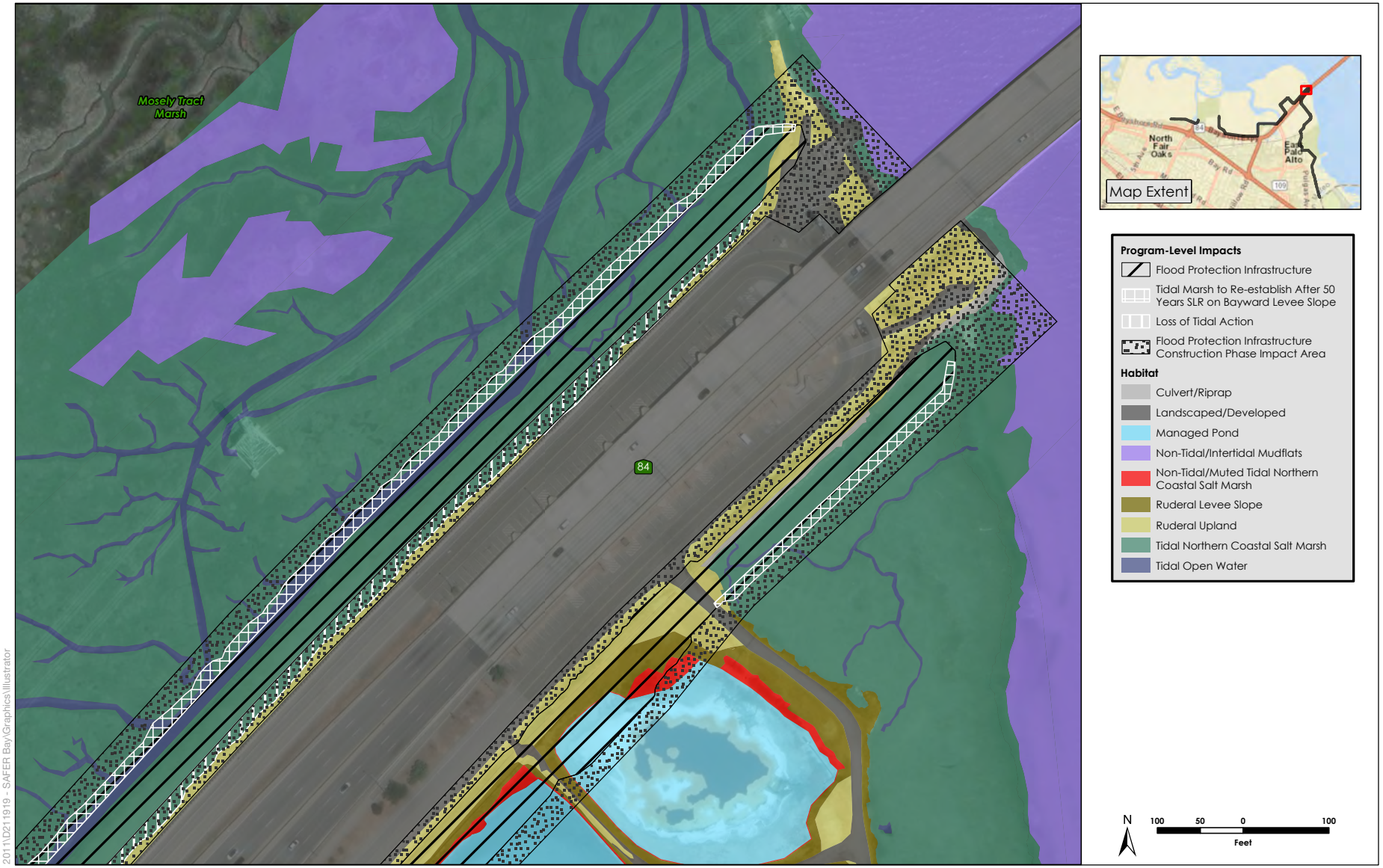
2011\D2119 19 - SAFER Bay\Graphics\Illustrator

SOURCE: H.T. Harvey & Associates, March 2025

SAFER Bay Project

Figure 3.4-2h
Program-Level Reaches

ESA
H. T. HARVEY & ASSOCIATES
Ecological Consultants

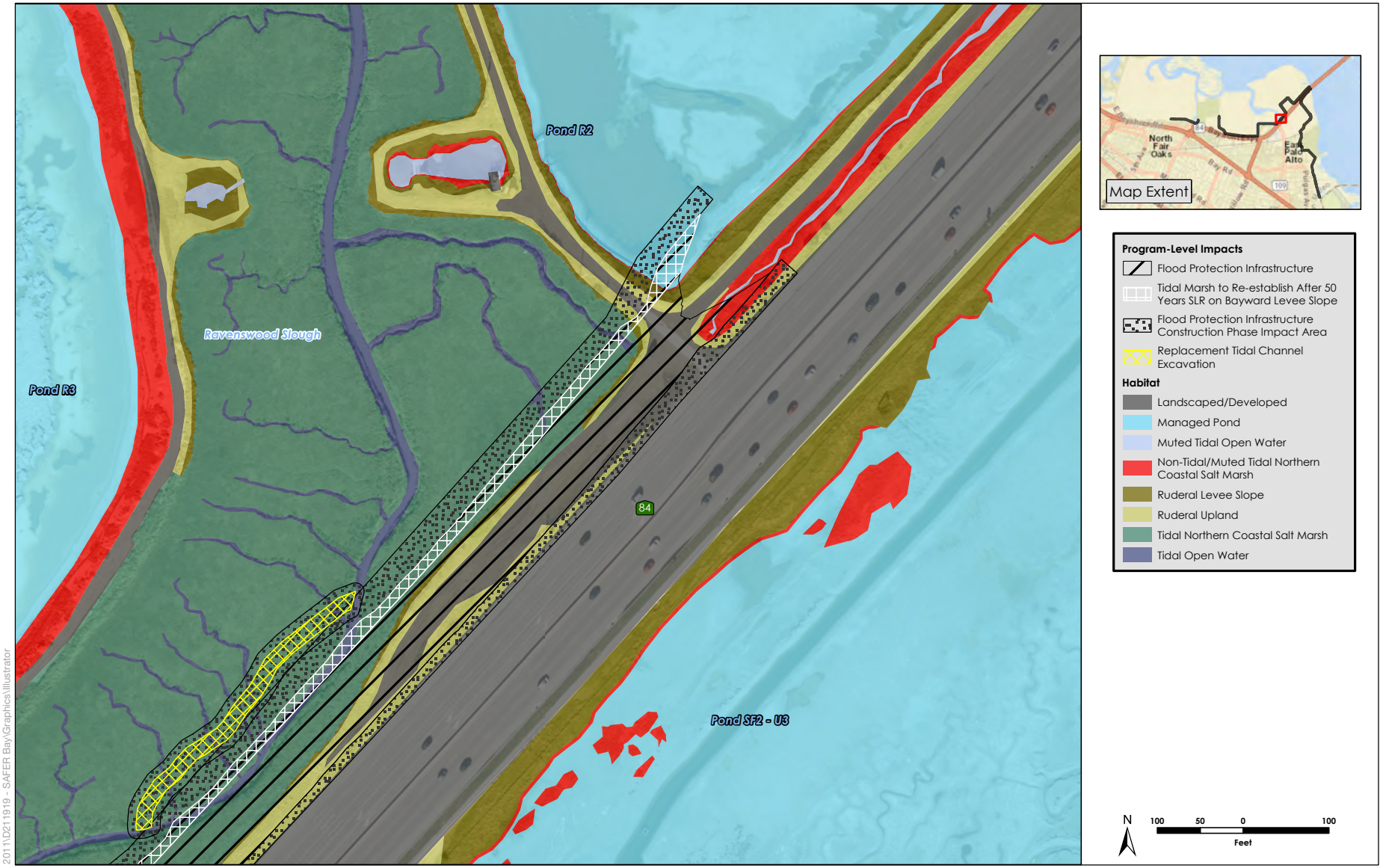


SOURCE: H.T. Harvey & Associates, March 2025

SAFER Bay Project

Figure 3.4-2i
Program-Level Reaches

ESA
H. T. HARVEY & ASSOCIATES
Ecological Consultants

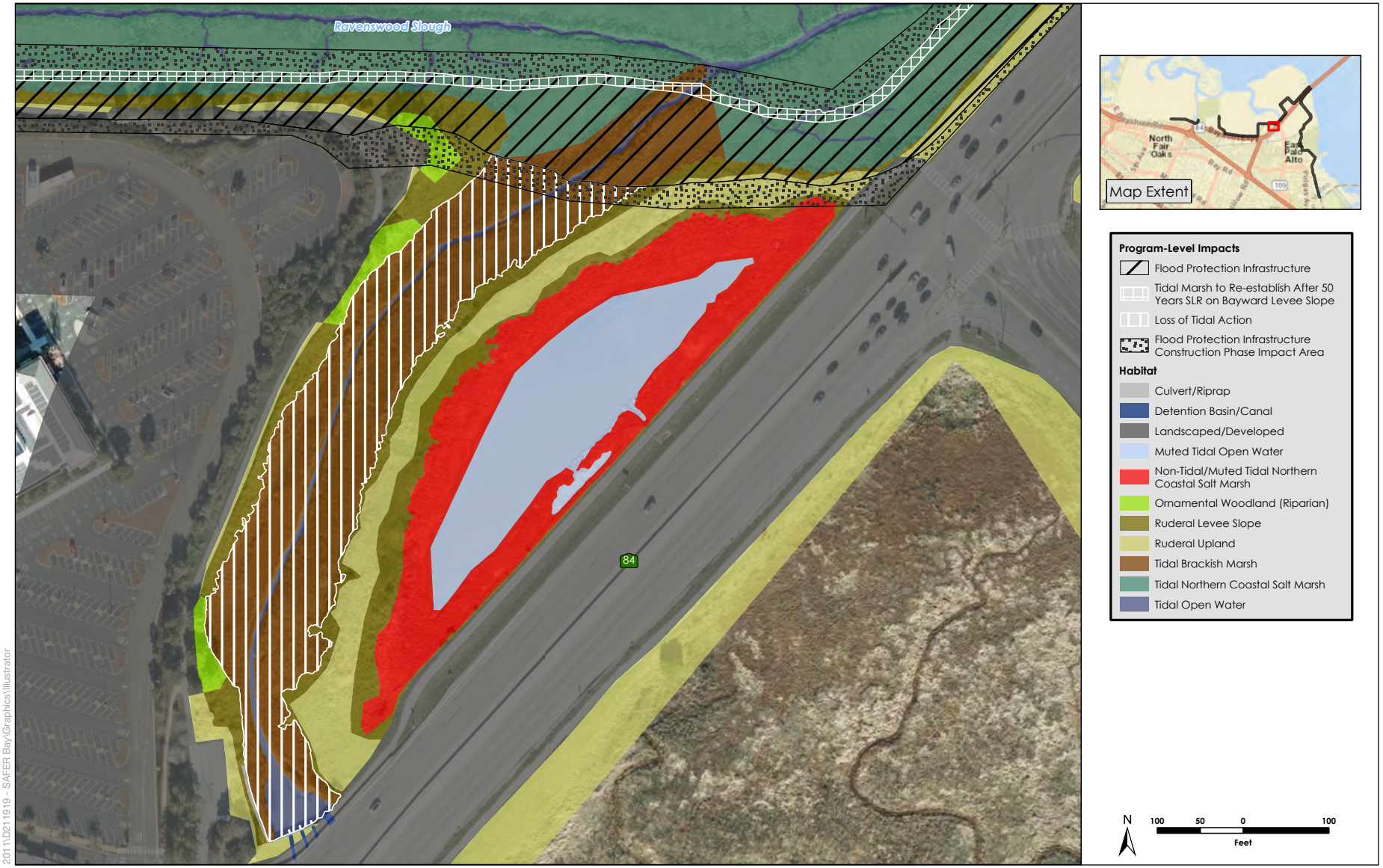


SOURCE: H.T. Harvey & Associates, March 2025

SAFER Bay Project

Figure 3.4-2j
Program-Level Reaches

ESA
H. T. HARVEY & ASSOCIATES
Ecological Consultants



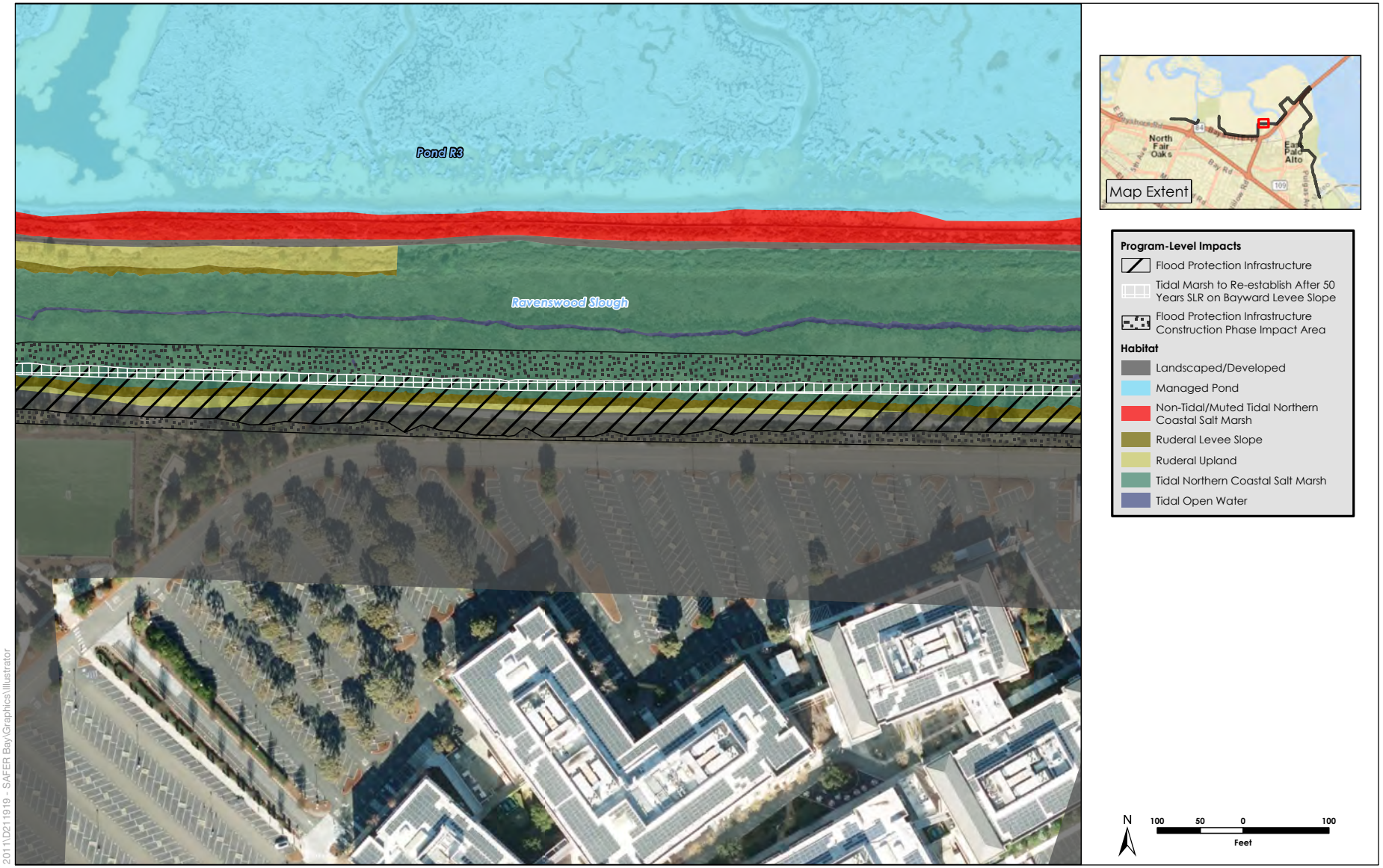
2011\D211919 - SAFER Bay\Graphics\Illustrator

SOURCE: H.T. Harvey & Associates, March 2025

SAFER Bay Project

Figure 3.4-2k
Program-Level Reaches

ESA
H. T. HARVEY & ASSOCIATES
Ecological Consultants



2011\D211919 - SAFER Bay\Graphics\Illustrator

SOURCE: H.T. Harvey & Associates, March 2025

SAFER Bay Project

Figure 3.4-2l
Program-Level Reaches

ESA
H. T. HARVEY & ASSOCIATES
Ecological Consultants



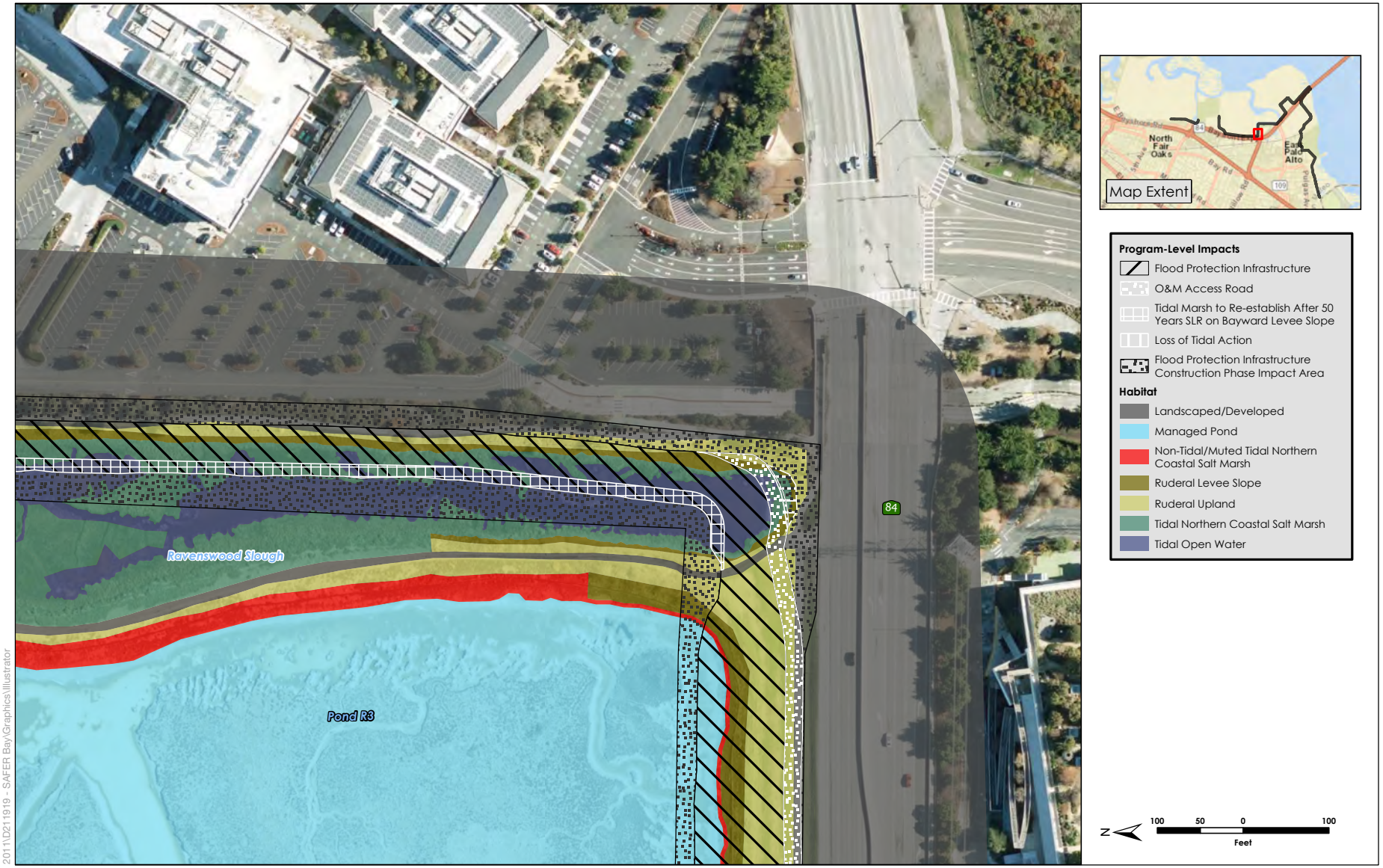
2011\D211919 - SAFER Bay\Graphics\Illustrator

SOURCE: H.T. Harvey & Associates, March 2025

SAFER Bay Project

Figure 3.4-2m
Program-Level Reaches

ESA
H. T. HARVEY & ASSOCIATES
Ecological Consultants

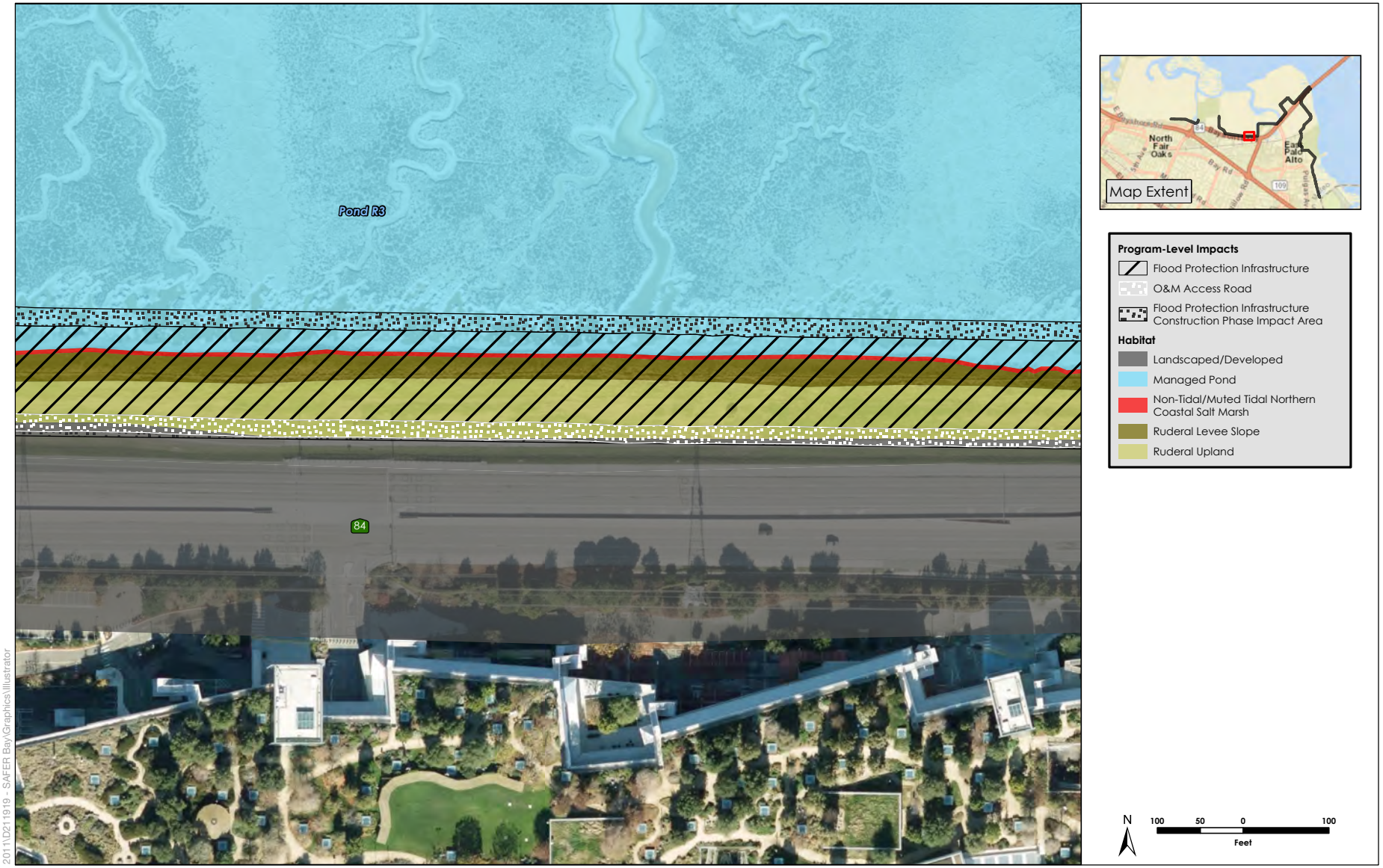


SOURCE: H.T. Harvey & Associates, March 2025

SAFER Bay Project

Figure 3.4-2n
Program-Level Reaches

ESA
H. T. HARVEY & ASSOCIATES
Ecological Consultants



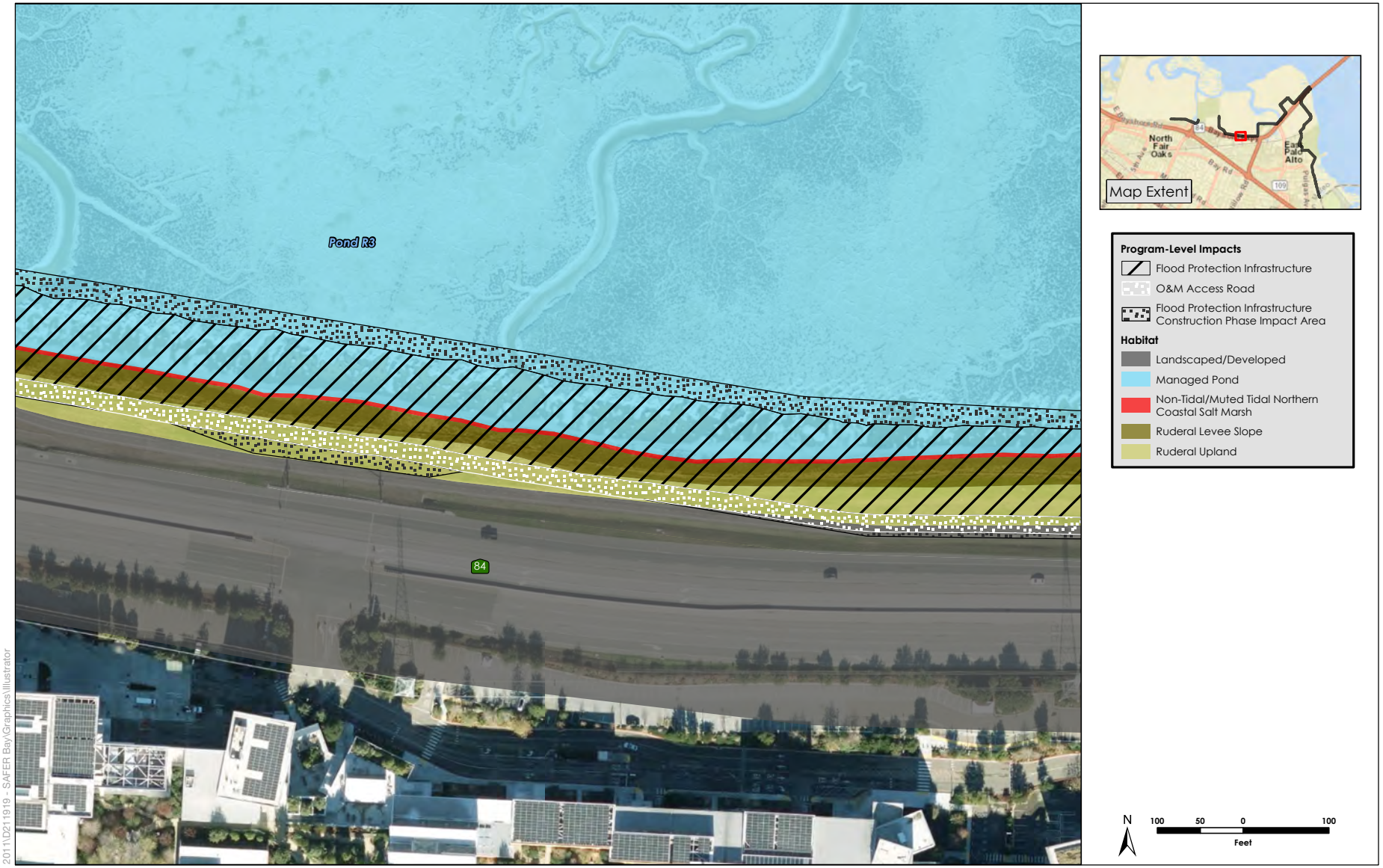
2011\D211919 - SAFER Bay\Graphics\Illustrator

SOURCE: H.T. Harvey & Associates, March 2025

SAFER Bay Project

Figure 3.4-2o
Program-Level Reaches

ESA
H. T. HARVEY & ASSOCIATES
Ecological Consultants



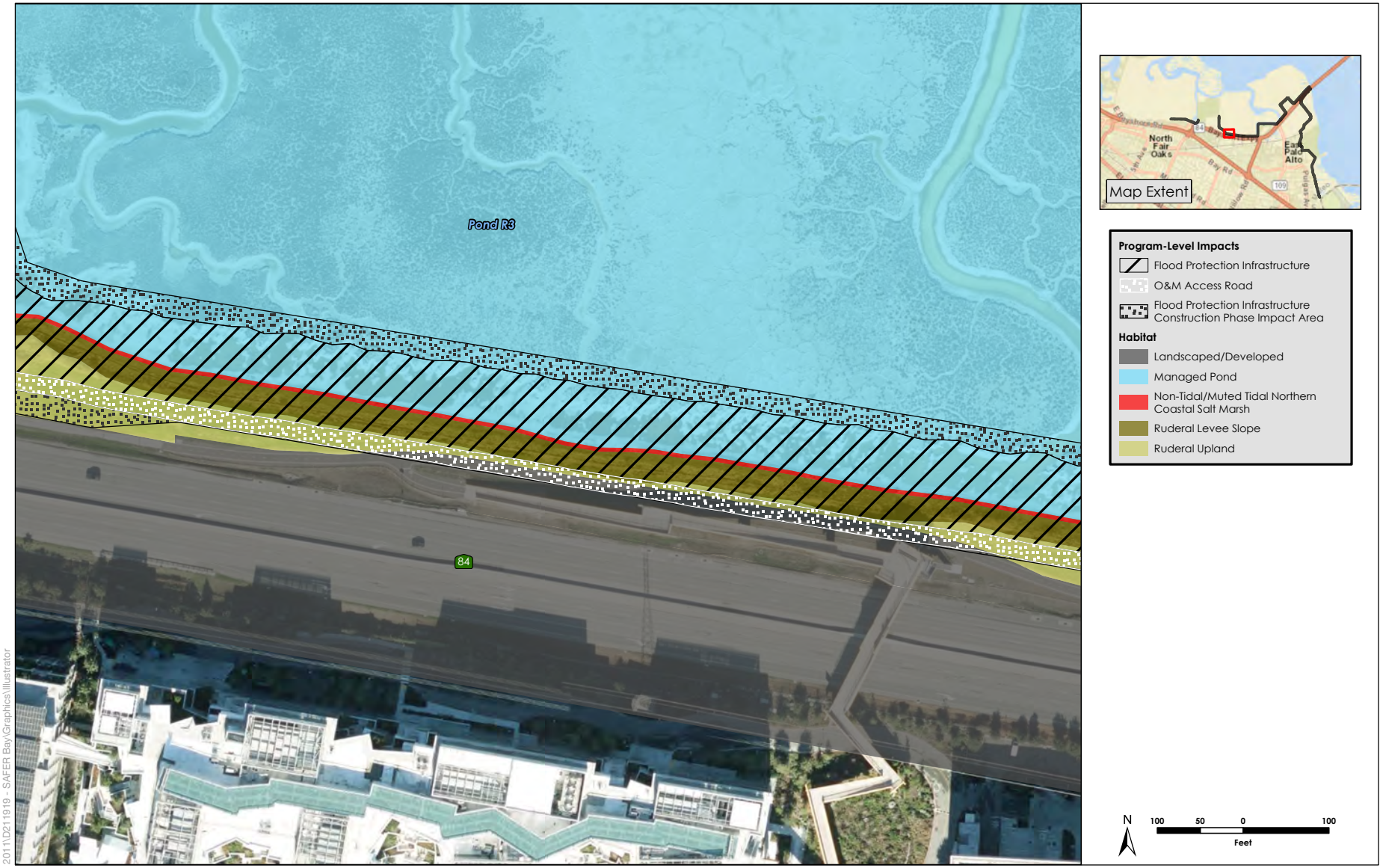
2011\D211919 - SAFER Bay\Graphics\Illustrator

SOURCE: H.T. Harvey & Associates, March 2025

SAFER Bay Project

Figure 3.4-2p
Program-Level Reaches

ESA
H. T. HARVEY & ASSOCIATES
Ecological Consultants



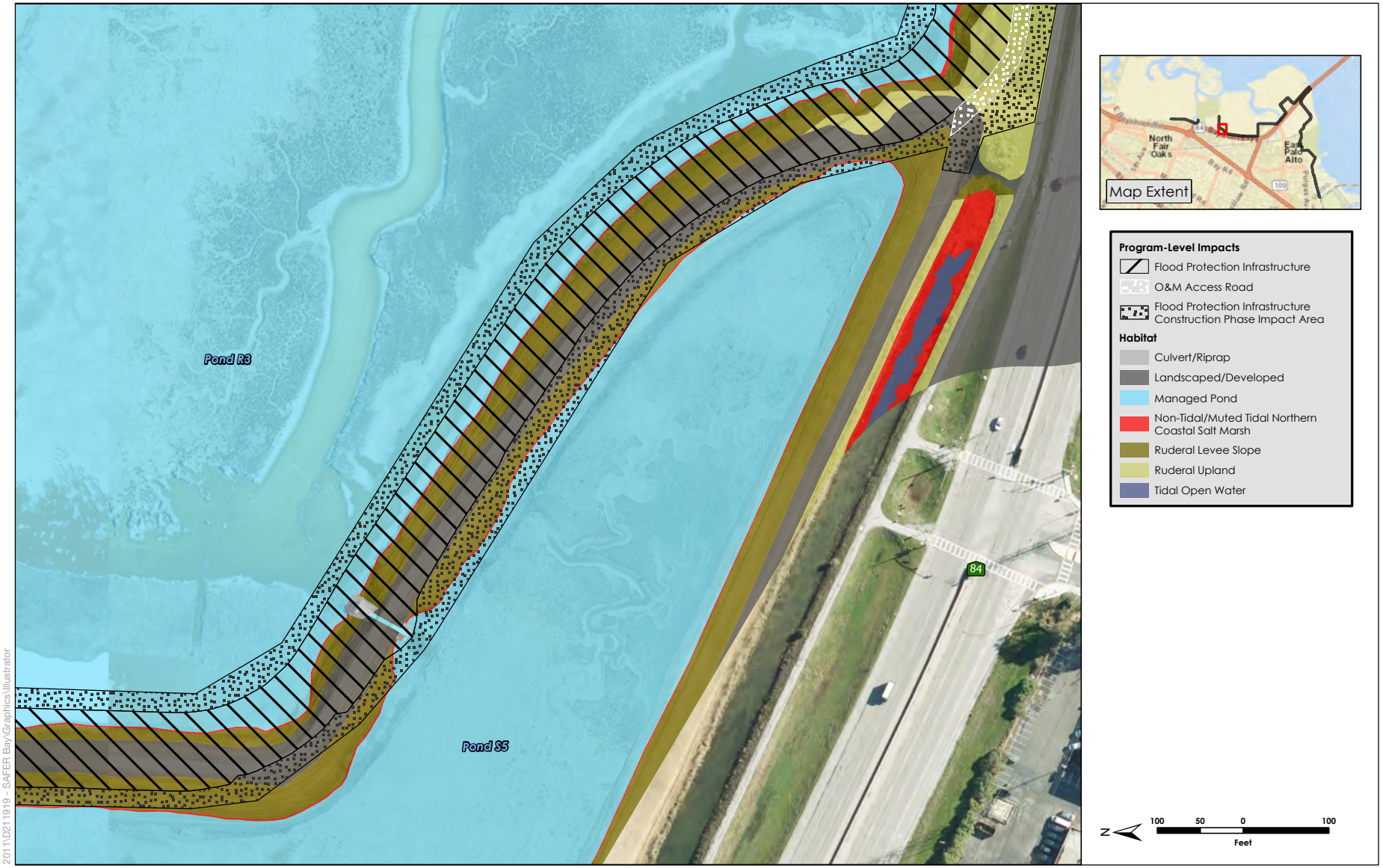
2011\D2119 19 - SAFER Bay\Graphics\Illustrator

SOURCE: H.T. Harvey & Associates, March 2025

SAFER Bay Project

Figure 3.4-2q
Program-Level Reaches

ESA
H. T. HARVEY & ASSOCIATES
Ecological Consultants



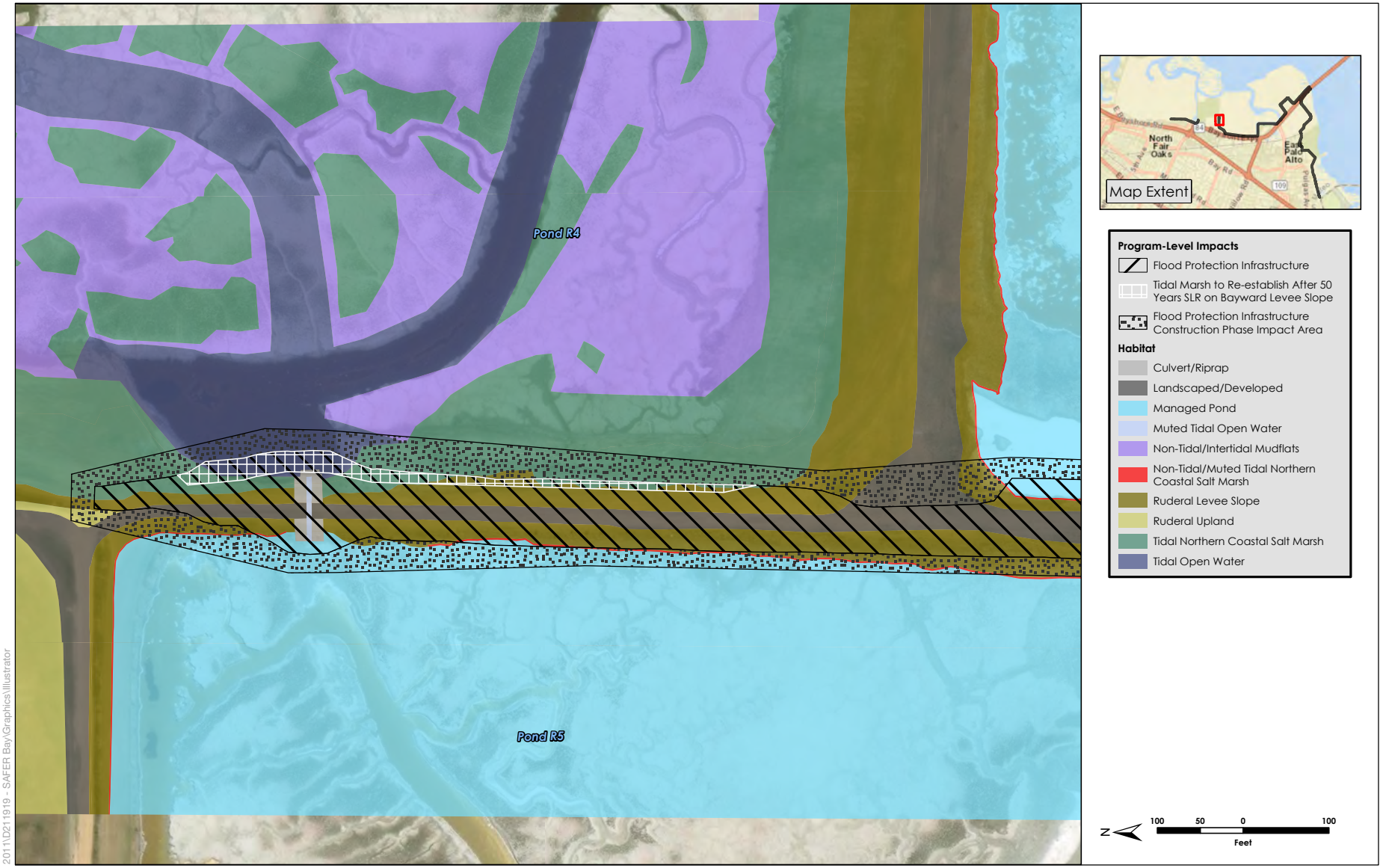
2011\D2119 19 - SAFER Bay\Graphics\Illustrator

SOURCE: H.T. Harvey & Associates, March 2025

SAFER Bay Project

Figure 3.4-2r
Program-Level Reaches

ESA
H. T. HARVEY & ASSOCIATES
Ecological Consultants

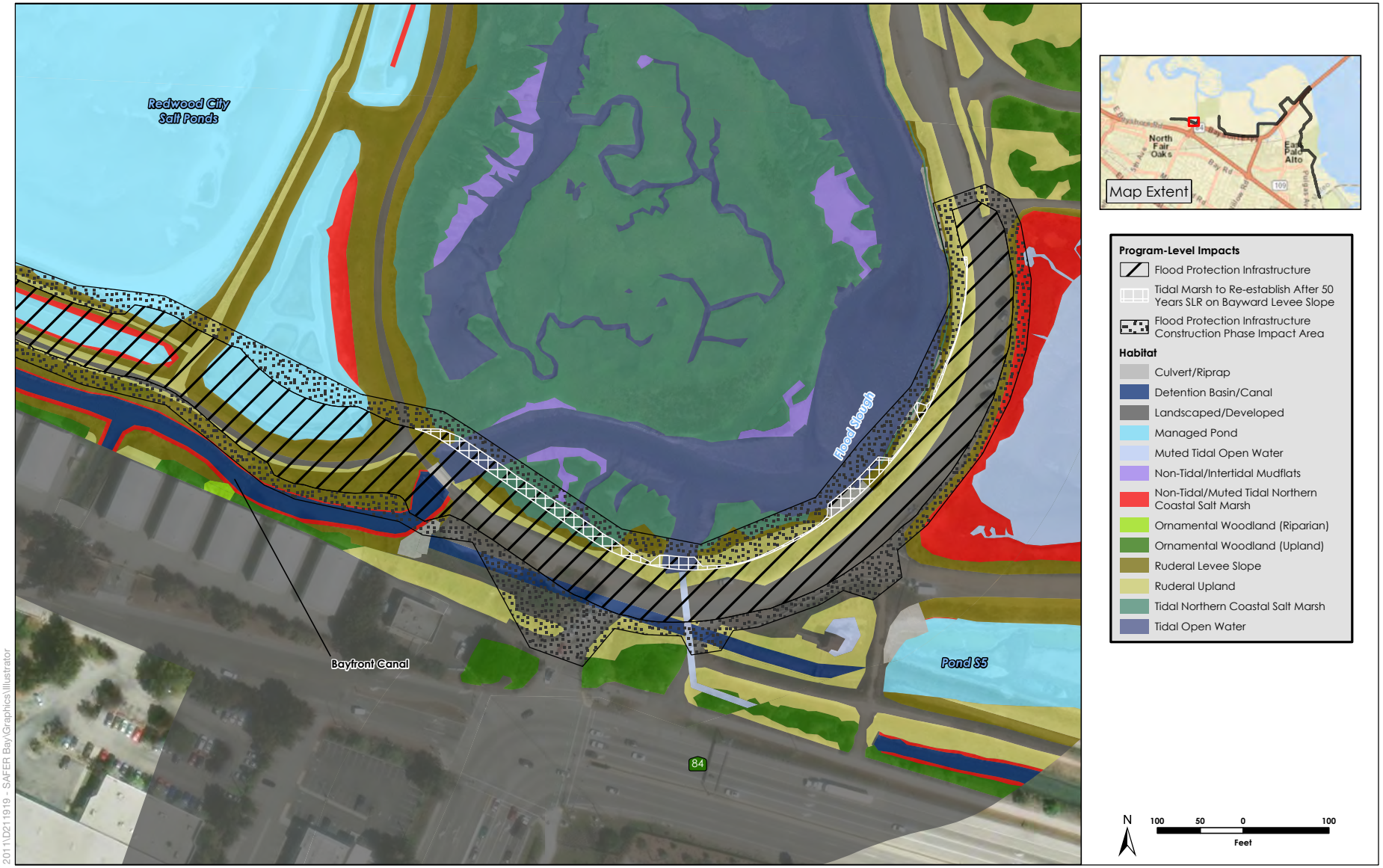


SOURCE: H.T. Harvey & Associates, March 2025

SAFER Bay Project

Figure 3.4-2s
Program-Level Reaches

ESA
H. T. HARVEY & ASSOCIATES
Ecological Consultants



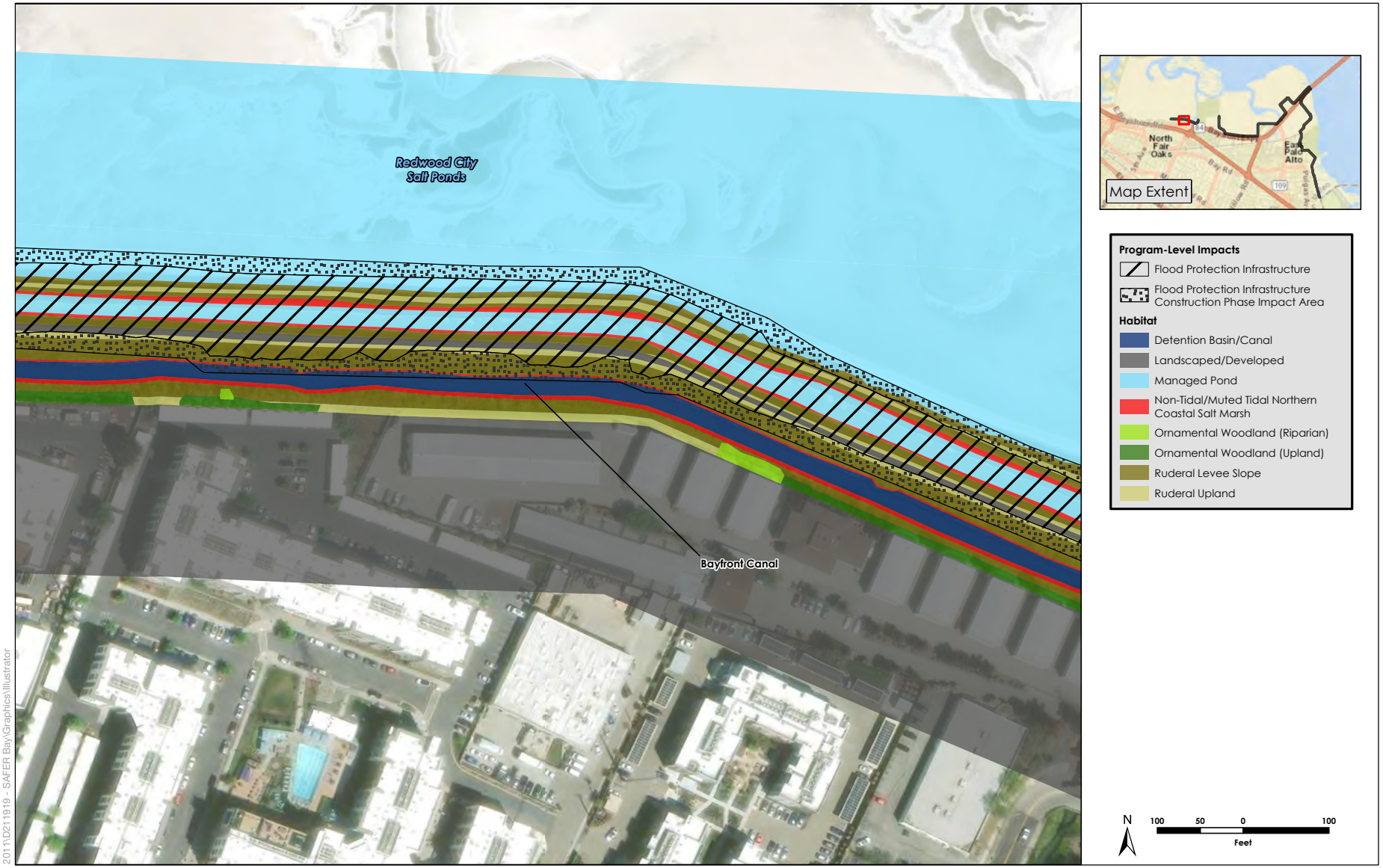
2011\D2119 19 - SAFER Bay\Graphics\Illustrator

SOURCE: H.T. Harvey & Associates, March 2025

SAFER Bay Project

Figure 3.4-2t
Program-Level Reaches

ESA
H. T. HARVEY & ASSOCIATES
Ecological Consultants



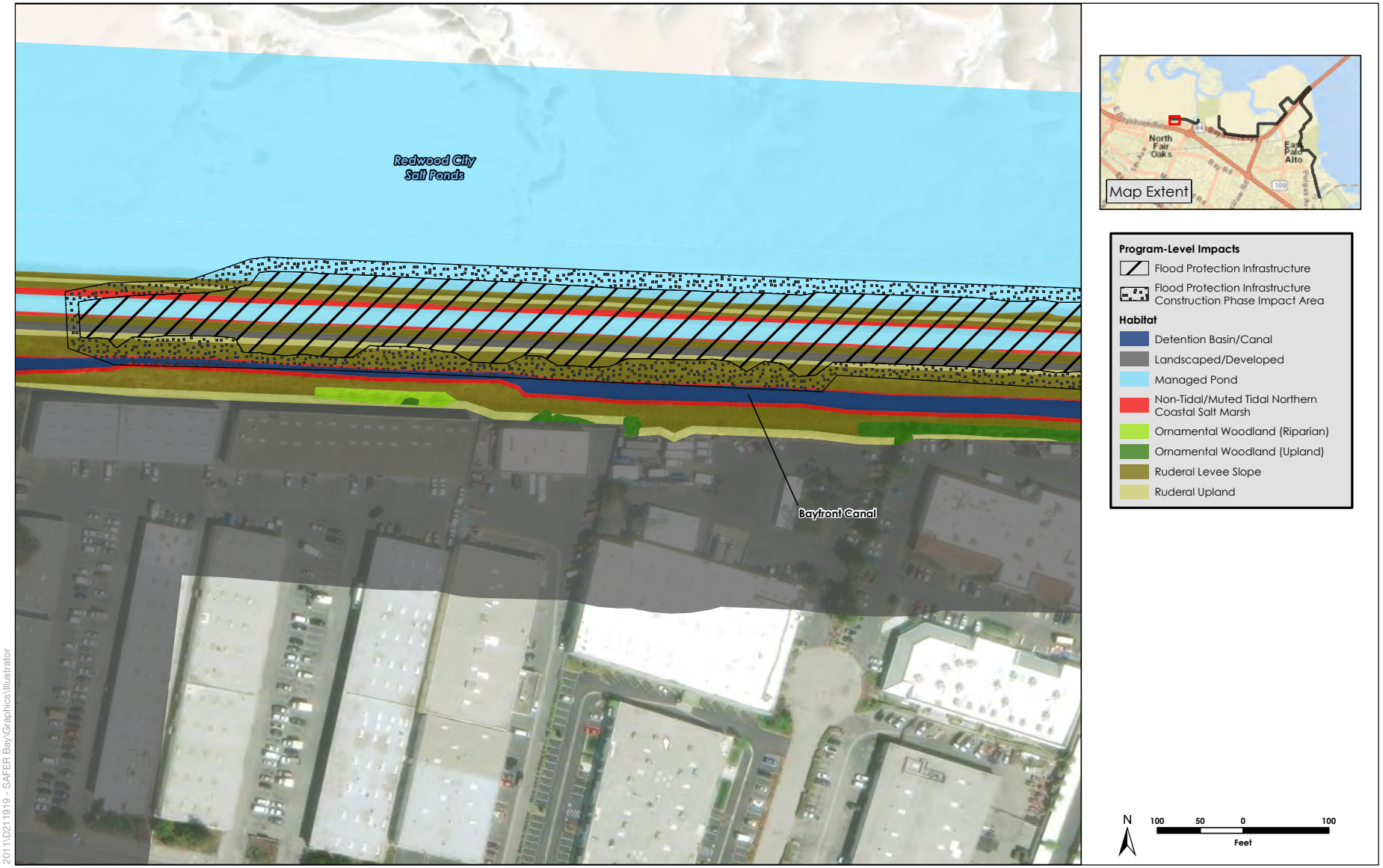
2011\D2119 19 - SAFER Bay\Graphics\Illustrator

SOURCE: H.T. Harvey & Associates, March 2025

SAFER Bay Project

Figure 3.4-2u
Program-Level Reaches

ESA
H. T. HARVEY & ASSOCIATES
Ecological Consultants



2011\D211919 - SAFER Bay\Graphics\Illustrator

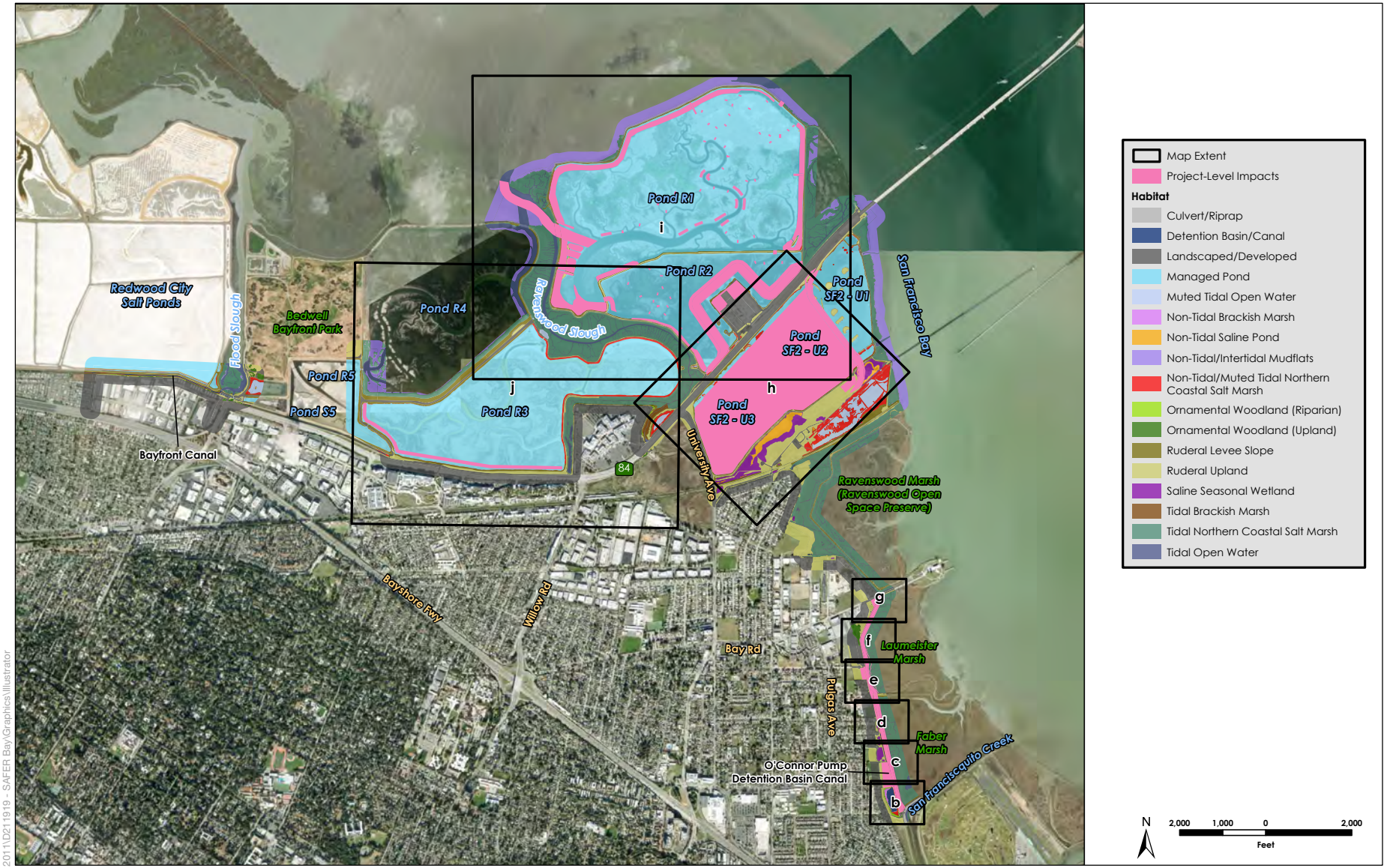
SOURCE: H.T. Harvey & Associates, March 2025

SAFER Bay Project

Figure 3.4-2v
Program-Level Reaches

ESA

H. T. HARVEY & ASSOCIATES
Ecological Consultants



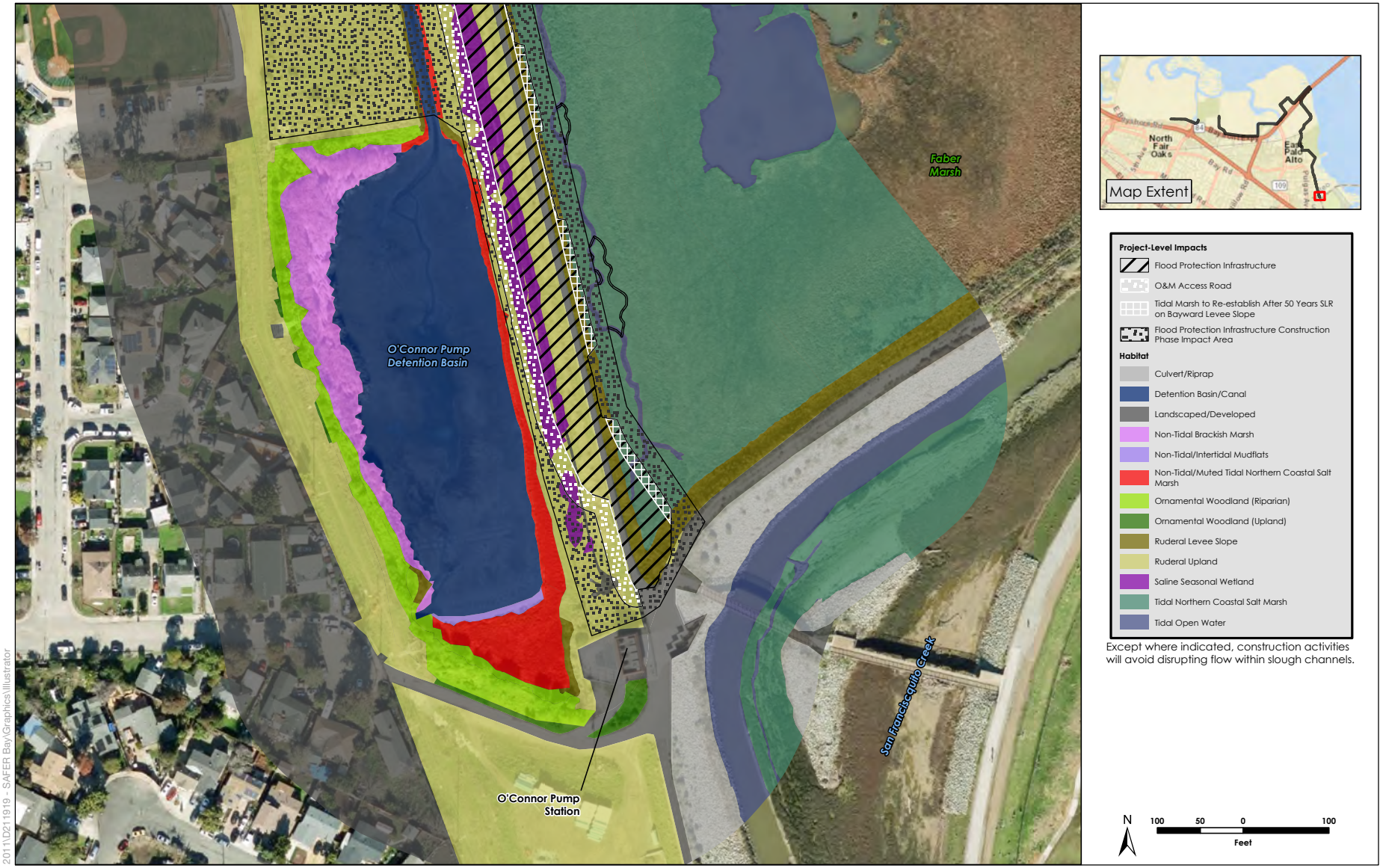
2011\D211919 - SAFER Bay\Graphics\Illustrator

SOURCE: H.T. Harvey & Associates, March 2025

SAFER Bay Project

Figure 3.4-3a
Project-Level Components - Existing Habitat Map Index

ESA
H. T. HARVEY & ASSOCIATES
Ecological Consultants



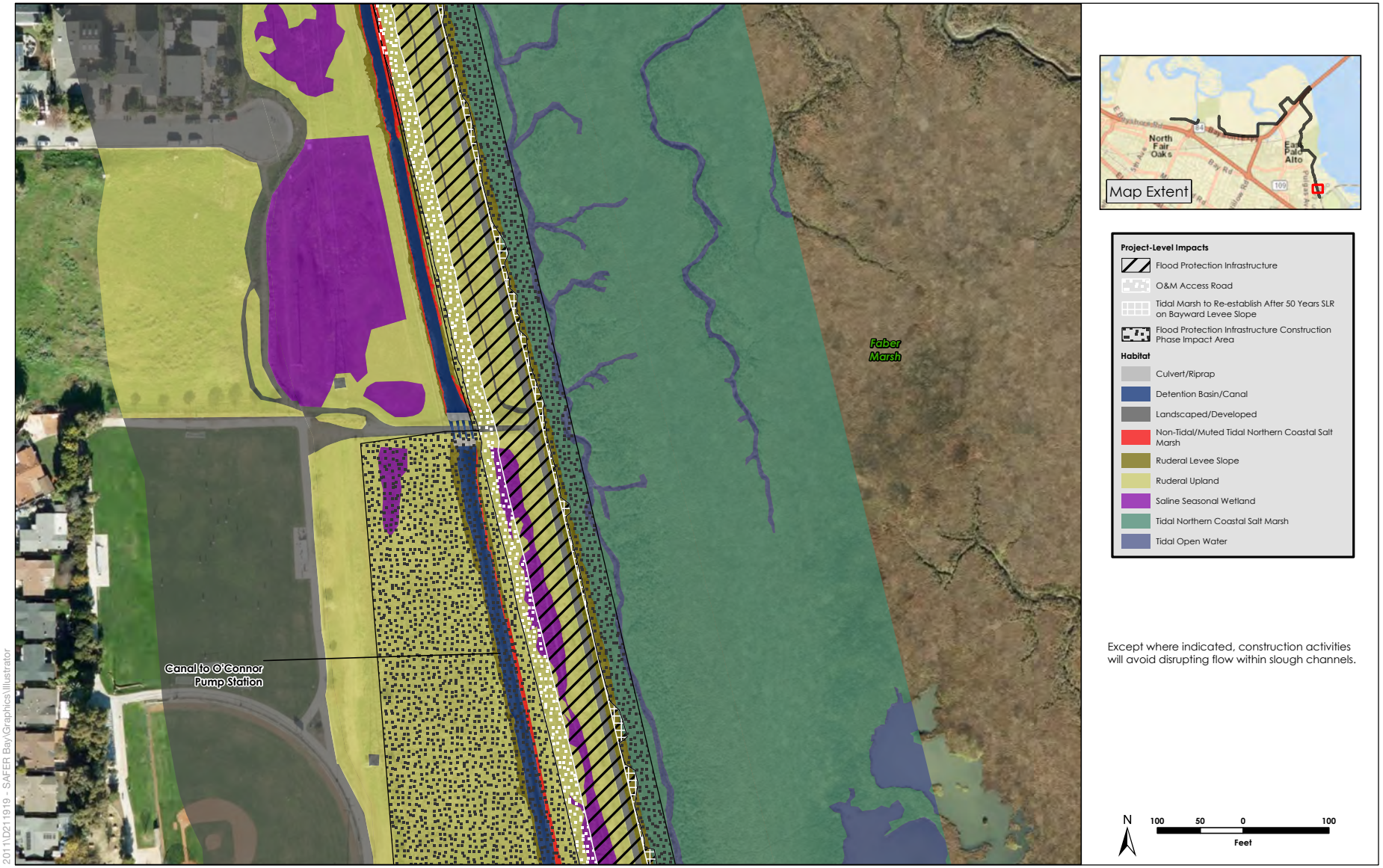
2011\D2119 19 - SAFER Bay\Graphics\Illustrator

SOURCE: H.T. Harvey & Associates, March 2025

SAFER Bay Project

Figure 3.4-3b
Project-Level Components

ESA
H. T. HARVEY & ASSOCIATES
Ecological Consultants

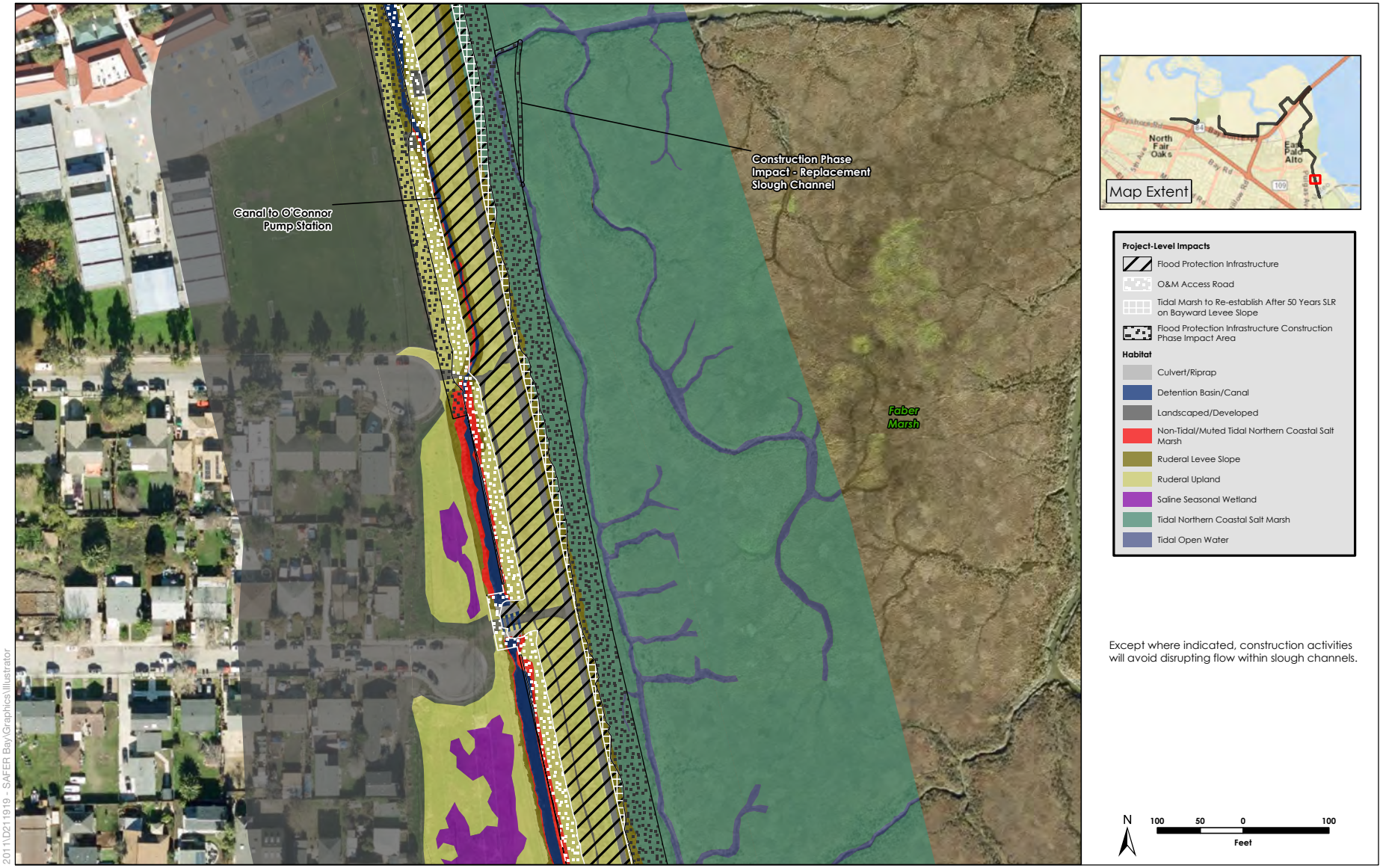


SOURCE: H.T. Harvey & Associates, March 2025

SAFER Bay Project

Figure 3.4-3c
Project-Level Components

ESA
H. T. HARVEY & ASSOCIATES
Ecological Consultants

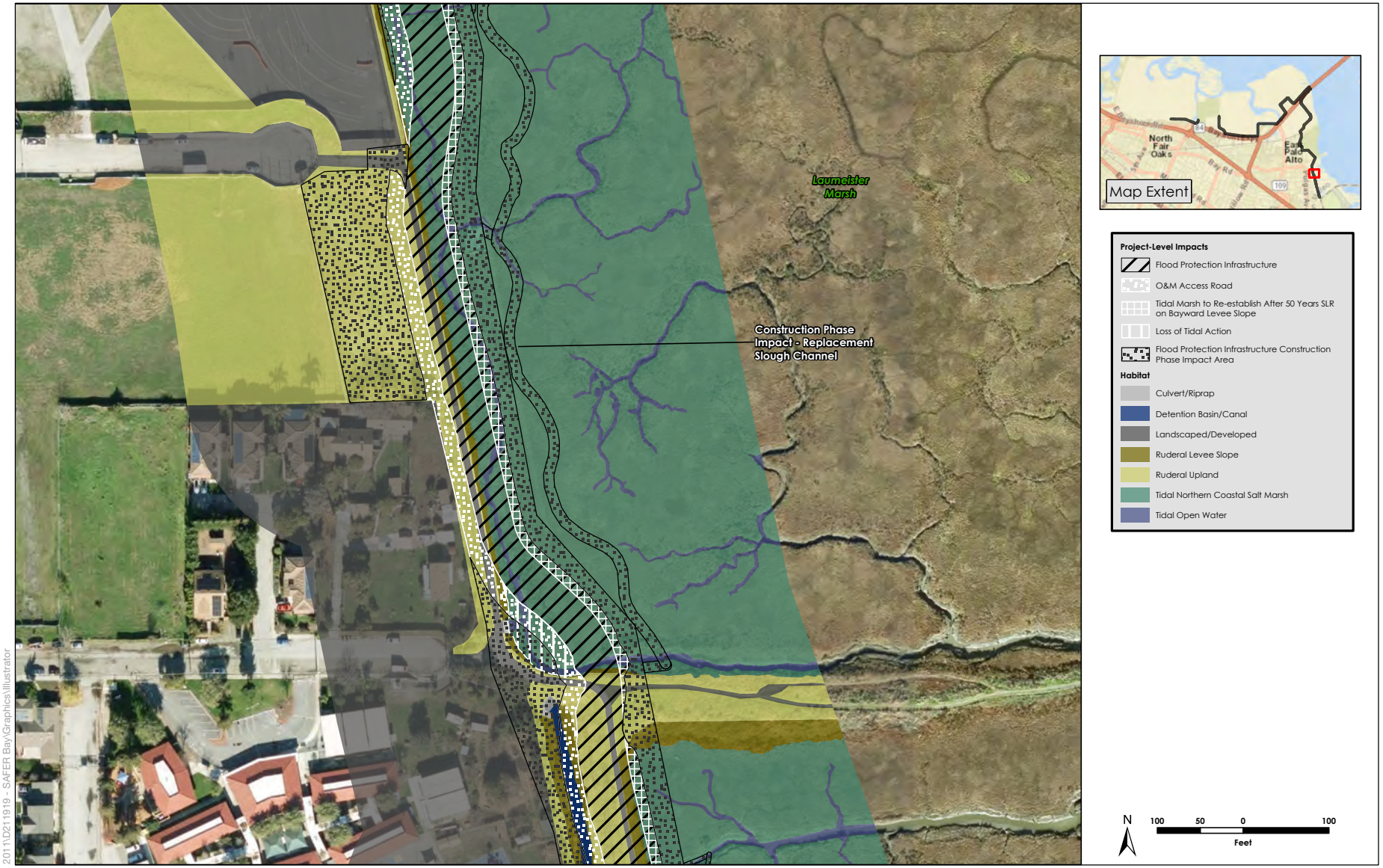


SOURCE: H.T. Harvey & Associates, March 2025

SAFER Bay Project

Figure 3.4-3d
Project-Level Components

ESA
H. T. HARVEY & ASSOCIATES
Ecological Consultants

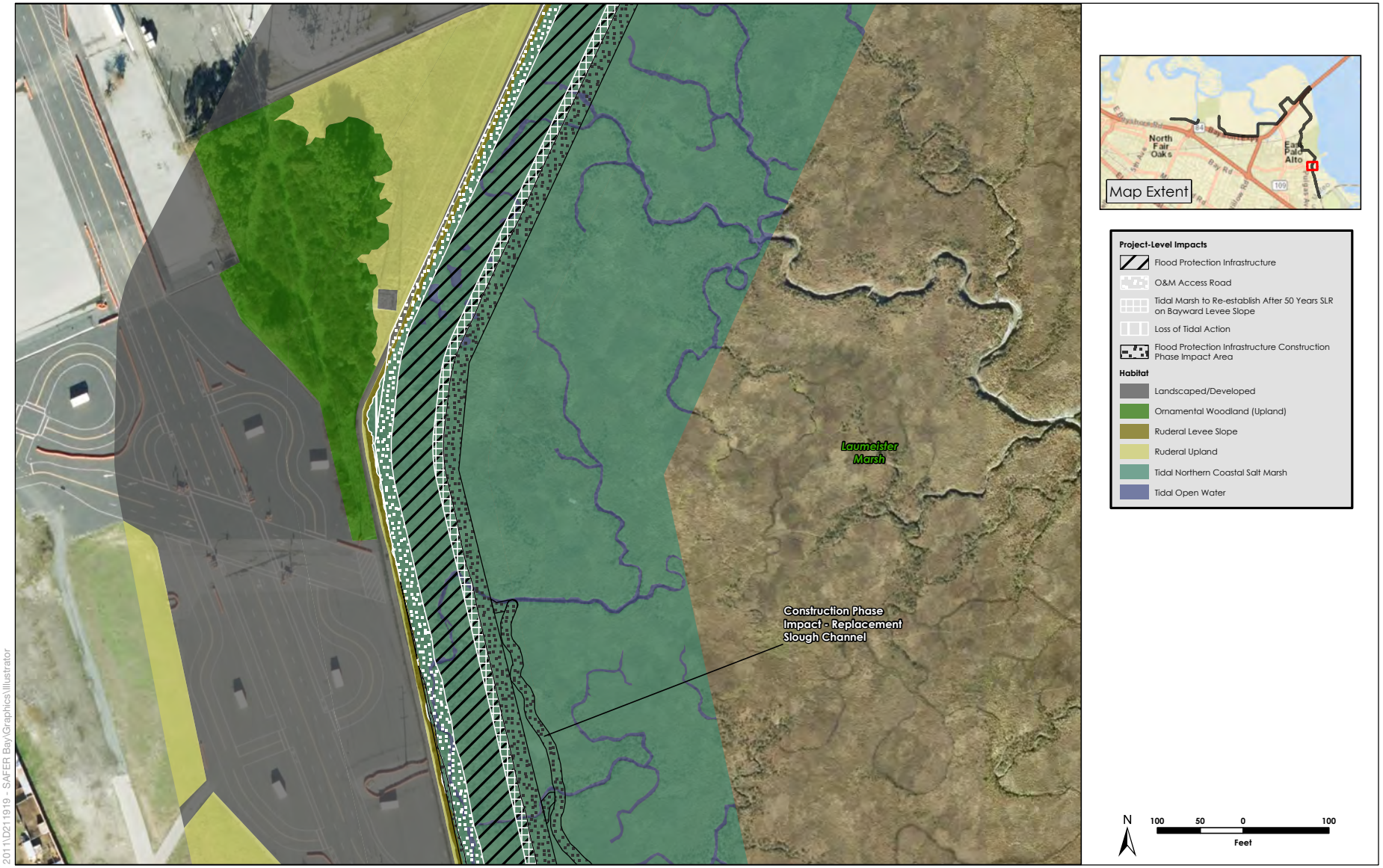


SOURCE: H.T. Harvey & Associates, March 2025

SAFER Bay Project

Figure 3.4-3e
Project-Level Components

ESA
H. T. HARVEY & ASSOCIATES
Ecological Consultants

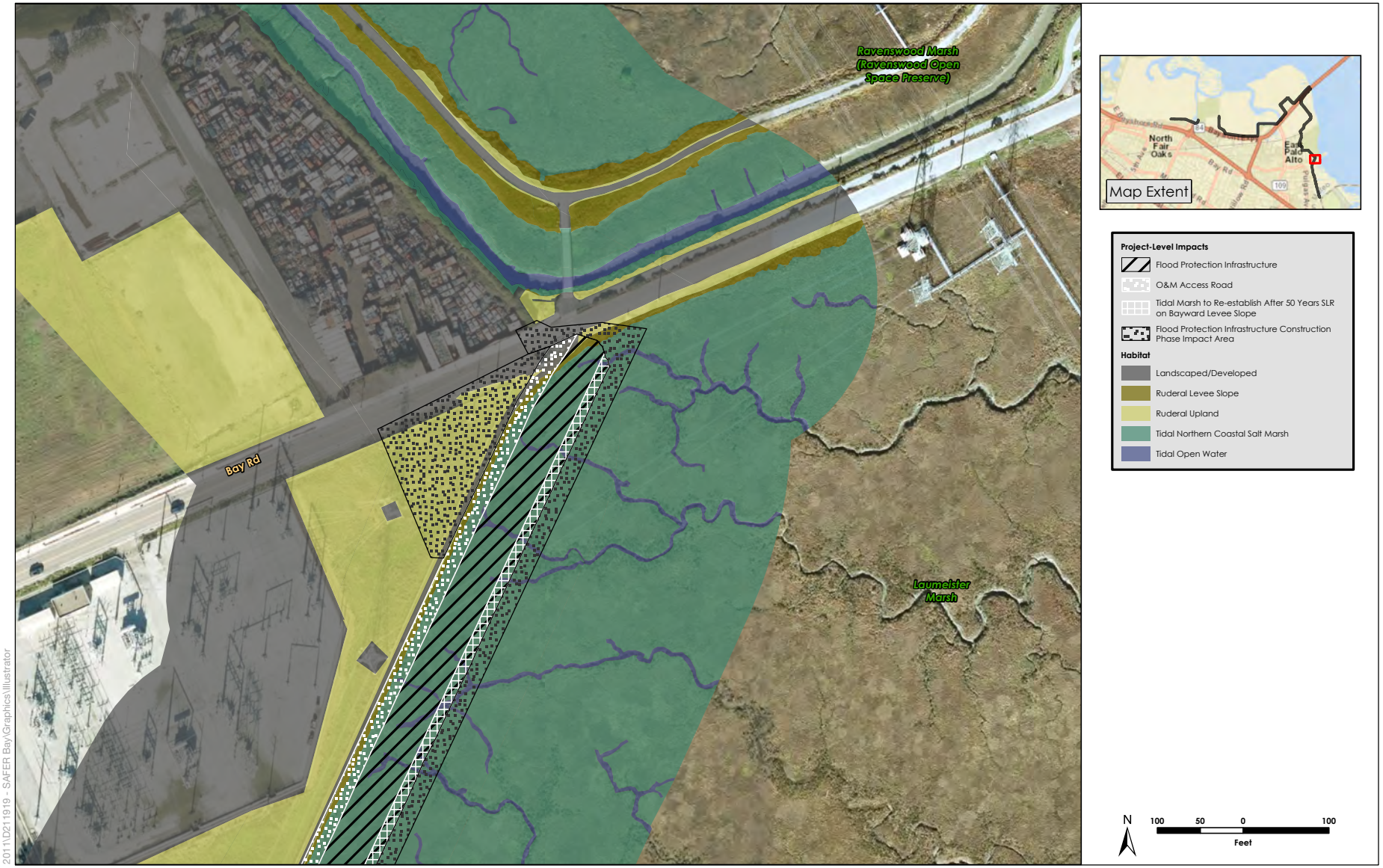


SOURCE: H.T. Harvey & Associates, March 2025

SAFER Bay Project

Figure 3.4-3f
Project-Level Components

ESA
H. T. HARVEY & ASSOCIATES
Ecological Consultants

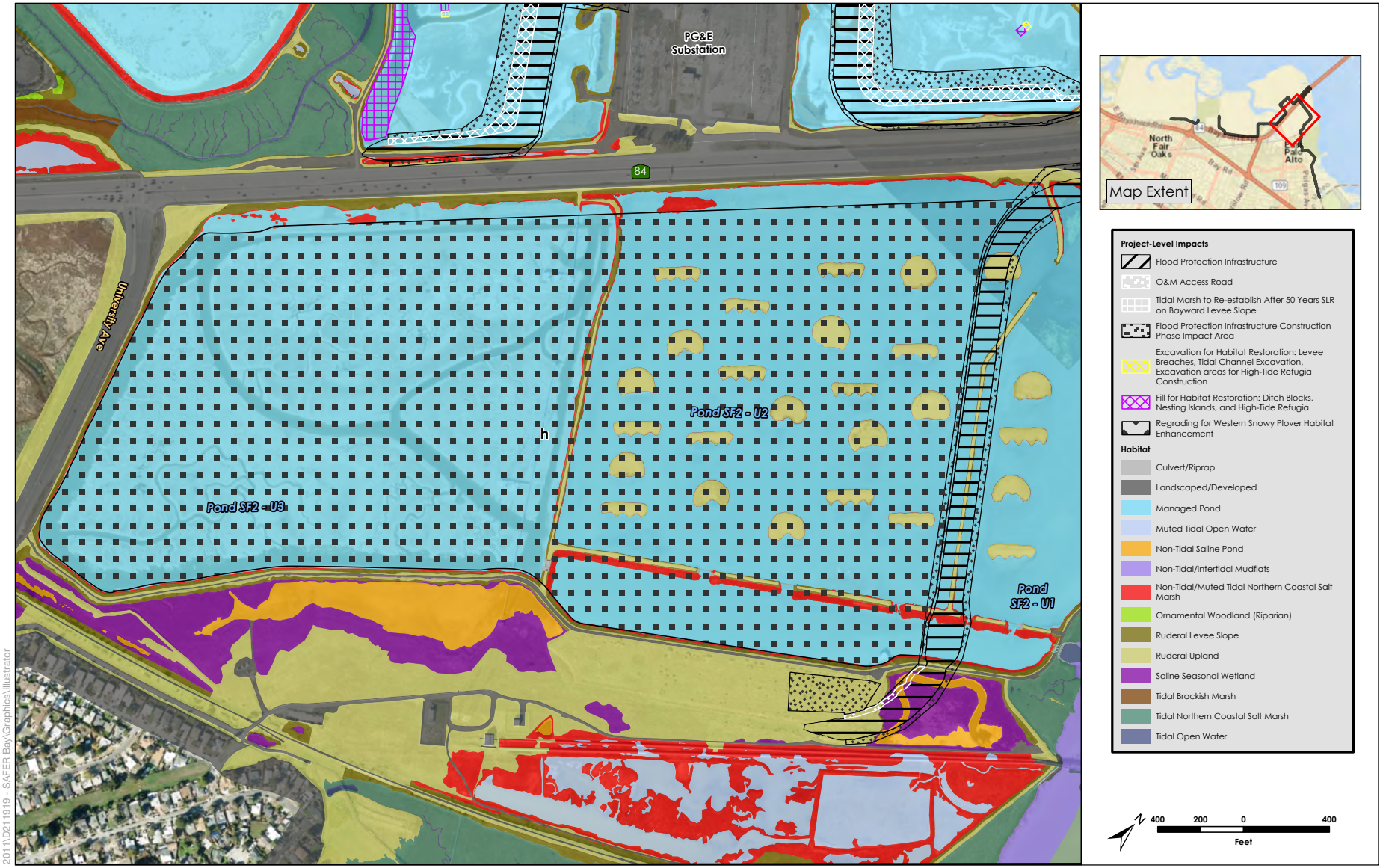


SOURCE: H.T. Harvey & Associates, March 2025

SAFER Bay Project

Figure 3.4-3g
Project-Level Components

ESA
H. T. HARVEY & ASSOCIATES
Ecological Consultants



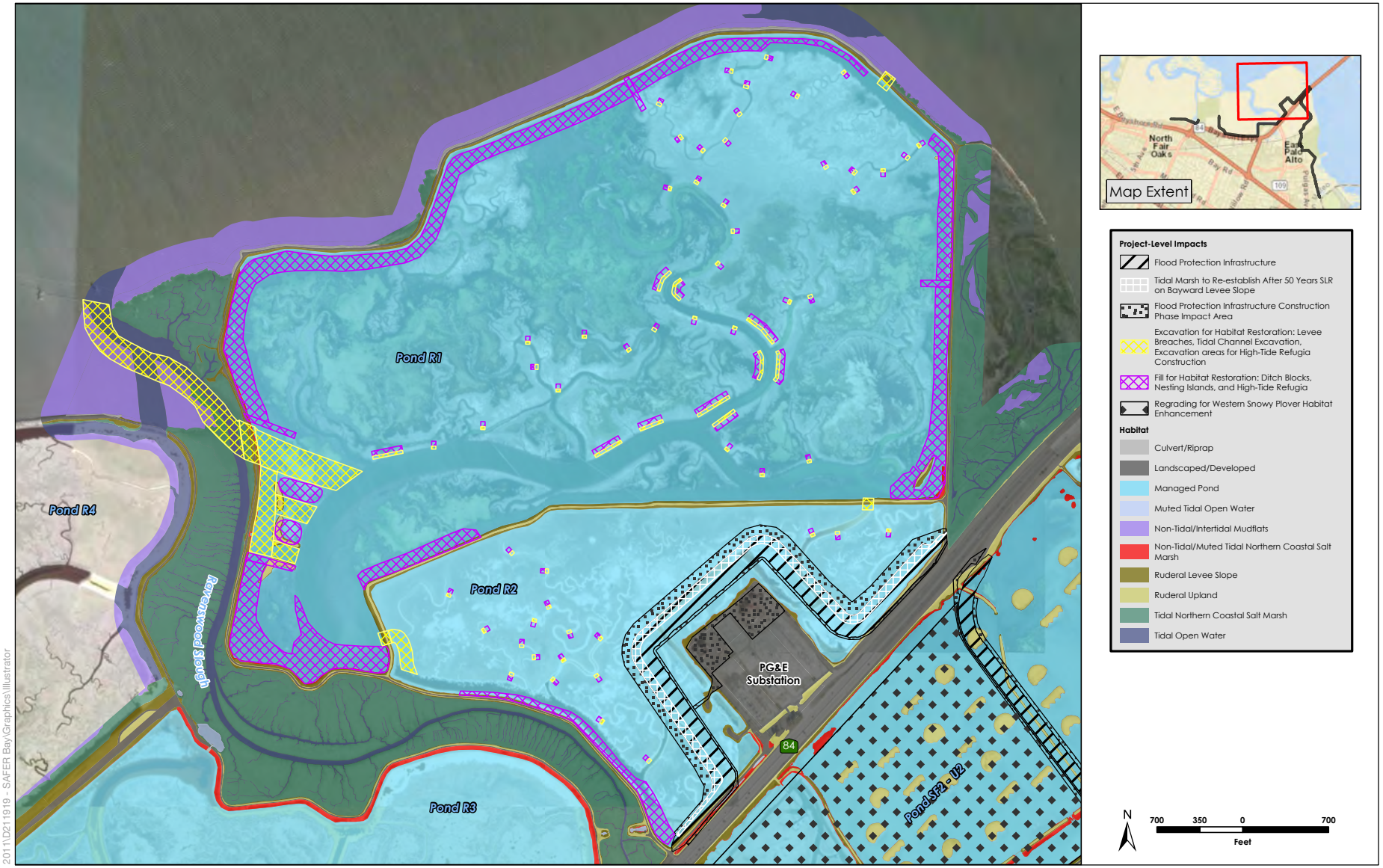
2011\D211919 - SAFER Bay\Graphics\Illustrator

SOURCE: H.T. Harvey & Associates, March 2025

SAFER Bay Project

Figure 3.4-3h
Project-Level Components

ESA
H. T. HARVEY & ASSOCIATES
Ecological Consultants



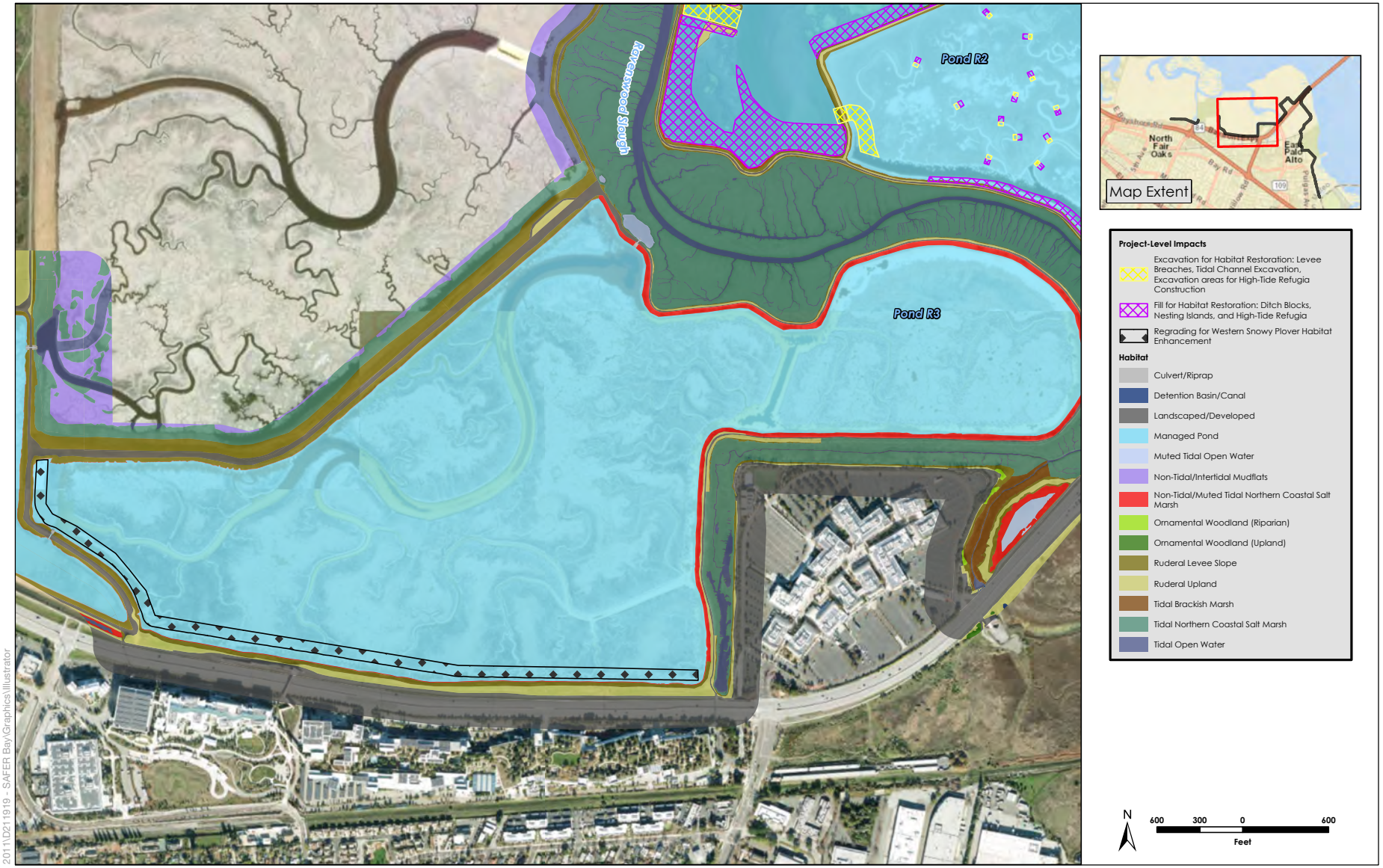
SOURCE: H.T. Harvey & Associates, March 2025

SAFER Bay Project

Figure 3.4-3i
Project-Level Components

ESA

H. T. HARVEY & ASSOCIATES
Ecological Consultants

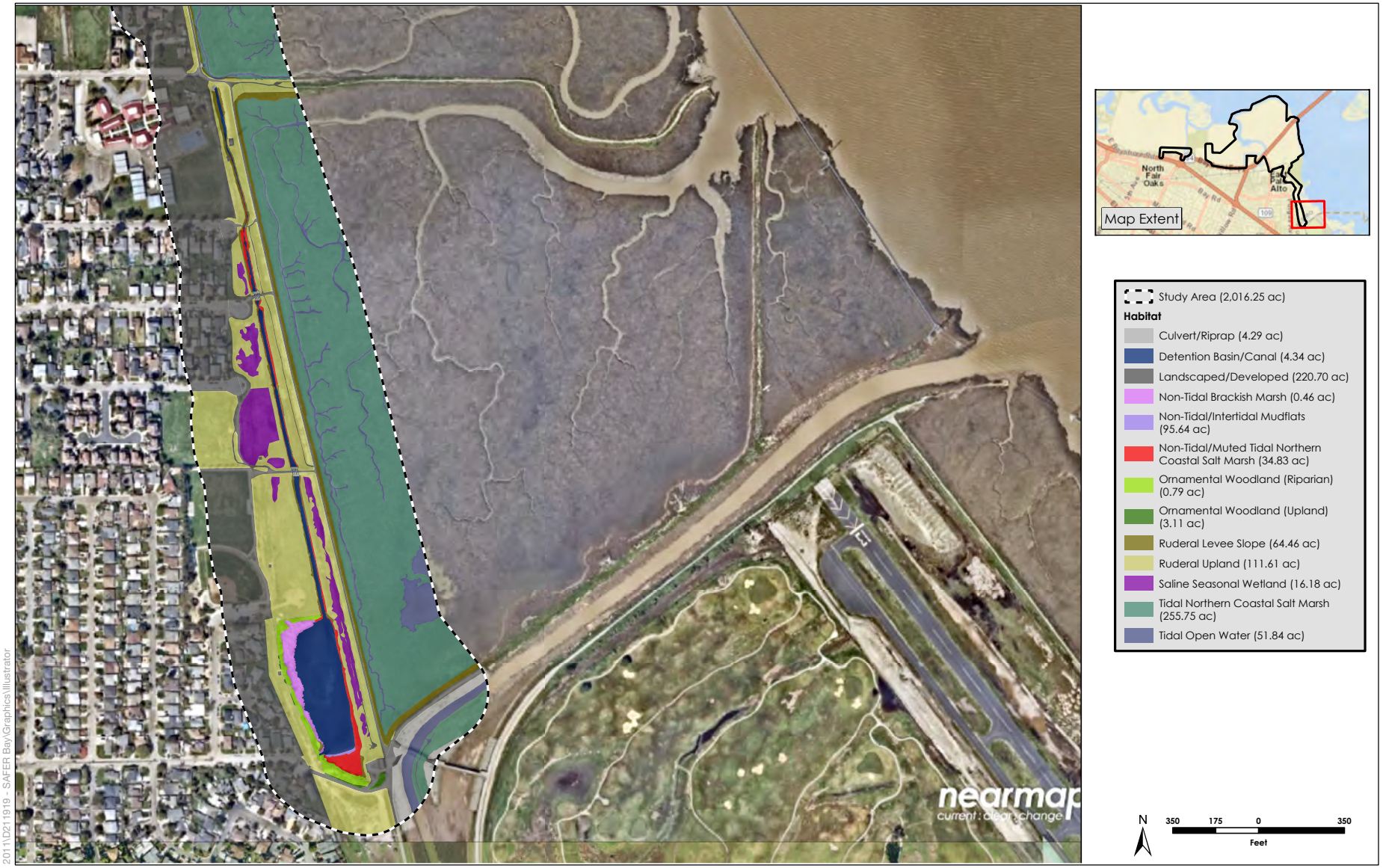


SOURCE: H.T. Harvey & Associates, March 2025

SAFER Bay Project

Figure 3.4-3j
Project-Level Components

ESA
H. T. HARVEY & ASSOCIATES
Ecological Consultants



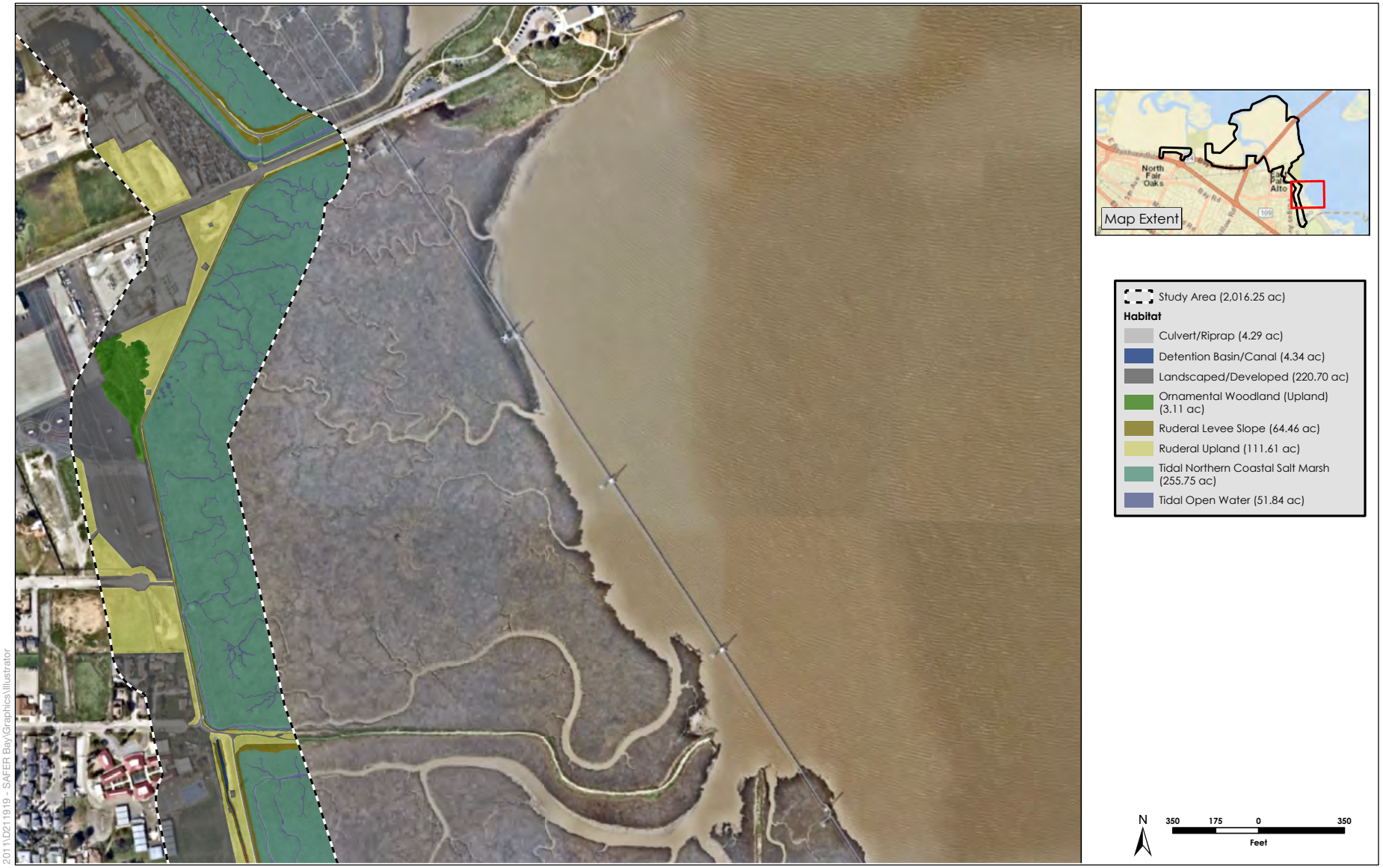
2011\D2119 19 - SAFER Bay\Graphics\Illustrator

SOURCE: H.T. Harvey & Associates, March 2025

SAFER Bay Project

Figure 3.4-4a
Habitat Map

ESA
H. T. HARVEY & ASSOCIATES
Ecological Consultants



2011\D2119 19 - SAFER Bay\Graphics\Illustrator

SOURCE: H.T. Harvey & Associates, March 2025

SAFER Bay Project

Figure 3.4-4b
Habitat Map

ESA
H. T. HARVEY & ASSOCIATES
Ecological Consultants

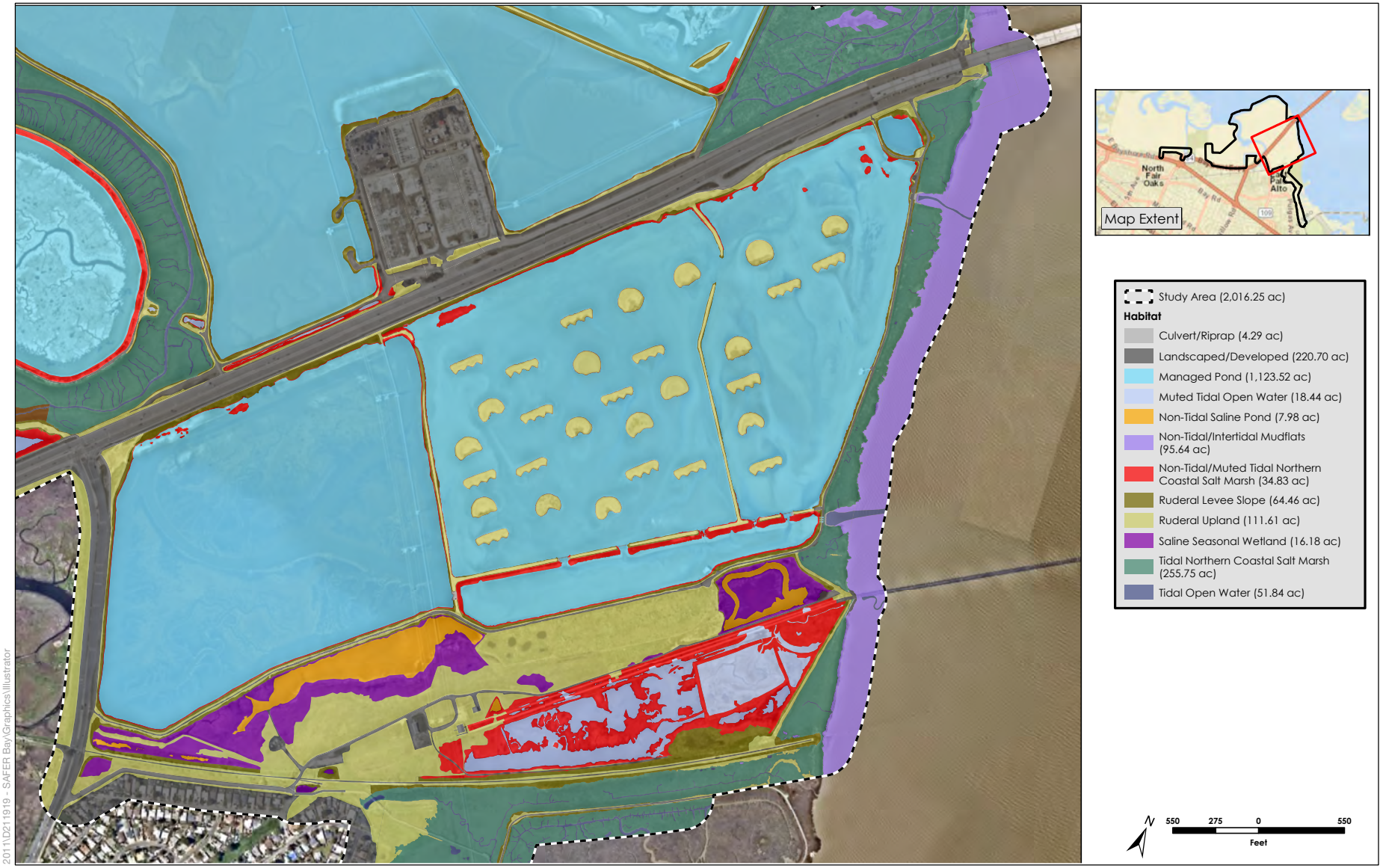


SOURCE: H.T. Harvey & Associates, March 2025

SAFER Bay Project

Figure 3.4-4c
Habitat Map

ESA
H. T. HARVEY & ASSOCIATES
Ecological Consultants

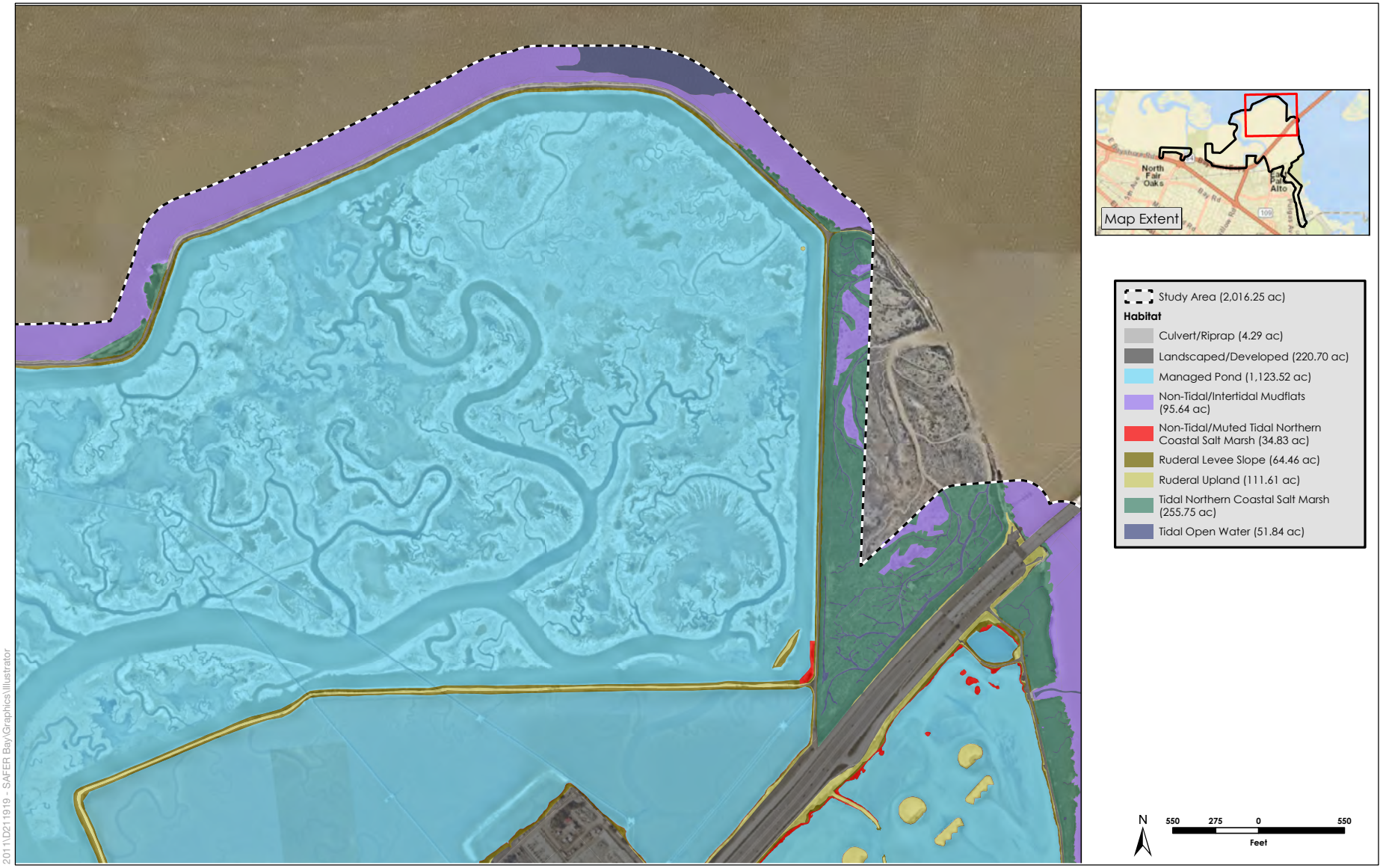


SOURCE: H.T. Harvey & Associates, March 2025

SAFER Bay Project

Figure 3.4-4d
Habitat Map

ESA
H. T. HARVEY & ASSOCIATES
Ecological Consultants



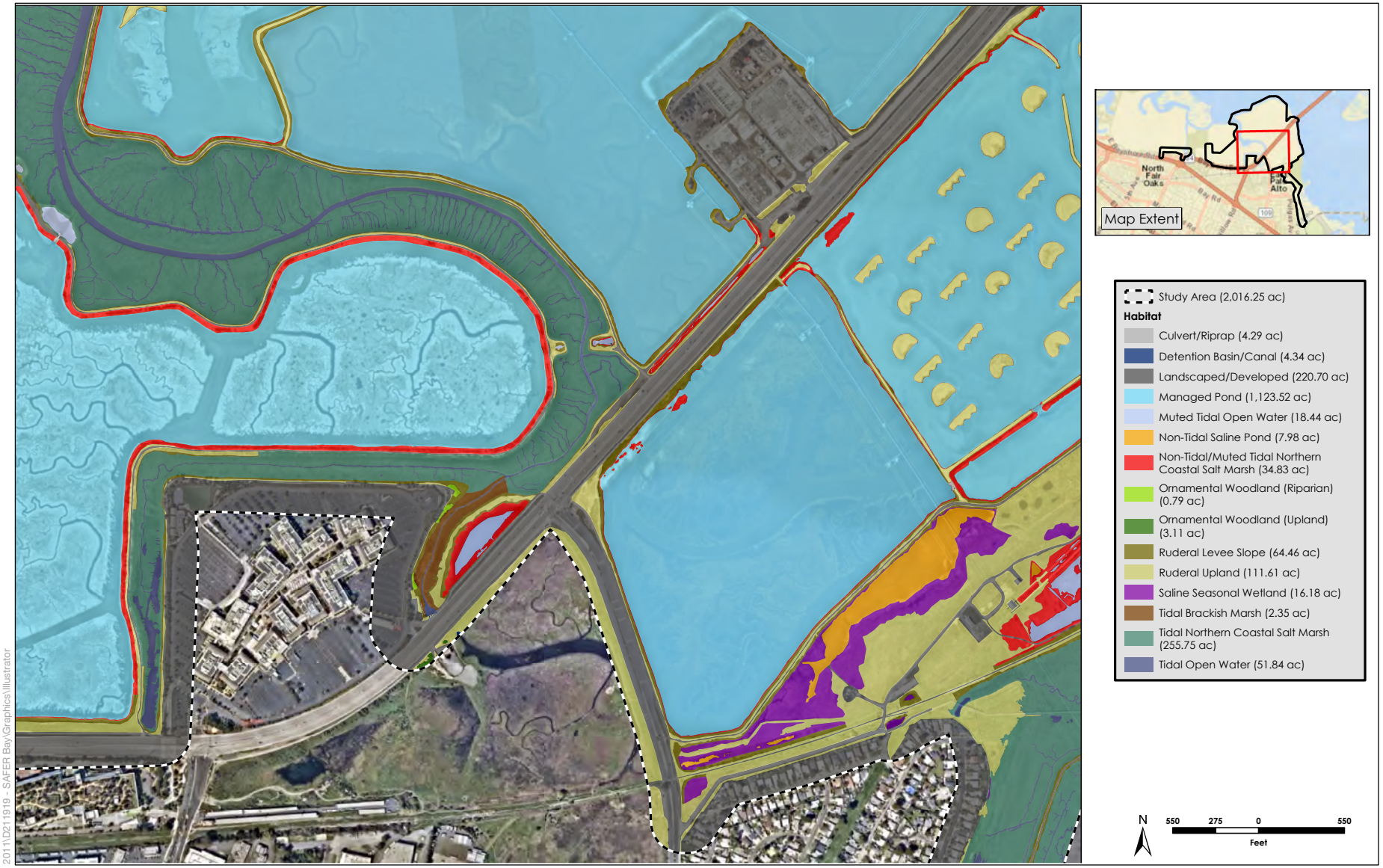
2011\D211919 - SAFER Bay\Graphics\Illustrator

SOURCE: H.T. Harvey & Associates, March 2025

SAFER Bay Project

Figure 3.4-4e
Habitat Map

ESA
H. T. HARVEY & ASSOCIATES
Ecological Consultants



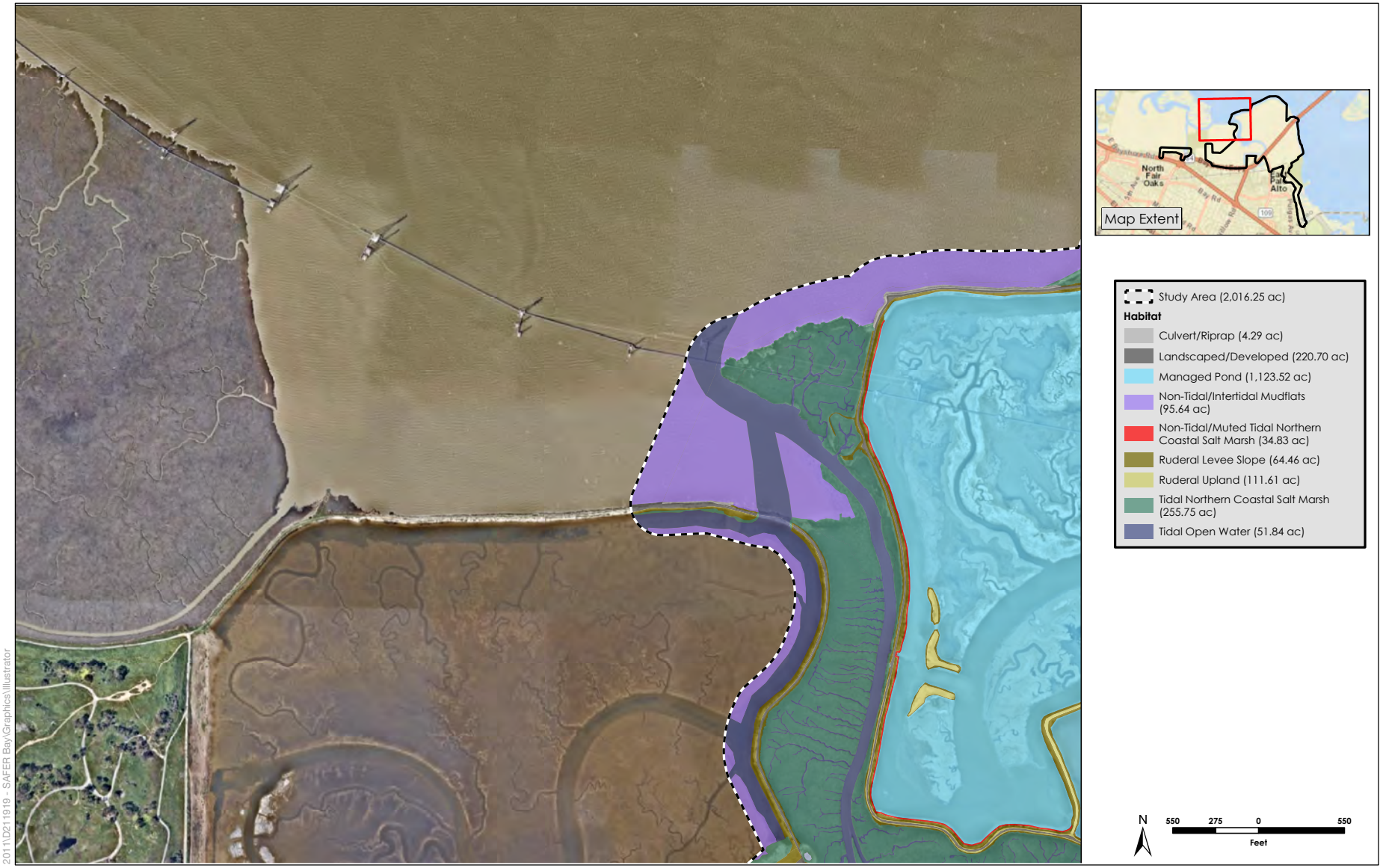
2011\D2119 19 - SAFER Bay\Graphics\Illustrator

SOURCE: H.T. Harvey & Associates, March 2025

SAFER Bay Project

Figure 3.4-4f
Habitat Map

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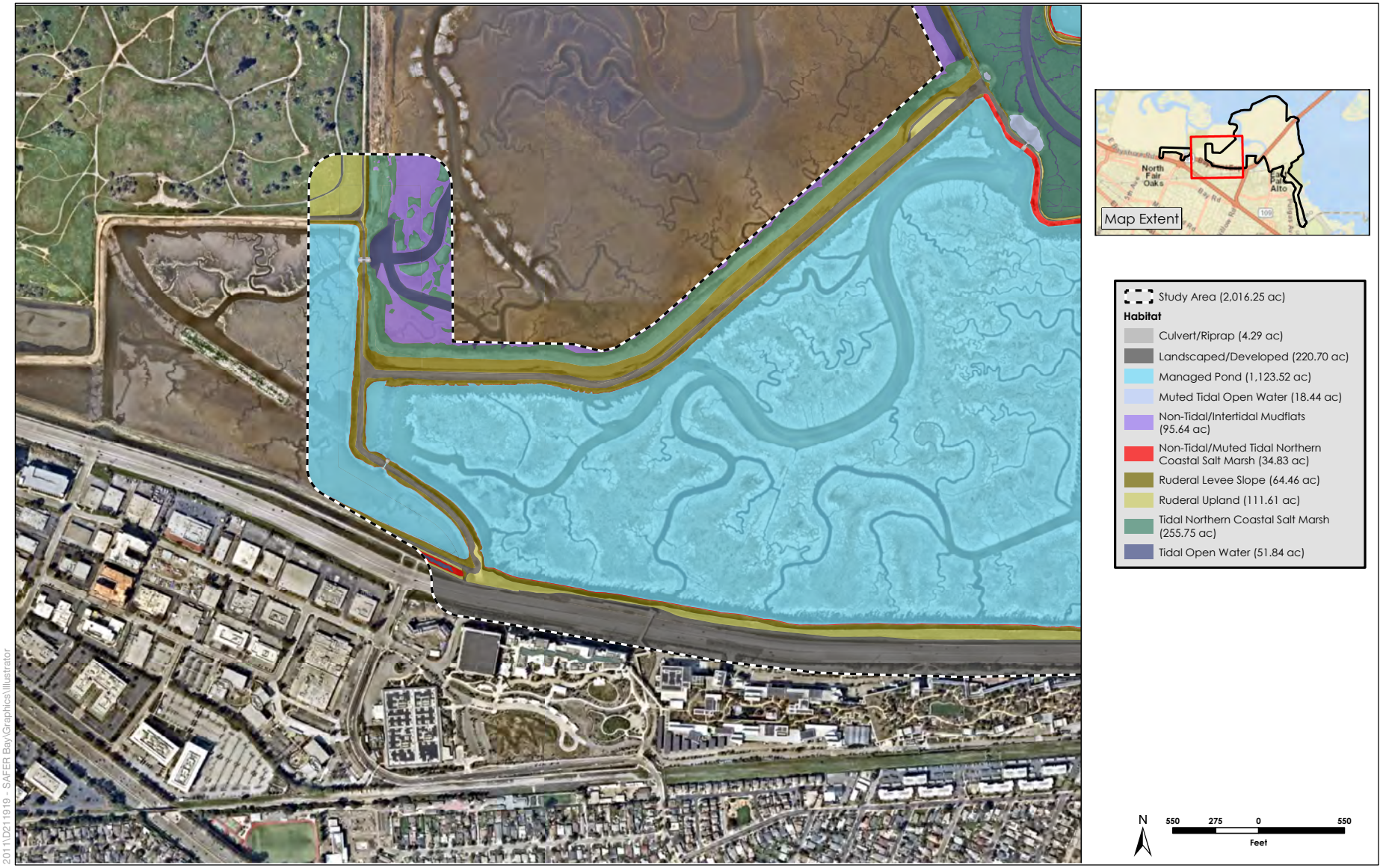
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SOURCE: H.T. Harvey & Associates, March 2025

SAFER Bay Project

Figure 3.4-4g
Habitat Map

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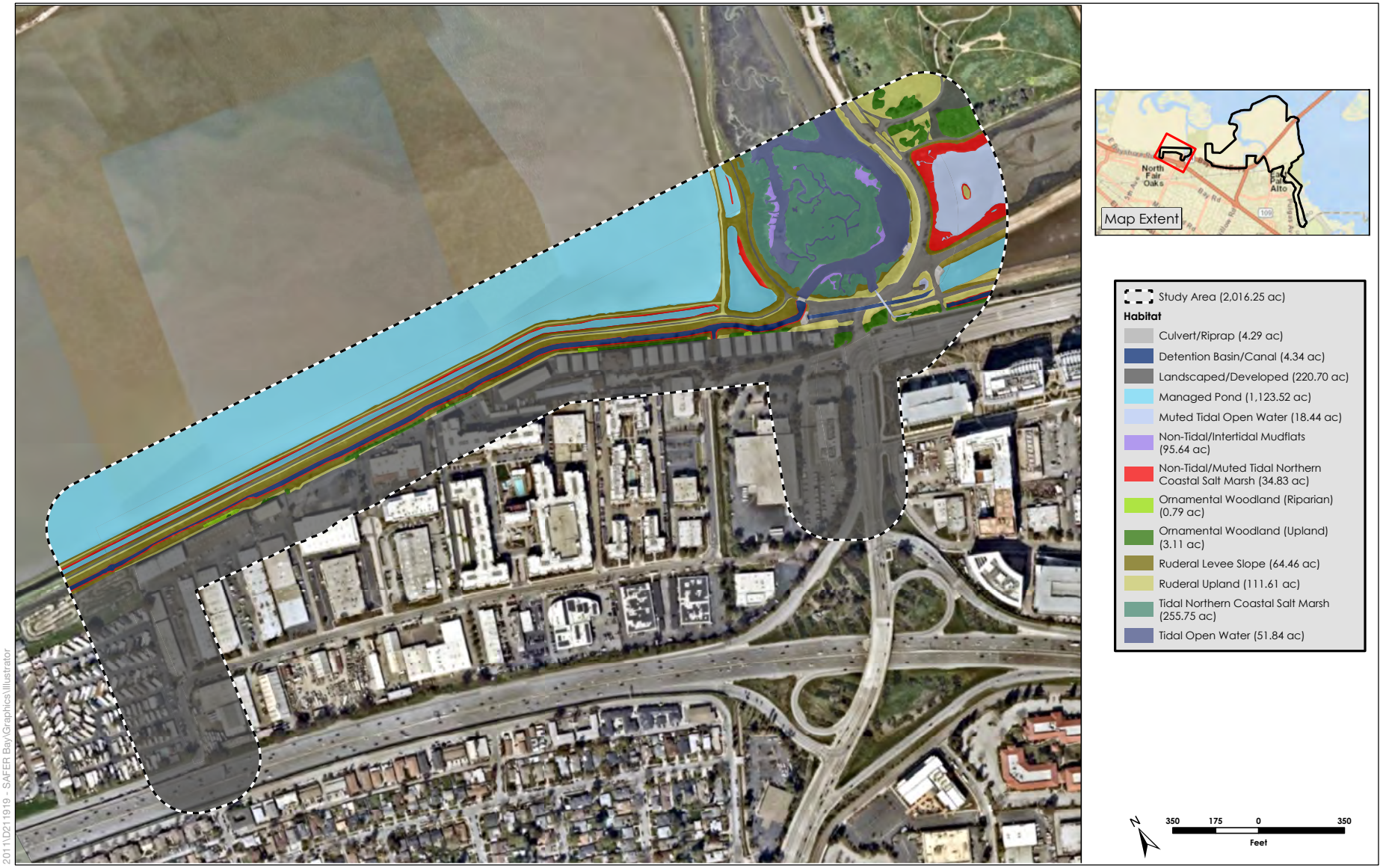
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SOURCE: H.T. Harvey & Associates, March 2025

SAFER Bay Project

Figure 3.4-4h
Habitat Map

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SOURCE: H.T. Harvey & Associates, March 2025

SAFER Bay Project

Figure 3.4-4i
Habitat Map

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3.5 Cultural Resources

This section evaluates the potential impacts of the SAFER Bay Project (Project) on existing cultural resources. For this assessment, *cultural resources* include architectural (built environment) resources, archaeological resources, and human remains. This section presents information about the environmental and regulatory setting and identifies the criteria used to evaluate the significance of potential impacts, the methods used in evaluating these impacts, and the results of the impact assessment. The Project evaluated is described in Chapter 2, *Project Description*, of this EIR.

3.5.1 Environmental Setting

Natural Environment

The Project is located in the southern portion of the Coast Ranges geomorphic province, a series of northwest-trending mountain ranges and valleys that stretch along the California coast from Santa Barbara north to the Oregon border.[1] The San Francisco Peninsula geology is characterized by rugged hills of Jurassic- to Cretaceous-age bedrock surrounded by low, flat-lying areas that are overlain by Quaternary sedimentary deposits. The Project is in the South Bay Drainage Unit, which is characterized by a broad alluvial valley sloping toward the San Francisco Bay and flanked by the Diablo Range in the East Bay and the Santa Cruz Mountains in the west. The hills to the west of the Project are the source of many perennial streams, which run from the hills to the bay, including San Francisquito Creek just south of the Project.

The San Francisco Peninsula exhibits a Mediterranean climate, with year-round moderate temperatures, mild weather, and an average of 15 inches of rainfall per year. This type of climate is subject to recurring and sometimes long-lasting droughts.

The tidal marshes in the Project area mark the edge of the bay. Until the 20th century, the marshes were much more extensive and would have provided the pre-contact indigenous inhabitants with a variety of plant and animal resources for food, medicine, building, and craft materials.

Geological Setting

The California coast and the San Francisco Bay has undergone dramatic landscape changes since humans began to inhabit the region more than 10,000 years ago. Rising sea levels and increased sedimentation into streams and rivers are among some of the changes.[2] In many places, the interface between older land surfaces and Holocene-age landforms are marked by a well-developed buried soil profile, or a paleosol. Paleosols preserve the composition and character of the earth's surface prior to subsequent sediment deposition; thus, paleosols have the potential to preserve archaeological resources if the area was occupied or settled by humans.[3] Because human populations have grown throughout the Holocene, archaeological sites are predicted to be more frequent in paleosols identified in Late Holocene contexts.

1 CGS (California Geological Survey), 2002. California's Geomorphic Provinces, CGS Note 36, 2002.

2 Helley, E.J, and R.W. Graymer, 2005. *Quaternary Geology of Alameda County, and parts of Contra Costa, Santa Clara, San Mateo, San Francisco, Stanislaus, and San Joaquin Counties, California*. [Online digital database.] U.S. Geological Survey Open-File Report 97-97, 13 pp. Available online at pubs.usgs.gov/of/1997/0097/.

3 Meyer, Jack, and Jeffrey Rosenthal, 2007. *Geoarchaeological Overview of the Nine Bay Area Counties in Caltrans District 4.* Prepared for California Department of Transportation, District 4, Oakland, CA.

Conversely, lower population levels during the early Holocene suggest a significantly less likely occurrence of archaeological resources in older paleosols (early Holocene or Pleistocene).

Other criteria used to measure the archaeological sensitivity of a given area include the following:

1) That archaeological sites tend to be located near perennial water sources.
2) That archaeological deposits from successive time periods are more common because the density of human populations increased over time.
3) That the longer a landform remained at the surface, the greater the probability that any one spot on that landform was occupied.4

However, the alignment of these harmonizing factors (i.e., a well-developed later-period buried landform in the vicinity of a perennial water source) does not conclude the presence of an associated archaeological resource. Geoarchaeological research has tended to focus on the identification of buried soils, yet without associated cultural resources, these investigations are purely informational and add to the greater knowledge of the San Francisco Bay Area (Bay Area) geologic framework.

Several geoarchaeological studies have been conducted along the San Mateo County bay shoreline, including two investigations in the Project area vicinity.[5] One study included a segment of United States Route 101 (U.S. 101) in the cities of Mountain View and Palo Alto extending from State Route 85 in the south to Embarcadero Road in the north, for a distance of approximately 5.2 kilometers (3.2 miles), just south of the Project area. The geoarchaeological assessment for that project concluded that:

> *[…] In general, Bay Mud deposits are not expected to contain buried archaeological deposits because they were formed in settings that were either submerged, or subject to regular tidal influence. As such they are generally estimated to have a low to very low potential for having buried sites. The interface of the Bay Mud with the adjacent terrestrial land surface is, however, an exception to this sensitivity assessment—these areas are considered to have at least moderate potential for buried sites.*[6]

The assessment further considered the additional criteria outlined above, including proximity to a perennial watercourse, and determined that the vicinity of Adobe and Barron creeks was among those areas considered highly sensitive for buried archaeological resources. A subsurface study was

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4 Ruby, A., 2010. *Draft Archaeological Survey Report for the Monterey Peninsula Light Rail Transit Project.* Prepared by Far Western Anthropological Group, Inc. Prepared for Parsons Corporation, San Francisco. On file, ESA.

5 Whitaker, Adrian, 2008. *Extended Phase I Testing for the U.S. 101 Auxiliary Lanes (Route 85 to Embarcadero Road) Project, Santa Clara County, California, 04-SCL-101 PM 48.97/52.17 EA 04-4A3300.* Prepared for Caltrans District 4. On file (S-37074), NWIC.

Rehor, Jay, and Kathleen Kubal, 2013. *DRAFT Extended Phase I Study, US 101 Express Lanes Project, Santa Clara County, California, US 101 PM 16.0/52.55, SR 85 PM 23.0/R24.1, Project No. 0412000459; EA 2G7100.* Prepared for State of California Department of Transportation District 4 and Santa Clara Valley Transportation Authority. September 2013.

6 Byrd, PhD, Brian F., and Michael Darcangelo, 2008. *Archaeological Survey Report for the US 101 Auxiliary Lanes (Route 85 to Embarcadero Road) Project, Santa Clara County, California, 04-SCL-101 PM 48.97/52.17 EA 04-4A33002008.* Prepared for Caltrans District 4. On file (S-35123), NWIC.

recommended, and 18 trenches were excavated in six locations. No buried soils and no archaeological deposits were encountered in any of the trenches.[7]

Archaeologists also completed a geoarchaeological analysis for the U.S. 101 corridor south of the Project area.[8] That analysis also concluded that the general vicinity was sensitive for buried paleosols. A subsurface study was completed on the west side of U.S. 101 in the San Antonio Road interchange. No archaeological materials or paleosols were identified, and the area was re-classified as moderately sensitive for buried archaeological resources.

Based on the results of these studies, as well as the geologic context and environmental setting including the proximity of the Project area to Ravenswood Slough, there is some degree of sensitivity for deeply buried archaeological resources in the Project area. Although documented archaeological resources in the vicinity have only been identified further inland to the west of the historic shoreline, the potential for older sites associated with earlier dry lands and submerged early Holocene-age landscapes around the bay margin cannot be discounted.

Pre-Contact Context

The natural marshland communities along the edges of bays and channels were the principal source for subsistence and other activities during the pre-contact period of the San Francisco Bay region. Many of the original surveys of archaeological sites in the area were conducted between 1906 and 1908 by U.C. Berkeley archaeologist N.C. Nelson. Such surveys yielded the initial documentation of nearly 425 "earth mounds and shell heaps" along the littoral zone of the bay.[9] From these beginnings, the most notable sites in the Bay Area were excavated scientifically, such as the Emeryville shellmound (CA-ALA-309), the Ellis Landing Site (CA-CCO-295) in Richmond, and the Fernandez Site (CA-CCO-259) in Rodeo Valley.[10] These dense midden sites, such as CA-ALA-309, have been carbon-14 dated to 2,310 ± 220 years before present (BP), but other evidence from around the bay suggests that human occupation in the region is of greater antiquity, perhaps as early as 9,000 BP.[11]

Archaeologists developed individual cultural chronological sequences tailored to the archaeology and material culture of each subregion of California. Each of these sequences is based principally on the presence of distinctive cultural traits and stratigraphic separation of deposits. Milliken et al. provide a framework for the interpretation of the San Francisco Bay Area.[12] The authors divided human history in California into three periods: the *Early Period*, the *Middle Period*, and the *Late Period*. In many parts of

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7 Whitaker, Adrian, 2008. *Extended Phase I Testing for the U.S. 101 Auxiliary Lanes (Route 85 to Embarcadero Road) Project, Santa Clara County, California, 04-SCL-101 PM 48.97/52.17 EA 04-4A3300.* Prepared for Caltrans District 4. On file (S-37074), NWIC.

8 Rehor, Jay, and Kathleen Kubal, 2013. *DRAFT Extended Phase I Study, US 101 Express Lanes Project, Santa Clara County, California, US 101 PM 16.0/52.55, SR 85 PM 23.0/R24.1, Project No. 0412000459; EA 2G7100.* Prepared for State of California Department of Transportation District 4 and Santa Clara Valley Transportation Authority. September 2013.

9 Nelson, Nels C., 1909. "Shellmounds of the San Francisco Bay Area", *University of California Publications in American Archaeology and Ethnology* 7 (4):310–356, Berkeley, CA.

10 Moratto, Michael J., 1984. *California Archaeology*. 2004 reprinted ed. Coyote Press, Salinas, California.

11 Moratto, Michael J., 1984. *California Archaeology*. 2004 reprinted ed. Coyote Press, Salinas, California.

12 Milliken, Randall, Richard T. Fitzgerald, Mark G. Hylkema, Randy Groza, Tom Origer, David G. Bieling, Alan Leventhal, Randy S. Wiberg, Andrew Gottfield, Donna Gillette, Vaviana Bellifemine, Eric Strother, Robert Cartier, and David A. Fredrickson, 2007. "Punctuated Culture Change in the San Francisco Bay Area." In *Prehistoric California: Colonization, Culture, and Complexity.* Edited by T.L. Jones, and K.A. Klar, pp. 99–124, AltaMira Press.

California, four periods are defined; the fourth being the *Paleoindian Period* (11500–8000 BC), characterized by big-game hunters occupying broad geographic areas. Evidence of human habitation during the Paleoindian Period has not yet been discovered in the Bay Area. Economic patterns, stylistic aspects, and regional phases further subdivide cultural periods into shorter phases. This scheme uses economic and technological types, socio-politics, trade networks, population density, and variations of artifact types to differentiate between cultural periods.

During the Early Period (Lower Archaic, 8000–3500 BC), geographic mobility continued from the Paleoindian Period and is characterized by the millingslab and handstone as well as large wide-stemmed and leaf-shaped projectile points. The first cut shell beads and the mortar and pestle are first documented in burials during the Early Period (Middle Archaic, 3500–500 BC), indicating the beginning of a shift from a nomadic lifestyle to sedentism (staying in one place). During the Middle Period, which includes the Lower Middle Period (Initial Upper Archaic, 500 BC–AD 430), and Upper Middle Period (Late Upper Archaic, AD 430–1050), geographic mobility may have continued, although groups began to establish longer-term base camps in localities from which a more diverse range of resources could be exploited. The first rich black middens are recorded from this period. The addition of milling tools, obsidian, and chert concave-base projectile points, as well as the occurrence of sites in a wider range of environments, suggest that the economic base was more diverse. By the Upper Middle Period, mobility was being replaced by the development of numerous small villages. Around AD 430, a dramatic cultural disruption occurred as evidenced by the sudden collapse of the *Olivella* saucer bead trade network. During the Initial Late Period (Lower Emergent, AD 1050–1550), social complexity developed toward lifeways of large, central villages with resident political leaders and specialized activity sites. Artifacts associated with the period include the bow and arrow, small corner-notched projectile points, and a diversity of beads and ornaments.

3.5.2 Ethnography

A compilation of ethnohistorical, historical, and archeological data indicates that the San Francisco peninsula, as well as the South and East Bay Areas were inhabited by a cultural group known as the Ohlone before the arrival of Europeans.[13] Although traditional anthropological literature portrayed the Ohlone peoples as having a static culture, today it is better understood that many variations of culture and ideology existed within and between villages. Although these static descriptions of separations between native cultures of California make it an easier task for ethnographers to describe past behaviors, this approach masks native adaptability and self-identity. California's Native Americans never saw themselves as members of larger cultural groups, as described by anthropologists. Instead, they saw themselves as members of specific village communities, perhaps related to others by marriage or kinship ties, but viewing the village as the primary identifier of their origins.

Levy describes the language group spoken by the Ohlone (often referred to as "Costanoan" in the literature).[14] This term is originally derived from a Spanish word designating the coastal peoples of Central California. Today, Costanoan is used as a linguistic term that refers to a larger language family that

[13] Milliken, Randall, 1995. *A Time of Little Choice: The Disintegration of Tribal Culture in the San Francisco Bay Area 1769–1810.* Ballena Press, Menlo Park, California.

[14] Levy, R., 1978. "Costanoan." In *California*, edited by R.F. Heizer, pp. 485–495. Handbook of North American Indians, Volume 8. William G. Sturtevant, general editor. Smithsonian Institution, Washington D.C.

included distinct sociopolitical groups that spoke at least eight languages of the Penutian language group. The Ohlone once occupied a large territory from San Francisco Bay in the north to the Big Sur and Salinas rivers in the south.

Economically, the Ohlone engaged in hunting and gathering. Their territory encompassed both coastal and open valley environments that contained a wide variety of resources, including grass seeds, acorns, bulbs and tubers, bear, deer, elk, antelope, a variety of bird species, and rabbit and other small mammals. The Ohlone acknowledged private ownership of goods and songs, and village ownership of rights to land and/or natural resources; they appear to have aggressively protected their village territories, requiring monetary payment for access rights in the form of clam shell beads, and even shooting trespassers if caught.

In 1770, the Ohlone lived in approximately 50 separate and politically autonomous nations. During the Mission Period (1770 to 1835), native populations, especially along the California coast, were brought—usually by force—to the missions by the Spanish missionaries to provide labor. The missionization caused the Ohlone people to experience cataclysmic changes in almost all areas of their life, particularly a massive decline in population caused by introduced diseases and declining birth rate, resulting in large part from colonization by the Spanish missionaries. Following the secularization of the missions by the Mexican government in the 1830s, most Native Americans gradually left the missions and established rancherias in the surrounding areas.[15]

After European contact, Ohlone life ways were severely disrupted by missionization, disease, and displacement. Today, the Ohlone still have a strong presence in the Bay Area, as represented by eight Native American tribes listed within the Native American Heritage Commission with Ohlone tribal members.

3.5.3 Historic Background

The Portola expedition made the initial historic contact with the native Ohlone in the San Mateo County area while in search of Monterey Bay in 1769. Mission Santa Clara de Asís was established along Guadalupe Creek in 1777, and the Spanish ruled the area until 1821 when the Mexican Revolution ushered in the period of Mexican rule. The area of East Palo Alto was part of the Rancho de las Pulgas, a 35,000-acre ranch granted to José Darío Argüello in 1795. Following the end of the Mexican-American War in 1848, California was admitted to the Union in 1850. San Mateo County was formed from parts of San Francisco County and Santa Cruz County in 1856. During the latter half of the 19th century, the county was focused on ranching, transportation and shipping, brick manufacturing, and farming. Influxes of settlers, from the Dust Bowl migrants of the 1930s to post-World War II military veterans and more recently entrepreneurs and technical companies, have urbanized the region.

Records Search and Literature Review

ESA conducted a records search of the Northwest Information Center (NWIC) of the California Historical Resources Information System on November 19, 2024 (File No. 24-0743). The purpose of the records search was to: (1) determine whether known cultural resources have been recorded within or in the

[15] Levy, R., 1978. "Costanoan." In *California*, edited by R.F. Heizer, pp. 485–495. Handbook of North American Indians, Volume 8. William G. Sturtevant, general editor. Smithsonian Institution, Washington D.C.

vicinity of the Project area; (2) assess the likelihood for unrecorded cultural resources to be present based on historical references and the distribution of nearby sites; and (3) develop a context for the identification and preliminary evaluation of cultural resources. The records search consisted of an examination of the following documents:

- NWIC digitized base maps (U.S. Geological Survey [USGS] Palo Alto and Mountain View 7.5-minute topographic maps) to identify recorded archaeological sites and studies within a 0.5-mile radius of the Project area.
- NWIC digitized base maps (USGS Palo Alto and Mountain View 7.5-minute topographic maps) to identify recorded historic-era resources of the built environment (e.g., building, structures, and objects) within and adjacent to the Project area.
- Resource Inventories: California Inventory of Historical Resources, California Historical Landmarks, Built Environment Resource Directory (through December 2024), and Archaeological Determinations of Eligibility (as of April 2012) for San Mateo County.

The NWIC records searches results identified 13 previous cultural resources studies that have been conducted in the Project area vicinity, most of which include a portion of the Project area. Review of the NWIC records search studies identified five previously recorded archaeological resources within 0.5 mile of the Project area and six previously recorded built environment resources (e.g., buildings, structures) within or adjacent to the Project area, as well as one resource that contains both pre-contact and historic-era components. **Table 3.5-1** provides details about these resources; entries in bold are within or immediately adjacent to the Project area and are described in more detail below.

P-41-002319 – SFPUC Bay Tunnel Discoveries

P-41-002319 represents two unanticipated discoveries that occurred during excavation of the San Francisco Public Utilities Commission (SFPUC) Bay Tunnel shaft as documented by Basin Research Associates in 2013. The first discovery consisted of wood fragments and a possible animal hide. Following analysis, it was concluded that the "hide and wood likely originated from a historic-era deposit located at or near the present ground surface that was somehow dislodged and mixed with the materials derived from greater depths within the shaft." The second discovery was a deposit of dense shell with several lithic fragments. It was concluded that the "formation had been severely compromised, and the cultural materials appeared to lack integrity."[16] Although these discoveries were identified in the vicinity of the Project's Dumbarton Approach Reach, neither of these discoveries would be considered a historic property eligible for listing in the National Register of Historic Places (National Register) or a historical resource eligible for listing in the California Register of Historical Resources (California Register). This resource is also not considered a unique archaeological resource for the purposes of CEQA.

[16] Basin Research Associates, Inc., 2013. Site Record Form for P-41-002319. On file at NWIC, January 2013.

TABLE 3.5-1
PREVIOUSLY RECORDED CULTURAL RESOURCES IN THE PROJECT AREA VICINITY

Primary #	Trinomial	Site Name	Site Type	Date/Author
P-41-000080	CA-SMA-77	University Village Site	Site (Pre-contact)	1952 (A.B. Elsasser)
P-41-000160	CA-SMA-160	Hiller Mound	Site (Pre-contact)	1978 (Robert Cartier, Archaeological Resource Management); 1996 (Linda Yamane, "most likely descendant"); 2008 (Adrian Whitaker, Far Western); 2020 (Richard Schwartz)
P-41-000233	CA-SMA-235	Pre-contact Site	Site (Pre-contact)	1982 (Miley Holman, Holman & Associates); 1982 (Christopher Pierce, Julia Hammetl); 2013 (Christopher Canzonieri, Basin Research Associates)
P-41-000244	CA-SMA-248	Tarlton Site	Site (Pre-contact)	1984 (Robert Cartier, Archaeological Resource Management); 2008 (Adrian Whitaker, Far Western)
P-41-001877	---	Southern Pacific Railroad Dumbarton Cutoff	Structure (Historic-era)	1996 (John W. Snyder, P.S. Preservation Services); 2019 (S. Psota, Holman & Assoc)
P-41-002076	CA-SMA-368/H	Carnduff Farmstead and Pre-contact Site	Site (Historic-era and Pre-contact)	2002 (Thad Van Bueren, Richard Fitzgerald, Brian Ramos, [none])
P-41-002319	**---**	**SFPUC Bay Tunnel Discoveries**	**Site (Redeposit/ Pre-contact)**	**2013 (Christopher Canzonieri, Basin Research Associates)**
P-41-002351	**---**	**Ravenswood Salt Works District**	**Structure, District (Historic-era)**	**2007 (Lou Ann Speulda-Drews, Nick Valentine, Ellen Joslin Johnck, U.S. Fish and Wildlife Service); 2019 (S. Psota, Holman & Assoc)**
P-41-002404	**---**	**Pond S5 Pump House**	**Building (Historic-era)**	**2014 (Lou Ann Speulda-Drews, Nick Valentine, U.S. Fish and Wildlife Service)**
P-41-002590	**---**	**Bay Road Segment**	**Structure (Historic-era)**	**2014 (Steven J. Melvin, Cheryl Brookshear, JRP Historical Consulting, LLC)**
P-41-002650	---	Menlo Park EQ Basin Levees	Structure (Historic-era)	2018 (Robert Templar, MIG, Inc.)
P-41-002651	---	MPEQ-Site-002	Building, Structure (Historic-era)	2018 (Robert Templar, MIG, Inc.); 2020 (Ward Hill and Denise Bradley)

NOTE: EQ = Equalization; SFPUC = San Francisco Public Utilities Commission
Resources designated in **BOLD** are in or immediately adjacent to the Project site.
SOURCE: Northwest Information Center Database Search, 2024.

P-41-002351 – Ravenswood Salt Works

P-41-002351 is the Ravenswood Salt Works, which encompasses 1,854 acres divided into seven ponds. The seven remnant salt ponds were initially constructed on tidally influenced salt marsh, with levees along the outer edge of the salt marsh and along each side of Ravenswood Slough to create large salt evaporation ponds.

The Ravenswood Salt Works has been evaluated for significance and determined to not convey a strong association with the solar salt industry landscape. The ponds were developed in the 1910s, but the land

uses and activities have changed, the spatial organization has been altered, and the water circulation pattern does not reflect the historic period of use. The Ravenswood ponds are not associated with an important person or family. No processing plants or residences were ever built on the Ravenswood Unit. There are no significant buildings or structures that are 50 years old within the ponds system. The ponds lack adequate integrity and do not convey a clear association with the salt industry. The Ravenswood Salt Works has been determined to not meet National Register eligibility criteria as a historic property.[17] Based on the results of the National Register evaluation, the Ravenswood Salt Works are also recommended not eligible for listing in the California Register and does not qualify for listing in a local register.

P-41-002404 – Pond S5 Pump House

P-41-002404 is a small pump house building that was first observed on a 1948 aerial photograph The building apparently dates to approximately 1948, but its use and function has changed as the pond configurations have changed, especially after 1978 when the S5 and R5 ponds were extended. The pump house is a utilitarian building and has been altered and no longer serves as a pump house.

The building lacks integrity of setting, location, function, feeling, and association. The building lacks an association with an important historical event, person, or architectural style, and has been determined not eligible for listing in the National Register.[18] Based on the results of the National Register evaluation, the Pond S5 Pump House is also recommended not eligible for listing in the California Register and does not qualify for listing in a local register.

P-41-002590 – Bay Road Segment

P-41-002590 is a segment of Bay Road between Clarke Avenue and the Cooley Landing Regional Park access road in East Palo Alto. Along this segment, the character of the road varies greatly. The east half is a narrow, two-lane road with dilapidated asphalt pavement, no curbs, and no sidewalks. At the extreme east end, the surface is gravel. West of Pulgas Avenue, the road is four lanes with space for on-street parking, a median strip, curbs, and sidewalks. This segment of Bay Road has been determined not eligible for listing in the National Register or the California Register.[19]

3.5.4 Regulatory Framework

Unless otherwise noted, the Project would be consistent with applicable plans and regulations outlined in this section.

Federal

Cultural resources are considered through the National Historic Preservation Act (NHPA) of 1966, as amended, and its implementing regulations. Under NHPA section 106, before implementing an "undertaking" (e.g., federal funding or issuance of a federal permit), federal agencies must consider the

[17] USFWS (U.S. Fish and Wildlife Service), 2007. Site Record Form for P-41-002351. On file at NWIC, December 2007; Office of Historic Preservation, Built Environment Resources Directory, 2024.

[18] USFWS (U.S. Fish and Wildlife Service), 2014. Site Record Form for P-41-002404. On file at NWIC, June 2014; Office of Historic Preservation, Built Environment Resources Directory, 2024.

[19] JRP Historical Consulting, LLC, 2014. Site Record Form for P-41-002590. On file at NWIC, July 2014; Office of Historic Preservation, Built Environment Resources Directory, 2024.

effects of the undertaking on historic properties (i.e., properties listed in or eligible for listing in the National Register) and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on any undertaking that would adversely affect properties eligible for listing in the National Register. Under the NHPA, a property is significant if it meets the National Register listing criteria in the Code of Federal Regulations title 36, section 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 that:*
>
> *(a) Are associated with events that have made a significant contribution to the broad patterns of our history, or*
>
> *(b) Are associated with the lives of persons significant in our past, or*
>
> *(c) 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) Have yielded, or may be likely to yield, information important in prehistory or history.*

Federal review of projects is normally referred to as the *section 106 process*. This process is the responsibility of the federal lead agency. The section 106 review normally involves a four-step procedure, which is described in detail in the implementing regulations (Code of Federal Regulations title 36, section 800 et seq.):

(1) Establish the undertaking.

(2) Identify and evaluate historic properties.

(3) Assess the effects to historic properties.

(4) Resolve any adverse effects.

State

The State of California implements the NHPA of 1966, as amended, through its statewide comprehensive cultural resource surveys and preservation programs. The California Office of Historic Preservation, as an office of the California Department of Parks and Recreation, implements the policies of the NHPA on a statewide level. The Office of Historic Preservation also maintains the California Historical Resources Inventory. The State Historic Preservation Officer is an appointed official who implements historic preservation programs within the state's jurisdiction.

California Environmental Quality Act

CEQA (Public Resources Code section 21000 et seq.) is the principal statute governing environmental review of projects occurring in California. CEQA requires lead agencies to determine whether a proposed project would have a significant impact on the environment, including a significant impact on historical or unique archaeological or paleontological resources. Under CEQA (section 21084.1), a project that may

cause a substantial adverse change in the significance of a historical resource is a project that may have a significant impact on the environment.

The State of California implements provisions in CEQA through its statewide comprehensive cultural resources surveys and preservation programs. Typically, a resource must be more than 50 years old to be considered as a potential historical resource. The California Office of Historic Preservation advises recording any resource 45 years or older, because there is commonly a 5-year lag between identification of a resource and the date that planning decisions are made.

Historical Resources

The CEQA Guidelines (California Code of Regulations title 14, section 15000 et seq.) recognize that *historical resources* include all of the following:

> *(a) A resource listed in or determined to be eligible by the State Historical Resources Commission for listing in the California Register of Historical Resources;*
>
> *(b) A resource included in a local register of historical resources, as defined in Public Resources Code section 5020.1(k) or identified as significant in a historical resource survey meeting the requirements of Public Resources Code section 5024.1(g); and*
>
> *(c) Any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California by the lead agency, provided the lead agency's determination is supported by substantial evidence in light of the whole record.*

If a lead agency determines that an archaeological site is a historical resource, the provisions of Public Resources Code section 21084.1 and California Code of Regulations title 14, section 15064.5 apply. If an archaeological site does not meet the criteria for a historical resource listed in the CEQA Guidelines, then the site may be treated in accordance with the provisions of Public Resources Code section 21083, pertaining to unique archaeological resources.

Unique Archaeological Resources

As defined in Public Resources Code section 21083.2, a *unique archaeological resource* is 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:

- Contains information needed to answer important scientific research questions and there is a demonstrable public interest in that information;
- Has a special and particular quality such as being the oldest of its type or the best available example of its type; or
- Is directly associated with a scientifically recognized important prehistoric or historic event or person.

The CEQA Guidelines note that if an archaeological resource is not a unique archaeological, historical, or tribal cultural resource, the impacts of the project on those cultural resources shall not be considered a significant impact on the environment (California Code of Regulations title 14, section 15064.5[c][4]).

California Register of Historical Resources

The California Register is "an authoritative listing and guide to be used by state and local agencies, private groups, and citizens in identifying the existing historical resources of the state and to indicate which resources deserve to be protected, to the extent prudent and feasible, from substantial adverse change" (Public Resources Code section 5024.1[a]). The criteria for eligibility for the California Register are based upon the criteria for listing in the National Register (Public Resources Code section 5024.1[b]). Certain resources are determined by the statute to be automatically included in the California Register, including California properties formally determined eligible for, or listed in, the National Register.

To be eligible for the California Register, a cultural resource must be significant at the local, state, and/or federal level under one or more of the following four criteria:

(1) Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;

(2) Is associated with the lives of persons important in our past;

(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 eligible for the California Register must be of sufficient age and retain enough of its historic character or appearance (integrity) to convey the reason for its significance. Additionally, the California Register consists of resources that are listed automatically and those that must be nominated through an application and public hearing process. The California Register automatically includes the following:

- California properties listed in the National Register (and those formally Determined Eligible for the National Register);
- California Registered Historical Landmarks from No. 770 onward; and
- Those California Points of Historical Interest that have been evaluated by the California Office of Historic Preservation and have been recommended to the State Historical Commission for inclusion in the California Register.

Other resources that may be nominated to the California Register include:

- Historical resources with a significance rating of Category 3, 4, or 5 (those properties identified as eligible for listing in the National Register, the California Register, and/or a local jurisdiction register);
- Individual historic resources;
- Historic resources contributing to historic districts;
- Historic resources designated or listed as local landmarks, or designated under any local ordinance, such as an historic preservation overlay zone; and
- Tribal cultural resources.

California Public Resources Code Section 5097

Public Resources Code section 5097.99 states that no person shall obtain or possess any Native American artifacts or human remains that are taken from a Native American grave or cairn. Any person who knowingly or willfully obtains or possesses any Native American artifacts or human remains is guilty of a felony punishable by imprisonment. Any person who removes, without authority of law, any such items with an intent to sell or dissect, or with malice or wantonness, is also guilty of a felony punishable by imprisonment.

California Native American Historic Resources Protection Act

The California Native American Historic Resources Protection Act of 2002 imposes civil penalties, including imprisonment and fines up to $50,000 per violation, for persons who unlawfully and maliciously excavate upon, remove, destroy, injure, or deface a Native American historic, cultural, or sacred site that is listed or may be listed in the California Register.

California Health and Safety Code Section 7050.5

Section 7050.5 of the California Health and Safety Code protects human remains by prohibiting the disinterment, disturbance, or removal of human remains from any location other than a dedicated cemetery. Public Resources Code section 5097.98 (reiterated in CEQA Guidelines section 15064.5[e]) also identifies steps to follow in the event of the accidental discovery or recognition of any human remains in any location other than a dedicated cemetery.

Local

General Plans

The Project would be subject to local plans and policies of the jurisdictions in which it is located, including East Palo Alto, Menlo Park, and Redwood City. **Table 3.5-2** presents local plans and policies regarding cultural resources to support consideration of Project consistency with general plan policies.

3.5.5 Impacts and Mitigation Measures

Significance Criteria

In accordance with CEQA, CEQA Guidelines (including Appendix G), relevant plans, policies, and/or guidelines, and agency standards, the Project could have a significant impact if it were to do any of the following:

- Cause a substantial adverse change in the significance of a historical resource pursuant to section 15064.5;
- Cause a substantial adverse change in the significance of an archaeological resource pursuant to section 15064.5; or
- Disturb any human remains, including those interred outside of dedicated cemeteries.

TABLE 3.5-2
LOCAL PLANS AND POLICIES RELEVANT TO THE PROJECT – CULTURAL RESOURCES

CITY OF EAST PALO ALTO VISTA 2035 GENERAL PLAN
Goal POC-9: Protect historic, natural, mineral, and cultural resources.
Policy 9.1: Archeology, paleontology and natural resources. Protect areas of important archaeological paleontological and natural resources.
Policy 9.2: Historic buildings and sites. Protect and conserve buildings or sites of historic or cultural significance to contribute to the character of the community.
CITY OF MENLO PARK GENERAL PLAN
GOAL LU-7: Promote the implementation and maintenance of sustainable development, facilities and services to meet the needs of Menlo Park's residents, businesses, workers, and visitors.
Policy LU-7.8: Cultural Resource Preservation. Promote preservation of buildings, objects, and sites with historic and/or cultural significance.
REDWOOD CITY GENERAL PLAN
Goal BE-37: Identify, study, and document historic resources.
Policy BE-37.1: Develop a detailed strategy for ongoing survey and identification of historic resources.
Policy BE-37.2: Develop citywide narrative context for historic resources.
Policy BE-37.3: Continue to maintain the Historic Resources Inventory in a digital format that can be easily updated and tracked.
SOURCES: City of East Palo Alto, 2017. *Vista 2035 General Plan*. Adopted October 4, 2016; Final Version March 2017. Available online at www.ci.east-palo-alto.ca.us/planning/page/vista-2035-general-plan; City of Menlo Park, 2016. *General Plan, City of Menlo Park*. Adopted November 29, 2016. Available online at www.menlopark.gov/files/sharedassets/public/v/1/community-development/documents/general-plan/land-use-and-circulation-element-adopted-20161129.pdf; City of Redwood City, 2023. *Redwood City General Plan*. Adopted October 11, 2010; Amended August 2023. Available online at www.redwoodcity.org/departments/community-development-department/planning-housing/planning-services/environmental-documents/general-plan-eir.

Methodology

Impacts on architectural resources are assessed by identifying any activities that could affect resources identified as historical resources for the purposes of CEQA. Properties identified as historical resources under CEQA include those that are significant because of their association with important events, people, or architectural styles or master architects, or for their informational value (California Register Criteria 1, 2, 3, and 4) and that retain sufficient historical integrity to convey their significance. Criterion 4 is typically applied to the evaluation of historic-era archaeological resources and not to architectural resources.

The significance of most pre-contact and historic-era archaeological sites, i.e., whether they are "historical resources," is usually assessed under California Register Criterion 4. This criterion stresses the importance of the information potentially contained within the site, rather than its significance as a surviving example of a type or its association with an important person or event. Archaeological resources may also be assessed under CEQA as *unique archaeological resources*, defined as archaeological artifacts, objects, or sites that contain information needed to answer important scientific research questions. Increasingly, archaeological resources are also assessed under the other criteria as well for their significance related to important events and individuals.

Once a resource has been identified as a CEQA historical resource (either architectural or archaeological), it then must be determined whether the project's impacts would "cause a substantial adverse change in the significance" of the resource (CEQA Guidelines section 15064.5[b]). A *substantial adverse change* in the significance of a historical resource means "physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of the historic resource would be

materially impaired" (CEQA Guidelines section 15064[b][1]). A historical resource is materially impaired through the demolition or alteration of the resource's physical characteristics that convey its historical significance and that justify its inclusion in the California Register (CEQA Guidelines section 15064.5[b][2][A]).

Human remains, including those buried outside of formal cemeteries, are protected under several state laws, including Public Resources Code section 5097.98 and Health and Safety Code section 7050.5. These laws are identified in Section 3.5.2, Regulatory Setting. This analysis considers impacts including intentional disturbance, mutilation, or removal of interred human remains.

This draft EIR evaluates proposed project activities at a level of detail consistent with the best available information and specificity available at the time of EIR preparation. To the extent that activities necessary for Project completion are known, they are described in Chapter 2, *Project Description*, and evaluated in the impact analysis below. Key information needed for the evaluation of cultural resources impacts includes areas of temporary and permanent ground disturbance as well as the depth of excavation and height of proposed structures—data that are used to characterize an area of potential effect. Those reaches for which conceptual (generally 10-percent) design information is available, depicted with dashed lines on Figure 2-1 in Chapter 2, *Project Description*, lack information for certain components (e.g., ramps, relocation of the pedestrian bridge at Bay Road). Appendix INFRA identifies those changes to infrastructure and other encroachments that are evaluated programmatically. Cultural resources impacts from these changes cannot be evaluated since there is little to no siting or design information available on which to base the evaluations. The need for additional supplemental CEQA documentation would be evaluated once these design details are developed as discussed in greater detail in Section 1.2.5, Program–Project EIR and Supplemental CEQA.

Impacts and Mitigation Measures

Table 3.5-3 summarizes the impact conclusions presented in this section.

TABLE 3.5-3
CULTURAL RESOURCES IMPACT CONCLUSIONS

Impact	Level of Significance
Impact CUL-1: Cause a substantial adverse change in the significance of a historical resource pursuant to § 15064.5.	NI
Impact CUL-2: Cause a substantial adverse change in the significance of an archaeological resource pursuant to § 15064.5.	LSM
Impact CUL-3: Disturb any human remains, including those interred outside of dedicated cemeteries.	LSM
Impact C-CUL-1: The Project, in combination with past, present, and probable future projects in the Project area, could result in significant adverse impacts related to cultural resources.	LSM

Notes: NI = No Impact, LSM = Less than Significant with Mitigation

Impact CUL-1: Cause a substantial adverse change in the significance of a historical resource pursuant to section 15064.5. ***(No Impact)***

The following discussion focuses on historical resources of the built environment, including architectural and structural resources. Archaeological resources, including archaeological resources that are potentially historical resources according to CEQA Guidelines section 15064.5, are addressed under Impact CUL-2.

Based on the results of the inventory and evaluation completed for the Project, no significant architectural/structural resources are in the Project area. Although three built environment resources (Ravenswood Salt Works [P-41-002351], Pond S5 Pump House [P-41-002404], and Bay Road Segment [P-41-002590]) have been documented in the Project area, as described in Section 3.5.3, these resources have been evaluated according to the criteria of the National Register and determined to be not eligible for listing. Based on the site constituents and National Register evaluations, these resources are also not eligible for listing in the California Register, are not listed on a local register of historical resources, and have not been determined by the lead agency to qualify as historical resources. Therefore, no further consideration of these resources is necessary for the Project and there would be **no impact** on historical resources.

Impact CUL-2: Cause a substantial adverse change in the significance of an archaeological resource pursuant to section 15064.5. ***(Less than Significant with Mitigation)***

The following discussion focuses on archaeological resources, including archaeological resources that are potentially historical resources pursuant to CEQA Guidelines section 15064.5 or unique archaeological resources according to Public Resources Code section 21083.2(g).

Based on the background research, survey efforts, and environmental context, no archaeological resources that could be considered historical resources or unique archaeological resources are in the Project area. One resource (SFPUC Bay Tunnel Discovery [P-41-002319]) has been documented in the Project vicinity, but has been recommended not eligible for listing in the California Register. No further consideration of this resource is necessary for the Project. No additional archaeological resources have been identified in the Project area that would be affected by the Project.

Based on a review of the geology, soils, and environmental context, there is some degree of sensitivity for buried pre-contact archaeological resources in the Project area and vicinity. Therefore, the discovery of buried pre-contact archaeological resources during Project implementation cannot be entirely discounted.

Impacts on previously undiscovered archaeological resources would be potentially significant. This impact would be reduced to a less-than-significant level by implementing **Mitigation Measure CUL-1**, which would require project-level cultural resources assessments for those areas not yet fully designed; **Mitigation Measure CUL-2**, which requires the development of a monitoring plan and archaeological and Native American monitoring during ground-disturbing activities according to the provisions outlined in the plan; and **Mitigation Measure CUL-3**, which requires that work halt in the vicinity of a find and proper procedures are followed to document, evaluate, and mitigate any potential impacts on the resource. Additionally, potential impacts on tribal cultural resources, including those also considered to be

archaeological resources, are discussed in Section 3.6, Tribal Cultural Resources. With implementation of these mitigation measures, potential impacts on archaeological resources would be **less than significant**.

Mitigation Measure CUL-1: Project-Level Cultural Resources Assessment.

When additional design details (including temporary and permanent areas of ground disturbance and depth of excavation) are available for shoreline protection features, habitat improvements, recreational features, and associated utilities improvements/relocations evaluated at a program-level of detail, the Project Proponent will retain a qualified archaeologist, defined as an archaeologist meeting the U.S. Secretary of the Interior's Professional Qualification Standards for Archaeology, to conduct a cultural resources investigation that includes, at a minimum:

- An updated records search at the Northwest Information Center;
- An intensive cultural resources survey of the proposed Area of Potential Effects;
- A report disseminating the results of this research; and
- Recommendations for additional cultural resources work necessary to mitigate any adverse impacts on recorded and/or undiscovered cultural resources.

Mitigation Measure CUL-2: Monitoring Plan. This measure applies to all reaches. Prior to authorization to proceed, the Project Proponent will retain a qualified archaeologist, defined as an archaeologist meeting the U.S. Secretary of the Interior's Professional Qualification Standards for Archeology. The archaeologist will prepare a cultural resources monitoring plan. The plan will be reviewed by consulting culturally affiliated Native American tribe(s) and the Project Proponent. The plan will include (but not be limited to) the following components:

- Training program for all construction and field workers involved in site disturbance; onsite personnel shall attend a mandatory pre-Project training led by a Secretary of the Interior qualified archaeologist and consulting Native American representative(s). The training will outline the general cultural sensitivity of the area and the procedures to follow in the event cultural materials and/or human remains are inadvertently discovered.
- Specifically, where monitoring will be completed and under what circumstances based on soil types, geology, distance to known sites, and other factors;
- Person(s) responsible for conducting monitoring activities, including a request to consulting culturally affiliated Native American tribe(s) for a tribal monitor;
- Person(s) responsible for overseeing and directing the monitors;
- How the monitoring shall be conducted and the required format and content of monitoring reports;
- Schedule for submittal of monitoring reports and person(s) responsible for review and approval of monitoring reports;
- Protocol for notifications in case of encountering cultural resources, as well as methods of dealing with the encountered resources (e.g., collection, identification, curation);
- Methods to ensure security of cultural resources sites;
- Protocol for notifying local authorities (i.e., Sheriff, Police) should site looting and other illegal activities occur during construction.

During monitoring, the archaeologist and consulting Native American tribe(s) may adjust the frequency—from continuous to intermittent—of the monitoring based on the conditions and professional judgment regarding the potential to affect resources. If cultural materials are encountered, all soil-disturbing activities within 100 feet in all directions of the find shall cease until the resource is evaluated. The archaeological monitor shall immediately notify the Project Proponent of the encountered resource. After making a reasonable effort to assess the identity, integrity, and significance of the encountered resource, in consultation with the consulting culturally affiliated Native American tribe(s), the archaeological monitor shall present the findings of this assessment and proceed according to the provisions of Mitigation Measure CUL-2 and, if applicable, Mitigation Measure CUL-3.

Mitigation Measure CUL-3: Inadvertent Discovery of Cultural Resources. This measure applies to all reaches. If pre-contact or historic-era archaeological resources are encountered during Project implementation, the Project Proponent will halt all construction activities within 100 feet of the resource, and a qualified archaeologist, defined as an archaeologist meeting the U.S. Secretary of the Interior's Professional Qualification Standards for Archaeology, shall inspect the find within 24 hours of discovery and notify the Project Proponent of their initial assessment. Pre-contact archaeological materials might include obsidian and chert flaked-stone tools (e.g., projectile points, knives, scrapers) or toolmaking debris; culturally darkened soil ("midden") containing heat-affected rocks, artifacts, or shellfish remains; stone milling equipment (e.g., mortars, pestles, handstones, or milling slabs); and battered stone tools, such as hammerstones and pitted stones. Historic-era materials might include building or structure footings and walls, and deposits of metal, glass, and/or ceramic refuse.

If the Project Proponent determines, based on recommendations from a qualified archaeologist and a Native American representative (if the resource is pre-contact), that the resource may qualify as a historical resource or unique archaeological resource (as defined in CEQA Guidelines section 15064.5) or a tribal cultural resource (as defined in Public Resources Code section 21080.3), the resource shall be avoided, if feasible. Consistent with section 15126.4(b)(3), this may be accomplished through planning construction to avoid the resource; incorporating the resource within open space; capping and covering the resource; or deeding the site into a permanent conservation easement.

If avoidance is not feasible, the Project Proponent shall consult with appropriate Native American tribes (if the resource is pre-contact), and other appropriate interested parties to determine treatment measures to avoid, minimize, or mitigate any potential impacts on the resource pursuant to Public Resources Code section 21083.2, and CEQA Guidelines section 15126.4. This shall include documentation of the resource and may include data recovery (according to Public Resources Code section 21083.2), if deemed appropriate, or other actions, such as treating the resource with culturally appropriate dignity and protecting the cultural character and integrity of the resource (according to Public Resources Code section 21084.3).

Impact CUL-3: Disturb any human remains, including those interred outside of dedicated cemeteries. ***(Less than Significant with Mitigation)***

Background research, surveys, previous disturbance, and the environmental context described in Section 3.5.1 indicate that no known areas containing human remains are in the Project area. Although unlikely, the discovery of human remains during Project implementation cannot be entirely discounted. Impacts on

previously undiscovered human remains would be potentially significant. **Mitigation Measure CUL-4**, which requires that work halt in the vicinity of a find and proper procedures are followed to appropriately treat any potential impacts, would reduce this impact to a less-than-significant level.

> **Mitigation Measure CUL-4: Inadvertent Discovery of Human Remains.**
>
> This measure applies to all reaches. In the event of discovery or recognition of any human remains during construction activities, the Project Proponent will cease all such activities within 100 feet of the find until the County Coroner has been contacted to determine that no investigation of the cause of death is required. The Native American Heritage Commission (NAHC) will be contacted within 24 hours if it is determined that the remains are Native American. The NAHC will then identify the person or persons it believes to be the most likely descendant from the deceased Native American, who in turn would make recommendations to the lead agency for the appropriate means of treating the human remains and any grave goods.

Cumulative Impacts

Impact C-CUL-1: The Project, in combination with past, present, and probable future projects in the Project area, could result in significant adverse impacts related to cultural resources. (*Less than Significant with Mitigation*)

The geographic scope for cumulative effects on cultural resources includes the immediate vicinity of locations where the Project could cause disturbance to historical resources, unique archaeological resources, and/or human remains. As the Project would not have an impact on historical resources of the built environment, no cumulative impact would occur. Similar to the Project, cumulative projects in the vicinity (listed in Table 3.1-2) could have a significant impact on previously undiscovered archaeological resources, including human remains interred outside of formal cemeteries, during ground-disturbing activities. The potential impacts of the Project when considered together with similar impacts from other probable future projects in the vicinity could result in a significant cumulative impact on buried archaeological resources or human remains. However, implementation of Mitigation Measures CUL-1, CUL-2, CUL-3, and CUL-4 would require an additional cultural resources assessment for program-level components, cultural resources monitoring in areas of sensitivity, halting work in the vicinity of a find until it is evaluated, and in the case of human remains, review by the County Coroner. Cumulative projects undergoing CEQA review would have similar types of monitoring requirements and inadvertent discovery measures. Therefore, with implementation of Mitigation Measures CUL-1, CUL-2, CUL-3, and CUL-4, the Project's contribution to cumulative impacts would not be considerable, and the impact would be **less than significant with mitigation**.

3.6 Tribal Cultural Resources

This section evaluates the potential impacts of the SAFER Bay Project (Project) on existing tribal cultural resources. For this assessment, *tribal cultural resources* are sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe that is included, or determined to be eligible for inclusion, in the national, state, or local register of historical resources and resources determined by the lead agency, in its discretion, to be significant on the basis of criteria for listing in the state register of historical resources (Public Resources Code section 21074). This section presents information about the environmental and regulatory setting and identifies the criteria used to evaluate the significance of potential impacts, the methods used in evaluating these impacts, and the results of the impact assessment. The Project evaluated is described in Chapter 2, *Project Description*, of this EIR.

3.6.1 Environmental Setting

Section 3.5.1 in Section 3.5, Cultural Resources, provides information on the natural and geological settings related to cultural resources, as well as background on the pre-contact period and ethnography of the Project vicinity. Section 3.5.1 also identifies existing recorded cultural resources. Based on background research, survey efforts, and environmental context, no archaeological resources that could be considered historical resources or unique archaeological resources are in the Project area. Based on a review of geology, soils, and environmental context, there is some degree of sensitivity for buried pre-contact archaeological resources in the Project area and vicinity.

Tribal Consultation

To comply with the consultation requirements of Public Resources Code section 21080.3.1(b), SFCJPA contacted each tribe on the Native American Heritage Commission (NAHC) list for the SAFER Bay alignment area in San Mateo County via email on June 17, 2022, and via U.S. Postal Service priority mail on June 24, 2022. The tribes contacted based on the May 5, 2022, list from the NAHC included the Amah Mutsun Tribal Band of Mission San Juan Bautista, the Costanoan Rumsen Carmel Tribe, the Indian Canyon Mutsun Band of Costanoan (two contacts), the Muwekma Ohlone Indian Tribe of the San Francisco Bay Area (two contacts), Tamien Nation, the Wuksache Indian Tribe/Eshom Valley Band, and The Ohlone Indian Tribe.

The May 5, 2022, NAHC letter also stated that the results of any Sacred Lands File check was positive. The letters sent by SFCJPA requested information from the listed tribe about Sacred Lands, as recommended by the NAHC. SFCJPA provided contact information for additional communication regarding the Project. No responses were received.

SFCJPA also discussed the Project with the Association of Ramaytush Ohlone, who are not listed on the NAHC contact list. The Association of Ramaytush Ohlone has indicated that they will review and comment on the Draft EIR as part of the public review process.

SFCJPA is consulting with the Association of Ramaytush Oholone, and their members have attended the SAFER Bay advisory group meetings.

3.6.2 Regulatory Framework

Unless otherwise noted, the Project would be consistent with applicable plans and regulations outlined in this section.

Federal

There are no federal laws or regulations specifically related to tribal cultural resources. Section 106 of the National Historic Preservation Act considers historic properties, which also includes traditional cultural properties. Refer to Section 3.5.3 in Section 3.5, Cultural Resources, for a summary of section 106 of the National Historic Preservation Act.

State

Public Resources Code Section 21074

In September 2014, the California Legislature enacted Assembly Bill (AB) 52, which added provisions to the Public Resources Code regarding the evaluation of impacts on tribal cultural resources under CEQA and consultation requirements with California Native American tribes. In particular, AB 52 now requires lead agencies to analyze project impacts on tribal cultural resources separately from impacts on archaeological resources (Public Resources Code sections 21074 and 21083.09). The law defines tribal cultural resources in a new section, Public Resources Code section 21074. AB 52 also requires lead agencies to engage in additional consultation procedures with respect to California Native American tribes (Public Resources Code sections 21080.3.1–21082.3). To comply with the consulation procedures, the lead agency must send notification of projects to Native American tribes who have requested consultation on projects within that agency's jurisdiction. The tribes have 30 days to request consulation.

Specifically, Public Resources Code section 21084.3 states:

> *(a) Public agencies shall, when feasible, avoid damaging effects to any tribal cultural resource.*
>
> *(b) If the lead agency determines that a project may cause a substantial adverse change to a tribal cultural resource, and measures are not otherwise identified in the consultation process provided in Section 21080.3.2, the following are examples of mitigation measures that, if feasible, may be considered to avoid or minimize the significant adverse impacts:*
>
> *(1) Avoidance and preservation of the resources in place, including, but not limited to, planning and construction to avoid the resources and protect the cultural and natural context, or planning greenspace, parks, or other open space, to incorporate the resources with culturally appropriate protection and management criteria.*
>
> *(2) Treating the resource with culturally appropriate dignity, taking into account the tribal cultural values and meaning of the resource, including, but not limited to, the following:*
>
> *A. Protecting the cultural character and integrity of the resource.*
>
> *B. Protecting the traditional use of the resource.*
>
> *C. Protecting the confidentiality of the resource.*

(3) Permanent conservation easements or other interests in real property, with culturally appropriate management criteria for the purposes of preserving or utilizing the resources or places.

(4) Protecting the resource.

Additionally, the Governor's Office of Land Use and Climate Innovation updated Appendix G of the CEQA Guidelines to provide sample questions regarding impacts on tribal cultural resources (Public Resources Code section 21083.09).

Local

There are no local regulations specifically related to tribal cultural resources.

3.6.3 Impacts and Mitigation Measures

Significance Criteria

In accordance with CEQA, CEQA Guidelines (including Appendix G), relevant policies, and/or guidelines, and agency standards, the Project could have a significant impact if it were to do any of the following:

- Cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, or cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:
  - Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or;
  - A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.

Methodology

Impacts on tribal cultural resources are assessed in consultation with the affiliated Native American tribes in accordance with Public Resources Code section 21080.3. This analysis considers whether the Project would cause damaging effects to any tribal cultural resource, including archaeological resources and human remains.

Regarding project-level versus program-level evaluations, please refer to the discussion under *Methodology* in Section 3.5, Cultural Resources.

Impacts and Mitigation Measures

Table 3.6-1 summarizes the impact conclusions presented in this section.

TABLE 3.6-1
TRIBAL CULTURAL RESOURCES IMPACT CONCLUSIONS

Impact	Level of Significance
Impact TCR-1: Cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code § 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe.	LSM
Impact C-TCR-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse impacts related to tribal cultural resources.	LSM

NOTES: LSM = Less than Significant with Mitigation

Impact TCR-1: Cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, or cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe that is:

a. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or

b. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe. ***(Less than Significant with Mitigation)***

As indicated in Section 3.6.1, SFCJPA sent letters to the culturally affiliated Native American tribes and individuals that may have interest in the Project. No tribal cultural resources listed or eligible for listing in the California Register of Historical Resources or in a local register of historical resources were identified in the vicinity of Project components. Additionally, SFCJPA, in its discretion and supported by substantial evidence, did not identify any tribal cultural resources in the Project area.

Based on the Northwest Information Center background research surveys described in Section 3.5, *Cultural Resources*, no known sacred, ceremonial, or gathering places are in the Project area. However, the potential exists for archaeological resources or human remains to be uncovered during ground-disturbing activities, and an impact on tribal cultural resources would be significant. **Mitigation Measures CUL-1, CUL-2, CUL-3,** and **CUL-4** described in Section 3.5, Cultural Resources, would apply to archaeological resources and human remains that are considered tribal cultural resources, and would be implemented to reduce potentially significant impacts to **less-than-significant** levels.

> **Mitigation Measure CUL-1: Project-Level Cultural Resources Assessment.** (Refer to Section 3.5, Cultural Resources, Impact CUL-1.)
>
> **Mitigation Measure CUL-2: Monitoring Plan.** (Refer to Section 3.5, Cultural Resources, Impact CUL-1.)

Mitigation Measure CUL-3: Inadvertent Discovery of Cultural Resources. (Refer to Section 3.5, Cultural Resources, Impact CUL-1.)

Mitigation Measure CUL-4: Inadvertent Discovery of Human Remains. (Refer to Section 3.5, Cultural Resources, Impact CUL-2.)

Cumulative Impacts

Impact C-TCR-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse impacts related to tribal cultural resources. (*Less than Significant with Mitigation*)

The geographic scope for cumulative effects on tribal cultural resources includes the immediate vicinity of locations where the Project could cause disturbance to tribal cultural resources, including archaeological resources and/or human remains, as well as any other identified tribal cultural resources. Similar to the Project, cumulative projects in the vicinity (listed in Table 3.1-2) could have a significant impact on previously undiscovered tribal cultural resources during ground-disturbing activities. The potential impacts of the Project when considered together with similar impacts from other probable future projects in the vicinity could result in a significant cumulative impact on tribal cultural resources. However, implementation of Mitigation Measures CUL-1, CUL-2, CUL-3, and CUL-4 would require an additional cultural resources assessment for program-level components, cultural resources monitoring in areas of sensitivity, halting work in the vicinity of a find until it is evaluated, and in the case of human remains, review by the County Coroner. Cumulative projects undergoing CEQA review would have similar types of monitoring requirements and inadvertent discovery measures. Therefore, with implementation of Mitigation Measures CUL-1, CUL-2, CUL-3, and CUL-4, the Project's contribution to cumulative impacts would not be considerable, and the impact would be **less than significant with mitigation**.

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3.7 Energy

This section describes existing energy use in the SAFER Bay Project (Project) area and evaluates the potential for the Project to result in significant impacts on energy use and conservation. This section presents information about the environmental and regulatory setting and identifies the criteria used to evaluate the significance of potential impacts, the methods used in evaluating these impacts, and the results of the impact assessment. The Project evaluated is described in Chapter 2, *Project Description*, of this EIR.

3.7.1 Environmental Setting

State Energy Profile

In 2022 (the most recent year for which these specific data are available), total energy usage in California was 6,882 trillion British thermal units (Btu), which equates to an average of 189 million Btu per capita per year. These figures place California second among the 50 states in total energy use and 46th in per-capita consumption. Of California's total energy usage, the 2022 breakdown by sector is roughly 42.6 percent transportation, 22.5 percent industrial, 17.4 percent commercial, and 17.6 percent residential. In California, electricity and natural gas are generally consumed by stationary users such as residences and commercial and industrial facilities, while petroleum-based fuel consumption is generally accounted for by transportation-related energy use.[1]

California relies on a regional power system composed of a diverse mix of natural gas, renewable, hydroelectric, coal, and nuclear gas generation resources. Approximately 77 percent of the electrical power needed to meet California's demand is produced in the state; the balance, approximately 23 percent, is imported from the Pacific Northwest and the Southwest. In 2023, California's in-state electricity use was derived from natural gas (44 percent); renewable resources that include geothermal, biomass, small hydroelectric resources, wind, and solar (35 percent); large hydroelectric resources and nuclear sources (21 percent each); and coal (less than 1 percent).[2]

Electricity

Electricity, as a consumptive utility, is a non-natural resource. The production of electricity requires the consumption or conversion of resources—water, wind, oil, gas, coal, solar, geothermal, and nuclear—into usable energy. The delivery of electricity involves several system components for distribution and use. Electricity is distributed through a network of transmission and distribution lines commonly called a power grid.

Energy capacity, or electrical power, is generally measured in watts, while energy use is measured in watt-hours. For example, if a light bulb has a capacity rating of 100 watts, the energy required to keep the bulb on for one hour is 100 watt-hours. If ten 100-watt bulbs were on for one hour, the energy required would be 1,000 watt-hours or 1 kilowatt-hour. On a utility scale, the capacity of a generator is typically

[1] EIA (U.S. Energy Information Administration), 2024. "California Energy Consumption by End Use Sector 2024." Available online at www.eia.gov/state/?sid=CA#tabs-2. Accessed December 24, 2024.

[2] CEC (California Energy Commission), 2023. "2023 Total System Electric Generation." Available online at www.energy.ca.gov/data-reports/energy-almanac/california-electricity-data/2023-total-system-electric-generation. Accessed December 9, 2024.

rated in megawatts, which is 1 million watts, while energy usage over time is measured in megawatt-hours (equal to 1 million watt-hours) or gigawatt-hours (equal to 1 billion watt-hours).

Pacific Gas and Electric Company (PG&E) provides electrical and natural gas services to approximately 16 million people throughout its 70,000-square-mile service area in Northern and Central California.[3] PG&E produces and purchases energy from a mix of conventional and renewable generation sources. Approximately 38 percent of PG&E's 2022 electricity purchases were from renewable sources.[4] **Table 3.7-1** summarizes electricity use in the state, the PG&E service area, and San Mateo County.

TABLE 3.7-1
EXISTING ANNUAL STATE AND REGIONAL ENERGY USE

Source	Area	Consumption
Electricity	Statewide	287,826 GWh
	PG&E service area	104,695 GWh
	San Mateo County	4,177 GWh
Natural Gas	Statewide	1,170,829,907 MMBtu
	PG&E service area	444,811,020 MMBtu
	San Mateo County	20,417,723 MMBtu
Gasoline	Statewide service area	13,576 million gallons
	San Mateo County	271 million gallons
Diesel	Statewide	2,316 million gallons
	San Mateo County	14 million gallons

NOTES: GWh = gigawatt-hours; MMBtu = million British thermal units; PG&E = Pacific Gas and Electric Company.

SOURCES: California Energy Commission, 2024a. 2023 California Annual Retail Fuel Outlet Report Results (CEC-A15). September 9, 2024. Available online at www.energy.ca.gov/media/3874. Accessed December 4, 2024; California Energy Commission, 2024b. California Energy Consumption Database. Available online at ecdms.energy.ca.gov/. Accessed December 4, 2024.

Natural Gas

Natural gas is a combustible mixture of simple hydrocarbon compounds (primarily methane) that is used as a fuel source. Natural gas consumed in California is obtained from naturally occurring gas deposits, which are drilled or fracked, processed, odorized, and delivered through high-pressure transmission pipelines. As indicated previously, natural gas provides almost half of California's total electricity requirements and is measured in terms of both cubic feet and Btu.

PG&E provides natural gas transportation services to "core" customers and to "non-core" customers (industrial, large commercial, and natural gas–fired electric generation facilities) that are connected to its gas system in its service territory. Core customers can purchase natural gas procurement service (natural gas supply) from either PG&E or non-utility third-party gas procurement service providers (referred to as *core transport agents*). When core customers purchase gas supply from a core transport agent, PG&E still

[3] PG&E (Pacific Gas and Electric Company), 2024. "Company Profile." Available online at www.pge.com/en/about/company-information/company-profile.html. Accessed December 9, 2024.

[4] PG&E (Pacific Gas and Electric Company), 2022. *PG&E 2022 Power Content Label*. Available online at www.pge.com/assets/pge/docs/account/billing-and-assistance/bill-inserts/1023-Power-Content-Label.pdf. Accessed December 9, 2024.

provides gas delivery, metering, and billing services to those customers. When PG&E provides both transportation and procurement services, PG&E refers to the combined service as "bundled" natural gas service.

PG&E does not provide procurement service to non-core customers, who must purchase their gas supplies from third-party suppliers. PG&E offers backbone gas transmission, gas delivery (local transmission and distribution), and gas storage services as separate and distinct services to its non-core customers. Access to PG&E's backbone gas transmission system is available for all natural gas marketers and shippers, as well as non-core customers. PG&E also delivers gas to off-system customers (i.e., outside of PG&E's service territory) and to third-party natural gas storage customers. Natural gas usage levels in 2022 for the state and the PG&E service area (as well as Santa Mateo County, more specifically) are also shown in Table 3.7-1.

Transportation Energy

In 2023, 13.6 billion gallons of gasoline and 3.0 billion gallons of diesel fuel were consumed in California.[5,6] Petroleum-based fuels currently account for more than 85 percent of the fuel used for ground transportation in California.[7]

Over the last decade, California has implemented several policies, rules, and regulations to improve vehicle efficiency, increase the development and use of alternative fuels, reduce emissions of air pollutants and greenhouse gases (GHGs) from the transportation sector, and reduce vehicle miles traveled. Accordingly, total gasoline consumption in California has declined. According to fuel sales data from the California Energy Commission (CEC), San Mateo County consumed approximately 271 million gallons of gasoline and 14 million gallons of diesel fuel in 2023.[8] Refer to Table 3.7-1 for a summary of statewide gasoline and diesel consumption in 2023.

Local Energy Profile

In San Mateo County, electricity is provided by both PG&E and Peninsula Clean Energy (under the Community Choice Aggregation program). Under the Community Choice Aggregation program, cities and counties local governments may procure electricity for their communities, providing a cleaner, local alternative to investor-owned utilities. PG&E partners with each community choice aggregator in its service area to deliver the electricity through its transmission and distribution system. PG&E also provides meter-reading, billing, maintenance, and outage response services for the community choice aggregators. Natural gas and electricity services are provided to the Project area by PG&E.

5 CDTFA (California Department of Tax and Fee Administration), 2024a. *MVF 10 Year Report*. Available online at www.cdtfa.ca.gov/taxes-and-fees/spftrpts.htm. Accessed on December 9, 2024.

6 CDTFA (California Department of Tax and Fee Administration), 2024b. *Diesel Gallons 10 Year Report*. Available online at www.cdtfa.ca.gov/taxes-and-fees/spftrpts.htm. Accessed on December 9, 2024.

7 EIA (U.S. Energy Information Administration), 2024. "California State Profile and Energy Estimates." Updated May 16, 2024. Available online at www.eia.gov/state/data.cfm?sid=CA#ConsumptionExpenditures. Accessed December 9, 2024.

8 CEC (California Energy Commission), 2024c. *2023 California Annual Retail Fuel Outlet Report Results (CEC-A15)*. September 9, 2024. Available online at www.energy.ca.gov/media/3874. Accessed December 9, 2024.

3.7.2 Regulatory Framework

Unless otherwise noted below, the Project would be consistent with applicable plans and regulations.

Federal

Energy Policy Act of 1992

The Energy Policy Act of 1992 was enacted to reduce U.S. dependence on foreign petroleum and improve air quality. This law includes several provisions intended to build an inventory of alternative-fuel vehicles in large, centrally fueled fleets in metropolitan areas. The Energy Policy Act of 1992 requires that certain federal, state, and local government agencies and private entities purchase for their vehicle fleets a percentage of light-duty alternative-fuel vehicles capable of running on alternative fuels each year. States are required to consider a variety of incentive programs to help promote alternative-fuel vehicles.

Energy Policy Act of 2005

The Energy Policy Act of 2005 provides for renewed and expanded tax credits for electricity generated by qualified energy sources, such as landfill gas; provides bond financing, tax incentives, grants, and loan guarantees for clean renewable energy and rural community electrification; and establishes a federal purchase requirement for renewable energy.

Executive Order 13423 (Strengthening Federal Environmental, Energy, and Transportation Management), signed in 2007, strengthens the federal government's key energy management goals and sets more challenging goals than the Energy Policy Act of 2005. The energy reduction and environmental performance requirements of Executive Order 13423 were expanded upon in Executive Order 13514 (Federal Leadership in Environmental, Energy, and Economic Performance), signed in 2009.

In 2011, the U.S. Department of Energy (DOE) initiated efforts to develop energy conservation standards for pumps. As a result, Part C of Title III of the Energy Policy and Conservation Act establishes the "Energy Conservation Program for Certain Industrial Equipment," which now includes pumps. The effective date of this rule was March 28, 2016.

Influence of Federal Agencies on Transportation Energy

At the federal level, the U.S. Department of Transportation, DOE, and U.S. Environmental Protection Agency (EPA) have substantial influence over energy policies related to fuel consumption in transportation. Generally, federal agencies influence transportation energy consumption by establishing and enforcing fuel economy standards for automobiles and light trucks, and by funding projects for energy-related research and development for transportation infrastructure.

In 1975, Congress enacted the Energy Policy and Conservation Act, which established the first fuel economy standards for on-road motor vehicles in the United States. Pursuant to this law, EPA and the National Highway Traffic Safety Administration are responsible for establishing additional vehicle standards. In August 2012, standards were adopted for model years 2017 through 2025 for passenger cars and light-duty trucks. According to EPA, a model year 2025 vehicle would emit half the GHG emissions

of a model year 2010 vehicle.[9] Notably, the State of California harmonized its vehicle efficiency standards through 2025 with the federal standards at this time (refer to *Advanced Clean Cars Program* in the discussion of state regulations).

In August 2018, EPA and the National Highway Traffic Safety Administration proposed maintaining the 2020 corporate average fuel economy and carbon dioxide ($CO_{2)}$ standards for model years 2021 through 2026. The estimated corporate average fuel economy and CO_2 standards for model year 2020 vehicles are 43.7 miles per gallon (mpg) and 204 grams of CO_2 per mile for passenger cars and 31.3 mpg and 284 grams of CO_2 per mile for light trucks, projecting an overall industry average of 37 mpg, as compared to 46.7 mpg under the standards issued in 2012. In September 2019, EPA finalized the Safer Affordable Fuel-Efficient Vehicles Rule Part One: One National Program and announced its decision to withdraw the Clean Air Act preemption waiver granted to the State of California in 2013.[10] However, on March 9, 2022, EPA reinstated California's authority under the Clean Air Act to implement its own GHG emissions standards and mandate for zero-emission vehicle (ZEV) sales.[11] On March 20, 2024, EPA finalized the 2027 multi-pollutant emission standards for light-duty and medium-duty vehicles for model years 2027 through 2032. The final rule builds upon EPA's final standards for federal GHG emissions standards for passenger cars and light trucks for model years 2023 through 2026 and leverages advances in clean car technology.[12] As of 2025, EPA is set to reconsider the 2027 multi-pollutant standards with intentions to roll back the regulation.[13]

State

Warren-Alquist Act

In 1974, the California legislature enacted the Warren-Alquist Act, which led to the creation of the CEC. This law also incorporated the following three key provisions designed to address energy demand:

- The CEC was directed to formulate and adopt the nation's first energy conservation standards for buildings constructed and appliances sold in California.
- The law removed the responsibility for electricity demand forecasting from the utilities, which had a financial interest in high-demand projections, and transferred it to a more impartial CEC.

The CEC was directed to embark on an ambitious research and development program, with a particular focus on fostering what were characterized as non-conventional energy sources.

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9 EPA (U.S. Environmental Protection Agency), 2012. *EPA and NHTSA Set Standards to Reduce Greenhouse Gases and Improve Fuel Economy for Model Years 2017 through 2025 Cars and Light Trucks*. August 2012. Available online at nepis.epa.gov/Exe/ZyPDF.cgi/P100EZ7C.PDF?Dockey=P100EZ7C.PDF.

10 EPA and NHTSA (U.S. Environmental Protection Agency and National Highway Traffic Safety Administration), 2019. *One National Program Rule on Federal Preemption of State Fuel Economy Standards*. September 19, 2019. Available online at nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100XI4W.pdf. Accessed December 9, 2024.

11 EPA (U.S. Environmental Protection Agency), 2022. "EPA Restores California's Authority to Enforce Greenhouse Gas Emission Standards for Cars and Light Trucks." March 9, 2022. Available online at www.epa.gov/newsreleases/epa-restores-californias-authority-enforce-greenhouse-gas-emission-standards-cars-and. Accessed December 9, 2024.

12 EPA (U.S. Environmental Protection Agency), 2024. *Final Rule: Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles*. April 18, 2025. Available online at www.govinfo.gov/content/pkg/FR-2024-04-18/pdf/2024-06214.pdf.

13 EPA (U.S. Environmental Protection Agency), 2025. "EPA Announces Action to Implement POTUS's Termination of Biden-Harris Electric Vehicle Mandate." March 12, 2025. Available online at www.epa.gov/newsreleases/epa-announces-action-implement-potuss-termination-biden-harris-electric-vehicle.

California Public Utilities Commission

The California Public Utilities Commission (CPUC) is a state agency created by a constitutional amendment that regulates privately owned utilities providing telecommunications, electric, natural gas, water, railroad, rail transit, and passenger transportation services, and in-state moving companies. CPUC is responsible for assuring that California utility customers have safe, reliable utility services at reasonable rates, while protecting customers from fraud. CPUC regulates the planning for and approval of the physical construction of electric generation, transmission, and distribution facilities, and local distribution pipelines for natural gas.

California Energy Commission

The CEC is the primary energy policy and planning agency in California. Created by the California legislature in 1974, the CEC has five major responsibilities:

(1) Forecast future energy needs and keep historical energy data;

(2) License thermal power plants 50 megawatts or larger;

(3) Promote energy efficiency through appliance and building standards;

(4) Develop energy technologies and support renewable energy; and

(5) Plan for and direct the state response to energy emergencies.

State of California Energy Action Plan

The CEC and CPUC approved the first State of California Energy Action Plan in 2003. The plan established shared goals and specific actions to ensure that adequate, reliable, and reasonably priced electrical power and natural gas supplies are provided. It also identified policies, strategies, and actions that are cost-effective and environmentally sound for California's consumers and taxpayers.

In 2005, the CEC and CPUC adopted a second Energy Action Plan to reflect various policy changes and actions from the prior two years. At the beginning of 2008, the agencies determined that it would not be necessary or productive to prepare a new Energy Action Plan. This determination was based in part on a finding that the state's energy policies have been significantly influenced by the passage of Assembly Bill (AB) 32, the California Global Warming Solutions Act of 2006 (discussed later in this section). Rather than produce a new Energy Action Plan, the CEC and CPUC prepared an update that examines the state's ongoing actions in the context of global climate change. The Energy Action Plan Update was released in February 2008.

Senate Bill 1389

Senate Bill (SB) 1389 (Public Resources Code sections 25300–25323) requires the CEC to prepare a biennial integrated energy policy report that assesses major energy trends and issues facing the electricity, natural gas, and transportation fuel sectors in California, and to provide policy recommendations to conserve resources; protect the environment; ensure reliable, secure, and diverse energy supplies; enhance the state economy; and protect public health and safety (Public Resources Code section 25301[a]).

The 2019 Integrated Energy Policy Report provides the results of CEC assessments on a variety of energy issues facing California including the following:

- Energy efficiency;
- Strategies related to data for improved decisions in the Existing Buildings Energy Efficiency Action Plan;
- Building energy efficiency standards;
- The impact of drought on California's energy system;
- Achieving 50 percent renewables by 2030;
- The California energy demand forecast;
- The natural gas outlook;
- The transportation energy demand forecast;
- Updates to Alternative and Renewable Fuel and Vehicle Technology Program benefits;
- An update on electricity infrastructure in Southern California;
- An update on trends in California sources of crude oil;
- An update on California nuclear plants; and
- Other energy issues.

Senate Bills 1078, 350, and 100

The State of California adopted standards to increase the percentage of electricity that retail sellers, including investor-owned utilities and community choice aggregators, must provide from renewable resources. The standards are referred to as the Renewables Portfolio Standard (RPS). California's RPS program was established in 2002 by SB 1078, with the initial requirement that 20 percent of electricity retail sales be served by renewable resources by 2017. The program was accelerated in 2015 with SB 350, which mandated a 50 percent RPS by 2030. SB 350 includes interim annual RPS targets with three-year compliance periods and requires that 65 percent of RPS procurement be derived from long-term contracts of 10 or more years.

On September 10, 2018, Governor Brown signed SB 100, which further increased the California RPS. SB 100 requires retail sellers and local publicly owned electric utilities to procure eligible renewable electricity for 44 percent of retail sales by December 31, 2024; 52 percent by December 31, 2027; and 60 percent by December 31, 2030. SB 100 also specifies that the California Air Resources Board (CARB) should plan for 100 percent eligible renewable energy resources and zero-carbon resources by December 31, 2045.

CPUC and the CEC jointly implement the RPS program. CPUC's responsibilities are to (1) determine annual procurement targets and enforce compliance; (2) review and approve each investor-owned utility's

renewable energy procurement plan; (3) review contracts for RPS-eligible energy; and (4) establish the standard terms and conditions used in contracts for eligible renewable energy.[14]

Assembly Bill 1493

In 2002, the California legislature adopted and the Governor signed Assembly Bill (AB) 1493, authored by Assemblymember Pavley. The bill recognized that global warming as a public health concern, that motor vehicles are a major source of the state's GHG emissions, and that reducing these emissions will protect public health and the environment while stimulating the economy and enhancing job opportunities. Among other things, the bill directed the CARB to adopt regulations that achieve the maximum feasible and cost-effective reduction of GHG emissions from passenger vehicles, beginning with the 2009 model year. (California Health and Safety Code section 43018.5.) These regulations, also known as the Pavley regulations were adopted in their final form in August 2005. In December 2005, CARB submitted a request to EPA for a waiver of preemption under the federal Clean Air Act to allow California to enforce its GHG emission standards which was challenged by motor vehicle manufacturers, automobile dealers, and their trade associations and denied by the EPA.

In May 2009, several automakers, California, and the federal government committed to a series of actions to resolve those current and potential future disputes over the standards through model year 2016. This agreement formed the genesis of a National Program to reduce GHG and improve fuel economy from passenger vehicles to achieve equivalent or greater GHG benefits as the Pavley regulations for the 2012 through 2016 model years. On July 8, 2009, EPA granted California a waiver for the Pavley regulations. (74 Fed. Reg. 32,744, July 8, 2009.) After adopting these initial GHG standards for passenger vehicles, CARB adopted continuing standards for future model years.

Assembly Bill 117 and Senate Bill 790

In 2002, the State of California enacted AB 117, enabling public agencies and joint powers authorities to form Community Choice Aggregation programs. SB 790 strengthened the provisions of AB 117 by creating a "code of conduct" to which the incumbent utilities must adhere in their activities relative to these programs. A Community Choice Aggregation program allows a city, county, or group of cities and counties to pool electricity demand and purchase or generate power on behalf of customers within their jurisdictions to provide local choice. Community choice aggregators work with PG&E to deliver power to its service area. The community choice aggregator is responsible for electricity generation (procuring or developing power) while PG&E is responsible for the delivery of electricity, power line maintenance, and monthly billing.

Airborne Toxic Control Measure to Limit Diesel-Fueled Commercial Motor Vehicle Idling

In 2004, CARB adopted the Airborne Toxic Control Measure to Limit Diesel-Fueled Commercial Motor Vehicle Idling to reduce public exposure to emissions of diesel particulate matter (California Code of Regulations title 13, section 2485 [13 California Code of Regulations section 2485]). The measure applies to diesel-fueled commercial vehicles with gross vehicle weight ratings greater than 10,000 pounds that are

[14] CPUC (California Public Utilities Commission), 2022. "RPS Program Overview." Available online at www.cpuc.ca.gov/RPS_Overview/#:~:text=The%20CPUC's%20responsibilities%20include%3A,contracts%20for%20RPS%2Deligible%20energy. Accessed December 9, 2024.

licensed to operate on highways, regardless of where they are registered. This measure prohibits diesel-fueled commercial vehicles from idling for more than five minutes at any given location. The primary goal of this regulation is to reduce public health impacts from diesel emissions, but compliance with the measure also results in energy savings in the form of reduced fuel consumption from unnecessary idling.

Airborne Toxic Control Measure for Stationary Compression Ignition Engines

In 2004, CARB adopted an airborne toxic control measure to reduce public exposure to emissions of diesel particulate matter and criteria pollutants from stationary diesel-fueled compression ignition engines (17 California Code of Regulations section 93115). The measure applies to anyone who owns or operates a stationary compression ignition engine in California with a rated brake horsepower (hp) greater than 50 hp, or who either sells, offers for sale, leases, or purchases a stationary compression ignition engine. This measure outlines fuel and fuel additive requirements; emissions standards; recordkeeping, reporting, and monitoring requirements; and compliance schedules for compression ignition engines.

Truck, Bus, and Construction Equipment Regulation

In addition to limiting exhaust from idling trucks, in 2008 CARB approved the Truck and Bus Regulation to reduce emissions of nitrogen oxides and particulate matter from existing diesel vehicles operating in California (13 California Code of Regulations section 2025). The phased regulation aims to reduce emissions by requiring the installation of diesel soot filters and encouraging the retirement, replacement, or retrofitting of older engines with newer emission-controlled models. This regulation has been implemented in phases; full implementation was projected for 2023.

CARB also promulgated emissions standards for off-road diesel construction equipment of greater than 25 hp such as bulldozers, loaders, backhoes, and forklifts, as well as many other self-propelled off-road diesel vehicles. The In-Use Off-Road Diesel-Fueled Fleets regulation, adopted by CARB on July 26, 2007, aims to reduce emissions by restricting the addition of older engines to fleets, and by requiring fleets to reduce their emissions by retiring, replacing, or repowering older engines, or installing Verified Diesel Emission Control Strategies such as diesel soot filters and other exhaust retrofits (13 California Code of Regulations section 2449). The compliance schedule requires full implementation by 2023 in all equipment for large and medium fleets and by 2028 for small fleets.

Advanced Clean Trucks Regulation

On June 25, 2020, CARB adopted the Advanced Clean Trucks rule, which requires truck manufacturers to transition from diesel vehicles to electric ZEVs beginning in 2024, with the goal of reaching 100 percent ZEVs by 2045. The goal of the legislation is to help California meet its climate targets of a 40 percent reduction in GHG emissions and 50 percent reduction in petroleum use by 2030, and an 80 percent reduction in GHG emissions by 2050.

Truck manufacturers will be required to sell ZEVs as an increasing percentage of their annual sales from 2024 through 2035. Companies with large distribution fleets (50 or more trucks) will be required to report

information about their existing fleet operations in an effort to identify future strategies for increasing zero-emission fleets statewide.[15]

According to CARB, ZEVs are two to five times more energy efficient than diesel vehicles.[16] The Advanced Clean Trucks rule will reduce GHG emissions with the co-benefit of reducing dependence on petroleum fuels.

Advanced Clean Fleets Regulation

In April 2023, CARB approved the Advanced Clean Fleets (ACF) regulation. The ACF regulation is part of California's strategy to accelerate the adoption of medium- and heavy-duty ZEV. It complements the Advanced Clean Trucks regulation and aims to achieve public health, air quality, and climate goals. The ACF regulation applies to fleets performing drayage operations, those owned by state, local, and federal government agencies, and high priority fleets. The ACF regulation includes components such as a manufacturer sales mandate, drayage fleet registrations, requirements for drayage fleets to transition to ZEVs, and mandates for high priority and government fleets to purchase increasing percentages of ZEVs over time. The regulation provides flexibility and exemptions for cases where zero-emission trucks are not yet available. The ACF regulation is expected to significantly increase the number of ZEVs on California roads, leading to emissions reductions and health benefits. The Advanced Clean Trucks and ACF regulations together are expected to result in about 510,000, 1,350,000, and 1,690,000 ZEVs in California in 2035, 2045, and 2050, respectively.[17] In January 2025, CARB withdrew its request for a waiver from the EPA regarding ACF. Without the EPA waiver, ACF only applies to state and local government fleets.

Advanced Clean Car Program

The Advanced Clean Cars emissions-control program, approved by CARB in 2012, is closely associated with the Pavley regulations.[18] The program requires the production of a greater number of ZEV models for years 2015 through 2025, to control smog, soot, and GHG emissions. This program includes the Low-Emissions Vehicle regulations, intended to reduce emissions of criteria air pollutants and GHGs from light- and medium-duty vehicles; and the ZEV regulations, which require manufacturers to produce an increasing number of pure ZEV (battery and fuel cell electric vehicles) and included the provision to produce plug-in hybrid electric vehicles between 2018 and 2025. The increase in low- and ZEV will result in a decrease in the consumption of non-renewable fuels such as gasoline and diesel.

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15 CARB (California Air Resources Board), 2022. "Advanced Clean Trucks Fact Sheet – Accelerating Zero-Emission Truck Markets." Available online at ww2.arb.ca.gov/resources/fact-sheets/advanced-clean-trucks-fact-sheet. Accessed December 9, 2024.

16 CARB (California Air Resources Board), 2022. "Advanced Clean Trucks Fact Sheet – Accelerating Zero-Emission Truck Markets." Available online at ww2.arb.ca.gov/resources/fact-sheets/advanced-clean-trucks-fact-sheet. Accessed December 9, 2024.

17 CARB (California Air Resources Board), 2025. "Withdrawal of California's Request for a Waiver, Pursuant to Clean Air Act Section 209(b), and Request for Authorization, Pursuant to Clean Air Act Section 209(e)(2), for the ACF Regulation." Available online at www.epa.gov/system/files/documents/2025-01/ca-acf-carb-withdrawal-ltr-2025-1-13.pdf. Accessed November 3, 2025.

18 CARB (California Air Resources Board), 2025. "Advanced Clean Cars." Available online at ww2.arb.ca.gov/our-work/programs/drive-forward-light-duty-vehicle-program/advanced-clean-cars. Accessed November 10, 2025.

Local

General Plans

The Project would be subject to local plans and policies of the jurisdictions in which it is located, including East Palo Alto, Menlo Park, and Redwood City. **Table 3.7-2** presents local plans and policies regarding energy to support consideration of Project consistency with general plan policies.

TABLE 3.7-2
LOCAL PLANS AND POLICIES RELEVANT TO THE PROJECT - ENERGY

CITY OF EAST PALO ALTO VISTA 2035 GENERAL PLAN
Goal POC-7: Promote a Sustainable Energy System.
CITY OF MENLO PARK GENERAL PLAN
Goal OSC2: Provide Parks and Recreation Facilities.
OSC2.7: Conservation of Resources at City Facilities. Reduce consumption of water, energy, landfilled waste, and fossil fuels in the construction, operations and maintenance of City owned and/or operated facilities.
Goal OSC4: Promote Sustainability and Climate Action Planning.
OSC4.2: Sustainable Building. Promote and/or establish environmentally sustainable building practices or standards in new development that would conserve water and energy, prevent stormwater pollution, reduce landfilled waste, and reduce fossil fuel consumption from transportation and energy activities.
OSC4.3: Renewable Energy. Promote the installation of renewable energy technology, such as, on residences and businesses through education, social marketing methods, establishing standards and/or providing incentives.
REDWOOD CITY GENERAL PLAN
Goal NR-4: Maximize energy conservation and renewable energy production in Redwood City to reduce consumption of natural resources and fossil fuels.
Policy NR-4.3: Incorporate the use of energy conservation strategies in City projects and operations.
Policy NR-4.5: Conserve energy by promoting efficient and cost-effective lighting that reduces glare and light pollution.
Source: City of East Palo Alto, *Vista 2035 General Plan*, adopted October 4, 2016. Final Version: March 2017; City of Menlo Park, *General Plan*, adopted November 29, 2016; Redwood City, Redwood City General Plan, adopted October 11, 2010. Amended August 2023.

3.7.1 Impacts and Mitigation Measures

Significance Criteria

In accordance with CEQA, CEQA Guidelines (including Appendix G), relevant plans, policies, and/or guidelines, and agency standards, the Project could have a significant impact if it were to do any of the following:

- Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during Project construction or operation; or
- Conflict with or obstruct a state or local plan for renewable energy or energy efficiency.

Methodology

This analysis considers the CEQA Guidelines Appendix G thresholds in determining whether implementing any of the alternatives would result in the inefficient, wasteful, or unnecessary use of energy or would conflict with a state or local plan for renewable energy or energy efficiency. The evaluation included reviewing regulations and determining their application to the Project. As discussed

previously, there are several federal, state, and local plans and policies that are intended to increase energy conservation and the use of renewable energy. Consistency of the Project with these regulations would support a finding that the Project would not result in the inefficient, wasteful, or unnecessary use of energy and energy-related impacts would be less than significant.

This impact analysis provides estimates of construction, and long-term operational energy use. The estimates are applied to determine whether this energy use would be considered wasteful, inefficient, or unnecessary, taking into account available energy supplies and existing use patterns, the Project's energy efficiency features, and compliance with applicable standards and policies aimed at reducing energy consumption.

The quantification of construction-related energy use presented in this section is based on the energy use assumptions and GHG emissions estimates presented in Section 3.3, Air Quality, and Section 3.9, Greenhouse Gases. Similar to the criteria air pollutant and GHG emissions estimates, construction energy use has been quantified by reach and construction year in the analysis presented below.

This Draft EIR evaluates Project activities at a level of detail consistent with the best available information and specificity available at the time of EIR preparation. To the extent that activities necessary for Project completion are known, they are described in Chapter 2, *Project Description*, and evaluated in the impact analysis below. Key information needed for the evaluation of energy impacts includes detailed construction assumptions such as worker trips, vehicle trips, and equipment usage. Those reaches for which conceptual (generally 10-percent) design information is available, depicted with dashed lines on Figure 2-1 in Chapter 2, *Project Description*, lack information for certain components (e.g., ramps, relocation of the pedestrian bridge at Bay Road). Appendix INFRA identifies those changes to infrastructure and other encroachments that are evaluated programmatically. Energy impacts from these changes cannot be evaluated since there is little to no siting or design information available on which to base the evaluations. The need for additional CEQA documentation would be evaluated once these design details are developed as discussed in greater detail in Section 1.2.5, Program–Project EIR and Supplemental CEQA.

Construction

The Project's construction activities would consume energy primarily in the form of transportation fuels (e.g., diesel and gasoline) used by haul trucks, heavy-duty equipment, and worker vehicles traveling to and from construction areas. Electricity consumed by any electrically powered equipment would be minimal relative to the amount of diesel and gasoline consumed during construction. Natural gas is generally not used during construction. Construction activities and associated energy use could vary substantially from day to day and year to year, depending on the phasing and type of construction activities and the number of workers and vendors traveling to the construction areas. The assumptions used for this analysis regarding the construction schedule, and the types, number, and level of usage of construction equipment and vehicles for each activity, are consistent with the assumptions used for the air quality and GHG emissions analyses in Sections 3.3 and 3.9. The CEQA significance criteria for energy use are qualitative in nature and there is no guidance from any regulatory agency on what would be considered wasteful, inefficient, or unnecessary consumption of energy resources; therefore, though energy use is estimated and provided, it is for informational purposes and the analysis provides a qualitative assessment relative to the two Appendix G CEQA checklist criteria.

Diesel fuel consumption by onsite construction equipment has been estimated based on the GHG emissions estimates for off-road equipment based on emission factors from the OFFROAD model and activity data provided by the Project Applicant, in combination with The Climate Registry 2024 default factors for calculating CO_2 emissions from diesel fuel.[19] All off-road construction equipment is assumed to be diesel-fueled.

With regard to on-road construction vehicles, travel by construction workers to and from each construction site would be in light-duty vehicles, which are primarily gasoline-powered while haul and vendor trucks are likely to be diesel fueled. Alternative-fueled vehicles powered by natural gas, hydrogen fuel cell, and electricity form a small percentage of the current fleet but are likely to increase in the future. The fuel quantities required by on-road vehicles during construction have been calculated based on the GHG emissions associated with commuting workers and vendor and haul trips. Such GHG emissions were estimated using EMFAC2021 emission factors for estimated trip counts and trip lengths and The Climate Registry 2024 default factors for calculating CO_2 emissions from gasoline and diesel fuels.[20]

Operation

An increase in operational energy use would result primarily from the increase in electricity use at the pump stations. Long-term operation and maintenance activities at the other Project sites are described in Section 2.7, Operation and Maintenance, and would involve the occasional use of construction equipment and vehicles, including equipment associated with vegetation control such as annual slope mowing or grazing.

As discussed in Section 3.7.2, numerous plans and policies encourage energy conservation and the use of renewable energy. Compliance with these regulations would also help support a finding that energy used by the Project would not be inefficient, wasteful, or unnecessary and energy-related impacts would be less than significant. Therefore, this analysis considers the two CEQA energy significance criteria together in the same impact discussion. The evaluation also considers the effectiveness of energy conservation measures included as part of the Project that would minimize the use and waste of fuels.

Impacts and Mitigation Measures

Table 3.7-3 summarizes the impact conclusions presented in this section.

TABLE 3.7-3
ENERGY IMPACT CONCLUSIONS

Impact	Level of Significance
Impact ENE-1: Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation, or Conflict with or obstruct a state or local plan for renewable energy or energy efficiency.	LTS
Impact C-ENE-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse impacts related to energy.	LTS

NOTES: LTS = Less than Significant

[19] The Climate Registry, 2024. *2024 Default Emission Factor Document.* February 2024.

[20] The Climate Registry, 2024. *2024 Default Emission Factor Document.* February 2024.

Impact ENE-1: Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during Project construction or operation or conflict with or obstruct a state or local plan for renewable energy or energy efficiency. ***(Less than Significant)***

Construction Impacts

Implementation of the Project would increase energy consumption during construction (described in Section 2.6) and operation and maintenance (described in Section 2.7).

During construction, energy would be consumed to power construction equipment and vehicles transporting workers, materials, and equipment to and from the construction sites. Energy use would vary throughout the construction period based on the activities performed and would cease upon completion of construction. Fuels used would typically include diesel and gasoline; the use of natural gas and electricity would be minimal and are hence not quantified. Heavy-duty equipment used for construction activities would rely on diesel fuel, as would vendor trucks delivering materials to the individual construction sites and haul trucks exporting demolition materials or other materials offsite. Workers would travel to and from each construction site in light-duty vehicles, which are primarily gasoline-powered. Light-duty vehicles could also include a small percentage of alternative-fueled vehicles powered by natural gas, hydrogen fuel cell, and electricity. However, all worker commute is conservatively assumed to be in gasoline fueled vehicles.

Table 3.7-4 identifies anticipated energy usage during construction and operation activities for the Project by component and construction year. As detailed in Table 3.7-4, maximum energy use for the Project is anticipated to occur in the year 2031 when construction-related off-road equipment and on-road vehicles would consume approximately 518,149 gallons of diesel fuel and on-road worker vehicles would consume approximately 16,441 gallons of gasoline.

Overall, the use of diesel and gasoline fuels for construction activities under the Project would not be substantial relative to the total sales of transportation fuels in San Mateo County. For context, based on the CEC's *California Annual Retail Fuel Outlet Report* for 2024, statewide consumption amounted to 13,423,000,000 gallons of gasoline and 2,212,000,000 gallons of diesel and San Mateo County consumption amounted to 264,000,000 gallons of gasoline and approximately 15,000,000 gallons of diesel fuel.[21]

The use of diesel, gasoline, and other alternative fuels for construction activities would be temporary and would constitute a small fraction of the regional usage (approximately 3.4 percent of San Mateo County diesel use, 0.01 percent of San Mateo County gasoline use, 0.02 percent of statewide diesel use, and 0.0001 percent of statewide gasoline use). Transportation fuels (gasoline and diesel) are produced from crude oil, which can be domestic or imported from various regions around the world. According to the U.S. Energy Information Administration's *International Energy Outlook 2023*, the global supply of crude oil, other liquid hydrocarbons, and biofuels is expected to be adequate to meet the world's demand for liquid fuels through 2050.[22]

[21] CEC (California Energy Commission), 2025. *2024 California Annual Retail Fuel Outlet Report Results (CEC-A15)*. August 26, 2025. Available online at www.energy.ca.gov/media/3874. Accessed November 7, 2025.

[22] EIA (U.S. Energy Information Administration), 2023. "Frequently Asked Questions." Last updated November 7, 2023. Available online at www.eia.gov/tools/faqs/faq.php?id=38&t=6. Accessed May 8, 2025.

TABLE 3.7-4
ESTIMATED ENERGY USE ASSOCIATED WITH PROJECT CONSTRUCTION

Component	Reach	Construction Year	Estimated Fuel Use (gallons per year)	
			Diesel[a]	Gasoline[b]
Shoreline Protection, Recreational Features	South of Bay Road	2030	44,048	5,208
		2031	39,152	3,215
	North of Bay Road	2031	208,141	3,725
		2032	5,076	769
	Dumbarton Approach (Railroad to SR 84)	2029	6,478	496
		2030	93,675	5,635
	Dumbarton Approach (SR 84 Crossing)	2032	5,298	923
		2033	48,728	5,490
	Substation and Marsh Restoration	2029	24,261	926
		2030	201,041	7,212
	Tech Campus	2031	96,461	7,860
		2032	6,628	1,629
	Bayfront Expressway	2032	28,236	4,159
	Bedwell Bayfront Park	2032	7,514	685
		2033	15,750	2,777
	Marsh Road	2033	8,305	1,069
		2034	3,195	269
Shoreline Protection, Recreational Features	All Reaches	2029	30,740	1,422
		2030	338,764	18,056
		2031	344,537	15,349
		2032	52,148	8,349
		2033	72,783	9,337
		2034	3,195	269
Habitat Improvements	Tidal Marsh Restoration in Ponds R1 and R2, Western Snowy Plover Breeding Habitat Enhancement in Ponds SF2 and R3	2029	80,789	751
		2030	127,160	4,383
		2031	173,612	1,092
Overall Project[c]		2029	111,529	2,173
		2030	465,925	22,439
		2031	518,149	16,441
		2032	52,148	8,349
		2033	72,783	9,337
		2034	3,195	269

NOTES: SR = State Route

a. Diesel use estimated based on a Carbon content of 10.2 kilograms of CO_2 per gallon of diesel from The Climate Registry 2019 Default Emission Factors (Table 2.1 - US Default Factors for Calculating CO_2 Emissions from Combustion of Transport Fuels).
b. Gasoline use estimated based on a Carbon content of 8.8 kilograms of CO_2 per gallon of diesel from The Climate Registry 2019 Default Emission Factors (Table 2.1 - US Default Factors for Calculating CO_2 Emissions from Combustion of Transport Fuels).
c. Includes energy use associated with shoreline protection, recreational features, and habitat improvements.

SOURCE: Table compiled by ESA in 2025 based on Appendix AIR of this EIR.

Construction equipment and vehicles used would be subject to CARB's In-Use Off-Road Diesel-Fueled Fleets regulation, which applies to certain off-road diesel engines, vehicles, or equipment greater than 25 hp. The regulation does the following:

(1) Imposes limits on idling, requires a written idling policy, and requires a disclosure when selling vehicles;

(2) Requires that all vehicles be reported to CARB (using the Diesel Off-Road Online Reporting System) and labeled;

(3) Restricts the addition of older vehicles into fleets after January 1, 2014; and

(4) Requires that fleets reduce their emissions by retiring, replacing, or repowering older engines or installing Verified Diesel Emission Control Strategies (i.e., exhaust retrofits).

The fleet must show either that its fleet-average index is less than or equal to the calculated fleet-average target rate, or that the fleet has met the Best Achievable Control Technology requirements. In addition, the use of Tier 4 engines in all construction equipment where possible (as indicated in Table 2-8 in Chapter 2, *Project Description*), while intended to reduce emissions, would also ensure energy efficiency as Tier 4 equipment are likely to be newer equipment meeting more recent and stringent emission and energy efficiency standards.

Construction activities for the Project would use fuel-efficient equipment and on-road vehicles consistent with federal and state regulations, such as the fuel efficiency regulations in CARB's Pavley Phase II standards for light-duty vehicles like worker commute and vendor vehicles; the anti-idling regulation in 13 California Code of Regulations section 2485 (concerning Airborne Toxic Control Measure to Limit Diesel-Fueled Commercial Motor Vehicle Idling); and fuel requirements for stationary equipment in 17 California Code of Regulations section 93115 17 California Code of Regulations 93115 (concerning the Airborne Toxic Control Measures for Stationary Compression Ignition Engines). In accordance with 13 California Code of Regulations section 2485 and section 2449, idling by commercial vehicles heavier than 10,000 pounds and off-road equipment greater than 25 hp would be limited to a maximum of five minutes. The intent of these regulations is to reduce construction emissions; however, compliance with the anti-idling and emissions reduction regulations would also result in fuel savings from the more efficient use of equipment.

Similar to the Appendix G checklist criteria, goals and policies in the general plans for the Cities of Redwood City, East Palo Alto and Menlo Park outlined in Table 3.7-2 primarily address energy conservation and encourage use of renewable energy. As discussed above, the Project would be consistent with these goals as it would comply with standards and regulations at the federal and state levels that promote energy efficiency.

Overall, construction activities under the Project would not be excessive compared to overall regional and local demands for energy resources, and construction equipment would not be less energy efficient than at comparable construction sites in the region or state. Compliance with CARB regulations would ensure that energy use during construction would not be wasteful, inefficient, or unnecessary, or conflict with/ obstruct state or local plans for renewable energy or energy efficiency. The impact would be **less than significant**.

Operations Impacts

Energy use during operation and maintenance would be associated with the use of equipment and vehicles for activities such as periodic inspections and vegetation control for levee maintenance (e.g., annual slope mowing or grazing, irrigation, weed control, and plant replacement), and pumping. Most maintenance activities currently take place and energy use associated with these activities would not substantially increase over existing conditions.

While existing pump stations would continue to operate as they currently do, there may be new pump stations east of Meta Headquarters and at Pond SF2 to control flows for western snowy plover habitat. Other improvements to pumping may be needed as changes to stormwater management systems are further investigated for program-level reaches. All expected pumping would be for the purpose of managing stormwater and maintaining habitat and therefore would not constitute an unnecessary or wasteful consumption of energy resources. Any new pumping plants would be equipped with newer, more energy-efficient motors that would comply with DOE energy efficiency standards. Consequently, energy consumption during operations would not be considered wasteful or inefficient.

As part of the RPS program (refer to *Senate Bills 1078, 350, and 100* in Section 3.7.2), electric utilities, including investor-owned utilities and community choice aggregators, are required to increase the percentage of electricity provided by renewable resources. Although the RPS program does not necessarily increase energy efficiency, implementing this program reduces the use of non-renewable energy sources. CPUC and the CEC jointly implement the RPS program and PG&E is required to adhere to these standards and deadlines. Additionally, electricity use at the pump station would not conflict with the State of California's plans to increase the use of renewable resources.

Overall, operational activities associated with the Project would not result in the inefficient, wasteful, or unnecessary consumption of energy, nor would any sources or activities associated with Project operations conflict with or obstruct a state or local plan for renewable energy or energy efficiency. Therefore, the operational energy-related operation impacts of the Project would be **less than significant**.

Cumulative Impacts

Impact C-ENE-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse impacts related to energy. (*Less than Significant*)

The geographic scope of potential cumulative effects with respect to energy resources includes PG&E's electric grid and natural gas transmission system that would serve the Project, and areas from which transportation fuels would be provided.

Project-related transportation fuel impacts (gasoline and diesel) during construction could overlap with the transportation needs (including fuel needs) of previously approved past projects, as well as other present or future projects that occur during the Project's construction (refer to Table 3.1-2 for a list of cumulative projects). However, there is no significant cumulative condition to which the Project could contribute related to the use of large amounts of fuel or energy in a wasteful or inefficient manner. Given the relatively small percentage of the Project's diesel and gasoline fuel use compared to existing use in

the region, the Project's less-than-significant incremental impacts related to the use of fuel or energy in a wasteful or inefficient manner are not expected to combine with the incremental impacts of other projects to cause a significant cumulative impact.

As described in Impact ENE-1, the operational electricity requirements of the Project would increase from existing conditions due to operation of the potential new pump station in the Tech Campus Reach. Any increase in electrical consumption is not anticipated to be substantial compared to the countywide consumption. Adverse Project-related impacts to electricity demand would be negligible and would not significantly impact peak or base power demands during construction, operation, or maintenance (refer to Impact ENE-1 for further analysis). Electricity providers are actively planning for anticipated increases in cumulative peak demand through 2050. California has approximately 80,000 megawatts (MW) of electric generation capacity installed across the state among more than 1,500 power plants, utilizing a broad array of technologies, including 26,500 MW from installed renewable generation.[23] As part of its mission to build a stronger, more resilient energy grid for its service area, PG&E is proposing nine new battery energy storage projects totaling approximately 1,600 MW, to further integrate renewable energy resources and improve the reliability of the California electric system.[24] Additionally, the SAFER Bay Project would protect PG&E as a primary electricity provider (e.g., the Ravenswood Substation), from sea level rise. The increase in electricity use associated with pumping would be easily accommodated by existing and planned energy infrastructure and would not constitute a cumulatively considerable impact on the primary regional electricity distributors or sources.

In summary, the Project's incremental cumulative impact relating to the consumption of energy or the use of renewable energy would not be cumulatively considerable and would be **less than significant**.

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[23] CEC (California Energy Commission), 2019. "2018 Total System Electric Generation." Data as of June 24, 2019. Available online at www.energy.ca.gov/data-reports/energy-almanac/california-electricity-data/2021-total-system-electric-generation/2018. Accessed on May 12, 2025.

[24] Solar Builder, 2022. "PG&E proposes nearly 1,600 MW of new battery energy storage capacity." January 27, 2022. Available online at solarbuildermag.com/news/pge-proposes-nearly-1600-mw-of-new-battery-energy-storage-capacity-details-on-nine-projects-lined-up/. Accessed on May 12, 2025.

3.8 Geology, Soils, and Paleontology

This section evaluates the potential impacts of the SAFER Bay Project (Project) on geologic and soils conditions, mineral resources, and paleontological resources in the Project area and region. This section presents information about the environmental and regulatory setting and identifies the criteria used to evaluate the significance of potential impacts, the methods used in evaluating these impacts, and the results of the impact assessment. The Project evaluated is described in Chapter 2, *Project Description*, of this EIR.

3.8.1 Environmental Setting

The Project site is located west of San Francisco Bay along approximately 7 miles of shoreline, within the geologically complex California Coast Ranges geomorphic province.[1] The Coast Ranges province is characterized by a series of northwest-trending ridges and valleys that run roughly parallel to the San Andreas Fault zone and can be further divided into the northern and southern ranges that are separated by the San Francisco Bay. The San Francisco Bay lies within a broad depression created from an east–west expansion between the San Andreas and Hayward fault systems.[2] The Project site lies on the flat western margins of the bay. Based on geologic mapping by the California Geological Survey (CGS),[3] the Project site is located on Holocene-age bay mud at the surface.

Fault Rupture and Ground Shaking

The Project area lies within a region of California that contains many active and potentially active faults and is considered an area of high seismic activity. In 2015, the 2014 Working Group on California Earthquake Probabilities presented the third Uniform California Earthquake Rupture Forecast. According to this report, there is a 62 percent probability of a magnitude 6.7 earthquake in the San Francisco Bay Area (Bay Area) and a 98 percent probability of a magnitude 6.7 or greater earthquake in the Northern California region by the year 2045.[4]

The California Earthquake Hazards Zone Application (EQ Zapp) is an interactive map on the CGS website. The EQ Zapp allows users to view all available earthquake hazard zone data, including all established Earthquake Fault Zones (EFZs), liquefaction, and earthquake-induced landslide zones. Under the Alquist-Priolo Earthquake Fault Zoning Act, Holocene-active faults are designated EFZs because they have displayed surface rupture in the last 11,700 years.[5]

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1 California's geomorphic provinces are naturally defined geologic regions that display a distinct landscape or landforms with unique, defining features based on geology, faults, topographic relief, and climate.

2 CGS (California Geological Survey), 2021. *Earthquake Zones of Required Investigation on EQ Zapp.* Updated September 23, 2021.

3 CGS (California Geological Survey), 1991. "San Francisco–San José Quadrangle – Map No. 5A (Geology)." Regional Geologic Map Series.

4 Field, E.H., G.P. Biasi, P. Bird, T.E. Dawson, K.R. Felzer, D.D. Jackson, K.M. Johnson, T.H. Jordan, C. Madden, A.J. Michael, K.R. Milner, M.T. Page, T. Parsons, P.M. Powers, B.E. Shaw, W.R. Thatcher, R.J. Weldon II, and Y. Zeng, 2015. "Long-Term Time-Dependent Probabilities for the Third Uniform California Earthquake Rupture Forecast." *Bulletin of the Seismological Society of America*, Vol. 105, No. 2A. pp. 511–543. April 2015. doi: 10.1785/0120140093.

5 CGS (California Geological Survey), 2018. *Earthquake Fault Zones: A Guide for Government Agencies, Property Owners/ Developers, and Geoscience Practitioners for Assessing Fault Rupture Hazards in California*. Special Publication 42. Revised 2018.

No known Holocene-active[6] faults or pre-Holocene[7] faults are within the Project site. However, multiple fault systems are present outside of the Project site in the region. The Project site is not within an EFZ as delineated on an EFZ Map. The nearest EFZ is the Woodside fault section of the San Andreas Fault zone, approximately 5.4 miles west of the Project site.[8] The Hayward Fault zone, further to the east, is also a possible source of significant ground shaking at the Project site.

The ShakeMap that corresponds with the earthquake planning scenario generated by the U.S. Geological Survey (USGS) states that if a magnitude 6.2 event were to occur near Palo Alto, east of the Woodside and Palo Alto sections of the San Andreas Fault zone, the Project site may experience very strong to severe ground shaking with moderate to heavy damage expected.[9]

Liquefaction and Lateral Spreading

*Liquefactio*n is a phenomenon in which loose, water-saturated, sandy soils become unstable due to the effects of strong seismic shaking. During an earthquake, these sediments can behave like a liquid, potentially causing severe damage to overlying structures. Lateral spreading is a variety of minor landslide that occurs when unconsolidated liquefiable material breaks and spreads due to the effects of gravity, usually down gentle slopes, or toward an open slope face. Liquefaction-induced lateral spreading is defined as the finite, lateral displacement of gently sloping ground as a result of pore-pressure buildup or liquefaction in a shallow underlying deposit during an earthquake. The occurrence of this phenomenon is dependent on many complex factors, including the intensity and duration of ground shaking, particle-size distribution, and density of the soil.

The potential damaging effects of liquefaction include differential settlement, loss of ground support for foundations and embankments, ground cracking, heaving, and cracking of structure slabs due to sand boiling, and buckling of deep foundations due to ground settlement. Dynamic settlement (i.e., pronounced consolidation and settlement from seismic shaking) may also occur in loose, dry sands above the water table, resulting in settlement of and possible damage to overlying structures. In general, a relatively high potential for liquefaction exists in loose, sandy soils that are within 50 feet of the ground surface and are saturated (below the groundwater table). Lateral spreading can move blocks of soil, placing strain on buried pipelines that can lead to leaks or pipe failure.

According to the EQ Zapp, the Project sites are entirely within an established liquefaction and lateral spreading hazard zone.[10]

[6] Holocene-active faults show evidence of displacement within the Holocene Epoch, or the last 11,700 years, and are therefore considered active. (CGS [California Geological Survey], 2008. *Special Publication 117A – Guidelines for Evaluating and Mitigating Seismic Hazards in California*.)

[7] Pre-Holocene faults have not shown evidence of displacement in the last 11,700 years (CGS 2008).

[8] CGS (California Geological Survey), 1991. "San Francisco–San José Quadrangle Map No. 5A (Geology)." Regional Geologic Map Series.

[9] USGS (U.S. Geological Survey), 2018. "Earthquake Hazards Program. M 6.2 Scenario Earthquake – Hayward aftershock – ShakeMap." Map. Scale: Unknown.

[10] CGS (California Geological Survey), 2024. *Earthquake Zones of Required Investigation on EQ Zapp.* Updated September 23, 2021.

Expansive Soils

Expansive soils are soils that possess a "shrink-swell" characteristic, also referred to as linear extensibility. Shrink-swell is the cyclic change in volume (expansion and contraction) that occurs in fine-grained clay sediments from the process of wetting and drying; the volume change is reported as a percent change for the whole soil. Changes in soil moisture can result from rainfall, landscape irrigation, utility leakage, roof drainage, and/or perched groundwater. This cyclical change in soil volume is measured using the coefficient of linear extensibility (COLE). The Natural Resources Conservation Service relies on linear extensibility measurements to determine the shrink-swell potential of soils. If the linear extensibility percent is more than 3 percent (COLE = 0.03), shrinking and swelling may cause damage to buildings, roads, and other structures. Structural damage may occur incrementally over a long period of time, usually as a result of inadequate soil and foundation engineering or the placement of structures directly on expansive soils. The greatest COLE along the Project alignment is 7.5 percent (0.075), which rates as a high expansion potential.[11]

Landslides

Landslides are one of the various types of downslope movements in which rock, soil, and other debris are displaced due to the effects of gravity. The potential for material to detach and move down slope depends on multiple factors, including the type of material, water content, and steepness of terrain. Generally, earthquake-induced landslides occur within deposits of a moderate to high landslide potential when ground shaking triggers slope failures during or as a result of a nearby earthquake. The Project vicinity has a very low landslide potential due to the relatively flat topography and lack of slopes and hills.

Paleontological Resources

Paleontological resources are the mineralized (fossilized) remains of prehistoric plants and animals, including body fossils, such as bones, bark or wood, and shell, as well as trace fossils, such as shell, leaf, skin, or feather impressions, footprints, burrows, or other evidence of an organism's life or activity. These resources are located within sedimentary rocks or alluvium and are considered to be non-renewable.

In the "Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources," the Society of Vertebrate Paleontology defines four categories of paleontological potential for rock units as follows:

- *High Potential.* Rock units from which vertebrate or significant invertebrate, plant, or trace fossils have been recovered are considered to have a high potential for containing additional significant paleontological resources.
- *Low Potential.* Rock units that are poorly represented by fossil specimens in institutional collections, or based on general scientific consensus, only preserve fossils in rare circumstances and the presence of fossils is the exception not the rule.
- *Undetermined Potential.* Rock units for which little information is available concerning their paleontological content, geologic age, and depositional environment.

[11] NRCS (Natural Resources Conservation Service), 2024. Web Soil Survey. Linear Extensibility Rating for the Project Site.

- *No Potential.* Rock units like high-grade metamorphic rocks and igneous rocks that will not preserve fossil resources.[12]

The surficial geology within the Project site is composed entirely of artificial fill underlain by Holocene-age bay mud. Due to the artificial nature of the fill and the recent age of the fill and bay mud underlying the Project site, it has no potential to contain significant paleontological resources. As discussed, in general, Holocene-age deposits are considered to have a low potential to contain significant paleontological resources, based on the relatively recent age of the deposits;[13] the youngest Holocene-age deposits (i.e., younger than 5,000 radiocarbon years) have a particularly low potential.

Mineral Resources

CGS has classified lands within the San Francisco–Monterey Bay Region into Aggregate and Mineral Resource Zones (MRZs) based on guidelines adopted by the California State Mining and Geology Board. The Project site is mapped as MRZ-1[14] and MRZ-4.[15] Brabb et al.[16] mapped surficial deposits beneath the fill along the Project alignment as Holocene-age bay mud deposits consisting predominantly of gray, green, and blue clay and silty clay underlying marshlands and tidal mud flats, which is not aggregate or a known mineral resource.

3.8.2 Regulatory Framework

Federal

United States Army Corps of Engineers Design Criteria

The United States Army Corps of Engineers (USACE) Design Criteria documents applicable to the levee or floodwall design include geotechnical investigations (EM 1110-1-1804, January 1, 2001), settlement analyses (EM 1110-1-1904, September 30, 1990), design and construction of levees (EM 1110-2-1913, April 30, 2000), and earthquake design and evaluation for civil works projects (ER 1110-2-1806, July 31, 1995; revised May 29, 2024).[17] The earthquake design and evaluation for civil works projects engineer regulation establishes minimum standards for serviceability and safety of civil works project features for specific earthquake return periods for ground motion, and provides requirements for aspects of seismic analysis, evaluation, and design. This regulation applies to civil works project features, such as the proposed shoreline protection. ER 1110-2-1806 section 9(c)(7) identifies earthquake ground motions and associated performance requirements for analysis, evaluation, and design applicable to levee embankments and floodwalls. For critical project features (failure of which could expose people to harm), such as the proposed levee and floodwalls, seismic analysis ground motion parameters must reflect potential increased loading due to liquefaction or loss in embankment layers. The proposed shoreline protection would therefore be required to be designed to remain safely functional for stronger shaking

[12] SVP (Society of Vertebrate Paleontology), 2010. *Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources.* Prepared by SVP Impact Mitigation Guidelines Revision Committee.

[13] SVP (Society of Vertebrate Paleontology), 2010. *Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources.* Prepared by SVP Impact Mitigation Guidelines Revision Committee.

[14] Areas where adequate information indicates that no significant mineral deposits are present.

[15] Areas where available information is inadequate for assignment to any other MRZ category.

[16] Brabb, E.E., R.W. Graymer, and D.L. Jones, 1998, "Geology of the Onshore Part of San Mateo County, California." U.S. Geological Survey Open-File 98-137.

[17] HDR, *Design Documentation Report*, SAFER Bay Project, East Palo Alto and Menlo Park, San Francisquito Creek Joint Powers Authority, 10% and 30% Desings. September 6, 2024.

with and without soil liquefaction or other types of strength and stiffness loss (ER 1110-2-1806, section 9[e][4]).

Clean Water Act

The federal Clean Water Act (CWA) and subsequent amendments,[18] under the enforcement authority of the U.S. Environmental Protection Agency, was enacted "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters."[19] The purpose of the CWA is to protect and maintain the quality and integrity of the nation's waters by requiring states to develop and implement state water plans and policies. The CWA gives the U.S. Environmental Protection Agency the authority to implement pollution control programs, such as setting wastewater standards, for industry. In California, implementation and enforcement of the National Pollutant Discharge Elimination System (NPDES) program is conducted through the California State Water Resources Control Board and the nine Regional Water Quality Control Boards (RWQCBs). The CWA also sets water quality standards for surface waters and established the NPDES program to protect water quality through various sections of the law, including sections 401 through 404 and 303(d), which are implemented and regulated by the State Water Resources Control Board and the nine RWQCBs. Section 402 of the CWA would apply to the Project because construction at the Project site would be required to control discharges of pollutants from point sources.

National Flood Insurance Program – Code of Federal Regulations

Title 44, chapter 1, section 65.10 of the Code of Federal Regulations contains requirements applicable to levee systems accredited by the Federal Emergency Management Agency (FEMA). An accredited levee system is a system that FEMA has recognized as reducing the flood hazards posed by a base flood (a flood with 1 percent chance of occurring within a given year).[20] Among other criteria, the design requirements for levee systems in section 65.10 require engineering analyses that would do the following:

- Demonstrate that any levee erosion during the base flood will not result in failure of the embankment or foundation due to seepage.
- Demonstrate that seepage during the base flood will not jeopardize embankment or foundation stability.[21]

State

National Pollutant Discharge Elimination System Construction General Permit

Project construction would disturb more than 1 acre of land surface, potentially affecting the quality of stormwater discharges into waters of the United States. The Project would therefore be subject to the *NPDES General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities* (Order 2022-0057-DWQ, NPDES No. CAS000002). The Construction General Permit (CGP) regulates discharges of pollutants in stormwater associated with construction activity to waters of the United States from construction sites that disturb 1 or more acres of land surface, or that are part of a

[18] U.S. Code title 33, section 1251 et seq.
[19] U.S. Code title 33, section 1251(a).
[20] Code of Federal Regulations title 44, sections 59.1, 65.10(a).
[21] Code of Federal Regulations title 44, section 65.10(b)(3)–(4).

common plan of development or sale that disturbs more than 1 acre of land surface. The permit regulates stormwater discharges from construction or demolition activities, such as clearing and excavation; construction of buildings; and linear underground projects, including installation of water pipelines and other utility lines.

The CGP requires the development and implementation of a stormwater pollution prevention plan (SWPPP) that includes specific best management practices designed to prevent sediment and pollutants from coming into contact with stormwater and moving offsite into receiving waters. The CGP also sets post-construction standards (i.e., implementation of best management practices to reduce pollutants in stormwater discharges from the site after construction).

The SWPPP must be prepared by a State Qualified SWPPP Developer, and implementation of the SWPPP must be overseen by a State Qualified SWPPP Practitioner. A legally responsible person, who is legally authorized to sign and certify permit registration documents, is responsible for obtaining coverage under the permit. Refer to Section 3.11, Hydrology and Water Quality, for additional information about this permit.

California Public Resources Code

Paleontological resources are the fossilized remains of organisms from prehistoric environments found in geologic strata. They range from mammoth and dinosaur bones to impressions of ancient animals and plants, trace remains, and microfossils. California Public Resources Code section 5097.5 stipulates that the unauthorized removal or destruction of a vertebrate paleontological site on public lands is a misdemeanor.

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act[22] was passed in 1972 to protect structures for human occupancy from the hazard of surface faulting. In accordance with the law, the State Geologist has established regulatory zones—called EFZs—around the surface traces of active faults and has published maps showing these zones. Buildings for human occupancy cannot be constructed across surface traces of faults that are determined to be active. Because many active faults are complex and consist of more than one branch that may experience ground surface rupture, EFZs extend approximately 200 to 500 feet on either side of the mapped fault trace.[23] As discussed previously, the Project site is not within an EFZ as delineated in accordance with the Alquist-Priolo Earthquake Fault Zoning Act.

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act[24] was enacted in 1990 after the Loma Prieta earthquake to reduce threats to public health and safety and minimize property damage caused by earthquakes. This law requires the State Geologist to delineate various seismic hazard zones, and cities, counties, and other local permitting agencies to regulate certain development projects within these zones. For projects that would locate structures for human occupancy within designated Zones of Required Investigation, the Seismic

[22] Public Resources Code section 2621 et seq.

[23] CGS (California Geological Survey), 2018. *Special Publication 42: Earthquake Fault Zones – A Guide for Government Agencies, Property Owners / Developers, and Geoscience Practitioners for Assessing Fault Rupture Hazards in California.* California Department of Conservation.

[24] Public Resources Code section 2690 et seq.

Hazards Mapping Act requires Project proponents to perform a site-specific geotechnical investigation to identify the potential site-specific seismic hazards and corrective measures, as appropriate, before receiving building permits.[25] CGS produces official maps based on USGS topographic quadrangles, as required by the law, and the CGS Guidelines for Evaluating and Mitigating Seismic Hazards (Special Publication 117A) provides guidance for evaluating and mitigating seismic hazards.[26] As discussed previously, the Project site is in a Liquefaction Seismic Hazard Zone.

Local

General Plans

The Project would be subject to local plans and policies of the jurisdictions in which it is located, including East Palo Alto, Menlo Park, and Redwood City. **Table 3.8-1** presents local plans and policies regarding geology, soils, and paleontological resources to support consideration of Project consistency with general plan policies.

TABLE 3.8-1
LOCAL PLANS AND POLICIES RELEVANT TO THE PROJECT – GEOLOGY AND SOILS

CITY OF EAST PALO ALTO VISTA 2035 GENERAL PLAN
Goal SN-1: Reduce the risk to people and property from earthquakes and other geologic hazards.
Policy 1.1: Construction requirements. Apply the proper development engineering and building construction requirements to avoid or minimize risks from seismic and geologic hazards.
Policy 1.2: Robust seismic guidance. Utilize and enforce the most recent State guidance for seismic and geologic hazards when evaluating development proposals.
Goal POC-9: Protect historic, natural, mineral, and cultural resources.
Policy 9.1: Archeology, paleontology and natural resources. Protect areas of important archaeological paleontological and natural resources.
CITY OF MENLO PARK GENERAL PLAN
Goal LU-7: Promote the implementation and maintenance of sustainable development, facilities and services to meet the needs of Menlo Park's residents, business, workers, and visitors.
Policy LU-7.7: Hazards, Avoid development in areas with seismic, flood, fire and other hazards to life or property when potential impacts cannot be mitigated.
REDWOOD CITY GENERAL PLAN
Goal PS-8: Minimize the potential damage to structures and loss of life that result from earthquakes and other geological hazards.
Policy PS-6.3: Work to ensure that structures and the public in Redwood City are exposed to reduced risks form seismic and geological events.
Sources: City of East Palo Alto, 2017. *Vista 2035 General Plan*. Adopted October 4, 2016; Final Version March 2017. Available online at www.ci.east-palo-alto.ca.us/planning/page/vista-2035-general-plan; City of Menlo Park, 2016. *General Plan, City of Menlo Park*. Adopted November 29, 2016. Available online at www.menlopark.gov/files/sharedassets/public/v/1/community-development/documents/general-plan/land-use-and-circulation-element-adopted-20161129.pdf; City of Redwood City, 2023. *Redwood City General Plan*. Adopted October 11, 2010; Amended August 2023. Available online at www.redwoodcity.org/departments/community-development-department/planning-housing/planning-services/environmental-documents/general-plan-eir.

[25] CGS (California Geological Survey), Undated. *Seismic Hazards Mapping Act Fact Sheet.* California Department of Conservation.

[26] CGS (California Geological Survey), 2008. *Special Publication 117A: Guidelines for Evaluating and Mitigating Seismic Hazards in California.* California Department of Conservation.

3.8.3 Impacts and Mitigation Measures

Significance Criteria

In accordance with CEQA, CEQA Guidelines (including Appendix G), relevant plans, policies, and/or guidelines, and agency standards, the Project could have a significant impact on geology, soils, seismicity, paleontological resources or mineral resources if it were to do any of the following:

- Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:
  - Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map, issued by the State Geologist for the area or based on other substantial evidence of a known fault;
  - Strong seismic ground shaking;
  - Seismic-related ground failure, including liquefaction; or
  - Landslides.
- Result in substantial soil erosion or the loss of topsoil;
- Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the Project, and potentially result in on or offsite landslide, lateral spreading, subsidence, liquefaction, or collapse;
- Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property;
- Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater;
- Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature;
- Result in the loss of availability of a known mineral resource that would be a value to the region and the residents of the state; or
- Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan.

Methodology

The following analysis focuses on the potential for Project implementation to result in impacts related to geology, soils, seismicity or paleontological resources. The approach to analysis involved reviewing and assessing published maps, professional publications, and reports pertaining to the Project vicinity. Published information was derived from resources provided by the Association of Bay Area Governments, the California Department of Conservation (which encompasses the CGS and the State Mining and Geology Board), the California Department of Water Resources, the Natural Resources Conservation Service, the Santa Clara Valley Water District, and USGS.

The Project would be required to comply with the various laws, regulations, and policies summarized in Section 3.8.2. These laws, regulations, and policies are implemented through a variety of means. This

analysis assumes Project compliance with applicable federal, state, and local laws and regulations; agencies would be expected to continue to enforce applicable requirements to the extent that they do so now. Compliance with many of these requirements is a condition of permit approvals, which stipulate the specific regulations requiring compliance.

This Draft EIR evaluates proposed Project activities at a level of detail consistent with the best available information and specificity available at the time of its preparation. Where specific activities necessary for Project completion are known, they are described in Chapter 2, *Project Description*, and evaluated in the following impact analysis. Key Project information needed for the evaluation of geology, soils, and paleontological resource impacts includes the locations of temporary and permanent ground disturbance and the depth of excavation. Appendix INFRA identifies those changes to infrastructure and other encroachments that are evaluated programmatically. Although the geology, soils, and paleontology impact analysis is not expected to change with future design, the need for supplemental CEQA documentation would be evaluated once additional design details are developed.

The following topics are not analyzed further in this section for the reasons described below:

- ***Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater.*** The Project does not propose septic tanks or alternative wastewater disposal systems.
- ***Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature***. As discussed in *Paleontological Resources*, the fill and bay mud beneath the Project site would have no potential for significant paleontological resources.
- ***Result in the loss of availability of a known mineral resource that would be a value to the region and the residents of the state; or result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan***. As discussed in *Mineral Resources,* the Project is mapped within MRZ-1 and MRZ-4, and surficial deposits along the Project alignment consist of Holocene-age bay mud, which is not considered aggregate or a known mineral resource. Therefore, the Project would not result in the loss of availability of known mineral resources classified as having regional or statewide significance and would not result in the loss of availability of a locally important mineral resource recovery site.[27]

Impacts and Mitigation Measures

Table 3.8-2 summarizes the impact conclusions presented in this section.

[27] DOC (California Department of Conservation, Division of Mines and Geology), 1987. *Mineral Land Classification: Aggregate Materials in the San Francisco–Monterey Bay Area, Special Report 146, Part II, Plate 2.3 Mineral Resource Zones and Resource Sectors San Francisco and San Mateo Counties.*

TABLE 3.8-2
GEOLOGY, SOILS, AND PALEONTOLOGY IMPACT CONCLUSIONS

Impact	Level of Significance
Impact GEO-1: Cause potential substantial adverse effects involving rupture of a known earthquake fault, strong seismic ground shaking, seismic-related ground failure including liquefaction, and/or landslides.	LTS
Impact GEO-2: Result in substantial soil erosion or the loss of topsoil.	LTS
Impact GEO-3: Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the Project.	LTS
Impact GEO-4: Be located on expansive soil.	LTS
Impact C-GEO-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse impacts related to geology and soils.	LTS

NOTES: LTS = Less than Significant

Impact GEO-1: Cause potential substantial adverse effects involving rupture of a known earthquake fault, strong seismic ground shaking, seismic-related ground failure including liquefaction, and/or landslides. *(Less than Significant)*

Construction and Operation

The Project site is not within an established EFZ. The nearest EFZ is the Woodside fault section of the San Andreas Fault zone (approximately 5.4 miles east of the Project site). Therefore, there would be no impact related to surface fault rupture.

The proposed habitat improvements would not involve constructing new habitable facilities or alter land use such that an increased number of people would be at risk from seismic activity. Therefore, the habitat improvements would have no impact related to strong seismic ground shaking, seismic-related ground failure, or landslides.

The presence of the San Andreas, Calaveras, Hayward, and Silver Creek Fault zones in the region could subject the Project site to strong seismic ground shaking in the event of an earthquake on either of these fault zones. The Project site is entirely within an established liquefaction hazard zone. According to the California Department of Water Resources Urban Levee Design Criteria, the most common mode of earthquake-induced levee damage is expected to be lateral spreading and cracking associated with earthquake shaking together with potential strength losses in the levees and their foundations (e.g., liquefaction).[28] The levees or floodwalls could exacerbate seismic hazards if they were to fail during a seismic event.

The design requirements for levee systems in the Code of Federal Regulations title 44, section 65.10 require engineering analyses that demonstrate that any levee erosion during the base flood will not result in failure of the embankment or foundation due to seepage, and that seepage during the base flood will not jeopardize embankment or foundation stability. Additionally, consistent with the requirements of section 65.10(d), accredited levee systems must implement maintenance plans specifying formal

[28] DWR (California Department of Water Resources), 2012. *Urban Levee Design Criteria.* May 2012.

procedures that ensure the stability, height, and overall integrity of the levee and associated structures and systems are maintained.

Additional seismic design guidance for levees and floodwalls is provided in USACE Design Criteria documents, as discussed in Section 3.8.2. ER 1110-2-1806 specifies that critical features—such as the proposed shoreline protection—must be designed to remain safely functional during strong ground shaking, including conditions involving liquefaction or loss of soil strength. Seismic analysis ground motion parameters must reflect potential increased loading due to liquefaction or loss in embankment layers.

Adherence to the applicable levee design requirements would reduce the Project's potential to directly or indirectly cause substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking, liquefaction, or landslides. Therefore, the impact would be **less than significant**.

Impact GEO-2: Result in substantial soil erosion or the loss of topsoil. ***(Less than Significant)***

Construction

The Project would include ground-disturbing construction activities that would total more than 1 acre and could increase erosion risk or sediment transport. Construction could result in soil erosion during excavation, grading, trenching, and soil stockpiling. Because construction activities would exceed 1 acre, the Project must comply with the CGP, described in Section 3.8.2.

The CGP requires the preparation and implementation of a SWPPP, which outlines best management practices to control run-on and runoff from construction sites. A qualified SWPPP developer would select site-specific best management practices, which would include, but not be limited to, physical barriers to prevent erosion and sedimentation; construction of sedimentation basins; limitations on work periods during storm events; use of infiltration swales; protection of stockpiled materials; and a variety of other measures that would substantially reduce or prevent erosion from occurring during construction. Additionally, non-stormwater management measures would include installing specific discharge controls during activities such as paving operations and washing and fueling vehicles and equipment. The SWPPP must also specify the proper handling of uncontaminated groundwater from dewatering to avoid causing or contributing to a violation of any water quality standard.

Through compliance with these independently enforceable existing requirements, the Project's potential impacts associated with soil erosion and loss of topsoil during construction would be **less than significant**.

Operation

Project operation would not include activities that would increase soil erosion at the Project sites. Restoring tidal action to Ponds R1 and R2 would result in increased sedimentation in these ponds, rather than cause substantial soil erosion. Routine operation and maintenance would include inspections, vegetation control, and minor repairs involving minimal soil disturbance. Additionally, the design of flood gate operations and interior drainage management would be required to avoid causing additional erosion of the levees, in compliance with FEMA requirements. Therefore, Project impact during operation would be **less than significant**.

Impact GEO-3: Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the Project. (*Less than Significant)*

The Project sites are located in a generally flat area along the San Francisco Bay shoreline that overlies bay mud. Habitat improvements would return tidal action to portions of the Project area or modify existing habitat in managed former salt ponds, which would not affect the stability of the underlying bay mud.

Construction

Depending on the height of new levee fill needed (refer to Chapter 2, *Project Description*, Table 2-3 for proposed levee heights) and the strength of underlying soil, stability failures could occur during construction if too much soil load is placed over a short period of time. As discussed previously, shoreline protection would be required to meet the USACE Design Criteria requirements, including requirements related to geotechnical investigations (EM 1110-1-1804, January 1, 2001), settlement analyses (EM 1110-1-1904, September 30, 1990), and design and construction of levees (EM 1110-2-1913, April 30, 2000). EM 1110-1-1904 (settlement analyses) includes guidance for tests and analyses to estimate immediate settlements associated with projects, applications in unstable soil (Chapter 5), and methods to address soil movements (Chapter 6). As noted in Chapter 5 of EM 1110-1-1904 (Section 5.1a), adequate engineering solutions, such as special foundation designs and soil stabilization techniques, exist to accommodate anticipated soil movement. Design and implementation of the proposed shoreline protection consistent with the USACE Design Criteria requirements would reduce the potential for soil instability during construction. Therefore, the impact would be **less than significant**.

Operation

Once completed, the additional loading from new levees or levee raises would cause settlement over time, primarily due to the consolidation of underlying bay mud or other fine-grained deposits such as clay. Landward of the proposed levee locations, young bay mud is not present or, where present, the layer of young bay mud is much thinner than in areas east of the proposed levee alignment.[29] Settlement is expected to be higher in portions of the Project alignment where existing development or levees have not been built, such as in Laumeister Marsh in the South of Bay Road Reach.[30]

As discussed briefly in Section 3.8.2, and Impact GEO-1, USACE Design Criteria documents applicable to the levee design include geotechnical investigations (EM 1110-1-1804, January 1, 2001) and settlement analyses (EM 1110-1-1904, September 30, 1990). Engineering manual 1110-1-1804 requires geotechnical investigations for civil works (infrastructure) projects, such as levees, to include recommendations for reducing settlement, considering factors, such as soil data, sediment type, and environmental conditions, to ensure accurate sampling and analysis. Engineering manual 1110-1-1904 requires settlement analyses to consider both short-term and long-term settlement incorporating features that reduce the hazard of settlement, such as proper foundation design, soil improvement techniques, drainage control, and monitoring systems.

When water levels are high enough to reach the levees, seepage could occur through the levee embankment and through more pervious layers under the levee. Seepage and under-seepage could lead to

[29] HDR, 2024. *DRAFT Preliminary Geotechnical Report for South of Bay Road, SAFER Bay Project.* June 12, 2024.
[30] HDR, 2024. *DRAFT Preliminary Geotechnical Report for South of Bay Road, SAFER Bay Project.* June 12, 2024.

levee and foundation erosion. However, the design requirements for levee systems outlined in the Code of Federal Regulations title 44, section 65.10 require engineering analyses to demonstrate that any levee erosion during the base flood will not result in failure of the embankment or foundation due to seepage, and that seepage during the base flood will not jeopardize embankment or foundation stability. Additionally, in accordance with section 65.10(d), accredited levee systems must implement maintenance plans specifying formal procedures that ensure the stability, height, and overall integrity of the levee and associated structures and systems are maintained.

Levees would also be constructed with properly moisture-conditioned, compacted, low-permeability fine-grained soils to control through-seepage. Where necessary, additional seepage control measures, such as seepage cutoff walls, pressure relief wells, and drained or underdrained berms, would be incorporated. Adherence to the applicable levee design requirements would reduce the Project's potential to directly or indirectly cause substantial adverse effects related to ground instability, and the operational impact related to geologic instability. Therefore, the impact would be **less than significant**.

Impact GEO-4: Be located on expansive soil.[31] (*Less than Significant*)

Construction and Operation

The Project sites are located on soils with a high expansion potential.[32] Habitat improvements would either restore tidal action to managed ponds or maintain former salt ponds as managed ponds. Habitat improvements would not involve constructing new habitable facilities or alter land use such that an increased number of people would be at risk from expansive soils. Regarding shoreline protection, as stated previously, the Project would be designed consistent with USACE Design Criteria documents, including EM 1110-1-1804 and EM-1110-2-1913. Geotechnical investigations must evaluate expansive soils, and detailed settlement analyses must be made during design of levee systems founded on compressible soils.

Although the levees would be constructed on expansive soils, the results of detailed settlement analyses that consider the presence of compressible soils would be reflected in levee design (consistent with requirements of EM 1110-2-1913). The levee's substantial weight would reduce the potential for the Project to cause adverse effects related to soil expansion. Additionally, the levees would be constructed using engineered fill material with low shrink-swell potential. As a result, despite the levees being situated on expansive soil, the risks associated with such soil conditions would be addressed by engineering design. Therefore, the impact would be **less than significant**.

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[31] The California Building Code, based on the International Building Code and the now defunct Uniform Building Code, no longer includes a Table 18-1-B. Instead, section 1803.5.3 of the California Building Code describes the criteria for analyzing expansive soils.

[32] NRCS (Natural Resources Conservation Service), 2024. Web Soil Survey. Linear Extensibility Rating for the Project Site.

Cumulative Impacts

Impact C-GEO-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse impacts related to geology and soils. (*Less than Significant*)

The entire Bay Area is a seismically active region with a high risk of seismic hazards and a wide variety of geologic conditions. Nevertheless, the geographic scope of potential geology and soils impacts is restricted to the Project area and the immediate vicinity because related risks are relatively localized or area specific. Therefore, the geographic scope of potential cumulative impacts for these resources includes the Project area and immediately adjacent areas. In order to have a cumulative impact, adverse geologic impacts would have to occur at the same time and in the same location or similar conditions of the Project.

The Project and cumulative projects listed in Table 3.1-2 and shown on Figure 3.1-1 could be subject to strong ground shaking and would be located in areas mapped as having "very high" liquefaction susceptibility. As described in Impact GEO-1, the Project would be designed and constructed in accordance with current levee standards and engineering practices to protect against seismic and soil-related hazards. The Sea-Level Rise Vulnerability and Adaptation Planning Study described in Table 3.1-2, which includes a shoreline protection levee, would be subject to similar engineering requirements. Adjacent cumulative development projects that do not involve levees would be constructed in accordance with current building codes, standards, and engineering practices to protect against seismic and soil-related hazards. Implementing the Project in accordance with these requirements would minimize safety risks related to seismic hazards. Therefore, the Project, in combination with the cumulative projects, would not result in a significant cumulative impact related to seismic safety and unstable soils.

Regarding soil erosion, the Project could increase the potential for soil erosion in the area of ground disturbance, as discussed in Impact GEO-2. Immediately adjacent cumulative projects under construction could also cause soil erosion. However, the Project and cumulative projects listed in Table 3.1-2 would be required to implement the requirements of the CGP which would reduce the potential for a cumulative impact. Therefore, the Project, in combination with the cumulative projects, would not result in a significant cumulative impact related to unstable soils and geologic units.

The Project, in combination with cumulative projects, could be subject to soil instability during construction due to the placement of new levee fill or expansive soils. The Sea-Level Rise Vulnerability and Adaptation Planning Study described in Table 3.1-2 would follow similar engineering standards as the Project. Adjacent cumulative development projects shown on Figure 3.1-1 that do not involve shoreline protection would follow current construction practices and engineering standards. Additionally, the design requirements for levee systems in the Code of Federal Regulations title 44, section 65.10 would ensure that any levee erosion or seepage during the base flood would not result in failure of the embankment or foundation. Therefore, the Project's impact related to soil instability or soil expansion, in combination with the cumulative projects, would not be cumulatively considerable, and the impact would be **less than significant**.

3.9 Greenhouse Gas Emissions

This section evaluates the potential impacts of the SAFER Bay Project (Project) on existing greenhouse gas (GHG) conditions in the Project area and the potential for the Project to result in significant impacts related to GHG emissions and global climate change. This section presents information about the environmental and regulatory settings, identifies the criteria used to evaluate the significance of potential impacts, the methods used in evaluating these impacts, and the results of the impact assessment. The Project evaluated is described in Chapter 2, *Project Description*, of this EIR.

3.9.1 Environmental Setting

Climate Science

The terms *global warming* and *climate change* are commonly used to describe the increase in the average temperature of the earth's near-surface air and oceans since the mid-20th century and related changes in global climate. Natural processes and human actions have been identified as affecting the climate. The Intergovernmental Panel on Climate Change (IPCC) has concluded that variations in natural phenomena such as solar radiation and volcanoes produced most of the warming from pre-industrial times to 1950. However, increasing GHG concentrations in the atmosphere since the 19th century that have resulted from human activities, such as fossil fuel combustion, deforestation, and other activities, have been demonstrated to be a major factor in causing global climate change. GHGs in the atmosphere naturally trap heat by impeding the exit of solar radiation that is received by Earth and is reflected back into space—a phenomenon referred to as the *greenhouse effect*. Some GHGs occur naturally and are necessary for keeping Earth's atmosphere warm and its surface inhabitable. However, increases in the concentrations of these gases in the atmosphere during the last 100 years have trapped solar radiation and reduced the amount of radiation that is reflected into space, which has intensified the natural greenhouse effect and resulted in an increase in global average temperature.

Greenhouse Gas Emissions

Carbon dioxide (CO_2), methane, nitrous oxide, sulfur hexafluoride, perfluorocarbons, and hydrofluorocarbons are the principal GHGs. When concentrations of these gases exceed historical concentrations in the atmosphere, the greenhouse effect is intensified. CO_2, methane, and nitrous oxide occur naturally and are also generated through human activity. CO_2 emissions are largely byproducts of fossil fuel combustion, whereas methane results from off-gassing, natural gas leaks from pipelines and industrial processes, and incomplete combustion associated with agricultural practices, landfills, energy providers, and other industrial facilities. Nitrous oxide emissions are also largely attributable to agricultural practices and soil management. Other human-generated GHGs include fluorinated gases, such as hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride, which have much higher heat absorption potential than CO_2 and are byproducts of certain industrial processes.

CO_2 is the reference gas for climate change, as it is the GHG emitted in the highest volume. The effect of each GHG on global warming is the product of the mass of its emissions and its global warming potential (GWP). GWP indicates the amount that a gas is predicted to contribute to global warming relative to the amount of warming predicted to be caused by the same mass of CO_2. For example, methane and nitrous

oxide are substantially more potent GHGs than CO_2, with respective GWPs of 25 and 298 times those of CO_2, which has a GWP of 1.[1]

In emissions inventories, GHG emissions are typically reported as metric tons[2] of CO_2 equivalent ($MTCO_2e$). CO_2e for a given GHG is calculated as the product of the mass emitted for a given GHG and its specific GWP. Methane and nitrous oxide have much higher GWPs than CO_2; however, CO_2 is emitted in higher quantities and accounts for the majority of GHG emissions in CO_2e, both from commercial developments and from human activities in general. The types of GHG emissions that are relevant to this analysis are described below.

Carbon Dioxide

Carbon dioxide is a naturally occurring gas that enters the atmosphere through both natural and anthropogenic (human) sources. Key anthropogenic sources include the burning of fossil fuels (e.g., oil, natural gas, and coal), solid waste, trees, wood products, and other biomass, as well as industrially relevant chemical reactions, such as those associated with manufacturing cement. CO_2 "sinks" include vegetation and the ocean, which absorb CO_2 through sequestration and dissolution and are two of the largest reservoirs of CO_2 sequestration. In other words, CO_2 is removed from the atmosphere when it is absorbed by plants and the ocean as part of the biological carbon cycle.

Methane

Methane, the main component of natural gas, is used for home heating and cooking and occurs naturally from the decay of organic matter. Natural sources of methane include wetlands, permafrost,[3] oceans, and wildfires. Anthropogenic sources include fossil fuel production, biomass burning, animal husbandry (fermentation during manure management), and landfills.

Nitrous Oxide

Nitrous oxide is a colorless gas produced by microbial processes in soil and water, including reactions that occur in nitrogen-rich fertilizers. In addition to agricultural sources, some industrial processes (i.e., nylon production, nitric acid production) emit nitrous oxide. Combustion processes emit primarily oxides of nitrogen (NO_X) composed of nitrogen dioxide and nitric oxide (i.e., NO). Very small quantities of nitrous oxide may be formed during fuel combustion through the reaction of nitrogen and oxygen.

Blue Carbon

Blue carbon refers to carbon captured and stored in coastal ecosystems like tidal marshes, mangroves, and seagrasses. These coastal systems, though much smaller in size than the planet's forests, sequester carbon at a much faster rate, and can continue to do so for millions of years. As a result, these ecosystems are highly efficient at sequestering carbon from the atmosphere, which is stored in both plant biomass and deep in the anaerobic soils. Blue carbon ecosystems can sequester carbon at rates up to 10 times greater

[1] CARB (California Air Resources Board), 2024. "GHG Global Warming Potentials." Available online at ww2.arb.ca.gov/ghg-gwps. Accessed January 2025.

[2] The term metric ton is commonly used in the U.S. to refer to the metric system unit, tonne, which is defined as a mass equal to 1,000 kilograms. A metric ton is approximately 1.1 short tons and approximately 2,204.6 pounds.

[3] *Permafrost* refers to soil or underwater sediment that continuously remains below 0 degrees Celsius (32 degrees Fahrenheit [°F]) for 2 years or more.

than and store three to five times more carbon when compared to terrestrial forests per unit area.[4] Carbon stored in coastal soils can remain locked away for millennia if undisturbed. These ecosystems also buffer coastlines from storm surges, reduce erosion, and support biodiversity. Blue carbon is increasingly being integrated into carbon markets and climate policy as a nature-based solution for GHG reduction.

Effects of Global Climate Change

The scientific community's understanding of the fundamental processes responsible for global climate change has improved over the past decade, and its predictive capabilities are advancing. However, uncertainties remain in scientific predictions of, for example, local effects of climate change; the occurrence, frequency, and magnitude of extreme-weather events; effects of aerosols; changes in clouds; shifts in the intensity and distribution of precipitation; and changes in oceanic circulation.

Because of the complexity involved and the inability to adequately model Earth's climate system in a sufficient resolution, the uncertainty surrounding climate change is dynamic and ever-changing with research. Nonetheless, the IPCC's Sixth Assessment Report states that the dominant cause of the warming observed since the mid-20th century is extremely likely to have been the anthropogenic increase in GHG concentrations mainly from the transportation and industrial sectors.[5] The national academies of science from 80 countries have issued statements endorsing the consensus position that humans are the dominant cause of global warming that has occurred since the mid-20th century.[6]

The *Fourth California Climate Change Assessment*, published in 2018, found that global climate change has had the following potential impact on California: loss of snowpack; sea level rise; more extreme-heat days per year; more high-ozone days per year; more extreme forest fires; more severe droughts punctuated by extreme-precipitation events; increased erosion of California's coastlines and sea water intrusion into the Sacramento–San Joaquin Delta and associated levee systems; and increased pest infestation.[7] The report's findings are consistent with climate change studies published by the California Natural Resources Agency (CNRA) since 2009, starting with the *California Climate Adaptation Strategy,* published as a response to Governor's Executive Order S-13-2008.[8] In 2014, the CNRA rebranded the first update of the 2009 adaptation strategy as the *Safeguarding California Plan*.[9] The 2018 update to the

[4] NOAA (National Oceanic and Atmospheric Association), 2025. "Blue Carbon Fast Facts." Last modified September 24, 2025. Available online at coast.noaa.gov/states/fast-facts/blue-carbon.html. Accessed November 3, 2025.

[5] IPCC (Intergovernmental Panel on Climate Change), 2022. "Climate Change 2022: Mitigation of Climate Change." Available online at www.ipcc.ch/report/sixth-assessment-report-working-group-3/. Accessed January 2025.

[6] Cook, J., N. Oreskes, P.T. Doran, W.R.L. Anderegg, B. Verheggen, E.W. Maibach, J.S. Carlton, S. Lewandowsky, A.G. Skuce, S.A. Green, D. Nuccitelli, P. Jacobs, M. Richardson, B. Winkler, R. Painting, and K. Rice, 2016. *Consensus on consensus: a synthesis of consensus estimates on human-caused global warming*. Environmental Research Letters Vol. 11 No. 4, DOI:10.1088/1748-9326/11/4/048002. 2016. Available online at iopscience.iop.org/article/10.1088/1748-9326/11/4/048002/pdf. Accessed January 2025.

[7] CNRA (California Natural Resources Agency), 2018. *Safeguarding California Plan: 2018 Update*. January 2018. Available online at resources.ca.gov/CNRALegacyFiles/docs/climate/safeguarding/update2018/safeguarding-california-plan-2018-update.pdf.

[8] CNRA (California Natural Resources Agency), 2009. *2009 California Climate Adaptation Strategy: A Report to the Governor of the State of California in Response to Executive Order S-13-2008*. Available online at resources.ca.gov/CNRALegacyFiles/docs/climate/Statewide_Adaptation_Strategy.pdf. Accessed January 2025.

[9] CNRA (California Natural Resources Agency), 2014. *Safeguarding California: Reducing Climate Risk, An Update to the 2009 California Climate Adaptation Strategy*. July 2014. Available online at resources.ca.gov/CNRALegacyFiles/docs/climate/Final_Safeguarding_CA_Plan_July_31_2014.pdf. Accessed January 2025.

Safeguarding California Plan identifies hundreds of ongoing actions and next steps that state agencies are taking to address climate impacts within a framework of 81 policy principles and recommendations.

In accordance with the 2009 *California Climate Adaptation Strategy*, the California Energy Commission was directed to develop a website on climate change scenarios and impacts that would be beneficial for local decision-makers. The website, known as Cal-Adapt, provides information on the projection of potential future climate scenarios, which consist of local average values for temperature, sea level rise, snowpack, and other data representative of a variety of models and scenarios, including potential social and economic factors. Below is a summary of some of the potential effects that could be experienced in California because of global warming and climate change.

Temperature Increase

The primary effect of the addition of GHGs to the atmosphere has been a rise in the average global temperature. The impact of human activities on global temperature is readily apparent in the observational record. In 2023, Earth's average land and ocean surface temperature was 2.12°F above the highest global temperature among all years in the 1850–2023 climate record maintained by National Oceanic and Atmospheric Association. The 10 warmest years since 1850 have all occurred in the past decade and the average global temperature for 2023 exceeded the pre-industrial (1850–1900) average by 2.43°F.[10]

The contiguous U.S. average maximum (daytime) temperature for 2023 was 66.2°F, 2.2°F above the 20th century average, ranking eighth warmest in the historical record.[11] The California Climate Adaptation Strategy projects climate change impacts to California. Average annual temperature increases experienced over most of California have already exceeded 1°F, with some areas exceeding 2°F, when comparing the average from 1901–1960 to 1986–2016. The daily maximum average temperature, an indicator of extreme temperature shifts, is expected to rise 4.4°F–5.8°F by 2050 and 5.6°F–8.8°F by 2100. Heat-Health Events (HHEs), which better predict risks to populations vulnerable to heat, will worsen drastically throughout the state. By 2050, the Central Valley is projected to experience average HHEs that are 2 weeks longer, and HHEs could occur four to 10 times more often in the northern Sierra region.[12] According to the Cal-Adapt website, San Mateo County could experience an increase in annual average maximum temperature of approximately 4.0 to 6.8°F by 2070–2099, compared to the baseline period of 1961–1990.[13]

Extreme-heat conditions and heat waves driven by climate change are predicted to impact larger areas, last longer, and have higher temperatures. Heat waves, defined as 3 or more days with temperatures above 90°F, are projected to occur more frequently by the end of the century. Extreme-heat days and heat waves can negatively impact human health. Heat-related illnesses that can occur as a result of extreme-heat

[10] NOAA (National Oceanic and Atmospheric Association), 2024. "2023 was the world's warmest year on record, by far." January 12, 2024. Available online at www.noaa.gov/news/2023-was-worlds-warmest-year-on-record-by-far. Accessed July 18, 2024.

[11] CNRA (California Natural Resources Agency), 2014. *Safeguarding California: Reducing Climate Risk, An Update to the 2009 California Climate Adaptation Strategy*. July 2014. Available online at resources.ca.gov/CNRALegacyFiles/docs/climate/Final_Safeguarding_CA_Plan_July_31_2014.pdf. Accessed January 2025.

[12] CNRA (California Natural Resources Agency), 2022. *Protecting Californians from Extreme Heat: A State Action Plan to Build Community Resilience*. April 2022. Available online at resources.ca.gov/-/media/CNRA-Website/Files/Initiatives/Climate-Resilience/2022-Final-Extreme-Heat-Action-Plan. Accessed December 2024.

[13] Cal-Adapt. 2025. "Local Climate Change Snapshot." Available online at cal-adapt.org/tools/local-climate-change-snapshot. Accessed January 2025.

include a spectrum of illnesses ranging from heat cramps to severe heat exhaustion and life-threatening heat stroke.[14]

Air Quality Degradation

Higher temperatures, conducive to the formation of air pollution, could worsen air quality in California and make it more difficult to achieve air quality standards. Climate change may increase the concentration of ground-level ozone, which can cause breathing problems, aggravate lung diseases such as asthma, emphysema, and chronic bronchitis, and cause chronic obstructive pulmonary disease; however, the magnitude of the effect, and therefore, its indirect effects, are uncertain. Emissions from wildfires can lead to excessive levels of particulate matter, ozone, and volatile organic compounds.[15] Additionally, severe heat accompanied by drier conditions and poor air quality could increase the number of heat-related deaths, illnesses, and asthma attacks throughout the state.[16]

Hydrology and Sea Level Rise

Climate change has the potential to affect the amount of snowfall, rainfall, and snowpack; the intensity and frequency of storms; flood hydrographs (flash floods, rain or snow events, coincidental high-tide and high-runoff events); sea level rise and coastal flooding; coastal erosion; and the potential for saltwater intrusion. Sea level rise can be a product of global warming that occurs through two main processes: expansion of seawater as the oceans warm and the melting of ice over land. A rise in sea levels could cause coastal flooding and erosion and could jeopardize California's water supply.

Sea level has risen 8 to 9 inches since 1880. In 2023, global sea level set a new record high of 3.99 inches above 1993 levels. The rate of sea level rise is accelerating; it has more than doubled, from 0.06 inch (1.4 millimeters) per year throughout most of the 20th century to 0.14 inch (3.6 millimeters) per year from 2006 to 2015. In many locations along the U.S. coastline, high-tide flooding is now 300 percent to more than 900 percent more frequent than it was 50 years ago. Models project that average sea level rise for the contiguous U.S. could be 2.2 meters (7.2 feet) by 2100 and 3.9 meters (13 feet) by 2150.[17] Rising seas could affect transportation infrastructure, utilities, and regional industries.

Ecosystems and Wildlife

Increases in global temperatures and the potential resulting changes in weather patterns could have ecological effects on a global and local scale. Increased concentrations of GHGs are likely to accelerate the rate of climate change. As stated in the *Safeguarding California Plan*:

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[14] RCCC (Red Cross Red Crescent Climate Centre), 2019. *Heatwave Guide for Cities*. July 2019. Available online at www.climatecentre.org/downloads/files/IFRCGeneva/RCCC%20Heatwave%20Guide%202019%20A4%20RR%20ONLINE%20copy.pdf.

[15] NOAA (National Oceanic and Atmospheric Association), 2022. *NOAA Wildfires/FIREX Fact Sheet – The Impact of Wildfires on Climate and Air Quality*. Available online at csl.noaa.gov/factsheets/csdWildfiresFIREX.pdf. Accessed January 2025.

[16] RCCC (Red Cross Red Crescent Climate Centre), 2019. *Heatwave Guide for Cities*. July 2019. Available online at www.climatecentre.org/downloads/files/IFRCGeneva/RCCC%20Heatwave%20Guide%202019%20A4%20RR%20ONLINE%20copy.pdf.

[17] NOAA (National Oceanic and Atmospheric Association), 2023. "Climate Change: Global Sea Level." Available online at www.climate.gov/news-features/understanding-climate/climate-change-global-sea-level. Last updated August 22, 2023. Accessed January 2025.

> *[S]pecies and ecosystems in California are valued both for their intrinsic worth and for the services they provide to society. Air purification, water filtration, flood attenuation, food provision, recreational opportunities such as fishing, hunting, wildlife viewing, and more are all services provided by ecosystems. These services can only be maintained if ecosystems are healthy and robust and continue to function properly under the impacts of climate change.*
>
> *A recent study examined the vulnerability of all vegetation communities statewide in California and found that 16 of 29 were highly or nearly highly vulnerable to climate change, including Western North American freshwater marsh, Rocky Mountain subalpine and high montane conifer forest, North American Pacific coastal salt marsh, and more.*

Soil moisture is likely to decline in many regions, and intense rainstorms are likely to become more frequent. With climate change, ecosystems and wildlife will be challenged by the spread of invasive species, barriers to species migration or movement in response to changing climatic conditions, direct impacts on species health, and mismatches in timing between seasonal life-cycle events such as species migration and food availability.[18]

Greenhouse Gas Emissions Inventories

U.S. Greenhouse Gas Emissions

In 2022 (i.e., the latest year for which data are available from the U.S. Environmental Protection Agency [EPA]), the U.S. emitted about 6,343 million $MTCO_2e$ of GHGs, 75 percent of which came from fossil fuel combustion for electricity, heat, and transportation.[19] Emissions increased by 1.3 percent from 2021 to 2022 (after accounting for sequestration from the land use sector). The increase was driven largely by an increase in CO_2 emissions from fossil fuel combustion, which increased by 1 percent relative to 2021. This increase in fossil fuel combustion emissions was due primarily to the economic activity rebound after the height of the COVID-19 pandemic. Of the nation's major sectors, transportation accounts for the highest volume of GHG emissions (approximately 28 percent), followed by electricity (25 percent), industry (23 percent), commercial and residential (13 percent), and agriculture (11 percent). Between 1990 and 2022, total U.S. GHG emissions decreased by 3 percent, reaching a peak in 2007 before generally decreasing.[20]

California Greenhouse Gas Emissions

The California Air Resources Board (CARB) compiles GHG inventories for the state. Based on the GHG inventory data from 2022 (the most recent year for which data are available), emissions from GHG-emitting activities statewide were 371.1 million $MTCO_2e$. From 2000 to 2022, the carbon intensity of California's economy decreased by 54.8 percent while the gross domestic product increased by

[18] CNRA (California Natural Resources Agency), 2018. *Safeguarding California Plan: 2018 Update*. January 2018. Available online at resources.ca.gov/CNRALegacyFiles/docs/climate/safeguarding/update2018/safeguarding-california-plan-2018-update.pdf.

[19] EPA (U.S. Environmental Protection Agency), 2024. *Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990–2022.* Available online at www.epa.gov/system/files/documents/2024-04/us-ghg-inventory-2024-main-text_04-18-2024.pdf. Accessed January 2025.

[20] CNRA (California Natural Resources Agency), 2018. *Safeguarding California Plan: 2018 Update*. January 2018. Available online at resources.ca.gov/CNRALegacyFiles/docs/climate/safeguarding/update2018/safeguarding-california-plan-2018-update.pdf.

77.5 percent.[21] The decline in total emissions is likely attributable to the State of California's GHG emissions reduction goals, and in part to the post–COVID-19 pandemic, most notably from reduced vehicle activity (reductions in travel by heavy- and light-duty vehicles).

Of California's major sectors, transportation accounts for the highest volume of GHG emissions (approximately 39 percent), followed by the industrial sector (22 percent), the electricity sector (16 percent), residential and commercial (14 percent), and agriculture (8 percent).

Local

City of East Palo Alto 2021 Greenhouse Gas Emissions Inventory

In September 2023, the City of East Palo Alto adopted its 2030 Community Climate Action Plan and Adaptation Strategies and conducted an inventory of their 2021 citywide GHG emissions. It was estimated that 73,885 $MTCO_2e$ were generated from residential, commercial, industrial, transportation, waste, water, and wastewater sectors. Of the major sectors, transportation accounts for the highest volume of GHG emissions (approximately 55 percent), followed by building energy (35 percent), solid waste (6 percent), off-road equipment (2 percent), wastewater (1 percent), and water (less than 1 percent).[22]

City of Menlo Park 2021 Greenhouse Gas Emissions Inventory

In July 2020, the City of Menlo Park adopted its 2030 Climate Action Plan (CAP), with amendments in April 2021 and August 2024. Included in the CAP is the 2021 Menlo Park Community GHG emissions inventory. It was estimated that 282,558 $MTCO_2e$ were generated from residential, commercial, industrial, transportation, waste, water, and wastewater sectors. Of the major sectors, transportation accounts for the highest volume of GHG emissions (approximately 62 percent), followed by natural gas uses (34 percent), waste (3 percent), and electricity (1 percent).[23]

City of Redwood City 2017 Greenhouse Gas Emissions Inventory

In November 2020, the City of Redwood City adopted its 2030 CAP. The CAP included the 2017 generation-based GHG emissions inventory.[24] It was estimated that 494,944 $MTCO_2e$ were generated from residential, commercial, industrial, transportation, waste, and municipal sectors. Of the major sectors, transportation accounts for the highest volume of GHG emissions (approximately 56.1 percent), followed by building energy use (40.7 percent), waste (2.4 percent), and wastewater (less than 1 percent).[25]

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[21] CARB (California Air Resources Board), 2024. *California Greenhouse Gas Emissions from 2000 to 2022: Trends of Emissions and Other Indicators*. Date of Release: September 20, 2024. Available online at ww2.arb.ca.gov/sites/default/files/2024-09/nc-2000_2022_ghg_inventory_trends.pdf. Accessed January 2025.

[22] City of East Palo Alto, 2021. "Greenhouse Gas Inventory." Available online at www.ci.east-palo-alto.ca.us/publicworks/page/greenhouse-gas-inventory. Accessed January 2025.

[23] City of Menlo Park, 2024. *2030 Climate Action Plan*. Adopted by City Council July 2020 (Resolution No.6575); Amended April 20, 2021 (Resolution No. 6621); Amended Aug. 27, 2024 (Resolution No. 6933). Available online at menlopark.gov/files/sharedassets/public/v/3/city-managers-office/documents/sustainability/2030-cap.pdf. Accessed January 2025.

[24] The generation-based GHG Inventory captures the level of emissions based on energy use. It includes 1) direct consumption of energy, 2) consumption of energy via the electrical grid, and 3) emissions from the treatment/decomposition of waste.

[25] City of Redwood City, 2020. *Climate Action Plan*. November 2020. Available online at www.redwoodcity.org/home/showpublisheddocument/22781/637426822669070000. Accessed January 2025.

3.9.2 Regulatory Framework

Federal

Clean Air Act

The U.S. Supreme Court has held that the EPA must consider regulation of GHG emissions by motor vehicles. In *Massachusetts v. Environmental Protection Agency et al.*,[26] 12 states and cities, including California, together with several environmental organizations, sued EPA to require that GHGs be regulated as pollutants under the Clean Air Act. The Supreme Court ruled that GHGs fit within the Clean Air Act's definition of a pollutant and that EPA has the authority to regulate GHGs.

On December 7, 2009, the EPA Administrator signed two distinct findings regarding GHGs under section 202(a) of the Clean Air Act:

- **Endangerment Finding:** Current and projected concentrations of the six key GHGs—CO_2, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride—in the atmosphere threaten the public health and welfare of current and future generations.
- **Cause or Contribute Finding:** The combined emissions of these GHGs from new motor vehicles and new motor vehicle engines contribute to the GHG pollution that threatens public health and welfare.[27]

These findings were a prerequisite for implementing GHG emissions standards for vehicles.

Vehicle Emissions Standards

The EPA and the National Highway Traffic Safety Administration are responsible for establishing vehicle standards. In August 2012, standards were adopted for model years 2017 through 2025 for passenger cars and light-duty trucks.[28] According to these standards, a model year 2025 vehicle would emit half the GHG emissions of a model year 2010 vehicle.[29] The State of California harmonized its vehicle efficiency standards through 2025 with the federal standards at this time (see *Advanced Clean Trucks Regulation and Advanced Clean Fleets Regulation*). In January 2017, EPA issued its Midterm Evaluation of the GHG emissions standards, finding that it would be practical and feasible for automakers to meet the model year 2022–2025 standards through several existing technologies.[30] In August 2018, EPA and the National Highway Traffic Safety Administration proposed maintaining the 2020 corporate average fuel

[26] 549 U.S. 497 (2007).

[27] EPA (U.S. Environmental Protection Agency), 2009. *Federal Register – 40 CFR Chapter 1, Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act; Final Rule.* December 15, 2009. Available online at www.epa.gov/sites/default/files/2021-05/documents/federal_register-epa-hq-oar-2009-0171-dec.15-09.pdf. Accessed January 2025.

[28] EPA (U.S. Environmental Protection Agency), 2012. *EPA and NHTSA Set Standards to Reduce Greenhouse Gases and Improve Fuel Economy for Model Years 2017 – 2025 Cars and Light Trucks.* August 2012. Available online at nepis.epa.gov/Exe/ZyPDF.cgi/P100EZ7C.PDF?Dockey=P100EZ7C.pdf. Accessed January 2025.

[29] EPA (U.S. Environmental Protection Agency), 2009. *Federal Register – 40 CFR Chapter 1, Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act; Final Rule.* Page 2. December 15, 2009. Available online at www.epa.gov/sites/default/files/2021-05/documents/federal_register-epa-hq-oar-2009-0171-dec.15-09.pdf. Accessed January 2025.

[30] EPA (U.S. Environmental Protection Agency), 2017. *Final Determination on the Appropriateness of the Model Year 2022–2025 Light-Duty Vehicle Greenhouse Gas Emission Standards under the Midterm Evaluation.* January 2017. Available online at nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100QQ91.pdf. Accessed October 2025.

economy and CO_2 standards for model years 2021 through 2026.[31] On March 20, 2024, EPA announced a final rule, *Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles*, which set new, more protective standards to further reduce harmful air pollutant emissions from light-duty and medium-duty vehicles starting with model year 2027.[32]

State

California has promulgated a series of executive orders, laws, and regulations aimed at reducing the level of GHGs in the atmosphere and emissions of GHGs. CARB regulates air quality issues in California and adopts regulations to reduce GHG emissions and establish vehicle emission standards, summarized below.[33]

California Environmental Quality Act Guidelines

Section 15064.4(a) of the CEQA Guidelines states that "[a] lead agency shall make a good-faith effort, based to the extent possible on scientific and factual data, to describe, calculate or estimate the amount of GHG emissions resulting from a project." Refer to Section 3.9.3, for additional information on the role of CEQA in the evaluation of GHG emissions.

State of California Executive Orders

Executive Order S-1-07 and Update to the Low Carbon Fuel Standard

EO S-1-07 (2007) established a low carbon fuel standard with a goal to reduce the carbon intensity of transportation fuels sold in California by at least 10 percent by 2020. In September 2018, CARB extended the low carbon fuel standard program to 2030, making significant changes to the design and implementation of the program, including a doubling of the carbon intensity reduction to 20 percent by 2030.[34] In 2024, CARB approved further updates setting targets to reduce the carbon intensity of California's transportation fuel pool by 30 percent by 2030 and by 90 percent by 2045. The amendments also increase support for zero-emissions infrastructure, including for medium- and heavy-duty vehicles, and make more transit agencies eligible to generate credits.[35]

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[31] EPA (U.S. Environmental Protection Agency), 2018. *Federal Register – 40 CFR Parts 85 and 86, The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021–2026 Passenger Cars and Light Trucks*. August 24, 2018. Available online at www.govinfo.gov/content/pkg/FR-2018-08-24/pdf/2018-16820.pdf. Accessed January 2025.

[32] EPA (U.S. Environmental Protection Agency), 2024. *Federal Register – 40 CFR Parts 85, 86, 600, 1036, 1037, 1066, and 1068, Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles.* April 18, 2024. Available online at www.govinfo.gov/content/pkg/FR-2024-04-18/pdf/2024-06214.pdf. Accessed January 2025.

[33] Refer also to Section 3.3, Air Quality, for a summary of the following rules and regulations that also address GHG emissions: Advanced Clean Trucks Regulation, Advanced Clean Fleets Regulation, Airborne Toxic Control Measure to Limit Diesel-Fuel Commercial Motor Vehicle Idling, Airborne Toxic Control Measure for Stationary Compression Ignition Engines, and Mobile Source Strategy.

[34] CARB (California Air Resources Board), 2018. *CARB Amends Low Carbon Fuel Standard for wider impact*. September 27, 2018. Available online at ww2.arb.ca.gov/news/carb-amends-low-carbon-fuel-standard-wider-impact/printable/print. Accessed January 2025.

[35] CARB (California Air Resources Board), 2024. "CARB updates the Low Carbon Fuel Standard to increase access to cleaner fuels and zero-emission transportation options." November 8, 2024. Available online at ww2.arb.ca.gov/news/carb-updates-low-carbon-fuel-standard-increase-access-cleaner-fuels-and-zero-emission. Accessed October 2025.

Executive Order B-30-15

EO B-30-15 (2015) established a new interim statewide reduction target to reduce GHG emissions to 40 percent below 1990 levels by 2030; and required all state agencies to implement measures to achieve reductions of GHG emissions to meet the 2030 and 2050 reduction targets.

Executive Order B-55-18

EO B-55-18 (2018) committed California to total, economy-wide carbon neutrality by 2045. EO B-55-18 directs CARB to work with relevant state agencies to develop a framework to implement for tracking progress toward this goal.

State of California Policy and Legislation

Assembly Bill 32 and Senate Bill 32

The California Global Warming Solutions Act of 2006 (Assembly Bill [32]) required that statewide GHG emissions be reduced to 1990 levels by 2020 through a statewide cap on GHG emissions. Among other things, this law represented the first enforceable statewide program to limit emissions of these GHGs from all major industries with penalties for noncompliance. AB 32 assigned CARB the primary responsibility for reducing GHG emissions by adopting rules and regulations directing state actions that would achieve GHG emissions. CARB approved the 1990 GHG emissions inventory and established the 2020 GHG emissions reduction target. Senate Bill (SB) 32 (2016) and its companion bill AB 197 established a new climate pollution reduction target of 40 percent below 1990 levels by 2030 and included provisions to ensure that the benefits of state climate policies reach environmental justice (EJ) communities.[36]

Assembly Bill 1279 (California Climate Crisis Act)

AB 1279 (passed in 2022) required codification of the state's goal to reach net-zero GHG emissions by 2045. This goal requires California to cut GHG emissions by 85 percent compared to 1990 levels.

Climate Change Scoping Plan

Pursuant to AB 32, CARB prepared and updated a Climate Change Scoping Plan (Scoping Plan) for achieving maximum technologically feasible and cost-effective GHG emission reductions by milestone years. CARB approved the initial Scoping Plan in 2008, outlining the regulations, market-based approaches, voluntary measures, policies, and other emission-reduction programs that would be needed to meet the 2020 statewide GHG emission limit and initiate the transformations needed to achieve the state's long-range climate objectives.[37] The Scoping Plan was subsequently updated in 2014 and again in 2022. The 2022 Scoping Plan assesses progress toward the statutory 2030 GHG reduction target while laying out a path to achieving carbon neutrality no later than 2045.[38] The major element of the 2022 Scoping Plan

[36] According to the State Climate Policy Dashboard, an EJ community, also known as a disadvantaged, underserved, or overburdened community, is a group within a certain geographic location that experiences disproportionate environmental harms and risks and may share certain socioeconomic conditions. This can be the result of greater exposure to environmental hazards, vulnerability to climate impacts, lack of opportunity for public participation, and other health-related and sociopolitical circumstances. EJ community designation is often based on environmental factors, like air and water pollution and hazardous waste; socioeconomic factors, like race and income; and health factors, like rates of asthma and cardiovascular disease, and some states also designate all Tribal lands as EJ communities.

[37] CARB (California Air Resources Board), 2008. *Climate Change Scoping Plan: A Framework for Change*. December 2008. Available online at ww3.arb.ca.gov/cc/scopingplan/document/adopted_scoping_plan.pdf. Accessed January 2025.

[38] CARB (California Air Resources Board), 2022. *2022 Scoping Plan for Achieving Carbon Neutrality*. December 2022. Available online at ww2.arb.ca.gov/sites/default/files/2023-04/2022-sp.pdf.

is the decarbonization of every sector of the economy. This requires rapidly moving to zero-emission transportation for cars, buses, trains, and trucks; phasing out the use of fossil gas for heating; clamping down on chemicals and refrigerants; providing communities with sustainable options, such as walking, biking, and public transit to reduce reliance on cars; continuing to build out solar arrays, wind turbine capacity, and other resources to provide clean, renewable energy to displace fossil fuel fired electrical generation; scaling up new options, such as renewable hydrogen for hard-to-electrify end uses and biomethane where needed.[39]

Senate Bill 375

SB 375 (passed in 2008) addressed GHG reductions from new vehicle technology and fuel standards with reductions from more efficient land use patterns and improved transportation. Under the law, CARB approved GHG reduction targets for California's 18 federally designated regional planning bodies, known as Metropolitan Planning Organizations. The target reductions for the San Francisco Bay Area (Bay Area) are a regional reduction of per-capita GHG emissions from cars and light-duty trucks by 10 percent by 2020 and by 19 percent by 2035 compared to a 2005 baseline.[40]

Truck and Bus Regulation

The intent of this regulation is to reduce the emissions of NO_X and PM from existing diesel vehicles operating in California by requiring installation of diesel soot filters and encouraging the retirement, replacement, or retrofit of older engines with newer emission-controlled models. CARB also promulgated emissions standards for select off-road diesel construction equipment, such as bulldozers, loaders, backhoes, and forklifts. The In-Use Off-Road Diesel-Fueled Fleets regulation adopted by CARB in 2007 aims to reduce emissions by installing diesel soot filters and encouraging the retirement, replacement, or repowering of older, dirtier engines with newer emissions-controlled models.

Senate Bill 350

SB 350 (2015) changed the standards of the California Renewables Portfolio Standard (RPS) program by requiring that the amount of electricity generated and sold to retail customers per year from eligible renewable energy resources be increased from 33 percent to 50 percent by December 31, 2030. The law requires the State Energy Commission to establish annual targets for statewide energy efficiency savings and demand reduction that will achieve a cumulative doubling of statewide energy efficiency savings in existing electricity and natural gas final end uses of retail customers by January 1, 2030.

Senate Bill 100

SB 100 (2018) requires that 100 percent of electricity in California must be obtained from renewable and zero-carbon energy resources by 2045 and creates new standards for RPS goals. Specifically, the law increases the percentage of energy that both investor-owned utilities and publicly owned utilities must obtain from renewable sources from 50 percent to 60 percent by 2030. Incrementally, these energy providers must also have a renewable energy supply of 33 percent by 2020, 44 percent by 2024, and 52 percent by 2027.

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[39] CARB (California Air Resources Board), 2008. *Climate Change Scoping Plan: A Framework for Change*. December 2008. Available online at ww3.arb.ca.gov/cc/scopingplan/document/adopted_scoping_plan.pdf. Accessed January 2025.

[40] CARB (California Air Resources Board), 2018. "SB 375 Regional Targets – Current Regional Targets." March 2018. Available online at ww2.arb.ca.gov/our-work/programs/sustainable-communities-program/sb-375-regional-targets. Accessed October 2025.

Senate Bill 1383 (Short-Lived Climate Pollutants)

SB 1383 (2016) requires statewide reductions in short-lived climate pollutants (methane, fluorinated gases, and black carbon—all GHGs with a much higher warming impact than CO_2) and requires CARB to adopt a strategy to reduce methane by 40 percent, hydrofluorocarbons gases by 40 percent, and anthropogenic black carbon by 50 percent below 2013 levels by 2030. The CH_4 emissions reduction goals include a 75 percent reduction in the level of statewide disposal of organic waste from 2014 levels by 2025.

Regional

Bay Area Air District

The Bay Area Air District (Air District), (formerly known as the Bay Area Air Quality Management District [BAAQMD] until January 2025) is the regional government agency that regulates stationary sources of air pollution in the nine Bay Area counties. The Air District regulates GHG emissions through the following plans, programs, and guidelines.

Air District Climate Protection Program

In 2005, the Air District established a climate protection program to reduce pollutants that contribute to global climate change and affect air quality in the San Francisco Bay Area Air Basin. The climate protection program includes measures that promote energy efficiency, reduce vehicle miles traveled (VMT), and develop alternative sources of energy, all of which assist in reducing GHG emissions and reducing air pollutants that affect the health of residents. The Air District also seeks to support current climate protection programs in the region and to stimulate additional efforts through public education and outreach, technical assistance to local governments and other interested parties, and promotion of collaborative efforts among stakeholders.[41]

Air District California Environmental Quality Act Air Quality Guidelines

The Air District's *California Environmental Quality Act Air Quality Guidelines* (CEQA Air Quality Guidelines) were prepared to assist in the evaluation of air quality impacts of projects and plans proposed in the Bay Area. The guidelines also include recommended assessment methods for air toxics, odors, and GHG emissions. The 2017 update to the CEQA Air Quality Guidelines[42] included significance thresholds for GHG emissions based on the emission-reduction goals for 2020 articulated by the California Legislature in AB 32. In April 2022, in response to SB 32 and the 2017 Scoping Plan targets for 2030,

[41] BAAQMD (Bay Area Air Quality Management District, now called the Bay Area Air District [Air District]), 2008. *Bay Area AQMD Climate Protection Program*. April 24, 2008. Available online at ww2.arb.ca.gov/sites/default/files/barcu/board/books/2008/042408/08-4-4pres.pdf.

[42] BAAQMD (Bay Area Air Quality Management District, now called the Bay Area Air District [Air District]), 2017. *California Environmental Quality Act Air Quality Guidelines*. May 2017. Available online at www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en.

and EO B-15's target for carbon neutrality by 2045, the Air District adopted updated CEQA significance thresholds for GHGs[43] and included them in the 2023 update, the 2022 CEQA Air Quality Guidelines.[44]

For land use development projects, the Air District recommends using the approach endorsed by the *California Supreme Court in Center for Biological Diversity v. Department of Fish & Wildlife,*[45] which evaluates a project based on its effect on California's efforts to meet the state's long-term climate goals. As the Supreme Court held in that case, a project that would be consistent with meeting those goals can be found to have a less-than-significant impact on climate change under CEQA. If a project would contribute its "fair share" of what will be required to achieve those long-term climate goals, then a reviewing agency can find that the impact will not be significant because the project will help to solve the problem of global climate change.[46] Applying this approach, the Air District recommends that new land use development projects incorporate the Air District-identified design elements to do their "fair share" of implementing the goal of carbon neutrality by 2045 (discussed more in Section 3.9.3.1).[47]

The project-level GHG thresholds adopted by the Air District are as follows:

A. Projects must include, at a minimum, the following project design elements:

    1. Buildings

        a. The project will not include natural gas appliances or natural gas plumbing (in both residential and non-residential development).

        b. The project will not result in any wasteful, inefficient, or unnecessary electrical usage as determined by the analysis required under CEQA section 21100(b)(3) and section 15126.2(b) of the State CEQA Guidelines.

    2. Transportation

        a. Achieve compliance with Electric Vehicle (EV) requirements in the most recently adopted version of CALGreen Tier 2.

        b. Achieve a reduction in project-generated VMT below the regional average consistent with the current version of the California Climate Change Scoping Plan (currently 15 percent).

            OR

[43] BAAQMD (Bay Area Air Quality Management District, now called the Bay Area Air District [Air District]), 2022. *Justification Report: CEQA Thresholds for Evaluating the Significance of Climate Impacts from Land Use Projects and Plans*. April 2022. Available online at www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa-thresholds-2022/justification-report-pdf.pdf?la=en.

[44] BAAQMD (Bay Area Air Quality Management District, now called the Bay Area Air District [Air District]), 2023. *2022 California Environmental Quality Act Air Quality Guidelines.* April 2023. Available online at www.baaqmd.gov/plans-and-climate/california-environmental-quality-act-ceqa/updated-ceqa-guidelines.

[45] 62 Cal. 4th 204 (2015).

[46] 62 Cal. 4th 220–23.

[47] BAAQMD (Bay Area Air Quality Management District, now called the Bay Area Air District [Air District]), 2022. Justification Report: CEQA Thresholds for Evaluating the Significance of Climate Impacts from Land Use Projects and Plans. April 2022. Available online at www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa-thresholds-2022/justification-report-pdf.pdf?la=en.

Meet a locally adopted Senate Bill 743 VMT target, reflecting the recommendations provided in the Governor's Office of Planning and Research's [now called the Governor's office of Land Use and Climate Innovation as of July 2024] Technical Advisory on Evaluating Transportation Impacts in CEQA:

i. *Residential projects*: 15 percent below the existing VMT per capita.

ii. *Office projects*: 15 percent below the existing VMT per employee.

iii. *Retail projects*: no net increase in existing VMT.[48]

Alternately, a local government may prepare a qualified GHG reduction strategy that is consistent with SB 32 goals. If a project is consistent with an adopted qualified GHG reduction strategy that addresses the project's GHG emissions, it can be presumed that the project will not have significant GHG emissions under CEQA.[49]

Clean Air Plan

The Air District and other air districts prepare clean air plans in accordance with the federal and state Clean Air Acts. On April 19, 2017, the Air District Board of Directors adopted the 2017 *Clean Air Plan: Spare the Air, Cool the Climate* (2017 Clean Air Plan), an update to the 2010 Clean Air Plan.[50] The 2017 Clean Air Plan is a comprehensive plan that focuses on the closely related goals of protecting public health and protecting the climate. Consistent with the state's GHG reduction targets, the plan lays the groundwork for a long-term effort to reduce Bay Area GHG emissions 40 percent below 1990 levels by 2030 and 80 percent below 1990 levels by 2050.

Local

General Plans

The Project would be subject to local plans and policies of the jurisdictions in which it is located, including East Palo Alto, Menlo Park, and Redwood City. **Table 3.9-1** presents local plans and policies regarding GHG emissions to support consideration of Project consistency with general plan policies.

[48] BAAQMD (Bay Area Air Quality Management District, now called the Bay Area Air District [Air District]), 2022. *Justification Report: CEQA Thresholds for Evaluating the Significance of Climate Impacts from Land Use Projects and Plans*. April 2022. Available online at www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa-thresholds-2022/justification-report-pdf.pdf?la=en.

[49] BAAQMD (Bay Area Air Quality Management District, now called the Bay Area Air District [Air District]), 2022. *Justification Report: CEQA Thresholds for Evaluating the Significance of Climate Impacts from Land Use Projects and Plans*. April 2022. Available online at www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa-thresholds-2022/justification-report-pdf.pdf?la=en.

[50] BAAQMD (Bay Area Air Quality Management District, now called the Bay Area Air District [Air District]), 2017. *2017 Clean Air Plan (2017 Clean Air Plan): Spare the Air, Cool the Climate*. Adopted April 19, 2017. Available online at www.baaqmd.gov/~/media/files/planning-and-research/plans/2017-clean-air-plan/attachment-a_-proposed-final-cap-vol-1-pdf.pdf.

TABLE 3.9-1
LOCAL PLANS AND POLICIES RELEVANT TO THE PROJECT – GREENHOUSE GAS EMISSIONS

CITY OF EAST PALO ALTO VISTA 2035 GENERAL PLAN
Goal POC-8: Adapt to and mitigate climate change impacts.
Policy POC-8.1: Climate Action Plan. Implement and regularly update the City's Climate Action Plan (CAP). Update the City's Greenhouse Gas Inventory and associated implementation actions matrix every 2 to 3 years, and the overall CAP framework document every 5 to 10 years.
CITY OF MENLO PARK GENERAL PLAN
Goal LU-7: Promote the implementation and maintenance of sustainable development, facilities and services to meet the needs of Menlo Park's residents, businesses, workers, and visitors.
Policy LU-7.E: Greenhouse Gas Emissions. Develop a Greenhouse Gas (GHG) standard for development projects that would help reduce communitywide GHG emissions to meet City and Statewide reduction goals.
Goal CIRC-4: Improve Menlo Park's overall health, wellness, and quality of life through transportation enhancements.
Policy CIRC-4.1: Global Greenhouse Gas Emissions. Encourage the safer and more widespread use of nearly zero-emission modes, such as walking and biking, and lower emission modes like transit, to reduce greenhouse gas emissions.
REDWOOD CITY GENERAL PLAN
Goal PS-4: Promote efficient management and use of energy resources to help minimize greenhouse gas emissions.
Goal PS-5: Mitigate against climate change.
Policy PS-5.2: Strive to reduce per capita GHG emissions and total municipal GHG emissions to 50 percent below 2005 levels by 2030.
Policy PS-5.3: Incorporate consideration of, and measures to mitigate the risks of, sea level rise, increased precipitation, flooding, extreme heat events, severe winds, prolonged drought, and other effects of climate change into the planning process.
Goal PS-6: Protect built and natural environments from the effects of climate change.
Policy PS-6.3: Support research that examines the effects of climate change on Redwood City, including both built and natural environments.
Policy PS-6.7: Consider future sea level rise in the planning and design of future development.
Policy PS-6.8: Ensure ongoing regional coordination for resiliency planning and sea level rise protection projects.
Policy PS-6.9: Consider sea level rise in the development of watershed management plans and flood control infrastructure.
Policy PS-6.10: Encourage the use of environmentally sensitive sea level rise adaptation strategies that incorporate natural infrastructure.
Sources: City of East Palo Alto, 2017. *Vista 2035 General Plan*. Adopted October 4, 2016; Final Version March 2017. Available online at www.ci.east-palo-alto.ca.us/planning/page/vista-2035-general-plan; City of Menlo Park, 2016. *General Plan, City of Menlo Park*. Adopted November 29, 2016. Available online at www.menlopark.gov/files/sharedassets/public/v/1/community-development/documents/general-plan/land-use-and-circulation-element-adopted-20161129.pdf; City of Redwood City, 2023. *Redwood City General Plan*. Adopted October 11, 2010; Amended August 2023. Available online at www.redwoodcity.org/departments/community-development-department/planning-housing/planning-services/environmental-documents/general-plan-eir.

City of East Palo Alto 2030 Climate Action Plan

In September 2023, the City of East Palo Alto adopted its 2030 CAP, aiming to reduce per capita GHG emissions by 55 percent below 2005 levels by 2030, and progressing toward carbon neutrality by 2045. The plan outlines various actions across several key areas including energy, water, transportation, land

use, and solid waste. Notably, the city surpassed its previous 2011 CAP goal by achieving 20 percent emissions reduction by 2020, exceeding the targeted 15 percent reduction.[51]

City of Menlo Park 2030 Climate Action Plan

In July 2020, the City of Menlo Park adopted its 2030 CAP with the goal of achieving carbon neutrality by 2030. The plan sets to reach zero carbon by 2030 through a 90 percent reduction in emissions from 2005 levels, with the remaining 10 percent through direct carbon removal.[52] The plan's key strategies include policies and programs targeting increases in all-electric infrastructure, reducing VMT, eliminating fossil fuels from municipal operations, and developing adaptation plans for sea level rise and flooding.

City of Redwood City 2030 Climate Action Plan

In November 2020, the City of Redwood City adopted its 2030 CAP, aiming to surpass state standards by reducing emissions by up to 50 percent below 2005 levels by 2030 and achieving carbon neutrality before 2045.[53] The CAP emphasizes community engagement, sustainable development, and the adoption of renewable energy, while also focusing on enhancing public transit, promoting energy efficiency in buildings, and expanding urban green spaces.

3.9.3 Impacts and Mitigation Measures

Significance Criteria

In accordance with CEQA, CEQA Guidelines (including Appendix G), relevant plans, policies, and/or guidelines, and agency standards, the Project could have a significant impact if it were to do any of the following:

- Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment; or
- Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

The California Air Pollution Control Officers Association considers GHG impacts to be exclusively cumulative impacts; therefore, assessment of significance is based on a determination of whether the GHG emissions from a project represent a cumulatively considerable contribution to the global atmosphere.[54]

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[51] City of East Palo Alto, 2023. *2030 Climate Action Plan and Adaptation Strategies*. Page 1. Available online at www.cityofepa.org/sites/default/files/fileattachments/public_works/page/23694/epa_2030_community_climate_action_plan_adaptation_strategies.pdf. Accessed January 2025.

[52] City of Menlo Park, 2024. *2030 Climate Action Plan*. Adopted by City Council July 2020 (Resolution No.6575); Amended April 20, 2021 (Resolution No. 6621); Amended Aug. 27, 2024 (Resolution No. 6933). Page 4. Available online at menlopark.gov/files/sharedassets/public/v/3/city-managers-office/documents/sustainability/2030-cap.pdf. Accessed January 2025.

[53] City of Redwood City, 2020. *2030 Climate Action Plan*. November 2020. Page 5. Available online at www.redwoodcity.org/home/showpublisheddocument/22781/637426822669070000. Accessed January 2025.

[54] CAPCOA (California Air Pollution Control Officers Association), 2008. *CEQA & Climate Change: Evaluating and Addressing Greenhouse Gas Emissions from Projects Subject to the California Environmental Quality Act*. January 2008. Available online at www.ourair.org/wp-content/uploads/CAPCOA-CEQA-and-Climate-Change.pdf.

In 2022, the Air District adopted new significance thresholds that address the state's SB 32 GHG emissions reduction goals and carbon neutrality goal for 2045. The Air District also published a Justification Report in 2022 that provides substantial evidence that lead agencies can use to support their use of these thresholds.[55] The recommended project-level GHG thresholds adopted by the Air District focus on operational emissions primarily from building energy use and transportation. The thresholds require elimination of natural gas use in projects, efficient use of electricity, electric vehicle charging infrastructure requirements consistent with CALGreen's Tier 2 standards, and a reduction in VMT relative to the regional average.[56] The Air District has not adopted significance thresholds that address construction emissions.

Alternatively, a project can be evaluated for consistency with a local GHG reduction strategy that meets the criteria under the CEQA Guidelines section 15183.5(b) to evaluate the significance of GHG impacts.[57]

Methodology

GHG emissions and global climate change represent cumulative impacts from human activities and development projects locally, regionally, statewide, nationally, and worldwide. GHG emissions from all of these sources cumulatively contribute to the significant adverse environmental impacts of global climate change. No single project could generate enough GHG emissions to noticeably change the global average temperature; instead, the combination of GHG emissions from past, present, and future projects around the world has contributed and will continue to contribute to global climate change and its associated environmental impacts.

No thresholds have been established for assessing whether the GHG emissions of a project would be considered a cumulatively considerable contribution to global climate change; however, all reasonable efforts should be made to minimize a project's contribution to global climate change. In addition, although GHG emissions impacts are recognized exclusively as cumulative impacts,[58] such impacts must also be evaluated at a project level under CEQA. To evaluate GHG emissions impacts, this analysis determines whether the Project is qualitatively consistent with the Air District's project-level GHG thresholds. This evaluation is considered in a cumulative context because the analysis of GHG emissions is only relevant in a cumulative context. GHG emissions associated with the Project have been quantified for informational purposes only.

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55 BAAQMD (Bay Area Air Quality Management District, now called the Bay Area Air District [Air District]), 2017. *2017 Clean Air Plan (2017 Clean Air Plan): Spare the Air, Cool the Climate*. Adopted April 19, 2017. Available online at www.baaqmd.gov/~/media/files/planning-and-research/plans/2017-clean-air-plan/attachment-a_-proposed-final-cap-vol-1-pdf.pdf.

56 BAAQMD (Bay Area Air Quality Management District, now called the Bay Area Air District [Air District]), 2017. *2017 Clean Air Plan (2017 Clean Air Plan): Spare the Air, Cool the Climate*. Adopted April 19, 2017. Available online at www.baaqmd.gov/~/media/files/planning-and-research/plans/2017-clean-air-plan/attachment-a_-proposed-final-cap-vol-1-pdf.pdf.

57 BAAQMD (Bay Area Air Quality Management District, now called the Bay Area Air District [Air District]), 2022. *Justification Report: CEQA Thresholds for Evaluating the Significance of Climate Impacts from Land Use Projects and Plans*. April 2022. Available online at www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa-thresholds-2022/justification-report-pdf.pdf?la=en.

58 CAPCOA (California Air Pollution Control Officers Association), 2008. *CEQA & Climate Change: Evaluating and Addressing Greenhouse Gas Emissions from Projects Subject to the California Environmental Quality Act*. January 2008. Available online at www.ourair.org/wp-content/uploads/CAPCOA-CEQA-and-Climate-Change.pdf.

Habitat restoration efforts proposed by the Project would result in an increase of blue carbon stored in plant biomass and sediment. Because blue carbon is not included in IPCC inventory guidelines or included in California's Natural and Working Lands (NWL) inventory, the analysis presented below does not quantify the benefits of blue carbon. A qualitative analysis is presented in the context of potential sequestration and storage benefits and consistency with the 2022 Scoping Plan.

GHG emissions impacts have also been evaluated by assessing whether the Project would conflict with applicable GHG emissions reduction strategies and local actions approved or adopted by CARB, the Air District, and the cities of East Palo Alto, Menlo Park, and Redwood City. The *2022 Scoping Plan for Achieving Carbon Neutrality*, the Air District's 2017 Clean Air Plan, the CAPs for the cities of East Palo Alto, Menlo Park, and Redwood City, and general plan policies and goals from these jurisdictions are applicable to the Project and are intended to reduce GHG emissions to meet the statewide targets.

This Draft EIR evaluates Project activities at a level of detail consistent with the best available information and specificity available at the time of EIR preparation. To the extent that activities necessary for Project completion are known, they are described in Chapter 2, *Project Description*, and evaluated in the impact analysis below. Key information needed for the evaluation of GHG impacts includes detailed construction assumptions, such as worker trips, vehicle trips, and equipment usage, along with proposed land use. Those reaches for which conceptual (generally 10-percent) design information is available, depicted with dashed lines on Figure 2-1 in Chapter 2, *Project Description*, lack information for certain components (e.g., ramps, relocation of the pedestrian bridge at Bay Road). Appendix INFRA identifies those changes to infrastructure and other encroachments that are evaluated programmatically. GHG impacts from these changes cannot be evaluated since there is little to no siting or design information available on which to base the evaluations. The need for additional CEQA documentation would be evaluated once these design details are developed as discussed in greater detail in Section 1.2.5, Program–Project EIR and Supplemental CEQA.

Impacts and Mitigation Measures

Table 3.9-2 summarizes the impact conclusions presented in this section.

TABLE 3.9-2
GREENHOUSE GAS EMISSIONS IMPACT CONCLUSIONS

Impact	Level of Significance
Impact GHG-1: Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.	LTS
Impact GHG-2: Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases.	NI
Impact C-GHG-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse impacts related to greenhouse gas emissions.	LTS

NOTES: LSM = Less than Significant with Mitigation; LTS = Less than Significant; NI = No Impact; SU = Significant and Unavoidable

Impact GHG-1: Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment. ***(Less than Significant)***

Project implementation would result in the generation of GHG emissions primarily during construction. Section 2.6 in Chapter 2, *Project Description*, details the activities that would occur during each phase of construction associated with the Project's shoreline protection features, recreational features, and habitat improvements. GHG emissions would be generated primarily by fuel combustion in construction equipment and vehicles transporting workers, materials, and equipment to and from the construction sites. Emissions generated would vary throughout the construction period by type and intensity of construction activities performed and would cease upon the completion of construction.

Table 3.9-3 summarizes GHG emissions generated from construction activities associated with each Project component as well as the overall GHG emissions generated by all combined Project components during each year of construction. Emissions are presented by component, reach, and construction year. As shown in Table 3.9-3, over the construction duration of the Project between 2027 and 2031, construction-related off-road equipment and on-road vehicles would range from a minimum of 520 $MTCO_2e$ per year in 2027 to a maximum of 6,423 $MTCO_2e$ per year in 2030.

The 2022 CEQA Air Quality Guidelines include project-level thresholds that primarily target operational GHG emissions based on implementation of best management practices. The Air District does not provide significance thresholds for construction-related GHG emissions; it considers a project's construction emissions to have a less-than-significant impact because they represent a very small portion of the project's lifetime GHG emissions. For this reason, among others, the Air District's proposed thresholds for land use projects are designed to address operational GHG emissions, which represent the vast majority of project-related GHG emissions. However, the Project would generate only minimal operational emissions, and construction-related emissions would constitute a large percentage of total GHG emissions over the Project's lifetime.

Nonetheless, the Air District's reasoning still applies at a foundational level: to achieve the statewide GHG targets pursuant to SB 32 and AB 1279 and the CARB 2022 Scoping Plan, efforts to reduce GHG emissions must focus on operational sources, such as building energy use and vehicle travel. The underlying principle of the Air District's thresholds is that operational emissions must align with state-level targets.

As discussed in Section 3.9.2, for land use development projects, the Air District recommends using the approach endorsed by the California Supreme Court in *Center for Biological Diversity v. Department of Fish & Wildlife*, which evaluates a project based on its effect on California's efforts to meet the state's long-term climate goals. As the Supreme Court held in that case, a project that would be consistent with meeting those goals can be found to have a less-than-significant impact on climate change under CEQA. If a project would contribute its "fair share" of what will be required to achieve those long-term climate goals, then a reviewing agency can find that the impact will not be significant because the project will help to solve the problem of global climate change.

TABLE 3.9-3
CONSTRUCTION GREENHOUSE GAS EMISSIONS—SHORELINE PROTECTION AND RECREATIONAL FEATURES

Component	Reach	Construction Year	Annual GHG Emissions ($MTCO_2e$ per year)
Shoreline Protection, Recreational Features	South of Bay Road	2030	504
		2031	434
	North of Bay Road	2031	2,241
		2032	59
	Dumbarton Approach (Railroad to SR 84)	2029	73
		2030	1,036
	Dumbarton Approach (SR 84 Crossing)	2032	63
		2033	555
	Substation and Marsh Restoration	2029	262
		2030	2,176
	Tech Campus	2031	1,082
		2032	84
	Bayfront Expressway	2032	337
	Bedwell Bayfront Park	2032	85
		2033	188
	Marsh Road	2033	98
		2034	36
Shoreline Protection, Recreational Features	All Reaches	2029	334
		2030	3,717
		2031	3,771
		2032	624
		2033	841
		2034	36
Habitat Improvements	Tidal Marsh Restoration in Ponds R1 and R2, Western Snowy Plover Breeding Habitat Enhancement in Ponds SF2 and R3	2029	841
		2030	1,353
		2031	1,789
Overall Project		2029	1,175
		2030	5,070
		2031	5,559
		2032	624
		2033	841
		2034	36

NOTES: $MTCO_2e$ = metric tons of carbon dioxide equivalent
SOURCE: Table compiled by Environmental Science Associates in 2025 based on Appendix AIR of this EIR.

GHG emissions from off-road construction equipment represent a very small portion of overall statewide emissions (0.6 percent), and CARB has identified only limited strategies to control emissions from such equipment. In other words, the state can achieve its 2030 target with very limited emissions reductions in the construction sector. This is a holistic approach in which CARB looks at all emissions sources in California and focuses on reducing the largest emissions sources that the state can influence and control. The 2017 Scoping Plan calls for reducing emissions from certain sources substantially (like vehicular emissions and building energy use) while not targeting emissions for other sources (like construction emissions). Under this strategy, the state can still achieve its 2030 GHG emissions reduction target. Likewise, the 2022 Scoping Plan focuses on building decarbonization, transportation electrification, and VMT reduction, and identifies one action item that requires 25 percent of the construction equipment-related energy demand to be met by electricity by the year 2030 and 75 percent by 2045.[59] These requirements would be implemented on equipment manufacturers and fleet owners to ensure availability of electric construction equipment. Because the Air District's thresholds are based on consistency with statewide targets, the Air District's conclusion that construction-related emissions are less than significant is warranted.

GHG emissions from long-term operations would be generated primarily by equipment and vehicles used for activities described in Section 2.7 in Chapter 2, *Project Description*, such as routine inspections of the shoreline protection facilities, operating flood gates, managing interior drainage, and maintaining the San Francisco Bay Trail. Both equipment use and vehicular activity for these activities would be minimal.

During operations, electricity use at the pump stations to maintain interior drainage would increase over existing conditions, resulting in indirect GHG emissions. However, as part of the RPS Program, SB 100 requires electric utilities—both investor-owned utilities (such as the Pacific Gas and Electric Company [PG&E]) and community choice aggregators—to increase the percentage of electricity provided by renewable resources with renewable energy and zero-carbon resources supplying 100 percent of electric retail sales to end-use customers by 2045.

Though not quantified, restoration of existing managed ponds to tidal marshes enhances long-term sequestration and storage. Managed ponds, often created for salt production or flood control, typically have lower carbon sequestration capacity due to altered hydrology and reduced vegetation. Tidal marsh restoration proposed in Ponds R1 and R2 would reestablish tidal flows and native vegetation (e.g., converting managed ponds back to tidal marshes) and would substantially boost blue carbon storage. Restoring these existing managed ponds to tidal marshes would not only increase carbon accumulation in sediments over time but would also lead to growth of native vegetation, which contributes to aboveground biomass carbon (which is minimal in managed ponds). The anaerobic conditions in tidal marsh soil slow decomposition, allowing carbon to remain stored for centuries and enhancing long-term sequestration. Based on data from the San Francisco Estuary Institute, soil carbon accumulation in restored tidal marshes ranges from 0.73 to 2.23 $MTCO_2$ per acre per year and aboveground biomass (e.g., cordgrass, pickleweed) adds approximately 0.08 to 0.2 $MTCO_2$ per acre per year.[60] This does not include

[59] CARB (California Air Resources Board), 2008. *Climate Change Scoping Plan: A Framework for Change*. December 2008. Available online at ww3.arb.ca.gov/cc/scopingplan/document/adopted_scoping_plan.pdf. Accessed January 2025.

[60] SFEI (San Francisco Estuary Institute), 2022. *Leveraging Wetlands for a Better Climate Future: Incorporating Blue Carbon into California's Climate Planning.* July 2022. Available online at www.sfei.org/sites/default/files/biblio_files/Leveraging%20wetlands%20for%20a%20better%20climate%20future_med%20res.pdf.

avoided emissions or co-benefits like flood protection and biodiversity gains. The benefits of tidal marsh restoration from increase in carbon storage and sequestration over the long term would offset the short-term emissions of GHG during construction.

Overall, construction-related and operational activities for the Project would not generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment. Therefore, the impact would be **less than significant**.

Impact GHG-2: Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases. ***(No Impact)***

The Project would generate emissions primarily from construction equipment and vehicles, which neither CARB nor the Air District consider to be significant sources of GHG emissions that would impede the state's progress toward its GHG reduction goals. In their climate action planning, CARB and the Air District target operational sources, such as building energy use and transportation, as sectors where maximum reductions can be achieved. The 2022 Scoping Plan identifies transportation electrification, VMT reduction, and building decarbonization as the priority strategies for local government climate action. It includes one action item that addresses electrification of construction equipment and requires that 25 percent of construction energy needs be powered by electricity by 2030 with the percentage increasing to 75 percent by 2045.[61] However, the Project's ability to meet this strategy depends on the availability of electric construction equipment in response to requirements imposed on equipment manufacturers and fleet owners. Therefore, this strategy is not implementable directly by the Project. In addition, the local CAPs and general plan policies (shown in Table 3.9-1) do not specifically address emissions from construction equipment and activities as a way to meet the state and cities' GHG reduction goals.

PG&E, which provides electricity to the pump stations used to manage interior drainage, is subject to the requirements of SB 100 under the RPS Program. The program requires that an increasing percentage of electricity supplied be derived from renewable sources, with the ultimate goal of providing 100 percent of the electricity from renewable, carbon-free sources by 2045. In 2024, PG&E was ahead of the state's 33 percent goal, with more than 35 percent of the electricity delivered to its customers coming from eligible renewable resources: solar, wind, bioenergy, geothermal, and small hydropower. Including nuclear and large hydropower, about 85 percent of PG&E's electric power mix was from carbon-free resources.[62]

Managing NWL to enhance carbon sinks and limit GHG emissions is a key component of California's ambitious strategy to achieve net carbon neutrality by 2045. CARB's 2022 Scoping Plan includes seven

[61] CARB (California Air Resources Board), 2008. *Climate Change Scoping Plan: A Framework for Change*. December 2008. Available online at ww3.arb.ca.gov/cc/scopingplan/document/adopted_scoping_plan.pdf. Accessed January 2025.

[62] PG&E (Pacific Gas and Electric Company), 2021. "PG&E Surpasses California's 2020 Renewable Energy Goal; Electricity Delivered to Customers is More than 88% Greenhouse Gas-Free and Among the Cleanest in the Nation." *News & Events from Pacific Gas and Electric Company.* March 9, 2021. Available online at investor.pgecorp.com/news-events/press-releases/press-release-details/2021/PGE-Surpasses-Californias-2020-Renewable-Energy-Goal-Electricity-Delivered-to-Customers-is-More-than-88-Greenhouse-Gas-Free-and-Among-the-Cleanest-in-the-Nation/default.aspx. Accessed on October 10, 2025.

NWL landscapes in its GHG emission-reduction scenarios, one of which is wetlands. Although this category is limited to wetlands and agricultural lands in the Suisun Marsh and the Sacramento–San Joaquin Delta, which represent only a portion of California's coastal wetlands, it is an important step forward in the state's climate planning given the potential for high GHG benefits from wetland restoration.[63]

The 2022 Scoping Plan identifies blue carbon as an eighth landscape type, which may be included in future scenarios if sufficient methods and data become available. However, this landscape is not currently covered by IPCC inventory guidelines or included in California's NWL inventory. California's Ocean Protection Council and San Francisco Estuary Institute are partnering to create a new coastal wetlands, beaches, and watersheds inventory, which will provide additional information. CARB staff will use information from this effort and assess other available data to evaluate how this landscape may be integrated into climate planning efforts in the future as more data becomes available. By increasing blue carbon through restoration of tidal marshland in Ponds R1 and R2, the Project aligns with the intent of the 2022 Scoping Plan Update.

In summary, GHG emissions generated during construction and operation of the Project would not conflict with any plan, policy, or regulation adopted to reduce GHG emissions; therefore, **no impact** would occur.

Cumulative Impacts

Impact C-GHG-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse impacts related to greenhouse gas emissions. (*Less than Significant*)

Global GHG emissions and global climate change are inherently a cumulative concern that is understood for CEQA purposes to be an existing significant and adverse condition. Accordingly, the significance of GHG emissions is determined based on whether such emissions would have a cumulatively considerable impact on global climate change.

Because the geographic scope of cumulative impacts related to GHG emissions (i.e., global climate change) is global, the Project's direct and indirect generation of GHG emissions contributes to this cumulative impact. The California Air Pollution Control Officers Association considers GHG emissions impacts to be exclusively cumulative impacts, in that no single project could, by itself, result in a substantial change in climate. Therefore, the evaluation of project-level GHG impacts presented earlier considers whether the Project would make a considerable contribution to cumulative emissions of GHGs. As discussed previously, Project implementation would result in a less-than-significant impact. Therefore, the contribution to the cumulative global GHG impact would also be **less than significant**.

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[63] CARB (California Air Resources Board), 2022. *2022 Scoping Plan for Achieving Carbon Neutrality*. December 2022. Available online at ww2.arb.ca.gov/sites/default/files/2023-04/2022-sp.pdf.

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3.10 Hazards, Hazardous Materials, and Wildfire

This section evaluates the potential impacts of the SAFER Bay Project (Project) on existing hazards and hazardous materials conditions in the Project area and evaluates the potential for the Project to result in impacts on people and the environment related to hazards, hazardous materials, and wildfire. This section presents information about the environmental and regulatory setting and identifies the criteria used to evaluate the significance of potential impacts, the methods used in evaluating these impacts, and the results of the impact assessment. The Project evaluated is described in Chapter 2, *Project Description*, of this EIR.

3.10.1 Environmental Setting

Study Area for Hazards, Hazardous Materials, and Wildfire

The geographic scope for the analysis of impacts related to hazards, hazardous materials, and wildfire generally encompasses the shoreline protection reaches and habitat restoration areas shown on figures throughout Chapter 2, *Project Description*. In addition, the geographic scope for proximity to schools extends to 0.25 mile beyond the Project and for proximity to airports extends to 2 miles beyond the Project.

Hazardous Materials

Cortese List Sites

A Cortese List[1] database search for hazardous materials sites within or directly adjacent to the Project footprint was performed. Refer to **Figure 3.10-1** for the location of the hazardous materials sites and **Table 3.10-1** for the results of the database search. Previous uses that released contaminants include, among others, disposal sites, agricultural land, a trap and skeet shooting range, and manufacturing plants.

Proximity to Schools

The only school within 0.25 mile of where Project construction or operation would occur is Aspire East Palo Alto Charter School (EPACS; part of Aspire Public Schools) at 1286 Runnymede Street, East Palo Alto. EPACS is approximately 170 feet east of proposed construction in the South of Bay Road Reach, with about half the reach being within 0.25 mile of the school.

Proximity to Airports

The only airport within 2 miles of the Project is Palo Alto Airport, a general aviation facility located at 1925 Embarcadero Road, Palo Alto, along the east side of where San Francisquito Creek (the border between San Mateo and Santa Clara counties) enters San Francisco Bay.

[1] Sites identified as meeting the Cortese List requirements are listed in the California Department of Toxic Substances Control (DTSC) EnviroStor database, State Water Resources Control Board (State Water Board) GeoTracker database, State Water Board's list of solid waste disposal sites with constituents above hazardous waste levels outside the waste management unit, State Water Board's list of active Cease and Desist and Cleanup and Abatement Orders, and DTSC's list of hazardous waste facilities subject to corrective action pursuant to California Health and Safety Code section 25187.5.



SOURCES: NAIP Imagery, 2024; Geotracker, 2025; EnviroStor, 2025

NOTES: Closed sites directly adjacent to Project components are shown on figure but not discussed in Table HAZ-1.

SAFER Bay Project

Figure 3.10-1
Cortese List Sites

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TABLE 3.10-1
CORTESE LIST SITES WITHIN OR DIRECTLY ADJACENT TO PROJECT FOOTPRINT

Business/Site Name	Street Address	Case Type	Status	Status Date	Potential Hazardous Materials Onsite	Brief Description of Site
State Water Resources Control Board GeoTracker						
Cooley Landing (T10000001713)	2100 Bay Road, East Palo Alto	Cleanup Program Site	Open – long-term management	6/9/2020	Arsenic, PCBs, PAHs, TPH	This site was a disposal site and burn dump from 1932 until 1957. Reportedly, waste material (mostly construction debris) was burned in open fires and later in an incinerator. The material was placed on tidelands and allowed to settle. During this time, approximately 2 to 15 feet of fill material was placed over the site. These land uses and the imported fill material resulted in the contamination of the site, including metals, pesticides, polychlorinated biphenyls, polynuclear aromatic hydrocarbons, and petroleum compounds. An engineered cap composed of approximately 2 feet of imported fill was placed over the historical imported fill material and redeveloped as a park with an educational center. The engineered cap is subject to a July 13, 2012, operation and maintenance plan that includes periodic inspections and reporting on the integrity of the cap.
Ravenswood - Romic Environmental Technologies (SL0608102323)	2081 Bay Road, East Palo Alto	Cleanup Program Site	Open – remediation	12/31/2007	Solvents	This site is associated with the "Romic Environmental Technologies Corp (800001633)" and "Bay Roads Holdings (CAD009452657)" EnviroStor sites listed below. The site is an approximately 12.6-acre property historically operated as a hazardous waste management facility, wherein services provided included solvent recycling, fuel blending, wastewater treatment, and hazardous waste storage and treatment. Previous facility operations conducted on the site by the Romic Environmental Technologies Corporation and predecessor companies dating back to the mid-1950s resulted in the release of chemical contaminants to both soil and groundwater. The site is a former Resource Conservation and Recovery Act facility undergoing corrective action and closure.
Peninsula Sportsmen's Club (SL0608116342)	South of the Dumbarton Bridge, East of University Avenue, Menlo Park	Cleanup Program Site	Completed – Case Closed	11/30/2011	Lead, PAHS	The Peninsula Sportsmen's Club operated a skeet shooting range on the site from the 1939 until mid-1994. As a result of these activities, lead pellets and PAH-laden clay pigeon debris was distributed on surficial soil and sediment to a maximum depth of approximately 2 feet below ground surface. Lead pellets and clay pigeon debris were also deposited in a portion of the adjacent salt pond owned by the Cargill Salt Company (Cargill), and on/within the levee (also owned by Cargill) that divides the salt pond and SFPUC's property. The site has been subdivided into six distinct geographic/ecological areas, including the firing range area (southern site), clay pigeon stockpile area (central site), Cargill's levee (north-central site), seasonal wetlands (western site), tidal slough (eastern site), and the Cargill salt pond (northern site). SFPUC developed a remediation plan that included semi-annual groundwater monitoring and a revegetation plan to be implemented after remediation. This extensive lead cleanup was completed in 2011 by SFPUC who still owns the uplands portion of the affected property. Ownership of the salt pond portion of the property was transferred to the U.S. Fish and Wildlife Service after cleanup and incorporated into the Don Edwards National Wildlife Refuge.
3723 Haven Avenue Development (T10000012491)	3723 Haven Avenue, Menlo Park	Cleanup Program Site	Open – assessment and interim remedial action	5/30/2020	Benzene, DCE, TCE, vinyl chloride	This former Siltec Site was closed in 2014 using the Low Threat Closure Assessment Tool for Chlorinated Solvent sites. Site remediation was completed in 1999 with TCE source-contaminated soil removal. Residual shallow groundwater contamination (an isolated pocket of TCE at concentrations exceeding ESLs) remained in 2004. Groundwater monitoring data collected in 2019 showed increased TCE concentrations, indicating that the groundwater TCE was not stable. Elevated concentrations of TCE and vinyl chloride were detected in 2019 soil vapor samples in the vicinity of the well with high TCE concentrations. The case was reopened to assess the extent of the mobilized groundwater TCE plume and to evaluate additional remedial actions necessary to degrade contaminants of concern for future site re-development.
Marsh Road Landfill (L10008021218)	Marsh Road, Menlo Park	Land Disposal Site	Open – closed with monitoring	9/15/1993	Acetone, arsenic, benzene, copper, cyanide, dichloroacetic acid, DCE, ethylbenzene, mercury, nickel, nitrate, other metal, other petroleum, other inorganic/salt, toluene, xylene	Marsh Road Landfill (also known as Bedwell Bayfront Park Landfill) was a Class III non-hazardous solid waste management facility where San Mateo County first established solid waste operations in 1957. In 1968, the City of Menlo Park took over the responsibility of the landfill until its closure in 1984 when the refuse was covered with clay. In 1982, the City of Menlo Park began the development of Bedwell Bayfront Park on the 160-acre site, of which the landfill comprises 155 acres (refer to Figures 2-1 and 2-24 in Chapter 2, *Project Description*, for the location of Bedwell Bayfront Park, the site of the former landfill).[2] San Mateo County conducts biennial inspections of the closed landfill. The most recent inspection occurred April 10, 2024, and no violations were observed.[3] Maintenance of the closed landfill includes managing gases that are produced as the waste decomposes (primarily methane) and groundwater that has infiltrated the refuse/migrated through landfill fill material and requires treatment through the sanitary sewer system (known as leachate.) The former landfill typically generates about 127 million standard cubic feet of landfill gas a year. A new flare was built in 2013 to replace old infrastructure, and landfill gas is combusted in compliance with the facility's Air District permit.[4] The City of Meno Park has the responsibility to monitor, collect samples, and dispose of the leachate. The monitoring system consists of 7 groundwater monitoring wells, 2 surface water monitoring locations, 6 leachate wells, 5 piezometers, 12 leachate extraction sumps, and 1 leachate monitoring location at a sanitary sewer manhole. About 3.5 million gallons of leachate are extracted from the landfill annually and discharged to the sanitary sewer system, operated by the West Bay Sanitary District, for conveyance to the wastewater plant for treatment, operated by Silicon Valley Clean Water.[5] The landfill is governed by regulations contained in title 27 (described in Table 3.10-3), which is administered by the San Mateo County Health Department, Environmental Health Services Division acting as the local enforcement agency and San Francisco Bay Regional Water Quality Control Board (RWQCB), and title 17 and Rule 8-34 administered by the Air District. Additionally, the landfill operates under Waste Discharge Requirements contained in RWQCB Order No. 97-073 and BAAQMD Permit to Operate 17478.[6]

[2] City of Menlo Park, 2021. Staff Report Number 21-005-CC. January 12, 2021.
[3] CalRecycle, 2021. SWIS Facility/Site Inspection Details, Marsh Road Sanitary Landfill, Sout (41-AA-0012). Available online at www2.calrecycle.ca.gov/SolidWaste/SiteInspection/Details/367910. Accessed February 27, 2025.
[4] City of Menlo Park, 2021. Staff Report Number 21-005-CC. January 12, 2021.
[5] City of Menlo Park, 2021. Staff Report Number 21-005-CC. January 12, 2021.
[6] City of Menlo Park, 2021. Staff Report Number 21-005-CC. January 12, 2021.

Business/Site Name	Street Address	Case Type	Status	Status Date	Potential Hazardous Materials Onsite	Brief Description of Site
1990 Bay Road Sites						
1990 Bay Road Site-Comprehensive Site (All Effected Properties) (SL0608148082)	1990 Bay Road, East Palo Alto	Cleanup Program Site	Open – verification monitoring	1/1/2005	Arsenic	The site is in an industrial area in East Palo Alto along the western shore of the San Francisco Bay. The approximately 26-acre site comprises several individual properties (described below) and is defined to include areas with arsenic concentrations in soil greater than 20 milligrams per kilogram. The 1990 Bay Road Site is the location of the former operating facility and the source of arsenic contamination. The remainder of the site includes partly developed commercial properties to the north, south, and west; residential and mixed-use properties to the south; and 1.9 acres of tidal wetland located beyond a levee east of the 1990 Bay Road Site. The site was investigated and remediated from the 1980s to the mid-2000s. In 2020, a construction risk management plan (CRMP) was developed for portions of the 1990 Bay Road Site (including the full eastern boundary of the site, where the proposed levee would be constructed), which sets forth management protocols that apply to the management of pollutant-impacted soil and groundwater during construction or development activities. Section 4 of the CRMP outlines the protocols that are required for any activity that disturbs or removes caps on the property. Implementation of the management measures are understood to protect human health, including onsite construction workers, nearby residents and workers, and the environment from potential impacts. The protocols include: replacement of caps (that is, of physical barriers that prevent exposure of underlying soil on the property, including asphalt pavement, geosynthetic clay liners, and other hardscape); access controls for areas where the caps have been removed; dust control; spill prevention; stormwater control; control of groundwater during operations; and soil management protocols.[7]
Rhone-Poulenc – 1990 Bay Road Site, South of Weeks Street Subarea (T10000010291)	1200 Weeks Street, East Palo Alto	Cleanup Program Site	Open – Remediation	7/1/2019	Arsenic, DDD/DDE/DDT, TCE	Arsenic and other contaminants are believed to have been left at the site by Chipman Chemical Co., who manufactured arsenic-based pesticides while occupying the site from 1926–1964. Although arsenic is a naturally occurring substance, tests have shown that it is present at levels higher than normal for the area. The site is being remediated to allow for use by The Primary School, a private, tuition-free early education and primary school that is slated for closure after the 2025–2026 school year. Soil will be removed and a clean cover placed over the remaining native soil.
Rhone-Poulenc-Primary School (T1000009541)	1200 Weeks Street, East Palo Alto	Cleanup Program Site	Open – site assessment	10/25/2016	Arsenic, chlordane, DDD/DDE/DDT, other insecticides/pesticide, fumigants/herbicides, toxaphene	This site has been affected by arsenic releases and is a part of the 1990 Bay Road Site. This site is considered the South of Weeks Street Subarea of the 1990 Bay Road Site. The site has also been affected by pesticides, which are likely related to past agricultural use.
1990 Bay Road Site-Wetland Operable Unit (T10000010290)	1990 Bay Road, East Palo Alto	Cleanup Program Site	Open – long-term management	6/9/2020	Arsenic, cadmium, copper, lead, mercury, selenium, zinc	This site has been affected by arsenic releases and is a part of the 1990 Bay Road Site. The site consists of approximately 2 acres of affected tidal wetlands east of the existing levee near the 1990 Bay Road Site. Soil and groundwater at the site contain elevated concentrations of arsenic, cadmium, copper, lead, mercury, selenium, and zinc.
Former Call-Mac Transportation (T10000012207)	1175 Weeks Street, East Palo Alto	Cleanup Program Site	Open – inactive	7/2/2019	Arsenic, other insecticides/pesticide/ fumigants/herbicides	This site has been affected by arsenic releases and is a part of the 1990 Bay Road Site. Additionally, on June 9, 1993, during boring activities related to development of the property by Shell, soil polluted with unknown contaminants was encountered. Personnel determined by odor that the contaminants in the soil were most likely associated with pesticides.
1990 Bay Road Site-Upland Operable Unit and Annex (T10000010289)	1990 Bay Road, East Palo Alto	Cleanup Program Site	Open – long-term management	6/9/2020	Arsenic	This site is part of the Upland Operating Unit of the 1990 Bay Road Site and is affected by arsenic. The site was used for industrial purposes for 60 years. From 1929 until the 1960s, sodium arsenate was formulated at the site. From 1972 to present, biorational insect controls have been manufactured at the facility.
Sycamore Real Estate Sites						
Sycamore Real Estate Investment (Sitewide) (T10000019768)	2555 Pulgas Avenue, East Palo Alto	Cleanup Program Site	Open – long-term management	7/28/2022	Oil/Grease, petroleum	This site is composed of the following sites, described below: 2555 Pulgas, 2535 Pulgas, 391 Demeter, 350 Demeter, 230 Demeter, 151 Tara, and 264 Tara. Land uses at the site have included agriculture, a construction yard with a mechanic shop, a facility to process and ship cut flowers, and a greenhouse to grow potted plants since approximately 1968. The site is undergoing remediation and in 2006, had two excavations to remove impacted soils. The site is located within the Ravenswood Industrial Area and is under an Area-Wide Risk Management Plan developed in 2021.
Sycamore Real Estate Investment - 2535 Pulgas Avenue (T10000017596)	2535 Pulgas Avenue, East Palo Alto	Cleanup Program Site	Open – long-term management	1/4/2022	Other petroleum	The site was originally developed as early as 1939 for agricultural use. In the late 1940s, the current site buildings were constructed for use as residential and agricultural buildings. In the late 1950s, hot houses for growing flowers were constructed on the site, and the hot houses were demolished in the early 1980s. In 1984, the site was purchased and occupied by the Touchatt Trucking Company for the storage of cars, trucks, and equipment. A cement batch also operated at the site between 2001 and 2008. The site is located within the Ravenswood Industrial Area and is under an Area-Wide Risk Management Plan.
391 Demeter (T10000010439)	391 Demeter Street, East Palo Alto	Cleanup Program Site	Open – long-term management	6/9/2020	PCBs	The site was used for cattle grazing. In the mid-1950s, three large warehouse-type structures were constructed in the southwest corner of the site and later removed. In 1986, fill activities were conducted by Facciola Meat Company (FMC) to raise the grade to prepare for construction of a meat packing plant, and a large quantity of soil was imported and dumped/placed roughly in the shape of a rectangular ringed berm on the southwestern portion of the site. In 2017, interim remedial measures consisting of grading activities in the pre-existing bermed area were performed to prevent the potential migration of PCBs into the tidal wetlands. The site is within the Ravenswood Industrial Area and is under an Area-Wide Risk Management Plan.
350 Demeter Street (T10000017384)	350 Demeter Street, East Palo Alto	Cleanup Program Site	Open – long-term management	2/3/2022	Lead, nickel, zinc, chloroform, chlordane, DDT	The site was used for cattle grazing and/or hay fields from circa 1939 to the mid-1950s; a large warehouse-type building was constructed on the site prior to 1956 and was removed by 1965. In 1970 and 1981, the western and eastern warehouses were constructed, and the site was used for commercial and industrial activities. The site is within the Ravenswood Industrial Area and is under an Area-Wide Risk Management Plan.
230 Demeter Street (T10000017389)	230 Demeter Street, East Palo Alto	Cleanup Program Site	Open – long-term management	4/3/2024	Low levels of cyanide, lead, methylene, chloride, phenol, nickel, arsenic, Chromium, Copper, mercury, selenium, zinc DDD/DDE/DDT, dieldrin	The two parcels are vacant and have been vacant since at least 1948. Grading of the parcels, likely conducted to address potential erosion conditions, was evident in aerial photographs starting in 2002. The site is located within the Ravenswood Industrial Area and is under an Area-Wide Risk Management Plan.[8]

[7] S.S. Papadopulos and Associates, Inc., 2020. *Construction Risk Management Plan Addendum to the Comprehensive Site Management Plan, 1990 Bay Road Site*. December 2020.

[8] Ninyo and Moore, 2021. *Ravenswood Industrial Area Area-Wide Risk Management Plan.*

Business/Site Name	Street Address	Case Type	Status	Status Date	Potential Hazardous Materials Onsite	Brief Description of Site
Sycamore Real Estate Investments - TWC Tara LLC (SL0608169978)	151 Tara Road, East Palo Alto	Cleanup Program Site	Open – verification monitoring	7/12/2018	Diesel, gasoline, lead, other petroleum	Auto dismantling operations were performed at the site from the 1950s through the 1980s. In the 1990s, soil and groundwater investigations and soil cleanup actions were conducted relating to impacts by former site uses. In 1999, the site was purchased by TWC Tara LLC. The site has received imported fill materials ranging up to approximately 8 feet in thickness in the northeast portion of the site to raise the overall elevation for re-development that did not occur. The site is within the Ravenswood Industrial Area and is under an Area-Wide Risk Management Plan.
Sycamore Real Estate Investments - 264 Tara (T10000009229)	264 Tara Street, East Palo Alto	Cleanup Program Site	Open – verification monitoring	7/1/2019	MTBE/TBA/other fuel oxygenates, TPH	The site land use was primarily agricultural up until the 1950s, at which point it was occupied by auto dismantlers and towing companies until the present. In addition, the adjacent property to the east and south, the former Romic facility, is responsible for a VOC groundwater plume that may be encroaching on the site's eastern and southern boundary. Currently undergoing remediation and under an Area-Wide Risk Management Plan, the site will be capped with covers. The site is located within the Ravenswood Industrial Area and is under an Area-Wide Risk Management Plan.
Department of Toxic Substances EnviroStor						
Starlink Logistics Inc. (80001775)	1990 Bay Road, East Palo Alto	Corrective Action	Refer: RWQCB	5/13/1994	Arsenic, lead, cadmium, mercury, and selenium	This site is associated with the "1990 Bay Road" GeoTracker sites and the "Zoecon/Rhone-Poulenc (41280121)" EnviroStor site listed below. The Rhone-Poulenc 1990 Bay Road Facility was originally used to formulate agricultural chemicals. The 5.19-acre Rhone-Poulenc Facility is now part of the "1990 Bay Road" hazardous waste site. Soil and groundwater were contaminated by herbicide formulation operations conducted by prior owners. Contaminated soils containing concentrations of arsenic in excess of 5,000 ppm were excavated and removed from the property in 1992, and soils containing concentrations of arsenic in excess of 500 ppm were treated and capped, except for areas beneath pavement and remaining structures. All these properties have been remediated and are either being used as expected or are available for expected use. Deed restrictions restrict land uses and prohibit intrusive work without the prior approval of the RWQCB, DTSC, StarLink Logistics, Inc., and property owners. These restrictions are intended to prevent exposure to arsenic-affected soil and groundwater.
Zoecon/Rhone-Poulenc (41280121)	1990 Bay Road, East Palo Alto	State Response or National Priorities List	Refer: RWQCB	1/1/1991	Manufacturing – pesticides, metals, uncategorized contaminants	This site is associated with the "1990 Bay Road" GeoTracker sites and the "Starlink Logistics Inc. (80001775)" EnviroStor site listed above. The site is in the middle of Zoecon/Rhone-Poulenc, a Superfund, National Priorities List site and former pesticide manufacturing plant where groundwater and soil were determined to be contaminated with arsenic.
Romic Environmental Technologies Corp (80001633)	2081 Bay Road	Corrective Action	Active	7/15/2010	Metals, organochlorine pesticides, petroleum, PCBs, semi-volatile organics, volatile organics	This site is associated with the "Ravenswood – Romic Environmental Technologies (SL0608102323)" GeoTracker site and the "Bay Roads Holdings (CAD009452657)" EnviroStor site listed below. The site was historically operated as a hazardous waste management facility, wherein services provided included solvent recycling, fuel blending, wastewater treatment, and hazardous waste storage and treatment. Previous facility operations conducted on the site by the Romic Environmental Technologies Corporation and predecessor companies dating back to the mid-1950s resulted in the release of chemical contaminants to both soil and groundwater. The site is a former Resource Conservation and Recovery Act facility undergoing corrective action and closure and is also included as an Active Cleanup Location on DTSC's Sea Level Rise Viewer.
Bay Road Holdings (CAD009452657)	2081 Bay Road	Hazardous Waste Facility	Undergoing closure	3/22/2024		This site is associated with the "Ravenswood – Romic Environmental Technologies (SL0608102323)" GeoTracker site and the "Romic Environmental Technologies Corp (800001633)" EnviroStor site listed above. As of March 2024, the site was undergoing Phase 2 of closure to address soil and groundwater contamination. The facility was being monitored and remediated with biological treatment process injection and circulation system, with source soil removal and thermal treatment as possible future treatment.
Former Peninsula Sportsmen's Club (41090001)	East of University Avenue, Menlo Park	Voluntary Cleanup	Refer: RWQCB	4/30/2004	Arsenic, lead, PAHS, antimony	The site was used as a trap and skeet shooting range onsite owned by the San Francisco Public Utilities Commission. Investigations have been completed by various consultants of soil, sediment, surface water, and groundwater. Lead, antimony, arsenic, and PAHs have been detected in soil. Clay pigeons were composed of clay and coal tar. Lead shot used at this site contained 95% lead and 2 to 3% each of arsenic and antimony. DTSC helped the State Water Board review the first Remedial Action Plan to ensure that treatment occurred in accordance with Health and Safety Code requirements. The site is listed as a Cleanup and Abatement Order (Facility ID 247935) on the State Water Board's list of "active" Cease and Desist Orders and Cleanup and Abatement Orders.
Menlo Park Sanitation (41409921)	1700 Marsh Road Extension, Menlo Park	Evaluation	No Further Action	9/1/1985	Arsenic, cadmium and compounds, chromium VI, lead, uncategorized contaminants (halogenated organic compounds, still bottoms with halogenated organics, sludge – sewage, unspecified acid solution and sludge waste)	This is the former site of a leachate wastewater treatment plant adjacent to Bedwell Bayfront Park Landfill (formerly known as Marsh Road Landfill), where leachate wastewater was processed until 1981. The treatment plant used unlined evaporation ponds to dry waste sludge. The dry waste produced during the process was periodically excavated and taken to the adjoining landfill. Lined oxidation ponds were built in 1965 and sludge was transported to the landfill.
Browning-Ferris Industries (41490048)	End of Marsh Road, East of United States Route 101, Menlo Park	Historical	Refer: RWQCB	4/1/1985	Uncategorized	Refer to the "Marsh Road Landfill (L10008021218)" GeoTracker description for information about this site.

NOTES: Air District = Bay Area Air District; CIS = 1,2-dichloroethene; DCE = dichloroethane; DDD = dichlorodiphenyldichloroethane; DDE = dichlorodiphenyldichloroethylene; DDT = dichlorodiphenyltrichloroethane; DTSC = Department of Toxic Substances Control; EPA = Environmental Protection Agency; ESLs = Environmental Screening Levels; MTBE= methyl tert-butyl ether; PAHS = polynuclear aromatic hydrocarbons; PCBs = ppolychlorinated biphenyls; PCE= tetrachloroethylene; PG&E = Pacific Gas and Electric; ppm = parts per million; RWP = Removal Action Workplan; RWQCB = Regional Water Quality Control Board; SFPUC = San Francisco Public Utilities Commission; State Water Board = State Water Resources Control Board; SUHSD = Sequioa Union High School District; TBA = tertiary butyl alcohol; TCA = 1,1,1-Trichloroethane; TCE = trichloroethylene; TPH = Total Petroleum Hydrocarbons; VOC = volatile organic compound

SOURCE: State Water Board (State Water Resources Control Board), 2024. "GeoTracker." Available online at geotracker.waterboards.ca.gov/. Accessed November 25, 2024; DTSC (Department of Toxic Substances Control), 2024. "EnviroStor." Available online at www.envirostor.dtsc.ca.gov/public/. Accessed November 25, 2024.

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Santa Clara County has prepared a comprehensive land use plan (CLUP) for the Palo Alto Airport, which is intended to ensure that surrounding new land uses do not affect the airport's continued operation and to safeguard the general welfare of the inhabitants in the Palo Alto Airport vicinity and the aircraft occupants.[9] The Palo Alto Airport CLUP identifies building height restrictions (pursuant to Federal Aviation Regulations [FAR] part 77) to ensure no obstructions to air navigation are created. The FAR part 77 surfaces for the Palo Alto Airport include the South of Bay Road Reach (for height restrictions of 154 feet above mean sea level) and the North of Bay Road Reach (for height restrictions of 154 to 354 feet above mean sea level).[10]

Airport safety zones are established to minimize the number of people exposed to potential aircraft accidents in the airport vicinity by imposing density and use limitations within these zones. The safety zones are related to runway length and expected use. The entire South of Bay Road Reach and the very southern portion of the North of Bay Road Reach are within the Palo Alto Airport's safety zones.[11]

Emergency Planning and Response

The County of San Mateo *Emergency Operations Plan: Basic Plan* was prepared by the San Mateo County Sheriff's Office, Homeland Security Division, and Office of Emergency Services based on the functions and principles of the California Standardized Emergency Management System, the National Incident Management System, and the California Incident Command System. The *Emergency Operations Plan* established policies and procedures and assigns responsibilities to ensure the effective management of emergency operations within the San Mateo County Operational Area, which includes cities and towns within the county, special districts, and unincorporated areas. According to the *Emergency Operations Plan*, "the overall objective of emergency management is to ensure the effective coordination of response forces and resources in preparing for and responding to situations associated with natural disasters, technological incidents and national security emergencies." [12]

Similarly, the San Mateo County Multi-Jurisdictional Local Hazard Mitigation Plan evaluates hazard vulnerabilities and outlines mitigation actions that local jurisdictions would implement to minimize injuries, property damage, and community disruptions caused by disasters. It addresses both natural and human-caused hazards, including flooding, drought, wildfires, landslides, severe weather, terrorism, cyber threats, pandemics, and the impacts of climate change.[13]

Evacuation Routes

The *Emergency Operations Plan* is not intended to address normal day-to-day emergency or well-established emergency procedures and does not identify specific emergency response or evacuation routes; the routes would depend on the nature and location of the emergency. The City of Menlo Park General Plan shows emergency response routes identified by the Menlo Park Fire Protection District to be used in response to emergency medical calls, vehicle collisions, hazardous material incidents, and fire

[9] Santa Clara County, 2020. *Comprehensive Land Use Plan: Palo Alto Airport*. Amended November 18, 2020.

[10] Santa Clara County, 2008. *Comprehensive Land Use Plan: Palo Alto Airport, Figure 6: FAR Part 77 Surfaces*. June 13, 2008.

[11] Santa Clara County, 2008. *Comprehensive Land Use Plan: Palo Alto Airport*. "Figure 7: Airport Safety Zones." June 13, 2008.

[12] County of San Mateo, 2015. *Emergency Operations Plan: Basic Plan*. May 22, 2015.

[13] Tetra Tech, 2021. *Multijurisdictional Local Hazard Mitigation Plan.* October 2021. Prepared for County of San Mateo Department of Emergency Management.

incidents.[14] Redwood City Police and Fire Departments implement the San Mateo County's Zonehaven evacuation system, which determines the most efficient and effective evacuation routes based on the emergency type and location. Although evacuation routes vary during an emergency, the Redwood City General Plan identifies roadways most frequently used for evacuations.[15] Although the City of East Palo Alto provides information related to preparing for disasters like floods,[16] the city does not have a publicly available, standardized evacuation plan.

Wildland Fires

As part of its Fire and Resources Assessment Program, the California Department of Forestry and Fire Protection (CAL FIRE) has mapped areas of significant fire hazards throughout the state. The Fire Hazard Severity Zone (FHSZ) maps are developed using a science-based and field-tested model that assigns a hazard score based on the factors that influence fire likelihood and fire behavior. Many factors are considered, such as fire history, existing and potential fuel (natural vegetation), predicted flame length, blowing embers, terrain, and typical fire weather for the area.[17] The SAFER Bay Project components are within Local Responsibility Areas and Federal Responsibility Areas, none of which are within a very high FHSZ.[18]

3.10.2 Regulatory Framework

Unless otherwise noted below, the Project would be consistent with applicable plans and regulations outlined in this section.

Federal

The primary federal agencies with responsibility for hazardous materials management are the U.S. Environmental Protection Agency (EPA), U.S. Department of Labor Occupational Safety and Health Administration (Fed/OSHA), and U.S. Department of Transportation (DOT). **Table 3.10-2** summarizes federal laws, regulations, and responsible agencies related to hazardous materials management relevant for the Project. State and local agencies often have either parallel or more stringent rules than federal agencies. In most cases, state law mirrors or overlaps federal law and enforcement of these laws is the responsibility of the state or of a local agency to which enforcement powers are delegated. Therefore, the requirements of the law and its enforcement are discussed under either the state or local agency section.

[14] City of Menlo Park, 2016. *General Plan*. "Figure 1: Emergency Routes." Adopted November 29, 2016.

[15] City of Redwood City, 2023. *Redwood City General Plan*. "Public Safety Element, Figure PS-11, Evacuation Routes." Amended August 2023.

[16] City of East Palo Alto, 2025. Flood Protection & Disaster Preparation. Available online at www.ci.east-palo-alto.ca.us/publicworks/page/flood-protection-disaster-preparation. Accessed September 8, 2025.

[17] CAL FIRE, 2024. "Fire Hazard Severity Zones." Available online at osfm.fire.ca.gov/what-we-do/community-wildfire-preparedness-and-mitigation/fire-hazard-severity-zones. Accessed December 23, 2024.

[18] CAL FIRE, 2023. *San Mateo County State Responsibility Areas Fire Hazard Severity Zones*. September 29, 2023, effective April 1, 2024. Available online at https://calfire.app.box.com/s/viyymvmweaaciuhwfb2bdxqdok3zo0ke/file/1483769665386; CAL FIRE, 2008. *San Mateo County Very High Fire Hazard Severity Zones in LRA as Recommended by CAL FIRE*. November 24, 2008. Available online at www.smcgov.org/media/73036/download?inline=. Accessed December 23, 2024.

TABLE 3.10-2
RELEVANT FEDERAL LAWS AND REGULATIONS RELATED TO HAZARDOUS MATERIALS MANAGEMENT

Classification	Law or Responsible Federal Agency	Description
Hazardous Materials Management	Community Right-to-Know Act of 1986 (also known as title III of the Superfund Amendments and Reauthorization Act) (Public Law 99-499)	Imposes requirements to ensure that hazardous materials are properly handled, used, stored, and disposed of and to prevent or mitigate injury to human health or the environment if such materials are accidentally released.
Hazardous Waste Handling	Resource Conservation and Recovery Act of 1976 (Code of Federal Regulations title 40, parts 239–282)	Under the RCRA, EPA regulates the generation, transportation, treatment, storage, and disposal of hazardous waste from "cradle to grave."
	Hazardous and Solid Waste Act (Public Law 98-616)	Amended the RCRA in 1984, affirming and extending the "cradle to grave" system of regulating hazardous wastes. The amendments specifically prohibit the use of certain techniques for the disposal of some hazardous wastes.
Hazardous Materials Transportation	DOT (Code of Federal Regulations title 49, parts 100–180)	DOT has the regulatory responsibility for the safe transportation of hazardous materials. The DOT regulations govern all means of transportation except packages shipped by mail.
Occupational Safety	Occupational Safety and Health Act of 1970 (Code of Federal Regulations title 29, 1910)	Fed/OSHA sets standards for safe workplaces and work practices, including the reporting of accidents and occupational injuries.

NOTES: DOT = U.S. Department of Transportation; EPA = U.S. Environmental Protection Agency; Fed/OSHA = U.S. Department of Labor Occupational Safety and Health Administration; RCRA = Resource Conservation and Recovery Act of 1976

SOURCE: Data compiled by Environmental Science Associates in 2025

State

Hazardous Materials

The primary state agencies with responsibility for hazardous materials management in the region are the DTSC and regional water quality control boards (RWQCBs) within the California Environmental Protection Agency, as well as the California Occupational Safety and Health Administration (Cal/OSHA), California Department of Public Health, California Highway Patrol, and California Department of Transportation (Caltrans). Laws and regulations pertaining to hazards and hazardous materials waste are implemented through a variety of means. In some cases, the project proponent or contractor must comply with a permit held at the county or regional level (e.g., the Construction Stormwater General Permit [Construction General Permit]) or must prepare a plan (e.g., the Hazardous Materials Business Plan). **Table 3.10-3** summarizes state laws, regulations, and responsible agencies related to hazardous materials management relevant for the Project.

Wildfires

California Department of Forestry and Fire Protection

Division 1.5 of title 14 of the California Code of Regulations establishes regulations for CAL FIRE in State Responsibility Areas where CAL FIRE is responsible for wildfire protection. These regulations constitute the basic wildland fire protection standards of the California Board of Forestry and Fire Protection. They have been prepared and adopted for the purpose of establishing minimum wildfire protection standards in conjunction with building, construction, and development in State Responsibility Areas. Additionally, California Code of Regulations title 14, division 1.5, chapter 7, subchapter 2 sets

forth the minimum standards for emergency access and egress, signage, water supply, and fuel modification standards for lands within State Responsibility Areas.

TABLE 3.10-3
RELEVANT STATE LAWS AND REGULATIONS RELATED TO HAZARDOUS MATERIALS MANAGEMENT

Classification	Law or Responsible State Agency	Description
Hazardous Materials Management	Unified Hazardous Waste and Hazardous Materials Management Regulatory Program; Certified Unified Program Agency (Health and Safety Code section 25404 et seq.)	In January 1996, the California Environmental Protection Agency adopted regulations, which implemented a Unified Program at the local level. The agency responsible for implementation of the Unified Program is called CUPA. For San Mateo County, the CUPA is the San Mateo County Environmental Health Services.
	California Fire Code (California Code of Regulations title 24, chapter 9)	The California Fire Code regulates the storage and handling of hazardous materials, including the requirement for secondary containment, separation of incompatible materials, and preparation of spill response procedures.
Post-Closure Maintenance Standards for Disposal Sites and Landfills	Closure and Post-Closure Maintenance Standards for Disposal Sites and Landfills (California Code of Regulations title 27, division 2, section 21190)	Under title 27 of the California Code of Regulations, the California Department of Resources Recycling and Recovery regulates post-closure land uses to ensure that they are designed and maintained to do the following: (1) Protect public health and safety and prevent damage to structures, roads, utilities, and gas monitoring and control systems; (2) Prevent public contact with waste, landfill gas, and leachate; and (3) Prevent landfill gas explosions.
Hazardous Waste Handling	California Hazardous Materials Release Response Plan and Inventory Law of 1985; CUPA (Health and Safety Code sections 25500–25519)	This law, also known as the Business Plan Act, requires any business that stores hazardous materials onsite to prepare and implement a Hazardous Materials Business Plan and submit it to the local CUPA.
	California Hazardous Waste Control Act; California Department of Toxic Substances Control (California Health and Safety Code, division 20, chapter 6.5, article 2, section 25100 et seq.)	Under the California Hazardous Waste Control Act, DTSC regulates the generation, transportation, treatment, storage, and disposal of hazardous waste in California. The hazardous waste regulations establish criteria for identifying, packaging, and labeling hazardous wastes; dictate the management of hazardous waste; establish permit requirements for hazardous waste treatment, storage, disposal, and transportation; and identify hazardous wastes that cannot be disposed of in landfills. DTSC is also the administering agency for the California Hazardous Substance Account Act. California Health and Safety Code division 20, chapter 6.8, section 25300 et seq., also known as the State Superfund Law, provides for the investigation and remediation of hazardous substances pursuant to state law.
	California Public Resources Code 21151.4 and CEQA Guidelines section 15186	Under these laws, an EIR shall not be certified for any project involving the construction or alteration of a facility within 0.25 mile of a school that might reasonably be expected to emit hazardous air emissions, or that would handle an extremely hazardous substance or a mixture containing extremely hazardous substances in a quantity equal to or greater than the state threshold quantity specified pursuant to subdivision (m) of section 25532 of the Health and Safety Code, that may pose a health or safety hazard to persons who would attend or would be employed at the school, unless both of the following occur: (1) The lead agency preparing the EIR or negative declaration has consulted with the school district having

Classification	Law or Responsible State Agency	Description
		jurisdiction regarding the potential impact of the project on the school. (2) The school district has been given written notification of the project not less than 30 days prior to the proposed certification of the EIR or approval of the negative declaration.
Hazardous Materials Transportation	California Code of Regulations titles 13 (division 2, chapter 6) and 22 (division 4.5)	These regulations govern the transportation of hazardous waste originating in and passing through the state, including through requirements for shipping, containers, and labeling.
	California Highway Patrol and Caltrans	These two state agencies have primary responsibility for enforcing federal and state regulations and responding to hazardous materials transportation emergencies.
Occupational Safety	Cal/OSHA (California Labor Code sections 6300–9254)	Cal/OSHA has primary responsibility for developing and enforcing workplace safety regulations in California. Because California has a federally approved OSHA program, it is required to adopt regulations that are at least as stringent as those found in Code of Federal Regulations title 29. Cal/OSHA standards are generally more stringent than federal regulations.
	Cal/OSHA Regulations (California Code of Regulations title 8)	For the use of hazardous materials in the workplace, these regulations (www.law.cornell.edu/regulations/california/title-26/division-10ations) require employee safety training, safety equipment, accident and illness prevention programs, hazardous substance exposure warnings, and emergency action and fire prevention plan preparation.
Water Quality	Porter-Cologne Water Quality Control Act (California Water Code section 7)	Refer to Section 3.11.2 in Section 3.11, Hydrology and Water Quality.
Construction Stormwater General Permit (i.e., Construction General Permit; Order 2022-0057-DWQ, NPDES No. CAS000002)	Regional Water Quality Control Boards	Any discharger whose project disturbs 1 or more acre of soil, or disturbs less than 1 acre but is part of a larger common plan of development that in total disturbs 1 or more acres, is required to obtain coverage under the NPDES General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities (Construction General Permit; Order 2022-0057-DWQ, NPDES No. CAS000002). Construction activity subject to this permit includes clearing, grading, grubbing, and other disturbances to the ground, such as excavation and stockpiling, but does not include regular maintenance activities performed to restore the original line, grade, or capacity of a facility. The Construction General Permit requires the development and implementation of a stormwater pollution prevention plan that includes specific best management practices designed to prevent sediment and pollutants from contacting stormwater from moving offsite into receiving waters. The best management practices fall into several categories, including erosion control, sediment control, waste management, and good housekeeping, and are intended to protect surface water quality by preventing the offsite migration of eroded soil and construction-related pollutants from the construction area.

NOTES: Cal/OSHA = California Occupational Safety and Health Administration; Caltrans = California Department of Transportation; CEQA = California Environmental Quality Act; CUPA = Certified Unified Program Agency; DTSC = California Department of Toxic Substances Control; MS4 = Municipal Separate Storm Sewer System; NPDES = National Pollutant Discharge Elimination System; OSHA = Occupational Safety and Health Administration; Unified Program = Unified Hazardous Waste and Hazardous Materials Management Regulatory Program

SOURCE: Data compiled by Environmental Science Associates in 2025

Fire Hazard Severity Zones—Public Resources Code Sections 4201–4204

California Public Resources Code sections 4201–4204 require CAL FIRE to prepare Fire Hazard Severity Zone maps for all lands within State Responsibility Areas, and to make recommendations for such zones in Local Responsibility Areas. Each zone is to embrace relatively homogeneous lands and is to be based on fuel loading, slope, fire weather, and other relevant factors present, including areas where winds have been identified as a major cause of wildfire spread.

The FHSZ maps are developed using a science-based and field-tested model that assigns a hazard score based on the factors that influence fire likelihood and fire behavior. Many factors are considered, such as fire history, existing and potential fuel (natural vegetation), predicted flame length, blowing embers, terrain, and typical fire weather for the area. There are three levels of hazard in the State Responsibility Areas: moderate, high, and very high.[19]

California Vehicle Code Section 38366

Vehicle Code section 38366 requires spark-arresting equipment on vehicles that travel off-road. This section applies to this analysis because any construction-related or other Project vehicle that travels in an off-road area would be required to have spark-arresting equipment to reduce the risk of wildfires.

Local

Certified Unified Program Agencies

In 1993, Senate Bill (SB) 1082 was enacted to streamline the permitting process for those businesses that use, store, or manufacture hazardous materials. The passage of SB 1082 provided for the designation of a Certified Unified Program Agency (CUPA) to be responsible for the permitting process and collection of fees. CUPA is responsible for implementing the Unified Hazardous Waste and Hazardous Materials Management Regulatory Program (Unified Program) at the local level, which serves to consolidate, coordinate, and make consistent the administrative requirements, permits, inspections, and enforcement activities for the following environmental and emergency management programs:

- Hazardous Materials Release Response Plans/Hazardous Materials Business Plans (HMBPs) and Hazardous Materials Inventory Sheets;
- California Accidental Release Prevention Program;
- Underground Storage Tank Program;
- Aboveground Petroleum Storage Act Requirements for Spill Prevention, Control, and Countermeasure Plans;
- Hazardous Waste Generator and Onsite Hazardous Waste Treatment (tiered permitting) Programs; and
- California Uniform Fire Code: Hazardous Material Management Plans and Hazardous Material Inventory Statements.

[19] CAL FIRE, 2025. "Fire Hazard Severity Zones." Available online at osfm.fire.ca.gov/what-we-do/community-wildfire-preparedness-and-mitigation/fire-hazard-severity-zones. Accessed February 3, 2025.

San Mateo County Environmental Health Services has been the designated CUPA for San Mateo County since 1996 and achieves compliance through routine inspections of regulated facilities, and investigation of citizen-based complaints and inquiries regarding improper handling and/or disposal of hazardous materials and/or hazardous wastes.[20] Contractors are required to comply with the regulatory programs overseen by the CUPA.

Regional Water Quality Control Board Environmental Screening Levels

For the San Francisco Bay Area, the regulatory standards typically used to assess whether a spill or release has occurred and whether chemical concentrations warrant further investigation or remediation are the San Francisco Bay RWQCB's Environmental Screening Levels (ESLs).[21] ESLs are risk-based guidelines used to evaluate the potential health and environmental risks associated with chemicals found in soil, groundwater, soil gas, or indoor air samples where a release of hazardous materials has occurred. For certain constituents (e.g., arsenic), the screening level may be below local naturally occurring background levels. In these cases, the background level is used instead of the RWQCB's ESL.

ESLs consider exposure to construction workers, residents, commercial/industrial workers, terrestrial habitat, leaching to groundwater, gross contamination, and odor nuisance. Residential ESLs are usually the most restrictive because they consider the exposure duration to be for a person living on the property year-round. Chemical concentrations below residential screening levels generally would not require remediation and the location would be considered suitable for unrestricted uses. Commercial/industrial ESLs are generally higher than residential ESLs because they are based on a shorter potential duration of worker exposure (e.g., 8 hours per day for 250 days per year) to hazardous materials than residential exposures. ESLs are also typically higher for construction workers than for residential ESLs, with few exceptions, because construction workers are only exposed to the chemical of concern for the duration of construction and wear protective clothing. Tier 1 ESLs are the lowest of the various ESLs previously listed. Chemical concentrations below Tier 1 ESLs would not be expected to pose potential health and environmental risks to people and the environment.

General Plans

The Project would be subject to local plans and policies of the jurisdictions in which it is located, including East Palo Alto, Menlo Park, and Redwood City. **Table 3.10-4** presents local plans and policies regarding hazards, hazardous materials, and wildfire to support consideration of Project consistency with general plan policies.

[20] San Mateo County Health, 2024. "Certified Unified Program Agency." Available online at www.smchealth.org/hazardous-materials-cupa. Accessed December 23, 2024.

[21] San Francisco Bay RWQCB (San Francisco Bay Regional Water Quality Control Board), 2019. *Environmental Screening Levels, Revision 2*.

TABLE 3.10-4
LOCAL PLANS AND POLICIES RELEVANT TO THE PROJECT – HAZARDS, HAZARDOUS MATERIALS AND WILDFIRE

CITY OF EAST PALO ALTO VISTA 2035 GENERAL PLAN
GOAL HE-4: Safely and systemically address toxics, legacy pollutants, and hazardous materials.
Policy 4.2: Pollutants. Continue to work with state, federal, regional, and local agencies to eliminate and reduce concentrations of regulated legacy pollutants.
Policy 4.4: Agricultural Pesticides. Reduce exposure to legacy pesticides, particularly in areas previously under agricultural use, and whenever possible work with landowners and developers to eliminate concentrations of pesticides from soil and groundwater.
Goal SN-3: Reduce the risk of fire and wildfire hazards in the community.
Policy 3.1: Response times. Continue to support [Menlo Park Fire Protection District] in helping maintain adequate emergency response times. Work with [Menlo Park Fire Protection District]to identify choke points to help ensure continuation of adequate emergency response in all of East Palo Alto.
GOAL SN-4: Protect the community from public safety hazards related to aircraft, surface transportation, and hazardous materials.
Policy 4.1: Contamination. Avoid or minimize risk to the community from exposure to contaminated soils or groundwater.
Policy 4.2: Management of hazardous materials. Continue to cooperate with federal, state, and county agencies to effectively regulate the management of hazardous materials and hazardous waste.
Policy 4.3: Risk Management Plans. Continue to cooperate with the Certified Unified Program Agency (CUPA) for East Palo Alto (the County of San Mateo Health System) and the Menlo Park Fire Protection District to administer Risk Management Plans for businesses within the City.
Policy 4.5: Airport land use plan. Coordinate with the Santa Clara County ALUC and Palo Alto Airport CLUP and consider the CLUP in making any land use decisions in airport influence area.
Goal SN-5: Provide efficient and effective emergency response in the immediate aftermath of a natural or human caused disaster.
Policy 5.4: Emergency access routes. Ensure the City's designated system of emergency access routes is coordinated with regional activities for both emergency operations and evacuation.
GOAL ISF-10: Provide excellent emergency services to the community.
Policy 10.2: Emergency preparedness. Work with [Menlo Park Fire Protection District], [East Palo Alto Police Department], City Staff, and East Palo Alto residents to ensure that sufficient emergency plans and resources are established and known by all stakeholders. Ensure that all City employees partake in yearly emergency drills and/or trainings.
CITY OF MENLO PARK GENERAL PLAN
***Goal S1: Assure a safe community*.**
Policy S1.10: Safety Review of Development Projects. Continue to require hazard mitigation, fire prevention, and adequate access for emergency vehicles in new development.
Policy S1.39: Emergency Vehicle Access. Require that all private roads be designed to allow access for emergency vehicles as a prerequisite to the granting of permits and approvals for construction.
GOAL LU-7: Promote the implementation and maintenance of sustainable development, facilities and services to meet the needs of Menlo Park's residents, businesses, workers, and visitors.
Policy LU-7.7: Hazards. Avoid development in areas with seismic, flood, fire and other hazards to life or property when potential impacts cannot be mitigated.
Goal CIRC-1: Provide and maintain a safe, efficient, attractive, user-friendly circulation system that promotes a healthy, safe, and active community and quality of life throughout Menlo Park.
Policy CIRC-1.6: Emergency Response Routes. Identify and prioritize emergency response routes in the citywide circulation system.

CITY OF EAST PALO ALTO VISTA 2035 GENERAL PLAN
REDWOOD CITY GENERAL PLAN
GOAL PS-8a*: *Protect city residents, and businesses and employees from potential hazards associated with the use, storage, transport, and disposal of hazardous materials in and through Redwood City.
Policy PS-8a.1: Establish policies to regulate and reduce hazardous waste within Redwood City that are consistent with the County's Hazardous Waste Management Plan and other County regulatory programs.
Policy PS-8a.3: Work to ensure that land previously used as agriculture, commercial, and industrial is safe and contains no environmental hazards.
Policy PS-8a.4: Encourage the use of green building practices to reduce potentially hazardous materials in construction materials.
Notes: ALUC = Airport Land Use Commission; CLUP = Comprehensive Land Use Plan.
Sources: City of East Palo Alto, 2017. *Vista 2035 General Plan*. Adopted October 4, 2016; Final Version March 2017. Available online at www.ci.east-palo-alto.ca.us/planning/page/vista-2035-general-plan; City of Menlo Park, 2016. *General Plan, City of Menlo Park*. Adopted November 29, 2016. Available online at www.menlopark.gov/files/sharedassets/public/v/1/community-development/documents/general-plan/land-use-and-circulation-element-adopted-20161129.pdf; City of Redwood City, 2023. *Redwood City General Plan*. adopted October 11, 2010; Amended August 2023. Available online at www.redwoodcity.org/departments/community-development-department/planning-housing/planning-services/environmental-documents/general-plan-eir.

3.10.3 Impacts and Mitigation Measures

Significance Criteria

In accordance with CEQA, CEQA Guidelines (including Appendix G), relevant plans, policies, and/or guidelines, and agency standards, the Project could have a significant impact if it were to do any of the following:

- Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials;
- Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment;
- Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school;
- Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code section 65962.5 and, as a result, would it create a significant hazard to the public or the environment;
- For a project located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, would the Project result in a safety hazard or excessive noise for people residing or working in the Project area; or
- Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plans.
- Expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires.

The thresholds listed below were also considered, but because the Project site is not in or near a State Responsibility Area or classified as very high FHSZ, the thresholds do not apply and are not addressed further:

- If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, the Project would pose a significant impact relative to hazards and hazardous materials if it would:
  - Substantially impair an adopted emergency response plan or emergency evacuation plan;
  - Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose Project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire;
  - Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment; or
  - Expose people or structures to substantial risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes.

Methodology

This analysis of the potential impacts related to hazards and hazardous materials is based on review of available published reports and planning and policy documents.

The Project would be required to comply with the various laws, regulations, and policies summarized previously in Section 3.10.2, Regulatory Framework. These laws, regulations, and policies are implemented through a variety of means. This analysis assumes Project compliance with applicable federal, state, and local laws and regulations; state and local agencies would be expected to continue to enforce applicable requirements to the extent that they do so now. Compliance with many of these requirements is a condition of permit approvals, which stipulate the specific regulations requiring compliance. For example, compliance with the Construction General Permit (discussed in Section 3.11, Hydrology and Water Quality) requires identifying all hazardous materials to be used during construction and describing the storage and use procedures to prevent spills (development of a stormwater pollution prevention plan).

Refer to Section 3.3, Air Quality, (Impact AIR-3) for a discussion of impacts related to toxic air contaminant emissions and health risk.

This Draft EIR evaluates Project activities at a level of detail consistent with the best information available at the time of EIR preparation. To the extent that activities necessary for Project completion are known, they are described in Chapter 2, *Project Description*, and evaluated in the impact analysis below. Key information needed for the evaluation of hazards and hazardous materials impacts includes the locations of temporary and permanent ground disturbance and proposed land uses. Those reaches for which conceptual (generally 10-percent) design information is available, depicted with dashed lines on Figure 2-1 in Chapter 2lack information for certain components (e.g., ramps, relocation of the pedestrian bridge at Bay Road). Appendix INFRA identifies those changes to infrastructure and other encroachments

that are evaluated programmatically. The need for additional CEQA documentation would be evaluated once these design details are developed, as discussed in greater detail in Section 1.2.5, Program–Project EIR and Supplemental CEQA.

Impacts and Mitigation Measures

Table 3.10-5 summarizes the impact conclusions presented in this section.

TABLE 3.10-5
HAZARDS, HAZARDOUS MATERIALS, AND WILDFIRE IMPACT CONCLUSIONS

Impact	Level of Significance
Impact HAZ-1: Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials, or reasonably foreseeable upset or accident conditions involving the release of hazardous materials into the environment.	LSM
Impact HAZ-2: Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school.	LTS
Impact HAZ-3: Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code § 65962.5 and, as a result, would it create a significant hazard to the public or the environment.	LSM
Impact HAZ-4: For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, result in a safety hazard or excessive noise for people residing or working in the project area.	LTS
Impact HAZ-5: Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plans.	LSM
Impact HAZ-6: Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires.	LTS
Impact C-HAZ-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse impacts related to hazards, hazardous materials and wildfire.	LSM
NOTES: LSM = Less than Significant with Mitigation; LTS = Less than Significant; NI = No Impact	

Impact HAZ-1: Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials, or reasonably foreseeable upset or accident conditions involving the release of hazardous materials into the environment. *(Less than Significant with Mitigation)*

Construction Impacts

Table 2-8 in Chapter 2, *Project Description*, identifies equipment that would be used during Project construction. Vehicles and equipment used for construction, operations, and maintenance would use fuels, oils, and lubricants; solvents and cleaners; cements and adhesives; and paints and thinners, all of which are commonly used in construction. The routine use or an accidental spill of hazardous materials could inadvertently release hazardous materials, which could adversely affect construction workers, the public, and the environment.

Construction and operation activities would be required to comply with numerous hazardous materials regulations identified in Section 3.10.2. Those regulations are designed to ensure that hazardous materials are transported, used, stored, and disposed of in a safe manner to protect worker safety, and to reduce the potential for a release of construction-related fuels or other hazardous materials into the environment,

including stormwater and downstream receiving waterbodies. For example, as required by the California Hazardous Materials Release Response Plan and Inventory Law of 1985, described in Table 3.10-2, contractors would prepare and implement HMBPs requiring that hazardous materials used for construction be used properly and stored in appropriate containers with secondary containment of a potential release. The HMBPs would include requirements for proper labeling, storage away from waterways and waterbodies, and prompt cleanup of spills. As required for HMBPs, a Spill Prevention, Control, and Countermeasure plan would be prepared to describe measures to properly store and handle hazardous materials, and measures and equipment to respond to and promptly cleanup spills. The California Fire Code would also require measures for the safe storage and handling of hazardous materials. Each jurisdiction implementing the Project would require the preparation and implementation of these measures as a contractual requirement. The San Francisco Bay RWQCB would also require these in compliance with the Clean Water Act section 401 water quality certification.

As discussed in Section 3.11, Hydrology and Water Quality, construction contractors would be required to prepare a stormwater pollution prevention plan (SWPPP) for construction activities according to the National Pollutant Discharge Elimination System Construction General Permit requirements. In addition to the sediment run-on and runoff control measures, the SWPPP would list the hazardous materials (including petroleum products) proposed for use during construction; describe spill prevention measures, equipment inspections, and equipment and fuel storage; identify protocols for responding immediately to spills; and describe best management practices for controlling site runoff.

In addition, the transportation of hazardous materials, if any, would be regulated by DTSC under a temporary EPA number and manifest. DOT would determine driver training requirements, load labeling procedures, and container specifications designed to minimize the risk of an accidental release.

Spill prevention best management practices would be in place as part of the SWPPPs to minimize or contain spills. A spill kit and spill response direction would be onsite and readily accessible as part of SWPPPs. In the event of a spill that releases hazardous materials at the Project site, a coordinated response would occur at the federal, state, and/or local levels, depending on the nature of the release. Hazardous materials response, mitigation, and cleanup in San Mateo County is managed by the Belmont Fire Protection District's Hazardous Materials Team through a contractual agreement between the County of San Mateo, the Emergency Services Council, and the Belmont Fire Protection District.[22] In the event of a hazardous materials spill, the hazardous materials response teams and police departments would be notified simultaneously and sent to the scene to respond to and assess the situation, depending on the location of the spill, and if the spill is not contained and controlled by the contractor responsible for the release of hazardous materials.

As indicated in Table 3.10-1 and discussed in Impact HAZ-3, Project construction would occur adjacent to or intersect with multiple sites that are included on a list of hazardous materials sites compiled pursuant to Government Code section 65962.5. However, as indicated in Table 3.10-1 and discussed in detail in Impact HAZ-3, a construction risk management plan (CRMP) was developed in 2020 for portions of the 1990 Bay Road Site and an Area-Wide Risk Management Plan was developed in 2021 for the Sycamore Real Estate Sites. SFCJPA or its members would implement the plans' measures and protocols to achieve

[22] County of San Mateo, 2025. "Emergency Management – Hazardous Materials Team." Available online at www.smcgov.org/ceo/emergency-management-hazardous-materials-team. Accessed February 3, 2025.

performance standards that are in place to protect human health and the environment from potential impacts related to the exposure to hazardous materials.

Additionally, **Mitigation Measure HYD-1b** (in Section 3.11) details groundwater handling requirements and **Mitigation Measures HAZ-1 and HAZ-2** would require implementation of a Health and Safety Plan and a Soil Management Plan that would include appropriate health and safety measures for worker safety, soil handling, and disposal of contaminated soils. Compliance with regulations, implementation of adopted protocols like those in the 2020 CRMP and 2021 Area-Wide Risk Management Plan, and implementation of Mitigation Measures HAZ-1, HAZ-2, and HYD-1b would reduce potentially significant impacts related to the transport, use, disposal, or accidental release of hazardous materials creating hazardous conditions to a **less-than-significant level**.

> **Mitigation Measure HAZ-1: Health and Safety Plan.** This measure applies to all reaches. Where adopted plans are in place with measures and protocols to achieve performance standards related to hazardous soil and groundwater management (e.g., the CRMP for the 1990 Bay Road Site in the South of Bay Road Reach [prepared for and administered by RWQCB] and the Area-Wide Risk Management Plan for the Sycamore Real Estate Site in the North of Bay Road Reach [prepared for and administered by RWQCB]), the Project Proponent would implement the adopted measures to protect human health and the environment from potential impacts related to exposure to hazardous materials.
>
> For construction sites outside of adopted plan areas, before the start of ground-disturbing activities at a Project site, including grading, excavation, or demolition of structures, the Project Proponent shall require that the construction contractor(s) retain a qualified professional to prepare a site-specific health and safety plan (HSP) in accordance with federal OSHA regulations (Code of Federal Regulations title 29, section 1910.120) and Cal/OSHA regulations (California Code of Regulations title 8, section 5192). The HSP shall be submitted to the Project Proponent and San Mateo County or the applicable city for review before the start of demolition and construction activities and as a condition of the grading, construction, and/or demolition permit(s). The HSP shall include, but not be limited to, the following elements:
>
> - Designation of a trained, experienced site safety and health supervisor who has the responsibility and authority to develop and implement the site HSP.
> - A summary of all potential risks to demolition and construction workers and maximum exposure limits for all known and reasonably foreseeable site chemicals.
> - Specified personal protective equipment and decontamination procedures, if needed.
> - The requirement to prepare documentation showing that HSP measures have been implemented during construction (e.g., tailgate safety meeting notes with signup sheet for attendees).
> - A requirement specifying that any site worker who identifies hazardous materials has the authority to stop work and notify the site's safety and health supervisor.
> - Emergency procedures, including the route to the nearest hospital.
> - Procedures to follow if evidence of potential soil or groundwater contamination is encountered (such as soil staining, noxious odors, debris, or buried storage containers). These procedures shall be followed in accordance with hazardous waste operations regulations and shall specifically include, but not be limited to, immediately stopping work in the vicinity of

the unknown hazardous materials release; notifying the Project Proponent and the RWQCB; and retaining a qualified environmental firm to perform sampling and remediation.

The construction contractor shall implement the HSP to protect construction workers, the public, and the environment during all ground-disturbing and demolition activities.

Mitigation Measure HAZ-2: Soil Management Plan. This measure applies to all reaches. Contaminated soil is well documented in the Project area. Where adopted plans are in place with measures and protocols to achieve performance standards related to hazardous soil and groundwater management (e.g., the CRMP for the 1990 Bay Road Site in the South of Bay Road Reach and the Area-Wide Risk Management Plan for the Sycamore Real Estate Site in the North of Bay Road Reach), the Project Proponent would implement the adopted measures to protect human health and the environment from potential impacts related to exposure to hazardous materials.

For construction sites outside of adopted plan areas and within or adjacent to known contaminated sites, using existing data to the extent practicable, the Project Proponent or its contractor(s) shall develop and implement a Soil Management Plan that specifies how the construction contractor shall remove, handle, transport, and dispose of all excavated material in a safe, appropriate, and lawful manner. The plan shall identify protocols for: training workers to recognize potential soil contamination (such as soil staining, noxious odors, debris, or buried objects or containers), soil testing, disposal by a qualified contractor if contamination is identified, and identification of approved disposal sites (e.g., approved landfill or reuse site). Uncontaminated soil may be reused onsite. Contract specifications shall mandate approval of the Soil Management Plan by the Project Proponent as well as full compliance with all applicable local, state, and federal regulations related to the identification, transportation, and disposal of hazardous materials.

Mitigation Measure HYD-1b: Groundwater Handling Requirements. (Refer to Section 3.11, Hydrology and Water Quality)

Operations Impacts

As indicated in Section 2.7, Operation and Maintenance, once construction is complete, operation and maintenance of levees would generally include vegetation control and maintenance, such as annual slope mowing, grazing, irrigation, weed control, and plant replacement. Pump stations would be operated once interior floodwaters are visually observed in certain key areas and would cease operations once the storm has passed and the flood areas return to normal. Operation and maintenance activities are not expected to require the routine transport, use, or disposal of hazardous materials, or reasonably foreseeable upset or accident conditions involving the release of hazardous materials into the environment. Consequently, this impact would be **less than significant** for the operations phase.

Impact HAZ-2: Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school. ***(Less than Significant)***

Construction Impacts

As noted in Table 3.10-3, section 15186 of the CEQA Guidelines and California Public Resources Code section 21151.4 requires that the environmental document for projects that are located within 0.25 mile of a school address the use of extremely hazardous materials and emission of hazardous air emissions, consult with the affected school district, and give the school district notice of the Project. As indicated in

Section 3.10.1, one school is within 0.25 mile of the Project site (EPACS). The SFCJPA sent the Notice of Availability of this Draft EIR to EPACS and is consulting directly with EPACS regarding the potential impact of the Project on the school, including a meeting on November 18, 2025.

The State of California defines acutely hazardous materials as extremely hazardous materials in section 25532(i)(2) of the Health and Safety Code.[23] Project construction would involve activities described in Section 2.6, Construction Details, such as demolition and off-haul of existing trail surfaces, construction of temporary access points, implementing drainage/water control systems, removal of topsoil, degrading existing berms, and constructing levees, floodwalls, and habitat features (e.g., earthwork and planting of transition zones). Excavated material would be temporarily stored onsite at one or more of the construction staging areas before disposal or reuse. Construction of shoreline protection, recreational, and habitat restoration features would use common hazardous materials, such as cements, adhesives, and petroleum products (such as asphalt, oil, and fuel), none of which appear in section 25532(i)(2) of the California Health and Safety Code (which references the list of substances in Code of Federal Regulations title 40, chapter I, subchapter J, part 355, appendix A), or in California Code of Regulations title 17, section 93000.

Additionally, construction within the whole South of Bay Road Reach (the only reach within 0.25 mile of a school) is expected to occur over approximately 1 year and the duration of construction activities adjacent to EPACS would be less than that.

Refer to Impact HAZ-3 for a discussion of the potential to emit hazardous emissions during construction, and the mitigation and adopted management plans that would be implemented to protect human health, including receptors at nearby schools and residents, from exposure to hazardous emissions. Refer also to Impact AIR-3 for a discussion of the potential for sensitive receptors (i.e., students and staff at EPACS) to be exposed to pollutant concentrations and emissions during construction (a less-than-significant impact).

Therefore, impacts related to hazardous emissions or the use of extremely hazardous materials within 0.25 mile of a school would be **less than significant**. No staging areas have been identified for the program-level reaches. If staging areas for these reaches are sited within 0.25 mile of a school, this impact should be reevaluated in a future CEQA document.

Operations Impacts

Once operational, the South of Bay Road Reach would provide flood protection for the City of East Palo Alto. Operation and maintenance of the shoreline protection features (described in Section 2.7 and summarized under Impact HAZ-1) would not result in hazardous emissions or require the handling of acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school. Therefore, this impact would be **less than significant** for the operations phase.

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[23] Hazardous air emissions include the toxic air contaminants that are listed in the California Code of Regulations title 17, section 93000. Impacts of toxic air contaminant emissions are addressed in Section 3.3, Air Quality.

Impact HAZ-3: Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code section 65962.5 and, as a result, would it create a significant hazard to the public or the environment. (*Less than Significant with Mitigation*)

Construction Impacts

As indicated in Table 3.10-1 and shown on Figure 3.10-1, Project components either intersect with or are directly adjacent to several hazardous materials sites. No hazardous material sites are within or directly adjacent to Project components in the Substation and Marsh Restoration, Tech Campus, or Bayfront Expressway reaches.

South of Bay Road Reach

1990 Bay Road Sites

The 1990 Bay Road Site consists of multiple GeoTracker and EnviroStor sites described in Table 3.10-1. Construction of the levee along the South of Bay Road Reach would require ground disturbance within the boundaries of the 1990 Bay Road Site and in locations with contaminated soil and groundwater, and therefore, protocols from the 2020 CRMP described in Table 3.10-1 would apply to construction activities in this area.

As indicated in Table 3.10-1 and discussed in detail in Section 3.11, Hydrology and Water Quality, (Impact HYD-1) the CRMP sets forth management protocols that apply to the management of contaminated soil and groundwater during construction or development activities, including protocols that are required for any activity that disturbs or removes caps at the property.[24] Implementation of the management measures are understood to protect human health, including onsite construction workers, nearby residents and workers, and the environment from potential impacts related to exposure to hazardous materials. Soil must be managed consistent with the soil management protocols, and temporary groundwater extraction (dewatering) from excavations would need to be stored, characterized, and disposed of at appropriate facilities (such as a local wastewater treatment facility). Prior to disposal, the water must be tested in accordance with requirements of the receiving facility. Refer to Impact HYD-1 for additional analysis related to handling hazardous soil and groundwater.

Following active cleanup measures, land-use restrictions were applied to the site to manage residual pollution. Deed restrictions intended to prevent exposure to arsenic-affected soil and groundwater restrict land use and prohibit intrusive work without the prior approval of the RWQCB, DTSC, StarLink Logistics, Inc., and property owners. In addition to agency approvals, final caps must be installed over the 1990 Bay Road Site at the end of construction. Levees are included as one of the types of final caps allowed by the construction risk management plan. Implementation of the management protocols identified in the 2020 construction risk management plan would protect human health, including onsite construction workers, nearby residents and workers, and the environment from potential impacts.

With compliance with the CRMP and deed restrictions, the Project is not expected to create a significant hazard to the public or the environment by constructing near the 1990 Bay Road sites.

[24] S.S. Papadopulos and Associates, Inc., 2020. *Construction Risk Management Plan Addendum to the Comprehensive Site Management Plan, 1990 Bay Road Site*. December 2020.

Cooley Landing

Although the Cooley Landing site described in Table 3.10-1 is directly east of where the Project would be implemented, the nearest construction activities would occur approximately 600 feet outside of the mapped area where historic contamination was covered with an engineered cap. Additionally, the Operation and Maintenance Plan for Cooley Landing presents protocols to ensure that the engineered cap is not compromised over time or as a result of future activities at the sites, and that the engineered cap is maintained to reduce the potential threat to public health and safety or the environment. [25] Therefore, the Project is not expected to create a significant hazard to the public or the environment by constructing near the Cooley Landing site.

North of Bay Road Reach

Sycamore Real Estate Sites

The Sycamore Real Estate Site consists of multiple GeoTracker sites described in Table 3.10-1. The levee alignment in the North of Bay Road Reach would include work within the Ravenswood Industrial Area, primarily within the 391 Demeter Street property. As indicated in Table 3.10-1 and discussed in detail in Section 3.11, Hydrology and Water Quality, (Impact HYD-1) an Area-Wide Risk Management Plan was developed for identified properties in the Ravenswood Industrial Area, including 391 Demeter Street.[26] The levee alignment would pass along the eastern and northern boundaries of the stabilized soil stockpile with low levels of PCBs. Should the Project would disturb the soil within the stockpile at 391 Demeter Street, it would be required to either be reused onsite beneath a durable cover, or disposed of offsite at an appropriate landfill facility.[27] Handling soil and excavated materials consistent with the requirements of the Ravenswood Industrial Area Area-Wide Risk Management Plan would reduce potential impacts associated with creating a significant hazard to the public or the environment in this area (at 391 Demeter Street).

Romic Environmental Technologies/Bay Road Holdings

The Romic Environmental Technologies Sites consist of multiple GeoTracker and EnviroStor sites described in Table 3.10-1. As discussed in detail in Section 3.11, Hydrology and Water Quality, (Impact HYD-1) the levee alignment in the North of Bay Road Reach would occur adjacent to 2081 Bay Road, where groundwater contamination in the northern area of the property is currently being remediated with a groundwater recirculation system, biobarrier injection events, and light non-aqueous phase liquid[28] recovery from a groundwater well at the northeastern area of the site. The groundwater that contains measurable contaminants has a very shallow gradient to the southeast. Temporary groundwater dewatering during levee construction in this portion of the North of Bay Road Reach could temporarily counteract the effectiveness of the injection wells located along the northeastern boundary of the site (where contaminant concentrations are highest). Although Attachment J of the stormwater Construction General Permit includes dewatering requirements, discharge of water from dewatering is not permitted under the Construction General Permit if the dewatering takes place in an area with known soil and/or groundwater contamination where the contamination could cause an exceedance of receiving water limitations. If untreated, water produced from the dewatering process for the North of Bay Road Reach along the 2081 Bay Road property

[25] Ninyo and Moore, 2012. *Cooley Landing Operations and Maintenance Plan*. July 13, 2012.

[26] Ninyo and Moore, 2021. *Ravenswood Industrial Area Area-Wide Risk Management Plan.*

[27] Ninyo and Moore, 2021. *Ravenswood Industrial Area Area-Wide Risk Management Plan.*

[28] Light non-aqueous phase liquids are organic liquids, such as gasoline, diesel, and other petroleum hydrocarbon products, that are immiscible with water and less dense than water.

could release contaminants into the environment, resulting in a potentially significant impact. However, as described in Impact HYD-1, with implementation of **Mitigation Measure HYD-1b**, which details groundwater handling requirements, this impact would be reduced to a less-than-significant impact.

Dumbarton Approach Reach

Former Peninsula Sportsmen's Club

As described in Table 3.10-1, remediation of the Former Peninsula Sportsmen's Club site was completed in 2011, and the site is now part of the Don Edwards San Francisco Bay National Wildlife Refuge. Although habitat improvements would occur within the site, the cleanup levels for lead shot and residual lead, arsenic, and antimony in soil were achieved in these areas through excavation and offsite disposal.[29] As discussed under Impact HAZ-1, Mitigation Measures HAZ-1 and HAZ-2 would require implementation of a Health and Safety Plan and a Soil Management Plan. With implementation of Mitigation Measures HAZ-1 and HAZ-2, the Project is not expected to create a significant hazard to the public or the environment by constructing near the Former Peninsula Sportsmen's Club site.

Bedwell Bayfront Park Reach

Marsh Road Landfill, Menlo Park Sanitation

Table HAZ-1 presents a description of the former Marsh Road Landfill and adjacent leachate (groundwater that has infiltrated the refuse/migrated through landfill fill material) wastewater treatment plant. Lined oxidation ponds were built at the former leachate wastewater treatment plant in 1965 and sludge was transported to the landfill. No further action is recommended by DTSC for this site. The adjacent former Bedwell Bayfront Park Landfill was closed in 1984 and subsequently covered with clay. In addition to biennial inspections, maintenance at the closed landfill includes managing the gases that are produced as waste decomposes and leachate. The landfill is governed by title 27, administered by the San Mateo County Health Department, and title 17 of the California Code of Regulations and Rule 8-34, administered by the Bay Area Air District (Air District), formerly called the Bay Area Air Quality Management District,[30] and operates consistent with Waste Discharge Requirements contained in RWQCB Order No. 97-073[31] and Air District Permit to Operate 17478.

Consistent with the California Code of Regulations title 27, section 21190:

> *[A]ll proposed post-closure land uses, other than non-irrigated open space, on sites implementing closure or on closed sites shall be submitted to the [San Mateo County Health Department, Environmental Health Services Division as the local enforcement agency], RWQCB, local air district and local land use agency. The [San Mateo County Health Department] shall review and approve proposed post-closure land uses if the project involves structures within 1,000 feet of the disposal area, structures on top of waste, modification of the low permeability layer, or irrigation over waste.*

[29] San Francisco Bay RWQCB (San Francisco Bay Regional Water Quality Control Board), 2011. *Concurrence with Baylands Recovery Project Remedial Action and Final Phase 1B Completion Report, Peninsula Sportsmen's Club, Menlo Park, San Mateo County (File No. 2179.7180).* June 14, 2011.

[30] Rule 8-34 was adopted on May 2, 1984, and last amended on October 6, 1999. The purpose of this rule is to limit the emission of non-methane organic compounds and methane from the waste decomposition process at solid waste disposal sites.

[31] California Regional Water Quality Control Board, San Francisco Bay Region, Order No. 97-073. 1997.

Construction of the levee and associated infrastructure in the Bedwell Bayfront Park Reach would be along the southwestern boundary of the Marsh Road Landfill site. Due to the Project's proximity to the site, SFCJPA or its members, the City East Palo Alto or the City of Menlo Park, would be required to coordinate with the San Mateo County Health Department and meet conditions and requirements detailed in title 27 that are in place to avoid posing a threat to public health and safety and the environment.

Additionally, as previously discussed, Mitigation Measures HAZ-1 and HAZ-2 would require implementation of a Health and Safety Plan and a Soil Management Plan. With compliance with regulations, such as title 27 of the California Code of Regulations and implementation of Mitigation Measures HAZ-1 and HAZ-2, the Project is not expected to create a significant hazard to the public or the environment by constructing near the Marsh Road Landfill or Menlo Park Sanitation sites.

Marsh Road Reach

3723 Haven Avenue

As indicated in Table HAZ-1, the 3723 Haven Avenue case was reopened in 2020 to assess the extent of a mobilized groundwater trichloroethylene plume from an adjacent site (3715 Haven Avenue property to the south) and evaluate additional remedial actions necessary to degrade contaminants of concern for future site re-development.[32] Although Project construction would take place approximately 220 feet north of the site, no construction activities would occur anywhere within the mapped site. Additionally, as previously discussed, Mitigation Measures HAZ-1 and HAZ-2 would require implementation of a Health and Safety Plan and a Soil Management Plan. With implementation of Mitigation Measures HAZ-1 and HAZ-2, the Project is not expected to create a significant hazard to the public or the environment by constructing near the 3723 Haven Avenue site.

In summary, contaminated soil and groundwater are well documented in the Project area and may be encountered during Project construction (e.g., excavation and dewatering). To avoid exposing the public to hazardous materials at a Cortese List site, the SFCJPA or its members implementing construction would comply with regulations and adopted plans (such as the CRMP for the 1990 Bay Road Site and the Area-Wide Risk Management Plan for the Sycamore Real Estate Sites) and implement their measures and protocols to achieve performance standards that are in place to protect human health and the environment from potential impacts related to exposure to hazardous materials. Additionally, Mitigation Measure HYD-1b includes groundwater handling requirements and Mitigation Measures HAZ-1 and HAZ-2 would require implementation of a Health and Safety Plan and a Soil Management Plan, further reducing this impact. Consequently, impacts related to the creation of a significant hazard to the public or the environment due to the presence of Cortese List hazardous materials sites would be **less than significant with mitigation** during construction.

Operations Impacts

Proposed operation and maintenance activities (described in Section 2.7 and summarized under Impact HAZ-1), even those that overlap with a portion of a Cortese List site, would be similar to activities

[32] AWR Environmental, Risk Management Plan, 2021. *Risk Management Plan: 3723 Haven Ave Menlo Park, California.* Prepared for FPG Development Group. April 2021. Available online at documents.geotracker.waterboards.ca.gov/regulators/deliverable_documents/3050016105/210412-Final%20RMP.pdf.

currently occurring in the area and are not expected to create a significant hazard to the public or the environment. Consequently, this impact would be **less than significant** during the operations phase.

Mitigation Measure HAZ-1: Health and Safety Plan. (Refer to Impact HAZ-1)

Mitigation Measure HAZ-2: Soil Management Plan. (Refer to Impact HAZ-1)

Mitigation Measure HYD-1b: Groundwater Handling Requirements. (Refer to Section 3.11, Hydrology and Water Quality)

Impact HAZ-4: For a project located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, result in a safety hazard or excessive noise for people residing or working in the Project area. (*Less than Significant*)

Construction Impacts

As indicated in Section 3.10.1, the South of Bay Road and North of Bay Road reaches are within the Palo Alto Airport's FAR part 77 surface and airport safety area; however, all construction equipment and shoreline protection features would be well below 154 feet in height and are not expected to result in a safety hazard related to airport use. Construction of the South of Bay Road and North of Bay Road reaches would each occur over approximately 1 year, so aircraft noise impacts on construction workers would be temporary and would occur only during periodic short-term overflights. Therefore, construction would not expose workers to airport-related safety hazards or excessive noise levels, and the impact would be **less than significant**. Refer to Section 3.13, Noise, for a full analysis of noise impacts on nearby receptors.

Operations Impacts

Once constructed, operation and maintenance of Project components (described in Section 2.7 and summarized under Impact HAZ-1) would be infrequent (e.g., two inspections of facilities per month and annual vegetation maintenance) and would not generate noise over existing conditions. Additionally, recreational activities along the San Francisco Bay Trail would continue as they currently do. For the reasons described for construction activities, operations, maintenance, and recreational activities would not expose people to airport safety hazards or excessive noise. Therefore, this impact is considered **less than significant** for the operations phase.

Impact HAZ-5: Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plans. (*Less than Significant with Mitigation*)

Construction Impacts

During construction, construction workers, equipment, and materials would be delivered to construction sites within the reaches and laydown areas (refer to Figure 2-26), which are not on public roads. As indicated in Section 2.6.3, Staging, Workforce, and Additional Construction Details, construction workers and vehicles would access the Project site via major roadways such as United States Route 101, State Route (SR) 84, Willow Road, and University Avenue (SR 109), connecting to smaller adjacent roads,

such as Bay Road, Clark Avenue, Weeks Street, Donohoe Street, O'Connor Street, Marsh Road, and a privately owned railroad/pipeline access road. Construction activities would occur off public roads and would not require closures or restrictions on public roads.

As discussed in Section 3.16, Transportation, the Project would add truck traffic to Project area roadways during construction activities, which could be encountered by emergency response vehicles. Truck routes are generally located on flat terrain and have shoulders that allow heavy vehicles to pull over if necessary to allow emergency response vehicles to pass, reducing the effect of added vehicle and truck traffic from Project construction on emergency vehicle response. However, there would still be a potentially significant impact on emergency access resulting from construction traffic given the size of the Project and the number of roadways that would be affected. The proposed traffic control plan(s) included in Mitigation Measure TRA-1 would ensure that construction activities are coordinated with local agencies, such as the Menlo Park Fire Protection District, and that emergency access and response times are not compromised. Therefore, with implementation of Mitigation Measure TRA-1, the impact would be **less than significant with mitigation.**

Operations Impacts

As indicated in Section 2.7, operation and maintenance activities are expected to result in an estimated two trucks trips per month, except during high-water events, which may require daily inspections. The minimal increase in vehicle trips on the local roadway network would be imperceptible, would not result in road closures, and would not interfere with an adopted emergency response plan or emergency evacuation plan.

> **Mitigation Measure TRA-1: Implement Traffic Control Plan** (refer to Impact TRA-1 in Section 3.16, Transportation)

Impact HAZ-6: Expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires. ***(Less than Significant)***

The Project sites are located in urban areas generally surrounded by marsh and ruderal uplands. As described in Section 3.10.1, the SAFER Bay Project components are within Local Responsibility Areas and Federal Responsibility Areas, none of which are within a high or very high FHSZ. Although the use of construction equipment and the possible temporary onsite storage of fuels and/or other flammable construction chemicals could pose an increased fire risk resulting in injury to workers or the public during construction, contractors would be required to comply with hazardous materials storage and fire protection regulations, which would reduce the potential for fire creation. Therefore, the impact related to exposing people or structures to a significant risk of loss, injury, or death involving wildland fires would be **less than significant**.

Cumulative Impacts

Impact C-HAZ-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse impacts related to hazards and hazardous materials. ***(less than significant with mitigation)***

This section presents an analysis of the cumulative effects of the Project in combination with other past, present, and reasonably foreseeable future projects that could cause cumulatively considerable impacts. Significant cumulative impacts related to hazards and hazardous materials could occur if the incremental impacts of the Project were to combine with the incremental impacts of one or more of the cumulative projects identified in Table 3.1-2 and shown on Figure 3.1-1 in Section 3.1.4, Approach to Cumulative Impact Analysis and Cumulative Projects.

The Project is minimizing potential exposures to hazardous materials by avoiding areas of known contamination. However, there is a potential to encounter soil or vapor hazards in an unmapped area with contamination. Some of the cumulative projects listed in Table 3.1-2 would also use hazardous materials and such projects could result in a hazard to construction workers, the public, schools within 0.25 mile, or the environment through the routine transport, use, or disposal of hazardous materials or the accidental spill or release of hazardous materials. However, cumulative projects would be subject to the same requirements as discussed for the Project to comply with existing hazardous materials regulations, including responding to spills, and spill prevention best management practices would be part of the SWPPPs. Cumulative projects that have spills of hazardous materials would be required to remediate their respective sites to the same established regulatory standards as the Project. This would be the case regardless of the number, frequency, or size of the release(s). The party responsible for each spill would be required to remediate site conditions to the same established regulatory standards.

Three of the cumulative projects listed in Table 3.1-2 (1990 Bay Road/The Landing, East Palo Alto Waterfront Project/Sycamore Real Estate Site, and Hotel Moxy/3723 Haven Avenue) are on hazardous materials sites described in Table HAZ-1 and Impact HAZ-3. Each of these projects would be required to implement the adopted site-specific plans and measures that are understood to protect human health and the environment from potential impacts related to constructing on a hazardous materials site, in addition to compliance with state and local regulations that govern hazardous materials. Where the Project overlaps with portions of these sites, as discussed in Impact HAZ-3, SFCJPA or its members, the City East Palo Alto and the City of Menlo Park, would implement adopted site-specific plans and measures, as well as Mitigation Measures HAZ-1, HAZ-2, and HYD-1b.

Therefore, although the Project could contribute to a significant cumulative impact related to transporting, using, or disposing of hazardous materials or being on a hazardous materials site, compliance with regulations and implementation of adopted site-specific plans and implementation of Mitigation Measures HAZ-1, HAZ-2, and HYD-1b would ensure that the Project's cumulative contribution is less than significant and the impact is **less than significant with mitigation**.

3.11 Hydrology and Water Quality

This section evaluates the potential impacts of the SAFER Bay Project (Project) on existing hydrology and water quality conditions in the Project area and the changes that could occur with Project implementation. This section presents information about the environmental and regulatory setting and identifies the criteria used to evaluate the significance of potential impacts, the methods used in evaluating these impacts, and the results of the impact assessment. The Project evaluated is described in Chapter 2, *Project Description*, of this EIR.

3.11.1 Environmental Setting

The geographic scope for potential impacts on hydrology and water quality encompasses the Project area, receiving waterbodies, and groundwater underlying the Project areas.

Regional Climate and Hydrology

The San Francisco Bay Area (Bay Area) has a Mediterranean climate, with cool, dry summers and mild, wet winters. Precipitation, wind, and air temperature influence San Francisco Bay salinity, currents, suspended sediments, waves, and freshwater inflow.

Waterbodies

San Francisco Bay

Figure 2-1 in Chapter 2, *Project Description*, depicts waterbodies in the Project vicinity.

San Francisco Bay is a large, complex, and highly dynamic estuarine environment that receives saltwater inputs from the Pacific Ocean through the Golden Gate. Water levels in San Francisco Bay are controlled by water level fluctuations in the Pacific Ocean that travel through the Golden Gate and propagate throughout the bay. San Francisco Bay experiences two high and two low tides of unequal heights each day (referred to as semidiurnal tides). As the only drainage outlet for waters from the Central Valley, the bay also receives freshwater inputs from the Sacramento–San Joaquin Delta to the northeast, as well as various other tributary rivers and creeks located around the bay. San Francisco Bay is subdivided into seven segments (moving north to south): Sacramento–San Joaquin Delta, Suisun Bay, Carquinez Strait, San Pablo Bay, Central Bay, Lower San Francisco Bay, and South Bay. The Project is located on the bay margins of the Lower San Francisco Bay (South Bay Basin) and South San Francisco Bay (Santa Clara Basin).

San Francisco Bay is relatively shallow with an average depth of approximately 20 feet and a median depth of approximately 7 feet[1] at *mean lower low water*.[2] **Table 3.11-1** lists tidal datums in the Project vicinity.

[1] San Francisco Bay RWQCB (San Francisco Bay Regional Water Quality Control Board), 2008. Total Maximum Daily Load for PCBs in San Francisco Bay, Final Staff Report for Proposed Basin Plan Amendment. February 13, 2008. Available online at www.swrcb.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/sfbaypcbs/Staff_Report.pdf.

[2] Mean lower low water is the lowest of the two low tides per day averaged over a 19-year period.

TABLE 3.11-1
TIDAL DATUMS IN PROJECT VICINITY

Tidal Datum	Feet NAVD88 2031 Projection[a,b]	Feet NAVD88 2081 Projection[a,b]
Highest astronomical tide	8.99	12.07
High tide line [c]	8.41	11.49
Mean higher high water	7.41	10.49
Mean high water	6.80	9.88
Mean sea level	3.48	6.56
Mean lower low water	-1.20	1.88

NOTES: NAVD88 = North American Vertical Datum of 1988

a. Tidal datums are based on Dumbarton Bridge tidal gauge (Station ID: 9414509) tidal datums from 1983-2001 epoch, reported relative to mean lower low water and adjusted to NAVD88 using offsets from Foxgrover et al. (Foxgrover, A.C., B.E. Jaffe, G.T. Hovis, C.A. Martin, J.R. Hubbard, M.R. Samant, and S.M. Sullivan, 2007. *2007, 2005 Hydrographic Survey of South San Francisco Bay, California*. U.S. Geological Survey Open File Report 2007-1169.).
b. Tidal datum projections are modified based on California Ocean Protection Council Intermediate-High sea level scenario for California (see also Table 3.11-2, below) from year 2000 baseline. Intermediate-High scenario is heavily reflective of a world where rapid ice sheet loss processes are contributing to sea level rise, associated with intermediate to high future emissions, and high warming.
c. High tide line is estimated as 1 foot above mean higher high water.

SOURCE: H.T. Harvey & Associates, SAFER Bay Habitat Restoration Basis of Design, February 2025.

Due to its size and geographic extent, the northern and southern portions of the bay have distinct hydrologic characteristics. Circulation and mixing, which influence water quality (such as salinity levels) within the bay, is dependent on tides, river flow, winds, runoff, and bathymetry. The northern portion of San Francisco Bay (Suisun Bay, Carquinez Strait, and San Pablo Bay), which receives freshwater inflow from 40 percent of California's land area through the Sacramento–San Joaquin Delta, is partially to well-mixed, while the Central Bay is mostly influenced by water exchange with the ocean through the Golden Gate. The Lower and South Bay together are surrounded by smaller watersheds with far less freshwater inflow and together are considered a tidal lagoon. Because of little freshwater inflow, active wind mixing during summer months, and a broad, shallow bathymetry, South Bay waters are generally well mixed throughout the year, except for brief periods during wet winters. Currents in the Lower and South Bay are driven predominantly by tidally and wind-forced flows and their interaction with the bathymetry. Tidal dispersion is the dominant form of sediment transport in the Lower and South Bay and the primary mechanism that controls residence times. At mean lower low water, the volume of water in San Francisco Bay south of the Dumbarton Bridge is less than half the volume present at mean higher high water. In addition, surface water area coverage at mean lower low water is less than half that at mean higher high water, indicating that over half of the far South Bay consists of shallow mudflats exposed at high tides.[3]

Waves along the bay margins originate locally within San Francisco Bay as well as from the Pacific Ocean. The Pacific Ocean waves are substantially dampened as they move into and through San Francisco Bay so waves within the bay are much smaller than those of the open coastline. Currents in San Francisco Bay develop primarily from tidal flows entering through the Golden Gate and extending into the southern and northern portions of the bay and the Sacramento–San Joaquin Delta. The tidal currents

[3] USFWS and CSCC (U.S. Fish and Wildlife Service and California State Coastal Conservancy), 2016. *South Bay Salt Pond Restoration Project Final Environmental Impact Statement/Report, Phase 2.* April 2016.

primarily result from the changing tides, which create a flushing action that exchanges bay water with ocean water through the Golden Gate with the Pacific Ocean.

San Francisquito Creek

San Francisquito Creek (labeled on Figure 2-1) flows approximately 13 miles from Searsville Reservoir to San Francisco Bay. Much of the approximately 45-square-mile drainage area of San Francisquito Creek is hilly to mountainous terrain. Urban runoff from the creek's alluvial fan, and several square miles outside of the natural drainage area boundaries (including parts of Palo Alto, East Palo Alto, Stanford University, and Menlo Park), flows through storm drains to the creek. San Francisquito Creek is tidally influenced from the mouth in San Francisco Bay to the vicinity of United States Route 101 (U.S. 101), with strong tidal effects visible near U.S. 101. The O'Connor Pump Station at the southern end of the South of Bay Reach discharges into the tidal portion of San Francisquito Creek.

Faber Marsh

Faber Marsh is located east of the South of Bay Road Reach, as shown in Figure 2-1. The estuarine tidal wetland extends approximately 2,100 feet east of the existing embankment to the mudflats that bound southern San Francisco Bay. Most of Faber Marsh is bounded on three sides by embankments. The bounded area of the marsh is connected to San Francisco Bay by one tidal slough with several tributary channels. Faber Marsh is owned and managed by the City of Palo Alto but is located within the City of East Palo Alto.

Laumeister Marsh

Laumeister Marsh is located east of the South of Bay Road Reach. The tidal wetland extends approximately 1,800 feet east of the existing embankment to the mudflats that bound southern San Francisco Bay. The wetland is estuarine and open to full tidal action from San Francisco Bay. An extensive network of natural tidal sloughs and human-made channels run through the tidal wetland. The northern portion of Laumeister Marsh includes an approximately 2-acre area affected by historic agricultural chemical plant operations at 1990 Bay Road, which resulted in elevated arsenic concentrations in soil and groundwater, although concentrations of arsenic in sediment in Laumeister Marsh were determined to not require remediation because they did not represent a public health risk.[4] Laumeister Marsh is owned and managed by the City of Palo Alto but is located within the City of East Palo Alto.

Ravenswood Open Space Preserve

The 376-acre Ravenswood Open Space Preserve is located east of the North of Bay Road Reach. A former salt production pond, the area was breached to open tidal action in 2000. Several channels allow full tidal action from San Francisco Bay. A storm drain system within the 1990 Bay Road property discharges to an outfall located in a tidal channel (East Slough) in Ravenswood Open Space Preserve, just north of Bay Road.[5] Ravenswood Open Space Preserve is owned and operated by Midpeninsula Open Space District.

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[4] Geomatrix Consultants, Inc., and S.S. Papadopulos and Associates, Inc., 2007. *Wetland Operable Unit Feasibility Study, 1990 Bay Road Site.* May 2007.

[5] S.S. Papadopulos and Associates, Inc., 2020. *Construction Risk Management Plan Addendum to the Comprehensive Site Management Plan, 1990 Bay Road Site.* December 2020.

Don Edwards San Francisco Bay National Wildlife Refuge – Ravenswood Pond Complex

The Project area includes multiple former salt ponds that are currently part of the Don Edwards San Francisco Bay National Wildlife Refuge (Refuge) Ravenswood Pond Complex. Commercial production of salt in San Francisco Bay began in 1854, and by 1868, there were 18 salt companies along the San Francisco Bay; these companies eventually merged into Leslie Salt by the 1930s before later being purchased by Cargill Corporation in 1978. Cargill Corporation retained salt making rights on the ponds until 2003, when Ponds R1, R2, R3, R4, S5/R5, and SF2 (among others) were acquired by the U.S. Fish and Wildlife Service for restoration.[6] The SAFER Bay Project proposes restoration and enhancement activities in ponds R1, R2, R3, and SF2. Levee construction is proposed in portions of ponds R2, R3, R4, S5/R5, and SF2.

Water movement in Ponds R1, R2, R3, and S5/R5 is managed with water control structures along the berms separating the ponds from Ravenswood Slough or Flood Slough and other surrounding ponds. Pond R1 is hydraulically connected to Ravenswood Slough via one water control structure on the western side. One recently completed two-way, gated water control structure with invert elevation of 2 feet North American Vertical Datum of 1988 (NAVD88; assumed for all elevations in this document unless otherwise noted) connects the eastern end of Pond R3 to Ravenswood Slough. At the western end of Pond R3, a two-way gated water control structure with invert elevation 4.5 feet connects Pond R3 to Pond S5/R5. Pond S5/R5 is also connected to Pond R4 and Flood Slough. A two-way, gated water control structure with invert elevation 3.5 feet connects Pond S5/R5 to Pond R4. A two-way, gated water control structure with invert elevation 2 feet connects Pond S5/R5 to Flood Slough.[7] The water control structures are gated at both ends to allow two-way control of flows in or out of each pond. The northeastern levee of Pond R4 was breached in December 2023 by the South Bay Salt Pond Restoration Project (SBSPRP), opening the pond to direct tidal action.

Pursuant to the SBSPRP Phase 2, Ponds R1, R2, R3, and S5/R5 are managed as seasonal ponds.[8] Pond R3 is managed for small shorebird habitat, including western snowy plover nesting habitat, by actively draining it prior to nesting season and periodically refreshing the water in the borrow ditches and sloughs to enhance forage quality.[9] The varying invert elevations of water control structures between ponds allows for separate control of different types of managed habitat for various birds.

Pond SF2 consists of managed pond habitat and is operated to circulate water around the habitat islands within the pond to meet water quality objectives, discharge requirements, and to provide forage for roosting and nesting birds in the pond. Two sets of culverts connect Pond SF2 to San Francisco Bay along

[6] USFWS (U.S. Fish and Wildlife Service), 2009. *South Bay Salt Pond Restoration Project Final Environmental Impact Statement Record of Decision.* January 27, 2009.

[7] San Francisco Bay RWQCB, Order No. R2-2018-0020, Waste Discharge Requirements and Water Quality Certification for U.S. Fish and Wildlife Service and the California Department of Fish and Wildlife South Bay Salt Pond Restoration Project, Phase 2.

[8] San Francisco Bay RWQCB, Order No. R2-2018-0020, Waste Discharge Requirements and Water Quality Certification for U.S. Fish and Wildlife Service and the California Department of Fish and Wildlife South Bay Salt Pond Restoration Project, Phase 2.

[9] BCDC (San Francisco Bay Conservation and Development Commission), 2018. *Letter of Agreement for Consistency Determination No. C2017.008.00.* June 28, 2018.

the pond's eastern berm. Internal water circulation in the pond is managed using a series of berms and water control structures (including flashboard weirs).[10]

Ravenswood Slough

Ravenswood Slough is an approximately 1.7-mile-long tidal slough, extending from open San Francisco Bay water to State Route (SR) 84. Ravenswood Pump Station, located on the southern side of SR 84, pumps water under SR 84 into Ravenswood Slough via culverts with flap gates. A box culvert that drains via gravity adjacent to the pump station connects the undeveloped areas south of SR 84 to Ravenswood Slough.

Flood Slough

Flood Slough is a large tidal slough between the former salt ponds of the Ravenswood Pond Complex and existing salt ponds and other development to the west.

Cargill Corporation Pond 7c

Pond 7c, located at the western end of the Project area and north of the Marsh Road Reach, is an actively used salt pond. Water is managed in the pond consistent with salt works.

Groundwater

The Project site overlies the Santa Clara Valley–San Mateo Plain Groundwater Basin (2-9.03). San Francisco Bay constitutes its eastern boundary. The Santa Cruz Mountains form the western margin of the San Mateo Plain basin. The westside basin bounds it on the north, and its southern limit is defined by San Francisquito Creek.[11] The San Mateo Plain basin is composed of alluvium deposits formed by tributaries to San Francisco Bay.[12] A relatively shallow water table aquifer[13] overlies confined and semi-confined aquifers in the lowland area that includes the Project area.[14]

Groundwater is used as a potable supply source in both Menlo Park and East Palo Alto. Pumping for these potable sources extracts water from deeper aquifers that are generally 50 feet or deeper below the ground surface. The Palo Alto Park Mutual Water Company in East Palo Alto and the O'Connor Tract Cooperative Water Company in Menlo Park supply water to portions of East Palo Alto and Menlo Park. The San Mateo Plain Groundwater Basin is also an emergency supply source for the City of Palo Alto, the City of Menlo Park, and Stanford University. There are also many private wells that are primarily

[10] San Francisco Bay RWQCB, Order No. R2-2018-0020, Waste Discharge Requirements and Water Quality Certification for U.S. Fish and Wildlife Service and the California Department of Fish and Wildlife South Bay Salt Pond Restoration Project, Phase 2.

[11] DWR (California Department of Water Resources), 2004. "San Francisco Bay Hydrologic Region, Santa Clara Valley – San Mateo Plain Groundwater Basin." *California's Groundwater Bulletin* 118. February 27, 2004.

[12] County of San Mateo, 2018. *San Mateo Plain Groundwater Basin Assessment*. July 2018.

[13] Shallow groundwater is not constrained by an overlying aquitard (an aquitard is a compacted layer of clay, silt, or rock that acts as a barrier for groundwater) and is therefore not confined. Unconfined aquifers are at atmospheric pressure, so water levels rise and fall in response to surface recharge, tidal changes, and underflow.

[14] DWR (California Department of Water Resources), 1967. *Evaluation of Groundwater Resources South Bay Appendix A: Geology Bulletin 118-1.* August 1967.

used for irrigation, including at San Mateo County Parks, residents in Atherton, Saint Patrick's Seminary, Holbrook Palmer Park, and Stanford University.[15]

Based on monitoring conducted at nearby locations, in the Project area, depth to shallow groundwater is generally about 2 to about 10 feet below ground surface (bgs) and flow direction is to the east, toward San Francisco Bay.[16]

Shallow groundwater underlying the Project site is of poor quality and is not used for supply. Groundwater pumpage in the deeper aquifer sufficiently affected the hydrology of the region as early as the 1920s enough to reverse artesian conditions along the San Francisco Bay and create an inland water gradient along Willow Road.[17] The City of San Francisco began delivering surface water from Hetch Hetchy Reservoir in 1940, and the State of California began delivering surface water in 1965 to supplement supplies. Maximum groundwater overdrafts generally occurred in 1965.[18] After 1965 increases in surface water deliveries were used to reduce demand for groundwater restoring water levels to pre-1960 conditions.[19]

Tsunami and Seiche

Tsunamis (seismic sea waves) are long-period waves that are typically caused by underwater seismic disturbances, volcanic eruptions, or submerged landslides, which can travel at speeds of up to 500 miles per hour. Tsunami wave heights are typically up to 3 feet in the open water and can be barely perceptible to watercraft. Wave heights may increase to 30 feet or more when they reach land, potentially causing large amounts of damage.[20] A *seiche* (a temporary disturbance in the water level) is caused by oscillation of the surface of an enclosed body of water, such as San Francisco Bay, due to an earthquake or large wind event. Seiches can result in long-period waves that cause run-up or overtopping of adjacent landmasses, similar to tsunami run-up.

San Francisco may experience distant-, regional-, and local-source tsunamis. The Tsunami Annex to San Francisco's Emergency Response Plan defines a distant-source tsunami as one generated by an earthquake or other source event located over 1,000 kilometers (621 miles) from San Francisco.[21] Travel times for distant-source tsunamis vary from 4 to 15 hours. A regional-source tsunami results from a source less than 621 miles from San Francisco and has a travel time of 1 to 2 hours. A near-source tsunami from a source less than 62 miles from San Francisco could reach San Francisco within 10 to 15 minutes. The primary tsunami threat to the Bay Area is from a distant-source earthquake originating

[15] County of San Mateo, 2018. *San Mateo Plain Groundwater Basin Assessment*. July 2018.

[16] Ninyo and Moore, 2021. *Ravenswood Industrial Area Area-Wide Risk Management Plan*.

[17] Killingsworth, C., and B.C. Hyde, 1932. *A Report on the Underground Water Supply of Stanford University and Vicinity.*

[18] Fio, J.L., and D.A. Leighton, 1995. *Geohydrological Framework, Historical Development of the Groundwater System, and General Hydrologic and Water Quality Conditions in 1990, South San Francisco Bay and Peninsula, California.* U.S. Geological Survey Open File Report 94-357.

[19] Fio, J.L., and D.A. Leighton, 1995. *Geohydrological Framework, Historical Development of the Groundwater System, and General Hydrologic and Water Quality Conditions in 1990, South San Francisco Bay and Peninsula, California.* U.S. Geological Survey Open File Report 94-357.

[20] City and County of San Francisco, 2017. Emergency Response Plan, an Element of the CCSF Emergency Management Program, Tsunami Annex. May 2017.

[21] City and County of San Francisco, 2017. Emergency Response Plan, an Element of the CCSF Emergency Management Program, Tsunami Annex. May 2017.

from a *subduction fault,* such as the Aleutian-Alaska-Cascadia Subduction Zone.[22] Approximately 94 percent of the 54 historic tsunamis to reach San Francisco were caused by distant-source events and resulted in maximum wave heights of 4 feet in San Francisco Bay. A near-source tsunami caused by a Bay Area earthquake is not seen as a major threat to the Project area because most Northern California's faults are *strike-slip*[23] and are less likely to cause damaging tsunamis. The Project site is within a potential tsunami inundation zone.[24]

Flooding, Drainage, and Flood Risk

Low-lying areas along San Francisco Bay's shoreline are subject to flooding during periods of high tides, storm surge, and waves. High bay water levels and wave conditions cause coastal flooding along the bay shoreline. High water levels occur because of high astronomical tides coupled with storm surge and other processes such as El Niño[25] conditions, which can elevate Pacific coast water levels during winter months. Strong winds during storms can also generate waves that affect the shoreline and cause localized flooding or erosion, particularly when the waves ride on a storm surge-elevated water surface. Depending on the intensity of each of these processes, as well as their timing relative to astronomic tides, storm surge can result in bay water levels up to about 3 feet higher than astronomic tides alone.

East Palo Alto

Flooding due to rainfall in the areas of low relief close to San Francisco Bay is aggravated by high tides which prevent drainage of stormwater. Flooding within the City of East Palo Alto is caused by heavy rainfall, which generally occurs during winter and early spring and by high tides associated with storms. San Francisquito Creek overflows at two locations within the City of Menlo Park. The overflow travels eastward toward the bay along streets leading away from the creek channel. At U.S. 101, this shallow flooding continues to flow toward the bay through Menlo Park and East Palo Alto.

Stormwater runoff in East Palo Alto is conveyed into flood protection systems that discharge to San Francisquito Creek and San Francisco Bay. The East Palo Alto Storm Drain Master Plan divides East Palo Alto into nine drainage sub-areas, the largest of which are O'Connor, Willow-Ravenswood, and Runnymede.[26] The drainage systems in East Palo Alto are largely dependent on the two pump stations, O'Connor Pump Station (at the southern end of the South of Bay Road Reach) and Ravenswood Pump Station (near the Tech Campus Reach).[27] **Figure 3.11-1** shows locations of the pump stations and other drainage features.

[22] *Subduction zones* are plate tectonic boundaries where two plates converge, and one plate is thrust beneath the other. This process results in geohazards, such as earthquakes and volcanoes.

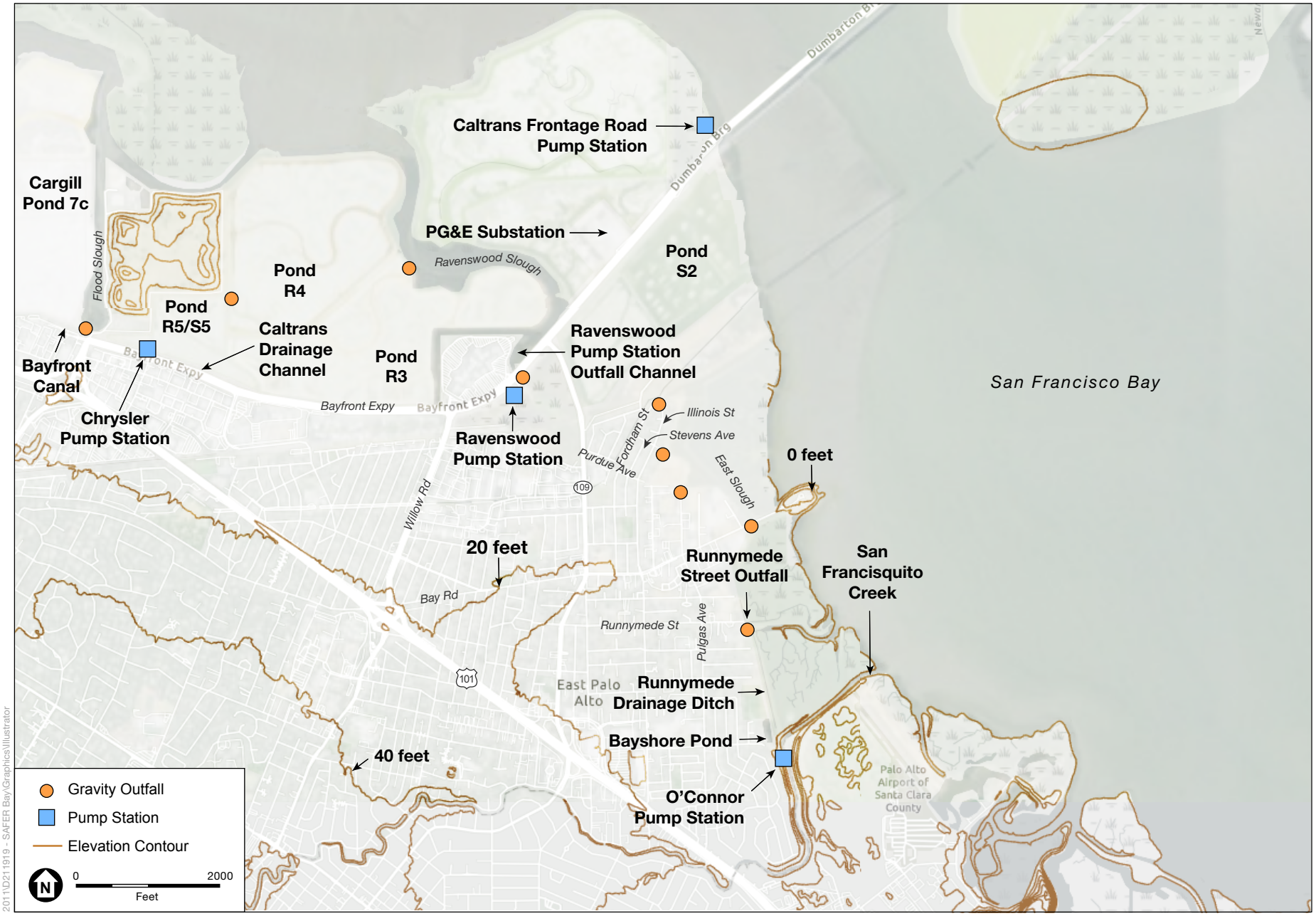
[23] Strike-slip faults are vertical (or nearly vertical) fractures where the blocks of earth move mostly horizontally past one another.

[24] CGS (California Geological Survey), 2025. "Tsunami Hazard Areas Map." Data updated 2020/2022. Available online at maps.conservation.ca.gov/cgs/informationwarehouse/ts_evacuation/. Accessed May 2025.

[25] El Niño is a climate pattern that describes the unusual warming of surface waters in the eastern tropical Pacific Ocean.

[26] City of East Palo Alto, 2014. *East Palo Alto Storm Drain Master Plan*. January 2014. Prepared by Schaaf and Wheeler.

[27] City of East Palo Alto, 2014. *East Palo Alto Storm Drain Master Plan*. January 2014. Prepared by Schaaf and Wheeler.



SOURCE: USGS

SAFER Bay Project

Figure 3.11-1
Topography and Drainage Features in Project Vicinity

ESA

Tidal flooding from the bay during the 1-percent annual chance flood can possibly overtop the levee system in the City of East Palo Alto and cause flooding in the residential area adjacent to San Francisquito Creek. Flooding of this area is the result of inadequate or nonexistent stormwater facilities causing local stormwaters to be trapped in the area.[28]

The 1-percent annual chance flood event elevation for zones VE (coastal flood hazard) and AE (other flood hazard) are both the same in areas of East Palo Alto near the shoreline.

Runnymede Storm Drain System discharges to San Francisco Bay at the Runnymede Street Outfall at the eastern end of Runnymede Street. Because of its elevation relative to present-day tides, this outfall's discharge can be limited or even blocked completely when bay water levels are high in the tide range. When that occurs, flow is redirected southward to be pumped into the bay via the O'Connor Pump Station.

Menlo Park and Redwood City

The City of Menlo Park's storm drainage facilities collect, convey, and discharge stormwater runoff to San Francisquito Creek, to the Atherton Channel, and to San Francisco Bay via two pump stations (Ravenswood Pump Station and Chrysler Pump Station).[29] Flooding due to rainfall in shoreline areas of Menlo Park is aggravated by high tides, which back up the storm drain network and slow drainage of storm runoff. Tidal waters can also inundate areas of low relief along the shoreline during maximum high tides (i.e., tides with an estimated 1-percent annual chance of occurrence) where not protected by berms or levees.[30] The elevation of developed shoreline areas of Menlo Park in the Project vicinity generally ranges between approximately 8 feet to 12 feet.[31]

The bayfront area of Redwood City is also subject to flooding northeast of U.S. 101 during extreme high tides.[32]As shown in Table 3.11-1, mean higher high water in the Project vicinity is approximately 7.41 feet.

Local flooding can occur in the neighborhoods behind Redwood City's Bayfront Canal and Menlo Park's Atherton Channel when large stormwater outflows coincide with high tides in Flood Slough. As of 2019, a 2-year or greater rainfall will cause flooding to low-lying areas adjacent to Bayfront Canal.[33] The Bayfront Canal is the stormwater transmission canal for Atherton Channel that discharges through Flood Slough and into the bay. Water levels in Bayfront Canal are controlled by tide gates at the east end of the canal; the tide gates allow water to leave the canal but prevent San Francisco Bay tidewater from entering.[34] During storms that coincide with high tides, Bayfront Canal and Atherton Channel cannot

[28] FEMA (Federal Emergency Management Agency), 2019. FEMA Flood Insurance Study, Volume 1 of 3, San Mateo County, California. Revised April 5, 2019.

[29] City of Menlo Park, 2023. *Stormwater Master Plan*. April 2023. Prepared by Wood Rogers.

[30] FEMA (Federal Emergency Management Agency), 2019. FEMA Flood Insurance Study, Volume 1 of 3, San Mateo County, California. Revised April 5, 2019.

[31] USGS (U.S. Geological Survey), 2025. "The National Map Viewer. Topography of East Palo Alto." Available online at apps.nationalmap.gov/viewer/. Accessed April 1, 2025.

[32] FEMA (Federal Emergency Management Agency), 2019. FEMA Flood Insurance Study, Volume 1 of 3, San Mateo County, California. Revised April 5, 2019.

[33] San Mateo County Department of Public Works, Flood Resilience Program, 2019. *Bayfront Canal and Atherton Channel Watershed Flood Management Plan.* August 2019.

[34] San Mateo County Department of Public Works, Flood Resilience Program, 2019. *Bayfront Canal and Atherton Channel Watershed Flood Management Plan.* August 2019.

discharge sufficient stormwater flows to the bay, and depending on the intensity of the storm, Bayfront Canal and Atherton Channel do not have enough detention capacity to prevent flooding in low-lying areas.[35]

Flood Hazard Zones

The 100-year floodplain denotes an area that has a 1 percent chance of being inundated during any 12-month period. Floodplain zones (Special Flood Hazard Areas) are determined by the Federal Emergency Management Agency (FEMA) and used to create flood insurance rate maps. These tools assist communities in mitigating flood hazards through land use planning. FEMA also outlines specific regulations, intended to be adopted by the local jurisdictions, for any construction, whether residential, commercial, or industrial, within 100-year floodplains. Flood Insurance Rate Maps published by FEMA identify the entire Project area as being within the 100-year flood hazard zone (Zone AE), with water surface elevations for the 100-year flood ranging from 11 feet to 12 feet.[36] Areas inland of the Project area are also within the 100-year and 500-year flood hazard zones.

Future Flood Risk

East Palo Alto and Menlo Park, as well as other nearby shoreline areas are vulnerable to flooding from extreme storms. During future floods, particularly those that include sea level rise, many stretches of the bay shoreline would be overtopped and experience landward bay water inundation. The Project is designed to provide a shoreline protection system against 100-year floods and incorporate protection for 3.5 feet of future sea level rise.

In 2024, the State of California released the *Draft State of California Sea Level Rise Guidance: 2024 Science and Policy Update*. The 2024 updated guidance provided a science-based methodology for state and local governments to analyze and assess the risks associated with sea level rise and reflects substantial advancements in scientific understanding and ability to project future sea level rise. The 2024 updated guidance presents five sea level scenarios for California, which are derived from the sets of probabilistic projections developed in the Intergovernmental Panel on Climate Change Sixth Assessment report. The sea level scenarios for California span the plausible range of future sea level rise under all emissions and global development futures and enable users to consider sea level rise without first selecting a single emissions future on which to base planning and projects. **Table 3.11-2** presents the statewide averages for three of the five California sea level scenarios. The draft 2024 State of California Sea Level Rise Guidance update recommends consideration of the Intermediate, Intermediate-High, and High scenarios to inform sea level rise planning and project decisions. The Intermediate scenario (up to 3.1 feet of sea level rise by 2100) is driven dominantly by high emissions scenarios, and thus, higher warming levels, and therefore provides a reasonable upper bound for the most likely range of sea level rise by 2100.[37]

[35] USFWS and CSCC (U.S. Fish and Wildlife Service and California State Coastal Conservancy), 2016. *South Bay Salt Pond Restoration Project Final Environmental Impact Statement/Report, Phase 2.* April 2016.

[36] FEMA (Federal Emergency Management Agency), 2019. National Flood Insurance Program Flood Insurance Rate Map, San Mateo County and Incorporated Areas. April 2019

[37] California Ocean Protection Council, 2024. *Draft State of California Sea Level Rise Guidance: 2024 Science and Policy Update.* January 2024.

TABLE 3.11-2
STATEWIDE ESTIMATES OF MEDIAN SEA LEVEL RISE RELATIVE TO THE YEAR 2000[a]

Year	Intermediate (feet) [b]	Intermediate-High (feet) [c]	High (feet) [d]
2030	0.4	0.4	0.4
2040	0.6	0.7	0.8
2050	0.8	1.0	1.2
2060	1.1	1.5	2.0
2070	1.4	2.2	3.0
2080	1.8	3.0	4.1
2090	2.4	3.9	5.4
2100	3.1	4.9	6.6

NOTES:

a. Values in Intermediate, Intermediate-High, and High columns all incorporate an average value of vertical land motion corresponding to a negligible rate of 0.1 millimeter per year of land uplift. The draft 2024 State of California Sea Level Rise Guidance update recommends consideration of the Intermediate, Intermediate-High, and High scenarios to inform sea level rise planning and project decisions.
b. Intermediate scenario is driven dominantly by high emissions scenarios, and thus, higher warming levels. This scenario provides a reasonable upper bound for the most likely range of sea level rise by 2100.
c. Intermediate-High scenario is heavily reflective of a world where rapid ice sheet loss processes are contributing to sea level rise, associated with intermediate to high future emissions, and high warming.
d. High scenario only arises with high future emissions and high warming with large potential contributions from rapid ice sheet loss processes. Deep uncertainties and ambiguity embedded in this scenario frame a worst case beyond 2100 as we currently understand it, and a statement about the likelihood of reaching this scenario is not possible. It should be used with caution and consideration of the underlying assumptions.

SOURCE: California Ocean Protection Council, 2024. *Draft State of California Sea Level Rise Guidance: 2024 Science and Policy Update*. January 2024.

Water Quality

San Francisco Bay

Water quality in San Francisco Bay is saline and predominated by ocean influences. During periods of significant runoff, substantial freshwater migrates into San Francisco Bay and can temporarily reduce the salinity of waters to substantially less than ocean water. When tidal currents are constrained, such as at the inlet of the Golden Gate, the behavior of the current can affect circulation, flushing action, and water exchange, thereby influencing sedimentation and water quality characteristics within the bay. Water in San Francisco Bay is generally well oxygenated with typical concentrations of *dissolved oxygen*[38] ranging from 9 to 10 milligrams per liter (mg/L) during high periods of freshwater inflow, 7 to 9 mg/L during moderate inflow, and 6 to 9 mg/L during the late summer months when freshwater inflows are lowest.[39]

Various contaminants are transported into San Francisco Bay by several different sources, including industrial outfalls, municipal wastewater outfalls, municipal stormwater, upstream farming, upstream historic and current mining discharges, *legacy pollutants*,[40] and various other pollutant sources. Mercury in the bay is deposited from the atmosphere along with sediments transported from areas affected by

[38] *Dissolved oxygen* is the amount of gaseous oxygen (O_2) dissolved in the water. Adequate dissolved oxygen is important for good water quality; when dissolved oxygen levels drop below 5.0 mg/L it can cause stress to aquatic life.

[39] SFEI (San Francisco Estuary Institute), 2008. "Effects of Short-term Water Quality Impacts Due to Dredging and Disposal on Sensitive Fish Species in San Francisco Bay," SFEI Contribution 560, San Francisco Estuary Institute, Oakland, California.

[40] Legacy pollutants are water quality constituents that are considered harmful to human health or the environment that were historically emitted by industry or other human activities, and that are in general banned or significantly restricted from current usage. Examples include mercury, lead, PCBs, and DDT.

historic gold mining in the Central Valley and Sierra Nevada foothills. Sediment, plastics, metals, and pesticides are washed into the bay from the surrounding communities during storms, and nutrients and low dissolved oxygen water can enter the bay through discharges from wastewater collection systems. Dredging of bay material can uncover and remobilize sediment-bound contaminants, such as mercury and polychlorinated biphenyls (PCBs).[41] Natural accretion processes in salt marshes continually supply fresh layers of mercury-contaminated sediments that release mercury in a form that can become biologically available to mercury-methylating bacteria and enter the food chain.

In accordance with Clean Water Act (CWA) section 303(d) (discussed in Section 3.11.2), states must present the U.S. Environmental Protection Agency (EPA) with a list of impaired waterbodies, defined as those waterbodies that do not meet water quality standards. The State Water Resources Control Board (State Water Board) and San Francisco Bay Regional Water Quality Control Board (RWQCB) have listed Lower San Francisco Bay (the South Bay Basin) as an impaired waterbody for legacy concentrations of the chlorinated pesticides chlordane, dichloro-diphenyl-trichloroethane (DDT), dieldrin, dioxin compounds, furan compounds, the oil coolant PCB, mercury, trash, and invasive species.[42] Total maximum daily loads (TMDLs) applicable to Lower San Francisco Bay have been developed and approved by the EPA for mercury and PCBs.[43] Lower San Francisco Bay is not considered a sediment-sensitive waterbody and is not listed as impaired for sediment.[44] San Francisquito Creek is listed as an impaired waterbody for the pesticide component diazinon, trash, and sedimentation/siltation. A TMDL applicable to San Francisquito Creek has been approved by the EPA for diazinon. South San Francisco Bay (Santa Clara Basin) is listed as an impaired waterbody for legacy concentrations of the chlorinated pesticides chlordane, DDT, dieldrin, dioxin compounds, furan compounds, the oil coolant PCB, mercury, selenium, and invasive species.[45] TMDLs applicable to South San Francisco Bay have been developed and approved by the EPA for mercury and PCBs.

Don Edwards San Francisco Bay National Wildlife Refuge – Ravenswood Pond Complex

The Project includes former salt ponds, which have been managed under an initial stewardship plan since 2004 by the SBSPRP. The main water quality parameters of concern for discharges from former salt ponds include salinity, metals, dissolved oxygen, pH, and temperature. Of these water quality parameters, dissolved oxygen levels have proven to be the most difficult water quality parameter to manage in the former salt ponds. The former salt ponds in the Project area are currently managed to maintain salinity and metals levels such that discharges from the ponds meet water quality objectives for both salinity and metals. Algal growth in salt ponds can cause dissolved oxygen and pH levels to vary significantly over the

[41] SFEI (San Francisco Estuary Institute), 2019. The Pulse of the Bay: Pollutant Pathways, SFEI Contribution 954, San Francisco Estuary Institute, Richmond, CA.

[42] State Water Board (California State Water Resources Control Board), 2024. Final 2018 California Integrated Report (Clean Water Act Section 303(d) List/305(b) Report). Available online at www.waterboards.ca.gov/rwqcb2/water_issues/programs/TMDLs/303dlist.html. Accessed December 20, 2024.

[43] A total maximum daily load is a regulatory term in the U.S. Clean Water Act that describes a plan for restoring impaired waters. The TMDL identifies the maximum amount of a pollutant that a body of water can receive while still meeting water quality standards.

[44] State Water Board, Final 2018 California Integrated Report (Clean Water Act Section 303(d) List/305(b) Report), https://www.waterboards.ca.gov/rwqcb2/water_issues/programs/TMDLs/303dlist.html, accessed December 20, 2024.

[45] State Water Board (California State Water Resources Control Board), 2018. Final 2018 California Integrated Report (Clean Water Act Section 303(d) List/305(b) Report). Available online at www.waterboards.ca.gov/rwqcb2/water_issues/programs/TMDLs/303dlist.html. Accessed December 20, 2024.

course of a day. This is because during daylight hours, photosynthesis will produce oxygen and consume dissolved carbon dioxide. At night, respiration will produce dissolved carbon dioxide and consume oxygen. Therefore, any significant algal growth will cause dissolved oxygen and pH levels to peak during the late afternoon and to be at their lowest levels in pre-dawn. Based on studies undertaken as part of the SBSPRP, continuous monitoring data within former salt ponds shows that pH levels can vary significantly and are often above the Basin Plan objective of 8.5. However, receiving water data has also shown that high pH levels from pond discharges are quickly normalized in nearby sloughs and the bay. Continuous monitoring data for dissolved oxygen within former salt ponds has also shown significant variations throughout the day. Continuous monitoring data since 2004 have shown that discharges from former salt ponds have complied with the state's Thermal Plan, which indicates that discharges shall not exceed the natural temperature of receiving waters by 20 degrees Fahrenheit (°F), and discharges shall not cause temperatures to rise greater than 4°F above the natural temperature of the receiving water at any time or place.[46] Total mercury and methylmercury concentrations were analyzed in sediment cores from Pond A4 collected in late summer/fall of 2003. Total mercury concentrations averaged 0.05 microgram/kilogram (mg/kg), which is lower than typical concentrations found in the bay. Methylmercury concentrations averaged 0.37mg/kg, which is also less than concentrations generally found in the bay.[47]

Water quality in the former salt ponds at the Ravenswood Pond Complex in the Project area is managed consistent with the requirements of the SBSPRP Phase 2 Adaptive Management Plan. The SBSPRP includes conversion of some managed ponds to tidal habitat and enhancement and/or reconfiguration of other managed ponds for targeted habitat management. To ensure that water quality impacts are avoided while progressing with conversion of habitat types, triggers for adaptive management actions are established well below water quality thresholds of significance identified in the SBSPRP 2016 Environmental Impact Statement/Report.[48] Requirements of the SBSPRP Adaptive Management Plan include:

- Monitoring to track algal abundance and water quality in the ponds;
- Management/operation of ponds to reduce residence time, increase mixing (e.g., by maintaining water at shallower depths);
- Active drainage of some seasonal ponds and period refreshing water in borrow ditches and slough channels, including in Pond R3 and Pond R5/S5;
- Periodic monitoring of biosentinel species to track methylmercury in the food webs of fish and wildlife in the South Bay, and/or other sediment or water quality monitoring;
- Adaptive management actions to be implemented if water quality limitations are exceeded, such as: improving water circulation patterns, decreasing hydraulic residence time, increasing exposure to wind, or otherwise increasing the re-aeration rate of waters; capping or removal of mercury-contaminated sediments; and

[46] San Francisco Bay RWQCB, South Bay Salt Pond Restoration Project, Phase 2. Order No. R2-2018-0020, CIWQS Place ID No. 4112258

[47] USFWS and CSCC (U.S. Fish and Wildlife Service and California State Coastal Conservancy), 2016. *South Bay Salt Pond Restoration Project Final Environmental Impact Statement/Report, Phase 2.* April 2016.

[48] San Francisco Bay RWQCB, South Bay Salt Pond Restoration Project, Phase 2. Order No. R2-2018-0020, CIWQS Place ID No. 4112258. Finding 111.

- Triggers and actions that are subject to RWQCB Executive Officer approval.

Cargill Corporation Pond 7c and Brine Line

Pond 7c and the associated brine channel (or brine line) bordering the pond are actively used for salt production. These areas are required to be managed pursuant to requirements of the general industrial stormwater permit, including implementation of an industrial stormwater pollution prevention plan. The industrial stormwater permit prohibits the release of pollutants or liquids or materials other than stormwater, except in limited circumstances. The stormwater pollution prevention plan must include best management practices that reduce or prevent discharges of pollutants in stormwater discharge in a manner that reflects best industry practice. Additional management requirements apply for dischargers located in a watershed for which a total maximum daily load has been approved by the U.S. Environmental Protection Agency. No open cleanup actions exist associated with Cargill salt operations in San Mateo County.

Contamination from Other Industrial Land Uses

Land uses adjacent to the Project site south of SR 84 include industrial areas with records of previous groundwater contamination (refer to Section 3.10, *Hazards and Hazardous Materials*, for detailed discussion of hazardous materials sites). Properties within the Ravenswood Industrial Area in East Palo Alto are covered by existing cleanup orders, or other orders issued by the San Francisco Bay RWQCB, U.S. Environmental Protection Agency, and/or California Department of Toxic Substances Control to aid redevelopment of the area. One order covers most of the Ravenswood Industrial Area properties. Properties at 1990 Bay Road and 2081 Bay Road are covered under individual separate orders.[49]

Sycamore Properties within Ravenswood Industrial Area (generally, site bounded by Illinois Street/Clarke Avenue, railroad tracks to the north, shoreline of Ravenswood Open Space Preserve to the east, and Bay Road to the south), East Palo Alto. The Ravenswood Industrial Area has been used for agricultural, residential, commercial and industrial purposes since the 1850s. Previous studies at the site identified a groundwater plume containing volatile organic compounds at the southeastern portion of the site.[50] Contaminants of concern that were previously identified in groundwater include petroleum hydrocarbons, volatile organic compounds, organochloride pesticides, metals; generally, historic data shows environmental screening level exceedances from petroleum-related contaminants of concern. Groundwater management objectives were established to protect future site users from exposures to groundwater and ensure appropriate management of construction-generated water. In general, residual petroleum hydrocarbons are the primary contaminants of concern impacting groundwater in this area and it is anticipated that natural processes over time will result in attenuation of residual pollutants in groundwater. In general, depth to groundwater in the vicinity is approximately 10 to 11 feet bgs and the groundwater flow direction is to the east, toward the San Francisco Bay. The shallowest aquifer in this area is approximately 22 feet thick and groundwater elevations generally range from 2 to 8 feet above mean sea level, groundwater flow in this aquifer is primarily north and east toward the sloughs. The next shallowest aquifer is semi-confined, separated from shallower aquifer by aquitard about 13 feet thick, and bottom of about 60 feet bgs. Groundwater flow direction in this aquifer is toward the east-northeast in the

[49] Ninyo and Moore, 2021. *Ravenswood Industrial Area Area-Wide Risk Management Plan*.

[50] EPA, San Francisco Bay RWQCB, and City of East Palo Alto (U.S. Environmental Protection Agency, San Francisco Bay Regional Water Quality Control Board, and City of East Palo Alto), 1996. *Soil and Groundwater Investigation at the Ravenswood Industrial Area, East Palo Alto California.* December 1996.

direction of the sloughs. The lowest aquifer is separated from overlying aquifers by an aquitard ranging in thickness from 3 to 22 feet. Groundwater flow in this aquifer is upward and toward the sloughs. A sitewide durable cover is present and groundwater extraction is prohibited without prior approval.[51] The North of Bay Road Reach includes work within this area, primarily within the 391 Demeter Street property. The 391 Demeter Street property is located on the northern portion of the Ravenswood Industrial Area, East Palo Alto. The 29-acre property remains undeveloped and consists of wetlands on the northern portion and approximately 9 acres of upland on the southern portion. In the 1980s, a large surcharge soil stockpile was placed on the southern portion of the property at 391 Demeter Street in anticipation of potential construction. Analysis has shown that this stockpile contains low levels of PCBs, which present a threat to the adjacent wetlands and surface waters via potential sediment runoff.[52] The interim remedial measures identified in the report are intended to remain in place until the property is developed and the impacted soil is either removed or capped by development.[53]

1990 Bay Road.[54] In this area there are two primary water-yielding groundwater zones: a shallow zone that occurs from a depth of about 5 to 40 feet with an intervening mixed sediment layer between 15 to 20 feet deep, and a deep aquifer that occurs below a depth of about 160 feet. A clay aquitard separates the two groundwater zones. The deep groundwater zone has not been affected by contamination. The direction of shallow groundwater flow has generally been toward the southeast to discharge areas along the sloughs in the tidal wetland, although a seasonal shift to a more southerly direction during dry summer months has been documented. As of 2021, due to storm drain construction in Pulgas Avenue, groundwater is flowing toward the southwest and potentially into the Runnymede Drainage Ditch.

The groundwater cleanup criteria for the site is to prevent migration of the zone of contaminated groundwater (shallow groundwater is not considered a source of drinking water). Groundwater is considered contaminated if arsenic exceeds 0.05 mg/L. The remedy for groundwater at the site included installation of monitoring wells and a subsurface hydraulic barrier wall and implementation of a groundwater monitoring program for the site to prevent migration of contaminated groundwater and to prevent groundwater from contacting capped contaminated soil. The U-shaped barrier wall was constructed in 2001 to a depth of 17 to 20 feet bgs and impedes discharge from the site to the tidal wetlands to the east. To prevent groundwater flow underneath the wall, the wall was tied into sediments with low hydraulic conductivity. Over 600 trees were planted to extract groundwater and thereby maintain groundwater hydraulics.

A sea level rise vulnerability assessment conducted in 2024 concluded that groundwater levels above the elevation of site caps is not expected in the next several decades and development plans for several of the properties onsite include raising the elevation of the ground surface and groundwater containment

[51] Ninyo and Moore, 2021. *Ravenswood Industrial Area Area-Wide Risk Management Plan*.

[52] San Francisco Bay RWQCB (San Francisco Bay Regional Water Quality Control Board), 2017. *Approval of August 23, 2017, Soil Characterization and Proposed Interim Remedial Measures Report – 391 Demeter Street, Ravenswood Industrial Area, East Palo Alto.* September 19, 2017.

[53] Ninyo and Moore, 2017. *Soil Characterization and Proposed Remedial Measures Report, 391 Demeter Street, East Palo Alto, California.* August 23, 2017.

[54] Information in this subsection is from: S.S. Papadopulos and Associates, Inc., 2024. *Five-Year Status Report, 1990 Bay Road Site East Palo Alto, California.* March 29, 2024.

measures would be replaced as necessary. These developments would reduce the risks of a new pathway due to shallow groundwater for site groundwater to surface water or to sensitive habitats in the tidal marsh.

In 2020, a construction risk management plan (CRMP) was developed for portions of the 1990 Bay Road site (including the full eastern boundary of the site, where the proposed levee would be constructed) which sets forth management protocols that apply to the management of pollutant-impacted soil and groundwater during construction or development activities.[55] Section 4 of the CRMP outlines the protocols that are required for any activity that disturbs or removes caps at the property. Implementation of the management measures are understood to protect human health, including onsite construction workers, nearby residents and workers, and the environment from potential impacts. The protocols include: replacement of caps (that is, of physical barriers that prevent exposure of underlying soil on the property, including asphalt pavement, geosynthetic clay liners, and other hardscape); access controls for areas where the caps have been removed; dust control; spill prevention; stormwater control; control of groundwater during operations; and soil management protocols.

2081 Bay Road.[56] This triangular 12.6-acre site is bounded by Bay Road to the south, Ravenswood Open Space Preserve to the north and east, and Tara Street to the west and was historically operated as a hazardous waste management facility, including solvent recycling, fuel blending, wastewater treatment, and hazardous waste storage and treatment. Operations ceased in 2008. Operations resulted in the release of chemical contaminants into both soil and groundwater, including volatile organic compounds (VOCs), metals, polychlorinated biphenyls, petroleum hydrocarbons, and semi-VOCs. Light non-aqueous phase liquids have also been identified at select locations across the site. The site is a former Resource Conservation and Recovery Act facility undergoing corrective action and closure. Groundwater monitoring is being performed at the site to document changes in groundwater conditions, offsite surface water conditions, and identify areas of concern warranting remediation. Groundwater encountered at depths typically ranging between 2 and 8 feet bgs. Groundwater hydraulic gradient is very shallow. Tidal influence studies indicate a minimal vertical hydraulic gradient exists from the shallowest groundwater toward the tidal channels. A 2018 tidal analysis study determined that in general, groundwater elevations and specific conductivity decline from east to west across the site and vary minimally from low to high and high to low tide. Active groundwater treatment to remove contaminants using a groundwater recirculation system, treatment injection wells, and Light non-aqueous phase liquid removal is ongoing; as of 2024, approximately half of the wells regularly monitored at the site contain contaminant concentrations that meet remedial goals.

3723 Haven Avenue Development. This former Siltec Site in Menlo Park was closed in 2014 using the Low Threat Closure Assessment Tool for Chlorinated Solvent sites. Site remediation was completed in 1999 with trichloroethylene (TCE) source contaminated soil removal. Residual shallow groundwater contamination (an isolated pocket of TCE at concentrations exceeding environmental screening levels) remained in 2004. Groundwater monitoring data collected in 2019 showed increased TCE concentrations, indicating that the groundwater TCE was not stable. Elevated concentrations of TCE and vinyl chloride were detected in 2019 soil vapor samples in the vicinity of the well with high TCE concentrations. The

[55] S.S. Papadopulos and Associates, Inc., 2020. *Construction Risk Management Plan Addendum to the Comprehensive Site Management Plan, 1990 Bay Road Site.* December 2020.

[56] Information in this paragraph is from: Ninyo and Moore, 2024. *First Semiannual 2024 Groundwater Monitoring and Remediation Evaluation Report, Bay Road Holdings Site, 2081 Bay Road, East Palo Alto.* October 2024.

case was reopened to assess the extent of the mobilized groundwater TCE plume and to evaluate additional remedial actions necessary to degrade contaminants of concern for future site redevelopment.

3.11.2 Regulatory Framework

Federal and State

Clean Water Act

In 1972, the CWA established the basic structure for regulating discharges of pollutants into the waters of the U.S. and gave the EPA the authority to implement pollution control programs. The CWA sets water quality standards for contaminants in surface waters. The statute incorporates a variety of regulatory and non-regulatory tools to reduce direct pollutant discharges into waterways, to finance municipal wastewater treatment facilities, and to manage polluted runoff. The EPA has delegated responsibility for implementation of portions of the CWA, including water quality control planning and programs in California, to the State Water Board and the nine regional boards. Water quality standards applicable to the Project are listed in the Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan), as discussed below.

Clean Water Act Section 303(d) and Total Maximum Daily Loads

In accordance with CWA section 303(d), states must present the EPA with a list of impaired waterbodies, defined as those waterbodies that do not meet water quality standards. The CWA requires the development of TMDLs to improve the water quality of impaired waterbodies. Implementation of this program in the Project area is conducted by the San Francisco Bay RWQCB and is discussed below.

Clean Water Act Section 401 – Water Quality Certification

CWA section 401 requires compliance with state water quality standards for actions within state waters. Compliance with the water quality standards required under section 401 is a condition for issuance of a section 404 permit, as described below. Under CWA section 401, every applicant for a federal permit or license for any activity that may result in a discharge to a waterbody must obtain a State Water Quality Certification that the proposed activity will comply with state water quality standards.

Clean Water Act Section 402 – NPDES Permits

CWA section 402 authorizes the EPA to establish a nationwide surface water discharge permit program for municipal and industrial point sources known as the National Pollutant Discharge Elimination System (NPDES) program. Under section 402, the regional board has set standard conditions for each permittee in the Bay Area, including effluent limitation and monitoring programs.

The NPDES program requires all facilities that discharge pollutants into waters of the U.S. to obtain a permit. The permit provides two levels of control – technology-based limits and water-quality-based limits – to control discharge of pollutants to protect water quality. Technology-based limits are based on the ability of dischargers in the same category to treat wastewater, while water-quality-based limits are required if technology-based limits are not sufficient to protect the waterbody. Water-quality-based effluent limitations required to meet water quality criteria in the receiving water are based on criteria specified in the National Toxics Rule, the California Toxics Rule, and the Basin Plan. NPDES permits must also incorporate TMDL waste load allocations when they are developed. In California, the state

board and the regional boards implement and enforce the NPDES program.[57] To ensure that activities do not degrade water quality, pollutant controls have been implemented in accordance with the NPDES permit. These controls apply to sanitary wastewater, industrial wastewater, and stormwater generated during construction activities and operations. Discharges of stormwater and dewatering effluent from the Project would be subject to the NPDES permits.

NPDES Construction General Permit

California adopted the Construction General Permit (CGP) on September 8, 2022 (Order 2022-0057-DWQ). The CGP regulates stormwater management at construction sites. Dischargers whose projects disturb 1 acre or more of soil, or whose projects disturb less than 1 acre but are part of a larger common plan of development that in total disturbs 1 acre or more, must obtain coverage under the CGP. Construction activity subject to this permit includes clearing, grading, and disturbances to the ground, such as stockpiling or excavation, as well as construction of buildings and linear underground projects, including installation of water pipelines and other utility lines.

In the Project area, the CGP is implemented and enforced by the regional board, which administers the stormwater permitting program. To obtain coverage under this permit, project operators must electronically file permit registration documents, which include a notice of intent, a construction stormwater pollution prevention plan (Construction SWPPP), and other compliance-related documents. The Construction SWPPP identifies best management practices that must be implemented to reduce construction effects on receiving water quality based on potential pollutants. The best management practices include both sediment and erosion control measures and other measures to control potential chemical contaminants. Examples of typical construction best management practices include scheduling or limiting certain activities to dry periods, installing sediment barriers such as silt fences and fiber rolls, and maintaining equipment and vehicles used for construction. Non-stormwater management measures include installing specific discharge controls during certain activities, such as paving operations, and vehicle and equipment washing and fueling. The Construction SWPPP also describes the best management practices to reduce pollutants in stormwater discharges after all construction phases have been completed at the site (post-construction best management practices).

The CGP includes requirements for a site-specific risk-level assessment,[58] an active stormwater effluent monitoring and reporting program during construction (for Risk Level 2 and 3 sites), rain event action plans for certain higher risk sites,[59] and numeric effluent limitations for pH and turbidity as well as requirements for qualified professionals who prepare and implement the plan. A state-certified Qualified SWPPP Developer (QSD) must prepare the risk assessment and Construction SWPPP, and a state-certified Qualified SWPPP practitioner (QSP) must oversee implementation of the Construction SWPPP.

[57] San Francisco Bay RWQCB (San Francisco Bay 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.

[58] The CGP defines three levels of risk (Risk Levels 1, 2, and 3) that may be assessed for a construction site. Risk is calculated based on the "project sediment risk," which determines the relative amount of sediment that can be discharged given the project and location details, and the "receiving water risk" (the risk sediment discharges pose to the receiving waters). Risk Level 1 corresponds to a low risk, Risk Level 2 to a moderate risk, and Risk Level 3 to a high risk.

[59] Those sites that have a high potential for mobilizing sediment in stormwater and drain to a sediment-sensitive waterbody.

NPDES Municipal Regional Permit

Stormwater runoff in the Bay Area can carry pollutants into natural waterbodies in the area. Pollutants include certain heavy metals, excessive sediment production, petroleum hydrocarbons, microbial pathogens, pesticides, excessive nutrient loads, and trash. The San Francisco Bay Region Municipal Regional Stormwater NPDES Permit (MRP) requires permittees, including San Mateo County and Santa Clara Counties and cities within these counties, to effectively prohibit the discharge of non-stormwater to storm drain systems and watercourses (except for discharges with an individual NPDES permit). The MRP also specifies technology-based effluent limitations that require controls to reduce the discharge of pollutants to the maximum extent practicable and water quality-based effluent limitations for pesticides, trash, mercury, PCBs, bacteria, and sediment, in addition to the technology-based effluent limitations.

Compliance with the MRP is achieved through timely implementation of control measures and other actions specified in the provisions of the MRP, including those applicable to new development and redevelopment (provision C.3) and San Mateo County sediment controls (provision C.18), among others.

Clean Water Act Section 404 – Dredging or Filling of Navigable Waters of the U.S.

Under CWA section 404, a Department of the Army permit must be obtained from the United States Army Corps of Engineers (USACE) for the discharge of dredged or fill material into waters of the U.S., including wetlands. The discharge of dredged or fill material typically means adding into waters of the U.S. materials such as concrete, dirt, rock, pilings, or side cast material for the purpose of replacing an aquatic area with dry land. Activities typically regulated under section 404 include the use of construction equipment such as bulldozers, and the leveling or grading of sites where jurisdictional waters occur. Construction activities conducted in the bay below the high tide line would be subject to CWA section 404.

USACE reviews applications for permits in accordance with section 404 guidelines, which have been established by USACE and the EPA. To issue a permit under section 404, USACE must ensure that any discharge will not violate the state's water quality standards. Therefore, in California, the proponent of any activity that may result in a discharge to surface waters of the U.S. must obtain water quality certification or a waiver of certification from the regional board (pursuant to CWA section 401). A permit from USACE under CWA section 404, as well as a section 401 water quality certification from the regional board, would be required to conduct any work below the high tide line.

Dredging Regulation

Dredging of sediment under the Project would be subject to the regulatory standards and permitting requirements described below.

Long-Term Management Strategy for the Placement of Dredged Material in the San Francisco Bay Region

Dredging or filling in San Francisco Bay waters or adjacent waters of the U.S., including wetlands, is regulated under CWA section 404, along with other state laws and regulations. In 1990, EPA, USACE, the regional board, the San Francisco Bay Conservation and Development Commission (BCDC), and the state board joined with navigation interests, fishing groups, environmental organizations, and other interested parties to form the Long-Term Management Strategy program for dredged material from the Bay Area. The goals of the strategy include maintaining in an economically and environmentally sound manner those channels necessary for navigation in the San Francisco Bay and Estuary and eliminating

unnecessary dredging activities in the bay and estuary, conducting dredged material disposal in the most environmentally sound manner, maximizing the use of dredged material as a resource, and maintaining the cooperative permitting framework for dredging and disposal applications.

Dredging or disposal of dredged material in South San Francisco Bay is usually restricted to between June 1 and November 30 to protect the beneficial uses of San Francisco Bay.[60] The Long-Term Management Strategy set a long-term in-bay dredged material disposal volume of 1.25 million cubic yards per year.[61] From 2001 to 2012, in-bay disposal volumes were successfully reduced from 2.8 million cubic yards to the target of 1.25 million cubic yards. Since 2012, the amount of in-bay disposal has continued to be below the 1.25 million cubic yards target set forth in the Long-Term Management Strategy.[62]

As part of implementing the Long-Term Management Strategy, the interagency Dredged Material Management Office (DMMO) was established to substantially streamline the application and permitting process for dredging and disposal projects.

Dredged Material Management Office

The DMMO is a joint program of BCDC, the regional board, California State Lands Commission, USACE, and the EPA. The California Department of Fish and Wildlife, the National Marine Fisheries Service, and the U.S. Fish and Wildlife Service also provide advice and expertise to the process. The goal of this interagency group is to increase efficiency and coordination among the member agencies and to foster a comprehensive and consolidated approach to handling dredged material management issues. Through the DMMO, applicants for dredging activities fill out one application form that the member agencies then jointly review before issuing their respective authorizations. The Dredge Material Reuse/Disposal Application serves as, and is accepted for, a number of permits, including: (1) section 404 or section 10 dredging authorization by the San Francisco District Corps, (2) an administrative dredging permit for BCDC, (3) the regional board section 401 water quality certification or waste discharge requirement, and (4) a dredging project lease from the California State Lands Commission.

The purpose of the DMMO is to cooperatively review sediment quality sampling plans, review the results of sediment sampling, and make suitability determinations for material proposed for disposal.[63] Suitability is based on physical characteristics (grain size, total organic carbon, and total solids), bulk sediment chemistry, and benthic and water column toxicity testing. Suitability is also measured against bioaccumulation triggers and TMDL values for seven contaminant classes: mercury, total PCBs, total polycyclic aromatic hydrocarbons (PAHs), total DDTs, total chlordane, dieldrin, and dioxins. Thresholds for mercury, PCBs, and PAHs are based on bay ambient sediment contaminant concentrations determined via the Regional Monitoring Program for Water Quality in San Francisco Bay and are updated as new data become available. The sediment testing program[64] also meets the national testing guidelines of the

[60] NMFS (National Marine Fisheries Service), 2015. Long-Term Management Strategy Biological Opinion Addendum.

[61] NMFS (National Marine Fisheries Service), 2015. Long-Term Management Strategy Biological Opinion Addendum.

[62] SFEI (San Francisco Estuary Institute), 2019. *The Pulse of the Bay: Pollutant Pathways,* SFEI Contribution #954*, San Francisco Estuary Institute, Richmond, CA.*

[63] USACE (U.S. Army Corps of Engineers), 2001. Long-Term Management Strategy for the Placement of Dredged Material in the San Francisco Bay Region, South Pacific Division, Final Long-Term Management Strategy Management Plan. July 2001.

[64] Dredged Material Management Office, 2001. Guidelines for Implementing the Inland Testing Manual in the San Francisco Bay Region. September 2001.

Inland Testing Manual[65] and the Ocean Testing Manual,[66] and allows less frequent testing where existing data consistently show contaminant levels are below the screening guideline values.[67]

Due to the water quality impairment of the bay, the following sediment testing and assessment requirements specified in the Basin Plan[68] also apply to dredging and disposal of dredged material in the bay.

- **Mercury – Sediment dredging and disposal.** The allocation for sediment dredging and disposal is both mass-based and concentration-based. The mercury concentration in dredged material disposed of in the bay must not exceed the 99th percentile mercury concentration of the previous 10 years of bay sediment samples collected through the Regional Monitoring Program (excluding stations outside the bay like the Sacramento River, San Joaquin River, Guadalupe River, and Standish Dam stations). Prior to disposal, the material must be sampled and analyzed according to the procedures outlined in the 2001 USACE document *Guidelines for Implementing the Inland Testing Manual in the San Francisco Bay Region*. All in-bay disposal of dredged material must comply with the Long-Term Management Strategy sampling and analysis requirements to assess whether material placed in the bay would violate water quality standards and be suitable for unconfined aquatic disposal. Furthermore, the process of dredging and disposing of dredged material in the bay may enhance biological uptake and methylmercury exposure. To address this concern, permitted dredging and disposal operations are required to demonstrate that their activities are accomplished in a manner that does not increase bioavailability of mercury. As part of this demonstration, the waste discharge requirements for such operations include requirements to conduct an assessment to better understand how proposed operations affect mercury fate, transport, and biological uptake.
- **PCBs – Sediment Dredging and Disposal.** The concentration of PCBs in dredged material disposed of in the bay must not exceed the 99th percentile PCBs concentration of the previous 10 years of bay sediment samples collected through the Regional Monitoring Program (excluding stations outside the bay like the Sacramento River, San Joaquin River, Guadalupe River, and Standish Dam stations). Prior to disposal, the material must be sampled and analyzed according to the procedures outlined in the 2001 USACE document *Guidelines for Implementing the Inland Testing Manual in the San Francisco Bay Region*. All in-bay disposal of dredged material must comply with the Guidelines' Section 4.20, *Dredging and Disposal of Dredged Sediment*, including the Long-Term Management Strategy. Additionally, dredged material dischargers are required to conduct or cause to be conducted studies to fill critical data needs identified in the Adaptive Implementation section.

The roles, responsibilities, and jurisdictions of the DMMO agencies differ, depending primarily on the proposed dredged material disposal or reuse site. As a result, member agencies may play only an advisory role in certain aspects of the permitting process. Decisions made by the DMMO do not in any way

[65] EPA and USACE (U.S. Environmental Protection Agency and U.S. Army Corps of Engineers), 1998. *Evaluation of Dredged Material Proposed for Ocean Disposal Testing Manual.* Inland Testing Manual, EPA-823-B-98-004, Office of Water 4305.

[66] EPA and USACE (U.S. Environmental Protection Agency and U.S. Army Corps of Engineers), 1991. *Evaluation of Dredged Material Proposed for Ocean Disposal Testing Manual*. EPA503/8-91/001, Office of Water 4504F.

[67] SFEI (San Francisco Estuary Institute), 2019. *The Pulse of the Bay: Pollutant Pathways,* SFEI Contribution 954*, San Francisco Estuary Institute, Richmond, CA.*

[68] San Francisco Bay RWQCB (San Francisco Bay 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.

supersede the primary roles of the permitting agencies, which remain free to accept or reject recommendations, including those of the DMMO staff. In practice, however, the discussions at the DMMO meetings help inform the permitting agencies of specific concerns and issues of the member agencies, often before finalization of project documents. This encourages and facilitates necessary project modifications at an early stage in project planning when such changes are more easily and economically accomplished. The DMMO facilitates the processing of dredging permit applications within existing laws, regulations, and policies. It was specifically designed to provide a mechanism for consistent review of permit applications through coordinated efforts by DMMO member agencies. It also provides a mechanism to allow the involvement and participation of permit applicants and interested parties during the application process. All applicable regulatory authority and processes of the member agencies remain in full force and effect.

Executive Order 11988

Under Executive Order 11988, FEMA is responsible for management of floodplain areas defined as the lowland and relatively flat areas adjoining inland and coastal waters subject to a 1 percent or greater chance of flooding in any given year (the 100-year floodplain). FEMA is a federal agency whose overall mission is to support citizens and first responders to ensure that the United States builds, sustains, and improves capabilities to prepare for, protect against, respond to, recover from, and mitigate all hazards. With regard to flooding, FEMA provides information, guidance, and regulation associated with flood prevention, mitigation, and response. Under Executive Order 11988, FEMA requires that local governments covered by the federal flood insurance program pass and enforce a floodplain management ordinance that specifies minimum requirements for any construction within the 100-year floodplain. Through its Flood Insurance and Mitigation Administration, FEMA manages the National Flood Insurance Program, which includes flood insurance, floodplain management, and flood hazard mapping functions. FEMA maps 100-year floodplains within its jurisdiction and provides flood insurance rate information via flood insurance rate maps.

National Flood Insurance Program Implementing Regulations

The National Flood Insurance Program was authorized under U.S. Code title 42, sections 4001 through 4128. Implementing regulations under the purview of the Federal Environmental Management Agency are included in the Code of Federal Regulations Title 44, Chapter 1, Subchapter B. Under this program, to qualify for the sale of federally subsidized flood insurance a community must adopt flood plain management regulations designed to reduce or avoid future flood damages.

Minimum requirements for adequate flood plain management regulations are set forth in section 60.3 of subchapter B for flood-prone areas. Pursuant to section 60.3(c)(10), development in Zones A1-30 and AE on a community's flood insurance rate map cannot be permitted unless it is demonstrated that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood by more than one foot at any point within the community. However, certain development can be approved which increases the base flood by more than one foot, provided that the community applies for a conditional flood insurance rate map revision and fulfills associated requirements, including a certification that no structures are located in areas which would be impacted by the increased base flood elevation.

Section 65.10(b) of the National Flood Insurance Program implementing regulations contain design criteria for levees that would qualify as accredited by FEMA and recognized as effective on flood insurance rate maps. The design criteria include requirements related to levee freeboard, closure devices on levee openings, and engineering analyses demonstrating that the levee can withstand a flood (including analyses demonstrating no appreciable erosion of the levee, foundation stability, and capacity of facilities for evacuating interior floodwaters from behind the levee).

Section 65.10(c), Operation Plans and Criteria, describes levee operational criteria that must be met for the levee to be accredited. These include: flood warning system information and plan of operation; and interior drainage system information and plan of operation, including provision for manual backup for activation of automated systems.

Pursuant to section 65.10(d), an accredited levee must be maintained in accordance with an officially adopted maintenance plan. The maintenance plan must document the formal procedure that ensures that the stability, height, and overall integrity of the levee and associated structures and systems are maintained.

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act (Division 7 of the California Water Code) provides for protection of the quality of waters of the state for use and enjoyment by the people of California. The act also establishes provisions for a statewide program for the control of water quality, recognizing that waters of the state are increasingly influenced by interbasin water development projects and other statewide considerations, and that factors such as precipitation, topography, population, recreation, agriculture, industry, and economic development vary regionally within the state. The statewide program for water quality control is therefore administered most effectively on a local level with statewide oversight. Within this framework, the act establishes the authority of the state board and the nine regional boards. The state board administers water rights, sets state policy for water pollution control, and implements various water quality functions throughout the state, while the regional boards conduct planning, permitting, and most enforcement activities.

San Francisco Bay Water Quality Control Plan (Basin Plan)

The Porter-Cologne Water Quality Control Act requires the state board and/or the regional boards to adopt statewide and/or regional water quality control plans, the purpose of which is to establish water quality objectives for specific waterbodies. The RWQCB has prepared the Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) that identifies existing and potential beneficial uses for surface and groundwaters and provides numerical and narrative water quality objectives designed to protect those uses.

The Project site is located adjacent to the Lower Basin of San Francisco Bay (Lower San Francisco Bay) and the Santa Clara Basin. Beneficial uses of Lower San Francisco Bay and the Santa Clara Basin consist of industrial service supply, commercial and sport fishing, shellfish harvesting, estuarine habitat, fish migration, preservation of rare and endangered species, fish spawning, wildlife habitat, water contact recreation, water non-contact recreation, and navigation.[69] All surface waters within the region must comply with objectives for many physical/chemical conditions or pollutants, including floating material,

[69] San Francisco Bay RWQCB (San Francisco Bay Regional Water Quality Control Board), 2017. Water Quality Control Plan (Basin Plan) for the San Francisco Bay Basin. Plan and amendments adopted through May 2017.

oil and grease, *pH*,[70] and turbidity, among others. The RWQCB has also identified numerical water quality objectives for mercury and PCBs in San Francisco Bay. **Table 3.11-3** summarizes beneficial uses of relevant surface waters.

Sustainable Groundwater Management Act

The Sustainable Groundwater Management Act establishes a framework for local agencies to develop and implement plans to sustainably manage high- and medium-priority basins by 2040.[71] The law provides groundwater sustainability agencies with the legal authority to regulate groundwater pumping and assess groundwater charges as tools to support continued groundwater sustainability.[72] The San Mateo Plain Subbasin is designated as a very low priority groundwater basin. A groundwater sustainability agency has not yet been designated for the San Mateo Plain Subbasin, and no groundwater sustainability plan has been developed for the basin.

McAteer-Petris Act

Section 3.2, *Aesthetics*, discusses the establishment and authority of the San Francisco BCDC pursuant to the McAteer-Petris Act. BCDC is authorized to control both bay filling and dredging and bay-related shoreline development and manages its jurisdiction through the *San Francisco Bay Plan* (Bay Plan) and the Suisun Marsh Protection Plan.[73] As discussed in greater detail in Section 3.4, Biological Resources, implementation of the Project would occur within BCDC jurisdiction.

Part IV, Development of the Bay and Shoreline: Findings and Policies, contains the following policies that are applicable to the Project and its effect on hydrology and water quality:

Water Quality

- Bay water pollution should be prevented to the greatest extent feasible. The bay's tidal marshes, tidal flats, and water surface area and volume should be conserved and, whenever possible, restored and increased to protect and improve water quality. Freshwater inflow into the bay should be maintained at a level adequate to protect bay resources and beneficial uses.
- Water quality in all parts of the bay should be maintained at a level that will support and promote the beneficial uses of the bay as identified in the regional board's Water Quality Control Plan, San Francisco Bay Basin and should be protected from all harmful or potentially harmful pollutants. The policies, recommendations, decisions, advice and authority of the state board and the regional board, should be the basis for carrying out BCDC's water quality responsibilities.

[70] pH (from potential of Hydrogen) provides a measure on a scale from 0 to 14 of the acidity or alkalinity of a solution, where 7 is neutral, greater than 7 is more basic (or alkaline), and less than 7 is more acidic.

[71] DWR (California Department of Water Resources), 2025. "Basin Prioritization." Available online at gis.water.ca.gov/app/bp-dashboard/final/. DWR categorizes groundwater basins as high, medium, low, or very low priority by considering eight factors listed in California Water Code section 10933(b), including the population overlying the basin, the number of public supply wells that draw from the basin, the degree to which persons overlying the basin rely on groundwater as their primary source of water, and documented impacts on the groundwater within the basin.

[72] California Water Code sections 10725 and 10726.4.

[73] BCDC (San Francisco Bay Conservation and Development Commission), 2020. *San Francisco Bay Plan*. May 5, 2020. The Bay Plan was completed and adopted by BCDC in 1968 and was transmitted to the California Legislature and the Governor in 1969; the Bay Plan has since been amended, with the most recent document released in May 2020.

TABLE 3.11-3
BENEFICIAL USES OF NEARBY WATERBODIES

Beneficial Use	Uses of Waters
San Francisco Bay South (Santa Clara Basin)	
IND, Industrial Service Supply	Industrial activities that do not depend primarily on water quality, including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, and oil well repressurization.
COMM, Commercial and Sport Fishing	Commercial or recreational collection of fish, shellfish, or other organisms, including, but not limited to, uses involving organisms intended for human consumption or bait purposes.
SHELL, Shellfish Harvesting	Habitats suitable for the collection of crustaceans and filter-feeding shellfish (e.g., clams, oysters, and mussels) for human consumption, commercial, or sport purposes.
EST, Estuarine Habitat	Estuarine ecosystems, including, but not limited to, preservation or enhancement of estuarine habitats, vegetation, fish, shellfish, or wildlife (e.g., estuarine mammals, waterfowl, shorebirds), and the propagation, sustenance, and migration of estuarine organisms.
NAV, Navigation	Shipping, travel, or other transportation by private, military, or commercial vessels.
MIGR, Fish Migration	Support habitats necessary for migration, acclimatization between freshwater and salt water, and protection of aquatic organisms that are temporary inhabitants of waters within the region.
RARE, Preservation of Rare and Endangered Species	Support habitats necessary for the survival and successful maintenance of plant or animal species established under state and/or federal law as rare, threatened, or endangered.
SPWN, Fish Spawning	Support high-quality aquatic habitats suitable for reproduction and early development of fish.
REC-1, Water Contact Recreation	Recreational activities involving body contact with water where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, whitewater activities, fishing, and uses of natural hot springs.
REC-2, Noncontact Water Recreation	Recreational activities involving proximity to water, but not normally involving contact with water where water ingestion is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tide pool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.
Ravenswood Slough	
WILD, Wildlife Habitat	Support wildlife habitats, including, but not limited to, the preservation and enhancement of vegetation and prey species used by wildlife, such as waterfowl.
EST, RARE, REC-1, REC-2	See above for San Francisco Bay
San Francisquito Creek	
COLD, Cold Freshwater Habitat	Support coldwater ecosystems, including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.
WARM, Warm Freshwater Habitat	Support warmwater ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.
MIGR, RARE, SPWN, REC-1, REC-2, WILD	See above for San Francisco Bay or Ravenswood Slough
Atherton Creek	
WARM, WILD, REC-1, REC-2	See above for San Francisco Bay, Ravenswood Slough, or San Francisquito Creek

Source: San Francisco Bay RWQCB (San Francisco Bay Regional Water Quality Control Board), 2019. *San Francisco Bay Basin Plan.*

- New projects should be sited, designed, constructed and maintained to prevent or, if prevention is infeasible, to minimize the discharge of pollutants into the bay by: (a) controlling pollutant sources at the project site; (b) using construction materials that contain nonpolluting materials; and (c) applying

appropriate, accepted and effective best management practices, especially where water dispersion is poor and near shellfish beds and other significant biotic resources.

- To protect the bay and its tributaries from the water quality impacts of nonpoint source pollution, new development should be sited and designed consistent with standards in municipal stormwater permits and state and regional stormwater management guidelines, where applicable, and with the protection of bay resources. To offset impacts from increased impervious areas and land disturbances, vegetated swales, permeable pavement materials, preservation of existing trees and vegetation, planting native vegetation and other appropriate measures should be evaluated and implemented where appropriate.
- Whenever practicable, native vegetation buffer areas should be provided as part of a project to control pollutants from entering the bay, and vegetation should be substituted for rock riprap, concrete, or other hard surface shoreline and bank erosion control methods where appropriate and practicable.

Bay Fill

- Adequate measures should be provided to prevent damage from sea level rise and storm activity that may occur on fill or near the shoreline over the expected life of a project. BCDC may approve fill that is needed to provide flood protection for existing projects and uses. New projects on fill or near the shoreline should either be set back from the edge of the shore so that the project will not be subject to dynamic wave energy, be built so the bottom floor level of structures will be above a 100-year flood elevation that takes future sea level rise into account for the expected life of the project, be specifically designed to tolerate periodic flooding, or employ other effective means of addressing the impacts of future sea level rise and storm activity. Rights-of-way for levees or other structures protecting inland areas from tidal flooding should be sufficiently wide on the upland side to allow for future levee widening to support additional levee height so that no fill for levee widening is placed in the bay.

Climate Change

- When planning shoreline areas or designing larger shoreline projects, a risk assessment should be prepared by a qualified engineer and should be based on the estimated 100-year flood elevation that takes into account the best estimates of future sea level rise and current flood protection and planned flood protection that will be funded and constructed when needed to provide protection for the Project or shoreline area. A range of sea level rise projections for mid-century and end of century based on the best scientific data available should be used in the risk assessment. Inundation maps used for the risk assessment should be prepared under the direction of a qualified engineer. The risk assessment should identify all types of potential flooding, degrees of uncertainty, consequences of defense failure, and risks to existing habitat from proposed flood protection devices.
- To protect public safety and ecosystem services, within areas that a risk assessment determines are vulnerable to future shoreline flooding that threatens public safety, all projects—other than repairs of existing facilities, small projects that do not increase risks to public safety, interim projects and infill projects within existing urbanized areas—should be designed to be resilient to a mid-century sea level rise projection. If it is likely the project will remain in place longer than mid-century, an Adaptive Management Plan should be developed to address the long-term impacts that will arise based on a risk assessment using the best available science-based projection for sea level rise at the end of the century.

Local

The Project would be subject to local plans and policies of the jurisdictions in which it is located, including East Palo Alto, Menlo Park, and Redwood City. **Table 3.11-4** presents local plans and policies regarding hydrology and water quality to support consideration of Project consistency with general plan policies.

TABLE 3.11-4
LOCAL PLANS AND POLICIES RELEVANT TO THE PROJECT – HYDROLOGY AND WATER QUALITY

City of East Palo Alto Vista 2035 General Plan[a]
GOAL ISF-1: Manage stormwater safely, efficiently, and sustainably.
1.3: Stormwater infrastructure for new development. Require development projects to pay for their share of new stormwater infrastructure or improvements necessitated by that development.
1.9: Stormwater and flooding. Integrate stormwater management efforts with flood control efforts, seeking synergies and innovative strategies for stormwater treatment to reduce flood risks and volumes.
GOAL SN-2: Provide adequate flood control and storm drainage facilities to minimize the risk of flooding.
2.7: San Francisquito Creek Joint Powers Authority (JPA): Continue to work with the JPA on projects that will reduce the risk of flooding in East Palo Alto.
GOAL W-11: Safe, sufficient, and well-maintained infrastructure and services.
11.3: Flood protection. Continue to work with adjacent cities and the Army Corps of Engineers to reduce flooding risks from the San Francisquito Creek.
City Of Menlo Park General Plan
GOAL LU-7: Promote the implementation and maintenance of sustainable development, facilities and services to meet the needs of Menlo Park's residents, businesses, workers, and visitors.
Program LU-7.G: SAFER Bay Process. Coordinate with the SAFER Bay process to ensure that the Menlo Park community's objectives for sea level rise/flood protection, ecosystem enhancement, and recreational trails are adequately taken into consideration**.**
Program LU-7.I: Green Infrastructure Plan. Develop a Green Infrastructure Plan that focuses on implementing City-wide projects that mitigate flooding and improve storm water quality.
Redwood City General Plan
GOAL PS-6: Protect built and natural environments from the effects of climate change.
Policy PS-6.9: Consider sea level rise in the development of watershed management plans and flood control infrastructure.
Program PS-6.9a: Use the City's selected sea level rise projections in hydraulic/hydrodynamic modeling, as well as climate adaptation strategies. The climate adaptation strategies may include but not be limited to: • Avoidance/planned retreat, • Enhanced levees and setback levees accommodating habitat transition and buffer zones, • Expanded tidal prisms for enhanced natural scouring of channel sediments, • Raised and flood proofed structures, • Provision for additional floodwater pumping stations, and Inland detention basins to reduce riverine peak discharges.
GOAL PS-7a: Provide adequate and appropriately-designed storm drainage and flood control facilities to meet current and future needs and minimize the risk of flooding.
Policy PS-7a.2: Improve the drainage system's level of service to minimize storm flooding.
Policy PS-7a.6: Minimize impervious surfaces to reduce stormwater runoff and increase flood protection.
NOTES: a. Refer also to discussion of the Ravenswood Specific Plan Update presented in Section 3.12, *Land Use, Agriculture, and Forestry Resources*. SOURCE: City of East Palo Alto, 2017. *Vista 2035 General Plan.* Adopted October 4, 2016; Final Version March 2017. Available online at www.ci.east-palo-alto.ca.us/planning/page/vista-2035-general-plan; City of Menlo Park, 2016. *General Plan, City of Menlo Park.* Adopted November 29, 2016. Available online at www.menlopark.gov/files/sharedassets/public/v/1/community-development/documents/general-plan/land-use-and-circulation-element-adopted-20161129.pdf; City of Redwood City, 2023. *Redwood City General Plan.* Adopted October 11, 2010; Amended August 2023. Available online at www.redwoodcity.org/departments/community-development-department/planning-housing/planning-services/environmental-documents/ general-plan-eir.

3.11.3 Impacts and Mitigation Measures

Significance Criteria

In accordance with CEQA, CEQA Guidelines (including Appendix G), relevant plans, policies, and/or guidelines, and agency standards, the Project could have a significant impact if it were to do any of the following:

- Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality;
- Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the Project may impede sustainable groundwater management of the basin;
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:
  - result in a substantial erosion or siltation on or offsite;
  - substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite;
  - create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or
  - impede or redirect flood flows.
- In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation; or
- Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan.

Due to the nature of the Project, there would be no impact related to the following topic for the reasons described below.

- **Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin.** As discussed in Section 3.11.1, the groundwater closest to the surface and most relevant to implementation of the Project is in the Shallow Aquifer, often referred to as "shallow groundwater" or the "water table." Most of the excavations would be completed within the artificial fill materials and upper layers of Young Bay Mud that underlie the Project site, and if groundwater is encountered, it would be in the Shallow Aquifer. The Project would not affect groundwater resources from the deeper Santa Clara Valley – San Mateo Plain Groundwater Basin because, other than temporary and limited dewatering during construction, the Project would not require continuous extraction of groundwater for water supply. Therefore, the Project would have no impact on groundwater resources.

Methodology

Regarding water quality, the impact evaluation discusses the Project in combination with existing regulatory requirements to assess whether the Project could violate water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality, which would be a potentially significant impact.

The Project would have a significant impact with respect to substantial erosion or siltation if it would alter drainage patterns or add impervious surfaces within areas considered sensitive to hydromodification or would result in permanent fill or diversion of existing waterbodies.

The Project would have a significant impact related to flooding if it would increase the volume of stormwater runoff directed to the existing or planned stormwater drainage system such that flooding would occur or be worsened. The Project would also have a significant flooding impact if it redirected flood flows to developed areas.

The impact evaluation discusses the proposed land uses and risk of inundation to determine whether the Project would have a significant impact related to releasing pollutants due to inundation.

Based on previous work completed for SBSPRP Phase 2, which proposes the restoration of tidal action to Pond A2W, Pacific Gas and Electric Company (PG&E) transmission towers in Ponds R1 and R2 could require reinforcement up to the high tide line to account for the introduced tidal flux. PG&E would evaluate information concerning tidal flux associated with proposed restoration and determine the need for improvements. SFCJPA would engage with PG&E to ensure that changes to transmission towers would be implemented prior to breaching the existing levees for Ponds R1 and R2. Given that it is uncertain whether and what improvements would be needed, for informational purposes Appendix PGE presents a brief description and environmental impact analysis of potential PG&E tower reinforcements.

This Draft EIR evaluates Project activities at a level of detail consistent with the best available information at the time of EIR preparation. To the extent that activities necessary for Project completion are known, they are described in Chapter 2, *Project Description*, and evaluated in the impact analysis below. Key Project information needed for the evaluation of hydrology and water quality impacts includes the locations of temporary and permanent ground disturbance, the location and extent of changes to land cover or use, and any proposed water control structures or features. Appendix INFRA identifies those changes to infrastructure and other encroachments that are evaluated programmatically. While most key information needed for the hydrology and water quality impact analysis is generally known, the design and capacity of some water control structures have yet to be developed. The need for additional CEQA documentation would be evaluated once these design details are developed as discussed in greater detail in Section 1.2.5, Program–Project EIR and Supplemental CEQA.

Refer to the impact discussions below for additional information regarding methodology used in specific evaluations.

Impacts and Mitigation Measures

Table 3.11-5 summarizes the impact conclusions presented in this section.

TABLE 3.11-5
HYDROLOGY AND WATER QUALITY IMPACT CONCLUSIONS

Impact	Level of Significance
Impact HYD-1: Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality.	LSM
Impact HYD-2: Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would result in substantial erosion or siltation.	LTS
Impact HYD-3: Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or impede or redirect flood flows.	LSM
Impact HYD-4: In a flood hazard, tsunami, or seiche zone, risk release of pollutants due to project inundation.	LTS
Impact HYD-5: Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan.	LSM
Impact C-HYD-1: The Project, in combination with past, present, and probable future projects in the Project area, would result in significant adverse impacts related to hydrology and water quality.	LSM

NOTES: LSM = Less than Significant with Mitigation; LTS = Less than Significant

Impact HYD-1: Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality. *(Less than Significant with Mitigation)*

The following impact discussion evaluates the effects of Project construction and operations on water quality, including both surface and groundwater quality. The discussion first considers impacts related to construction ground disturbance and soil import for all Project locations and then discusses construction activities at particular reaches where ground disturbance or dewatering could involve contaminated soil or groundwater. The analysis also considers impacts associated with in-water construction work. The analysis of water quality impacts during operations addresses changes to water quality associated with changes in former salt pond management or hydraulics and with new impervious surface created by the proposed levee.

Construction

All Project Locations: Construction Ground Disturbance

Project construction would include staging of construction equipment and material, installation of sheet piles, construction of cofferdams, earthwork (grading, excavation, and other soil-disturbing activities), and demolition/removal/relocation of existing infrastructure (e.g., utilities, walkways, gates, signs etc.). Earthwork can render soils and sediments more susceptible to erosion from stormwater runoff and could require dewatering. In addition, Project construction would likely involve using various materials typically associated with construction activities such as paint, solvents, oil and grease, petroleum hydrocarbons, concrete, and corrosion resistance coating on steel sheet pile walls. If handled in a way that is not consistent with manufacturer recommendations or safety recommendations and requirements, these materials could be mobilized and transported offsite by stormwater runoff and degrade the water quality of receiving bay waters.

Role of Construction General Permits, SWPPPs. The CWA effectively prohibits discharges of stormwater or non-stormwater from construction projects unless the discharge complies with an NPDES permit. Because the Project would exceed 1 acre in size, all construction activities would be required to comply with NPDES regulations and obtain coverage under the CGP for construction activities. The CGP would require implementation of construction best management practices as set forth in a site-specific Construction SWPPP. Construction SWPPPs must specify erosion control and stormwater quality best management practices needed to minimize pollutants in stormwater runoff and must detail best management practice placement and proper installation. Construction SWPPPs must also address the possibility of groundwater dewatering and handling of dewatered groundwater. Best management practices are designed to prevent pollutants from contacting stormwater and to keep all products of erosion and stormwater pollutants from migrating offsite into receiving waters. A state-certified QSD is responsible for determining the site risk level for sediment transport, and a state-certified QSP is responsible for developing and implementing the Construction SWPPP (refer to Section 3.11.2).

Types of Best Management Practices and Receiving Water Risk. The types of best management practices commonly included in a SWPPP are selected based on a combination of the Project's sediment risk and the risk to receiving water quality. The sediment risk for the Project would depend on when it is implemented: it would be a higher sediment risk if construction were to occur during the rainy season. Receiving water risk is based on whether the project drains to a *sediment-sensitive waterbody*.[74] Risk levels include:

- ***Risk Level 1*** (low risk) specifies minimum best management practices to address good housekeeping practices (including those for managing hazardous materials used during construction), non-stormwater management, erosion and sediment control, and run-on and runoff control. Typical best management practices include placement of fiber rolls or gravel barriers to detain sediment from disturbed areas and temporary or permanent covering of stockpiles to prevent rainfall from contacting the stockpiled material. In addition, best management practices also would be required to prevent discharge of pollutants other than sediment (e.g., corrosion prevention coatings and paint, solvents, concrete, petroleum products) to downgradient waters. Best management practices for pollutants include routine inspections for equipment leaks, proper material handling and construction material disposal.

- ***Risk Level 2*** (moderate risk) erosion controls must be implemented in conjunction with sediment controls in active construction areas, and linear sediment controls such as silt fences, gravel bag berms, or fiber rolls must be used along slopes. Risk Level 1 or 2 require a state-certified QSD to prepare a rain event action plan, assign a site stormwater manager, identify the purveyor and source of erosion and sediment controls, manage stormwater sampling, list construction workers active at the site during all construction phases. The rain event action plan would include suggested actions for each construction phase.

- ***Risk Level 3*** (high risk) requirements include more stringent narrative and numeric effluent standards as compared to Risk Level 2 sites, as well as additional sediment control requirements (such as

[74] A sediment-sensitive waterbody is one that appears on the most recent 303(d) list for waterbodies as impaired for sediment; has a U.S. Environmental Protection Agency-approved TMDL implementation plan for sediment; or has the beneficial uses of cold freshwater habitat, fish migration, and fish spawning. Lower San Francisco Bay is not listed as impaired for sediment.

covering and containing stockpiles of soil with berms). Project construction activities would not be characterized as Risk Level 3 because the Lower San Francisco Bay is not considered a sediment-sensitive waterbody listed as impaired for sediment[75] and does not have all three beneficial uses: cold freshwater habitat, fish migration, and fish spawning.[76]

Role of the QSP in Protecting Water Quality. Under the direction of the state-certified QSD, the state-certified QSP routinely inspects best management practices, conducts surface water sampling when necessary, and reports site conditions to the state board and/or the applicable regional board as part of CGP compliance monitoring and reporting, using the Stormwater Multi Application Reporting and Tracking System. Compliance with the CGP is required for the Project and has proven effective in protecting water quality at construction sites.

Compliance with the requirements of the CGP would substantially reduce the potential for pollutants to be discharged to groundwater or surface waters, including San Francisco Bay receiving waters, and would reduce or eliminate potential degradation of groundwater or surface water quality during on-land construction of the Project.

All Project Locations: Dredged Material Handling

Dredging activities and the placement of fill would involve removal of sediment, reuse of dredged material as onsite fill, and/or transport and disposal of dredge spoils.

Construction of the proposed shoreline protection would be required to comply with Rivers and Harbors Act section 10 and/or CWA sections 401 and 404. As discussed above, these laws regulate discharges of pollutants into the waters of the U.S. and the state. Prior to being permitted to proceed and pursuant to these laws, anyone proposing work that could affect quality of waters of the U.S. or state must demonstrate to the satisfaction of USACE and the regional board that the work would not substantially degrade water quality. Prior to placement of fill below the high tide line, the Project Proponent would be required to demonstrate to BCDC's satisfaction that the policies of the San Francisco Bay Plan relating to water quality and dredging would be implemented. The Project would also be subject to the DMMO requirements for dredging and dredged materials. As part of the permitting process, the following requirements would apply:

- Prepare a sampling and analysis plan (or quality assurance project plan) describing any sampling that would be conducted and quality assurance procedures that would be implemented to ensure the collection of data of appropriate quality to support a decision regarding a suitable disposal location. The sampling and analysis plan and quality assurance project plan must be prepared in accordance with EPA guidance and approved by DMMO to ensure consistency with DMMO requirements for

[75] State Water Board (State Water Resources Control Board), 2025. "Final 2014 and 2016 Integrated Report (CWA Section 303[d] List/305[b] Report)." Available online at www.waterboards.ca.gov/water_issues/programs/tmdl/2014_16state_ir_reports/category5_report.shtml. Accessed January 21, 2025.

[76] San Francisco Bay RWQCB (San Francisco Bay Regional Water Quality Control Board), 2024. *San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan).* July 22, 2024. Available online at www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/planningtmdls/basinplan/web/bp_ch1-7_print.html. Accessed January 21, 2025.

quality assurance.[77] Additional components can be required for complex dredging projects or those that include dredging of contaminated sediments.

- Sample the sediments in accordance with the approved sampling and analysis plan or quality assurance project plan. Additionally, there are numeric trigger thresholds for specific pollutants as part of the sediment characterization process that require additional sediment testing to ensure compliance with relevant TMDLs for receiving waters.
- Submit a report to DMMO documenting the sampling event and providing adequate information to make a decision regarding suitability of the material tested. Based on this report, DMMO would determine the suitable disposal method (formally, a "suitability determination") for the dredged sediments (e.g., open ocean, in-bay or upland disposal and/or for reuse as wetland foundation or cover material).
- Submit a Consolidated Dredging-Dredged Material Reuse/Disposal Application to DMMO specifying the planned disposal method and the specific site planned for disposal. The application must be accompanied by the sampling and analysis plan, testing data, calculations, and the environmental document prepared to comply with CEQA (i.e., this EIR).

The sediment characterization conducted as part of the DMMO permit process is required prior to other DMMO joint program agencies issuing a dredge permit. The suitability determination for dredge spoil disposal is provided to the DMMO joint program agencies and informs subsequent permit requirements. The Project Proponent would also be required to adhere to the policies and requirements set forth by BCDC in order to obtain a BCDC Major Permit to conduct construction and dredge and fill operations within BCDC's jurisdiction. All participating DMMO agencies would review the sediment characterization and construction methods and issue the permit with requirements (such as the best management practices described previously) or deny the permit.

Mandatory compliance with the DMMO permit process as well as RWQCB water quality certification, USACE 404 certification and section 10 permit requirements, and BCDC Major Permit requirements would ensure that water quality impacts associated with dredging activities, placement of fill, and the transport and disposal of dredge spoils with implementation of the Project would be ***less than significant***.

All Project Locations: Soil Import

Construction would also involve importing or reusing substantial amounts of soil to construct the shoreline protection levee. RWQCB has approved a master quality assurance project plan (Master QAPP) for fill import to lands that are part of the Refuge (including Ponds R1, R2, R3, R4, S5/R5, and SF2).[78] Most locations where the Project would place fill are within ponds or marsh that are part of Refuge-managed lands, where the Master QAPP would apply; however, Faber and Laumeister marshes, Ravenswood Open Space Preserve, Moseley Tract, Flood Slough, and Pond 7c are not within the Refuge. Terrestrial fill used for habitat enhancement features, pond restoration, levee construction, and levee maintenance on Refuge lands must meet the requirements of the Master QAPP. Consistent with the

[77] Dredged Material Management Office, 1999. Sampling and Analysis Plan (Quality Assurance Project Plan) Guidance for Dredging Projects within the San Francisco District. July 1, 1999.

[78] USFWS and H.T. Harvey (U.S. Fish and Wildlife Service and H.T. Harvey & Associates). 2021. *Master Quality Assurance Project Plan for Don Edwards San Francisco Bay National Wildlife Refuge.*

Master QAPP, fill testing must show that the fill has contaminant levels below screening limits in the Master QAPP through a series of Master QAPP elements including:

- Soil screening;
- Using soil import contractors that have previously successfully implemented QAPP procedures;
- Use of a full-time gate keeper to screen all trucks entering the site;
- Oversight by an independent quality assurance officer;
- Oversight of soil screening results by a peer reviewer prior to soil acceptance by the quality assurance officer; and
- Consultation with the RWQCB and BCDC by the quality assurance officer prior to acceptance of soil if the sample analysis methods or results do not strictly meet the Master QAPP requirements.

While the Master QAPP would apply to most of the Project alignment, it is not required in Faber and Laumeister marshes, Ravenswood Open Space Preserve, Moseley Tract, Flood Slough, or Pond 7c and therefore the Project could degrade water quality if earthen fill contains contaminant concentrations that exceed levels determined to be protective of the public and the environment, a **significant impact**. Implementation of **Mitigation Measure HYD-1a** (Master QAPP for Imported Terrestrial Fill) would require use of the Master QAPP criteria for all imported terrestrial fill used by the Project, regardless of whether the area is within the Refuge, and thereby ensure that imported fill is suitable for placement and is protective of water quality and the environment.

> **Mitigation Measure HYD-1a: Master QAPP for Imported Terrestrial Fill**
>
> This measure applies to imported fill for all reaches including those outside the Refuge. The Project Proponent shall implement the requirements of the Master Quality Assurance Project Plan (Master QAPP) for the Don Edwards San Francisco Bay National Wildlife Refuge for all imported terrestrial fill to be used on the Project site. Consistent with the Master QAPP, fill testing shall be required, and no imported fill shall be placed that does not meet the Master QAPP process or requirements. Documentation shall be prepared to demonstrate compliance with the Master QAPP that specifies the identities and qualifications of the Project's team members, the Project purpose, Project-specific permits (including the agency-specific identification numbers for those permits), and Project-specific material handling protocols.

South of Bay Road Reach

Construction of the levee along the South of Bay Road Reach would require ground disturbance within the boundaries of contamination at the 1990 Bay Road site and in locations with contaminated soil and groundwater. In 2020, a CRMP was developed for portions of the 1990 Bay Road site (including the full eastern boundary of the site, where the proposed levee would be constructed) which sets forth protocols for the management of pollutant-impacted soil and groundwater during construction or development activities.[79] Protocols from the 2020 CRMP would apply to construction in this area. Section 4 of the CRMP outlines the protocols that are required for any activity that disturbs or removes caps at the property. Implementation of the management measures are understood to protect human health, including onsite construction workers, nearby residents and workers, and the environment from potential impacts.

[79] S.S. Papadopulos and Associates, Inc.,2020. *Construction Risk Management Plan Addendum to the Comprehensive Site Management Plan, 1990 Bay Road Site.* December 2020.

The protocols include: replacement of caps (physical barriers to prevent exposure of underlying soil on the property, including asphalt pavement, geosynthetic clay liners, and other hardscape); access controls for areas where the caps have been removed; dust control; spill prevention; stormwater control; control of groundwater during operations; and soil management protocols. Additional mandated procedures include the following:

- **Onsite Soil Management**. During construction, soil must be managed consistent with the soil management protocols. Soil excavated is expected to be reused to limit offsite removal or disposal and can remain onsite if capped at the end of construction. Soil stockpiled during construction must be located in close proximity to the work area or ultimate disposition area, within fenced or secure areas to prevent public access, and managed in accordance with the stormwater pollution prevention plan required by the CRMP and consistent with the requirements of the CGP, described above. Stormwater detention must be managed to minimize infiltration. Other specific practices that could be implemented include: grading to prevent stormwater from running offsite, installing stormwater control devices such as silt fences and other barriers around the site perimeter, and fuel storage that minimizes leakage (such as storage with secondary containment).
- **Dewatering**. Project construction could require temporary groundwater extraction (dewatering) from excavations. Pursuant to the CRMP, standing water would need to be appropriately stored, characterized, and disposed of at an appropriate facility (such as a local wastewater treatment facility). Prior to disposal, the water must be tested in accordance with requirements of the receiving facility.
- **Imported soil** must meet the category 1 fill criteria specified in Section 4.5.3 of the CRMP. This fill must consist of clean imported material that meets the soil import criteria for unrestricted use specified in Appendix A of the CRMP.
- **Final caps** must be installed over the 1990 Bay Road site at the end of construction. Levees are included as one of the types of final caps allowed by the CRMP.

Implementation of the management protocols required by the 2020 CRMP would protect human health, including onsite construction workers, nearby residents and workers, and the environment from potential water quality impacts.

North of Bay Road Reach

The shoreline protection alignment in the North of Bay Road Reach would include work within the Ravenswood Industrial Area, primarily within the 391 Demeter Street property. In 2021 an area-wide risk management plan was developed for identified properties in the Ravenswood Industrial Area, including 391 Demeter Street.[80] The proposed shoreline protection alignment is along the eastern and northern boundaries of the stabilized soil stockpile with low levels of PCBs. If the Project were to disturb the soil within the stockpile at 391 Demeter Street, that soil must either be reused onsite beneath a durable cover or disposed of offsite at an appropriate landfill facility.[81] Soil handling of excavated materials consistent

[80] Ninyo and Moore, 2021. *Ravenswood Industrial Area Area-Wide Risk Management Plan.*

[81] Ninyo and Moore, 2021. *Ravenswood Industrial Area Area-Wide Risk Management Plan.*

with the requirements of the Ravenswood Industrial Area area-wide risk management plan would reduce potential water quality impacts of construction at 391 Demeter Street.

The shoreline protection alignment in the North of Bay Road Reach would also be adjacent to 2081 Bay Road, where groundwater contamination in the northern area of the property is currently being remediated with a groundwater recirculation system, biobarrier injection events, and light non-aqueous phase liquids recovery from a groundwater well at the northeastern area of the site. The groundwater that contains measurable contaminants has a very shallow gradient to the southeast. Temporary groundwater dewatering during levee construction in this portion of the North of Bay Road Reach could temporarily counteract the effectiveness of the injection wells located along the northeastern boundary of the site (where contaminant concentrations are highest). While Attachment J of the stormwater CGP includes dewatering requirements, discharge of extracted water is not permitted under the CGP if the dewatering takes place in an area with known soil and/or groundwater contamination where the contamination could cause an exceedance of receiving water limitations. If untreated, extracted water from the North of Bay Road Reach along the 2081 Bay Road property could release contaminants into the environment, a **significant impact**. With implementation of **Mitigation Measure HYD-1b** (Groundwater Handling Requirements), this impact would be less than significant.

> **Mitigation Measure HYD-1b: Groundwater Handling Requirements**
>
> This measure applies to the North of Bay Road and Marsh Road reaches. If excavations for the North of Bay Road Reach east of 2081 Bay Road would occur in East Slough (located between 2081 Bay Road and the existing Bay Trail) or extend below approximately 5 feet below ground surface, dewatering of groundwater is likely. Excavations for the Marsh Road Reach could also require dewatering. If groundwater is encountered, and dewatering is necessary, the Project Proponent shall temporarily store and sample the groundwater to evaluate disposal options, which may include but are not limited to discharge to sanitary sewer or storm drain, application to land, or offsite disposal. Prior to discharge, a qualified engineer or other qualified professional shall review analytical sampling results and develop a proposed discharge that prevents the release of groundwater with contaminant levels that exceed the final Media Cleanup Objectives for Romic East Palo Alto (2081 Bay Road) in Table 1 of the EPA *Final Remedy Decision for Former Romic Environmental Technologies Corporation Facility, East Palo Alto, California*, July, 2008, unless otherwise specified by the EPA, Department of Substances Control, and RWQCB. The Project proponent shall document the proposed discharge approach in a groundwater management plan and submit it to the EPA, Department of Substances Control, and RWQCB for review. If discharging to the sanitary sewer is a possibility, the Project proponent shall contact the East Palo Alto Sanitary District to inquire about obtaining a special discharge permit.

Substation and Marsh Restoration Reach

In-Water Work. The Project would generally avoid in-water work by placing fill in channels within the levee footprint. With the exception of the Substation and Marsh Restoration Reach, construction activities would not occur in areas of open bay water. However, dredging would be required in the vicinity of Ravenswood Slough during construction of habitat improvements. The Project would dredge new slough channels near Pond R1 to reestablish a direct tidal connection between the pond and Ravenswood Slough. Dredging activities and the placement of fill would disturb sediment, resulting in increased turbidity and the resuspension of sediment in the water column, which could degrade bay water quality. Implementation of **Mitigation Measure BIO-10** (Minimize Dredging Impacts; refer to Section 3.4,

Biological Resources**)** would reduce potential water quality effects of dredging by requiring the use of silt curtains or gunderbooms and operational controls to minimize sediment release during construction.

Marsh Road Reach

Construction activities along the Marsh Road Reach could require excavation and groundwater dewatering in the vicinity of 3723 Haven Avenue, where elevated TCE concentrations have been identified in groundwater. Temporary groundwater dewatering during levee construction could result in release of contaminated groundwater into the environment. While Attachment J of the stormwater CGP includes dewatering requirements, discharge of extracted water is not permitted under the CGP if the dewatering takes place in an area with known soil and/or groundwater contamination where the contamination could cause an exceedance of receiving water limitations. If untreated, dewatered water from the Marsh Road Reach near the 3723 Haven Avenue property could release contaminants into the environment, a potentially significant impact. With implementation of Mitigation Measure HYD-1b (Groundwater Handling Requirements), this impact would be less than significant.

Therefore, water quality impacts of the Project related to a violation of water quality standards or degradation of water quality from construction activities would be **less than significant with mitigation**.

Operations

Former Salt Pond Discharges

The Project would: restore tidal action to Ponds R1 and R2, which are currently managed as seasonal ponds; modify water management in Pond SF2; and retain existing water management in other affected ponds.[82] Ponds that remain seasonal would be actively managed to ensure that water levels and water quality are maintained to meet the biological requirements specified in Chapter 2, *Project Description*. Once the habitat improvements are completed, the SBSPRP team and the Refuge would adaptively manage the restoration in accordance with the SBSPRP's Adaptive Management Plan. As discussed above, the current Adaptive Management Plan includes requirements applicable to the types of habitat/water management improvements proposed as part of the Project (conversion of some managed ponds to tidal habitat and enhancement and/or reconfiguration of other managed ponds for targeted habitat management).

Dissolved Oxygen and Algae

Based on previous salt pond restoration projects in South San Francisco Bay, the biggest water quality challenge for former salt ponds has been maintaining dissolved oxygen at concentrations that are safe for aquatic life.[83] Risk factors for both algae and dissolved oxygen in any particular pond complex are waters that are deep, slow (long residence times), rich in nutrients, rich in organic matter, and subject to calm wind exposure. Conversely, the lowest risk waterbodies would likely be quickly turned over (short residence times), poor in nutrients, poor in organic carbon, and windy.[84] A study of 34 temperate ponds and shallow lakes found that mixing of smaller waterbodies (less than about 10 acres) is best predicted by surface area and depth, and mixing was related to solar radiation and heat transfer. Smaller waterbodies with depths less than 2.4 feet mixed intermittently, with daytime stratification often breaking down at

[82] Management information is from the RB order No. R2-2018-0020 for SBSPRP Phase 2.

[83] Order No. R2-2018-0020 Finding 70.

[84] Order No. R2-2018-0020.

night due to convective cooling.[85] Design elements can be used to minimize high risk factors for poor water quality, such as low dissolved oxygen. Operating ponds at shallower depths and with more wind-driven mixing can increase dissolved oxygen. The Project would not alter the surface area or depth of water, or hydraulics, of Pond R5/S5. Potential Project effects related to dissolved oxygen in other ponds are discussed below.

Ponds R1 and R2. Tidal action would reduce or avoid the types of conditions that lead to low dissolved oxygen in managed ponds (i.e., would decrease residence times). With tidal action introduced, frequency of algae growth and poor dissolved oxygen in Ponds R1 and R2 would be expected to decline.

Pond R3. As noted above, during the dry season when algae production increases, Pond R3 would be drained with the exception of the borrow ditch and interior channels (consistent with current operations). While the proposed borrow ditch would be 1 to 2 feet deeper than the existing borrow ditch, the ditch would be about 30 feet wider, which could increase wind fetch and thereby increase potential for mixing relative to existing conditions. With the Project, algae production and associated dissolved oxygen depletion could be reduced or remain similar to existing conditions in Pond R3.

Meredith A. Holgerson, David C. Richardson, Joseph Roith, Lauren E. Bortolotti, Kerri Finlay, Daniel J. Hornbach, Kshitij Gurung, Andrew Ness, Mikkel R. Andersen, Sheel Bansal, Jacques C. Finlay, Jacob A. Cianci-Gaskill, Shannon Hahn, Benjamin D. Janke, Cory McDonald, Jorrit P. Mesman, Rebecca L. North, Cassandra O. Roberts, Jon N. Sweetman, Jackie R. Webb

Pond SF2. Dissolved oxygen levels at the existing Pond SF2 inlet structure were lower than levels at the existing Pond SF2 outlet structure for each summer monitoring event in 2022.[86] In summer 2022, dissolved oxygen levels at the SF2 outlet ranged between 4.8 and 8.6 mg/L until late September, when levels fell to 3.2 mg/L.[87] With the Project, during summer when low dissolved oxygen is more likely to develop, Pond SF2 would mostly be drained and would not be in direct contact with bay waters. Similar to Pond R3, with the Project Pond SF2 would be drained during the dry season with the exception of the borrow ditch and interior channels. The interior channels would be made narrower and shallower than existing channels in unit 3 of Pond SF2. The borrow ditch would be 60 feet wide and between 1 and 4 feet deep. At these depths water in the borrow ditches is likely to mix daily due to changes in temperature, reducing the potential development of low dissolved oxygen in Pond SF2.

Summary. The ponds would be managed consistent with the SBSPRP's Adaptive Management Plan, which is required to include triggers applicable to algae growth and dissolved oxygen levels. Application

[85] Meredith A. Holgerson, David C. Richardson, Joseph Roith, Lauren E. Bortolotti, Kerri Finlay, Daniel J. Hornbach, Kshitij Gurung, Andrew Ness, Mikkel R. Andersen, Sheel Bansal, Jacques C. Finlay, Jacob A. Cianci-Gaskill, Shannon Hahn, Benjamin D. Janke, Cory McDonald, Jorrit P. Mesman, Rebecca L. North, Cassandra O. Roberts, Jon N. Sweetman, Jackie R. Webb. 2022. "Classifying Mixing Regimes in Ponds and Shallow Lakes," *Water Resources Research*, 58, e2022WR032522. Available online at doi.org/10.1029/2022WR032522.

[86] Refuge (Don Edwards San Francisco Bay National Wildlife Refuge), 2022. *Annual Self Monitoring Report.*

[87] Refuge (Don Edwards San Francisco Bay National Wildlife Refuge), 2022. *Annual Self Monitoring Report.*

of the SBSPRP's Adaptive Management Plan to Ponds R3 and SF2 would reduce or avoid water quality impacts related to dissolved oxygen levels.[88]

Salinity and Metals

Salinity levels in former salt ponds are generally elevated. Former salt ponds can also contain metals present as inorganic salts. Therefore, changes in water management that increase salinity in the ponds can also increase metals concentrations, and impacts related to salinity and metals are discussed together.

Under existing conditions, water quality monitoring for salinity is conducted from June through November on a weekly basis at the discharges from Ponds SF2 and R5/S5. SBSPRP Phase 2 converted Pond R4 from managed pond to tidal habitat, similar to what is proposed for Ponds R1 and R2. SBSPRP Phase 2 also reconfigured managed pond R3 to include seasonal drainage of the pond for western snowy plover nesting habitat, similar to what is proposed for pond SF2. Potential Project effects related to salinity and metals in the ponds are discussed below.

Ponds R1 and R2. For Ponds R1 and R2, which would be restored to tidal action, a period of initial higher salinity in water from these ponds could occur, however this increase would diminish over time with ongoing tidal mixing. Restoring tidal wetland functions to former salt ponds is expected to improve water quality in the South San Francisco Bay on a spatially substantial scale with large contiguous habitat to maximize ecotonal or edge habitat and minimize non-native vegetation. Marsh systems that are tidally connected to the Bay improve water quality by filtering and fixing pollutants in addition to protecting beneficial uses.

Ponds R3 and R5/S5. The Project would not alter managed pond operations of Ponds R3 and R5/S5, and therefore Project activities at these ponds would not affect salinity of receiving waters.

Pond SF2. As discussed above, Pond SF2 would be filled with bay water during the wet season and drawn down during the dry season, although water would remain in deeper areas of the pond. In 2022, salinity and pH levels at the Pond SF2 discharge were below 40 ppt and 8.5 thresholds, respectively, set for pond discharges.[89] The timing of drawdown (discharge) from Pond SF2 is at the end of the wet season, when contributions of low salinity stormwater to the pond is likely to be highest. The Project does not propose activities that would generate or release additional salts or metals into Pond SF2. Pond SF2 is already operated as a managed pond, and under current managed conditions salinity levels remain below thresholds established to protect water quality.[90] Pond SF2 would be managed consistent with the SBSPRP's Adaptive Management Plan, which includes weekly salinity monitoring between June through November along with adaptive management actions should salinity levels exceed thresholds protective of water quality. Therefore, the Project would not substantially increase the salinity or metals concentration of the discharge from Pond SF2 to San Francisco Bay.

[88] See finding 112 for completed studies. Also Order R2-2018-0020 requires applied studies to determine how pond geometry (surface area, depth, filling borrow ditches) should be altered to make managed ponds ecologically sustainable and how to develop a site-specific objective for DO in managed ponds.

[89] Refuge (Don Edwards San Francisco Bay National Wildlife Refuge), 2022. *Annual Self Monitoring Report.*

[90] Modeling for previous salt pond restoration work showed that discharging pond waters at salinity levels up to 44 parts per thousand would not have substantial water quality impacts on receiving waters. Order No. R2-2018-0020.

Methylmercury

San Francisco Bay is listed on the CWA 303(d) list as being impaired by mercury and the State Water Board adopted a TMDL to address this impairment. Tidal wetlands can be both sources and sinks of total mercury and methylmercury, and many factors can affect wetland biogeochemistry and thus methylmercury production. The data and studies available suggest tidal restoration may reduce methylmercury production but can potentially increase overall methylmercury supply because of greater hydrologic exchange.[91]

The SBSPRP included incremental restoration and an adaptive management approach to address potential changes in bioaccumulation of mercury. Adaptive management included applied studies, the results of which are being evaluated. Concerns regarding mercury bioaccumulation were primarily focused on restoration of Pond A8, the sediment in which contains relatively high concentrations of mercury due to past mercury mining in the Guadalupe River watershed. As noted in Section 3.11.1, total mercury and methylmercury concentrations in Pond A4 sediment were found to be below typical San Francisco Bay concentrations. As part of the evaluation of Phase 2 of the SBSPRP, the RWQCB indicated that due to the regional setting of the Ravenswood ponds (the Project area), the risk that introduction of Bay ambient sediments could increase bioaccumulation of mercury in the area was not considered substantial. However, as part of the Adaptive Management Plan, all pond complexes including the Ravenswood ponds are monitored for, among other parameters, the accumulation of mercury in biosentinel species. The SBSPRP Adaptive Management Plan also identifies management actions to be implemented if monitoring activities observe levels above trigger thresholds. Examples of management actions include capping or removal of contaminated sediment. All former salt ponds in the Project area would be managed consistent with the SBSPRP's Adaptive Management Plan, and therefore the Project would not substantially increase mercury bioaccumulation or methylmercury production in San Francisco Bay.

Post-Construction Stormwater Management

The Project's recreational improvements along the shoreline would result in newly created or replaced impervious surfaces. As shown in the typical cross sections of the Project alignment in Chapter 2, *Project Description*, the levee tops where the trail is installed would be sloped at approximately 2 percent grade. The minimum crest width of the levee would generally be 20 feet in most reaches. The trail on the levee tops would be suitable for vehicle access for maintenance and shoreline protection efforts, in addition to providing replacement of the existing Bay Trail in the Project area.

The Bay Trail design guidelines and toolkit include recommendations addressing stormwater runoff from the paved Bay Trail. These recommendations indicate that design of the Bay Trail should:

- Reduce runoff by minimizing impervious areas that are directly connected to a storm drain system; use permeable paving systems such as porous concrete, porous asphalt, or permeable pavers, where possible, and if appropriate, use gravel; and

[91] San Francisco Bay RWQCB (San Francisco Bay Regional Water Quality Control Board), 2020. *Clean Water Action Section 401 Water Quality Certification and Order for Lower Walnut Creek Restoration Project, Contra Costa County, Place ID 860162.* Effective October 8, 2020.

- Direct runoff from the trail's impervious areas to pervious areas, including permeable trail shoulders and/or small swales or retention areas that are outside the trail shoulder.[92]

The design approach also recommends stormwater runoff be managed with sheet drainage directed to a system of water quality control features or through use of permeable paving materials.

The San Francisco Bay MRP requires local permittees (including San Mateo and Santa Clara Counties) to require all projects considered "Regulated Projects" to implement low impact development source control, site design, and stormwater treatment onsite in accordance with provisions C.3.c and C.3.d unless alternative compliance options in provision C.3.e are invoked. Consistent with MRP Section C.3.b.ii(4)(d), impervious trails that direct stormwater to adjacent vegetated areas, or other non-erodible permeable areas, preferably away from creeks or toward the outboard side of levees, where those areas are at least half as large as the contributing impervious surface area, are not considered "Regulated Projects."

While the proposed levee sections of shoreline protection would be designed to withstand failure during flood events, they would be earthen and would not have an impermeable surface (other than trail segments). Consistent with USACE Guidelines for Landscape Planting and Vegetation Management at Levees, Floodwalls, Embankment Dams, and Appurtenant Structures (ETL 1110-2-571), all levees must have effective and reliable erosion protection, and perennial grasses are allowed as an erosion-protective cover on levees.[93] The levee would be composed of engineered fill designed consistent with USACE Engineer Manual 1110-2-1913, Design and Construction of Levees. The levee tops would be gently sloped to the adjacent unpaved levee sides. Adjacent unpaved areas along the proposed Bay Trail would be more than half as large as the paved Bay Trail. In addition, the paved Bay Trail would be used for non-motorized recreation, and operations activities on the trail generally would not require the use of potential water quality pollutants. Therefore, the new impervious surface created by the Project would not substantially degrade water quality.

Summary

Construction activities could temporarily degrade surface or groundwater quality. Implementation of best management practices required pursuant to the CGP, the 1990 Bay Road site CRMP, and the Ravenswood Industrial Area Area-wide Risk Management Plan would avoid or reduce water quality impacts during construction of the Project. Implementation of Mitigation Measure HYD-1a (Master QAPP for Imported Terrestrial Fill), Mitigation Measure HYD-1b (Groundwater Handling Requirements), and Mitigation Measure BIO-10 (Minimize Dredging Impacts; refer to Section 3.4Biological Resources) would further reduce the risk of degrading water quality during construction. Construction impacts related to violation of water quality standards, waste discharge requirements, or the degradation of water quality would be **less than significant with mitigation**.

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92 2M Associates, 2016. *San Francisco Bay Trail Design Guidelines and Toolkit.* June 2016. Available online at mtc.ca.gov/sites/default/files/documents/2021-10/Bay-Trail-Design-Guidelines-and-Toolkit.pdf.

93 USACE guidelines identify a three-dimensional vegetation-free zone applicable to all levees, floodwalls, embankment dams, and critical appurtenant structures in all flood damage reduction systems. The vegetation-free zone applies to all vegetation except perennial grass. The minimum height of the vegetation-free zone is 8 feet and the minimum width is the width of the levee, including all critical appurtenant structures, plus 15 feet on each side. Only approved grasses, or less than half of tree trunk, can be in the vegetation-free zone. Minimum dimensions may not be diminished without a formal variance. (ETL 1110-2-571)

Adverse water quality effects during operations would be reduced or avoided by monitoring water quality and implementing requirements of the SBSPRP's Adaptive Management Plan for all ponds affected by the Project. The proposed levee and Bay Trail would not adversely affect water quality based on the current proposed design, which includes pervious levee banks on either side of the Bay Trail alignment. Therefore, water quality impacts during Project operations related to violation of water quality standards, waste discharge requirements, or the degradation of water quality would be **less than significant**.

Impact HYD-2: Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would result in substantial erosion or siltation. ***(Less than Significant)***

Alteration of Drainage Patterns Along Levee Alignment

Impact HYD-3 evaluates the Project's effects related to flooding, stormwater drainage systems or impeding flood flows. As discussed in Impact HYD-3, the Project would replace, improve, or protect most of the existing drainage features within the Project footprint, retaining existing drainage features would avoid altering the course of a stream in a way that would result in substantial erosion or siltation. The Project would potentially eliminate existing gravity outfalls north of Bay Road and add drainage area to the stormwater drainage system and O'Connor Pump Station beyond what is planned; however, because the drainage area added to the stormwater drainage system is generally paved or impervious (e.g., impervious cap overlying contaminated soil), these changes would not result in substantial erosion or siltation.

Former Salt Ponds

Ponds R1 and R2 would be breached to tidal inundation; existing drainage patterns within Ponds R1 and R2 and tidal flows in Ravenswood Slough would be intentionally altered. Tidal scour would widen the breach and widen and deepen sections of Ravenswood Slough, and marsh channels near the breach would increase in complexity. A greater area of marsh in Lower and South San Francisco Bay would be available for tidal flows. Sediment from the incoming tide would settle out in Ponds R1 and R2 and support the development of marsh habitat. These changes would return the ponds to tidal action and therefore would not result in adverse impacts related to substantial erosion or siltation.

Inland Areas and Levee

Based on the San Mateo County Water Pollution Prevention Program Hydromodification Management Applicability Map, the Project is in an area where catchments drain to hardened channels and tidally influenced areas. Based on the San Mateo County Water Pollution Prevention Program's C.3 Regulated Projects Guide, all of East Palo Alto and areas of Menlo Park and Redwood City east of El Camino Real are exempt from hydromodification management controls due to the extent of existing developed (impervious) area and low slopes. In these areas hydromodification is not likely to cause increased erosion, silt pollutant generation, or other impacts to local rivers, streams, and creeks.[94]

The Project would install new impervious surface along the levee top trail. These areas would drain to San Francisco Bay. Trail activities (pedestrian and bicycle use) would not release water quality

[94] SMCWPPP (San Mateo County Water Pollution Prevention Program), 2023. C.3 Regulated Projects Guide, Version 2.0. November 2023.

contaminants. The levee would be designed consistent with Section 65.10(b) of the National Flood Insurance Program implementing regulations, which require engineering analyses demonstrating that the levee can withstand a flood with no appreciable erosion of the levee. The purpose of the habitat restoration components is to restore tidal marsh, transition zone habitat, ponded waterbird habitat and other habitat. These features would be designed to avoid substantial adverse erosion. Therefore, the Project would not add impervious surfaces in a manner that would result in substantial adverse erosion or sedimentation and the impact would be **less than significant**.

Impact HYD-3: Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or impede or redirect flood flows. ***(Less than Significant with Mitigation)***

As discussed above, the Project area is subject to flooding from multiple causes, including coastal flooding from San Francisco Bay, bank overflow from San Francisquito Creek in Menlo Park and East Palo Alto and localized flooding due to under-capacity stormwater conveyance infrastructure. The Project would replace, improve, or protect in place most of the existing drainage features within the Project footprint, as summarized in **Table 3.11-6**. The Project would also fill several small sloughs or channels along the bay shoreline.

The Project would prevent bay water from flooding development landward of the Project alignment. Coastal hydraulics modeling indicates that the potential extent and magnitude of change to the bay's coastal hydraulics caused by protecting a section of the shoreline including and longer than the Project are limited.[95] Because the Project would prevent coastal flooding for a shorter section of the shoreline, displacement of water due to the presence of the Project would not substantially affect surrounding bay water surface elevations during a coastal flood, or result in additional areas becoming inundated. Therefore, the Project would not cause substantial adverse effects due to impeding or redirecting bay flood flows, and the impact would be ***less than significant***.

South of Bay Road and North of Bay Road Reaches

Existing drainage along the Project alignment is managed by each city as part of its storm drain system. Much of East Palo Alto drains by gravity southeast to the O'Connor Pump Station, which discharges to San Francisquito Creek. Northwest portions of the city drain to the Ravenswood Pump Station in Menlo Park. Some smaller catchments near the shoreline drain directly to San Francisco Bay. The area is generally flat (elevations vary by about 10 feet over one to two miles), and consequently the drainage systems in East Palo Alto are largely dependent on the two pump stations. Table 3.11-6 lists the existing drainage outfalls along each Project reach. Flooding within the City of East Palo Alto is caused by heavy rainfall which generally occurs during winter and early spring and by elevated Bay water levels caused by high tides augmented by processes associated with storms.

[95] Hummel, M.A., and M.T. Stacey, 2021. "Assessing the influence of shoreline adaptation on tidal hydrodynamics: the role of shoreline typologies." *Journal of Geophysical Research: Oceans*: 126, e2020JC016705. Available on at doi.org/10.1029/2020JC016705.

TABLE 3.11-6
DRAINAGE FEATURES

Reach[a]	Existing Drainage Infrastructure	Function/Existing Hydraulics	Proposed Modifications[b]
South of Bay Road	O'Connor Pump Station, Bayshore Pond, and Runnymede-O'Connor Drainage Ditch	Collect and convey water from eastern half of East Palo Alto (inland side of embankment) to San Francisquito Creek.	Protect in place and relocate a portion of the Runnymede Drainage Ditch inland.
	Runnymede Street Outfall	Gravity outfall (Tideflex valves); convey a portion of stormwater from areas north of Runnymede Street to Laumeister Marsh through existing embankment.	Replace gravity outfall with pump station Protect existing concrete drainage structure in place; connect discharge to Runnymede Drainage Ditch via new culvert.
	Tidal channels	Convey tidal exchange within Faber and Laumeister marshes; on bay side of existing berm.	Relocate.
North of Bay Road	Bay Road, Demeter Street, Stevens Street, Fordham Street outfalls	Gravity outfalls from storm drain system collecting water from north of Bay Road and draining to backside of tidal marsh in Ravenswood Open Space Preserve.	Shoreline protection eliminates outfalls; drainage from these outfalls assumed to be removed by a combination of onsite stormwater management and/or new storm drain connections that convey stormwater to other trunk lines and pump stations.
	Tidal channels	Convey tidal exchange within Ravenswood Open Space Preserve and help convey runoff from area north of Purdue Avenue and east of Fordham Street to the bay.	Relocate.
Dumbarton Approach	Caltrans Frontage Road Pump Station	Stormwater pump station	Relocate or protect in place, preserving pump station's discharge capacity to the bay.
	Drainage channel and culvert	Collect and convey stormwater from adjacent frontage road and parking area south of State Route 84 to gravity outfall to San Francisco Bay east of SF2 Trail (trail shown on Figure 2-13).	Replace.
Tech Campus	Ravenswood Pump Station outfall channel and adjacent box culvert	Ravenswood outlet pipelines and box culvert discharge to the Bay via Ravenswood Slough.	Replace if condition warrants.
	Ravenswood Slough	Main channel of slough that conveys tidal exchange and stormwater discharged from Ravenswood Pump Station.	Protect in place or relocate if needed.
Bayfront Expressway	Water control structures	Concrete control structures with gated conveyance channel through existing berms between ponds S5/R5-R3 and S5/R5-R4.	Replace or protect in place.

Reach[a]	Existing Drainage Infrastructure	Function/Existing Hydraulics	Proposed Modifications[b]
Bedwell Bayfront Park	Bedwell Managed Wetland Outfall (culvert)	Allow two-way conveyance between Bedwell Managed Wetland and Flood Slough.	Replace.
	Culvert between Pond R5/S5 and Flood Slough	Allow two-way conveyance between Pond R5/S5 and Flood Slough.	Replace.
	Caltrans Channel Outfall	Convey water from Caltrans Drainage Channel under Marsh Road to Flood Slough.	Replace.
	Bayfront Canal Outfall	Concrete structure controlling gravity flow from Bayfront Canal to Flood Slough, includes gates.	Improve.
	Bayfront Canal Diversion	Convey water from Bayfront Canal to Pond R5/S5.	Protect in place.
Marsh Road	Bayfront Canal	Collects runoff from Redwood City and other nearby areas.	Protect in place.

NOTES:

a. Only reaches with drainage feature infrastructure shown.
b. Proposed actions from Appendix INFRA and 10 percent and 30 percent design plans.

SOURCE: Appendix INFRA from HDR, 2024. Design Documentation Report and 10 Percent and 30 Percent Designs, Strategy to Advance Food Protection, Ecosystems, and Recreation along the Bay (SAFER Bay). September 6; ESA, Strategy to Advance Flood Protection Ecosystems and Recreation along the Bay (SAFER Bay Project) – Interior Drainage Summary Memorandum, November 10, 2025.

The City of East Palo Alto has been developing stormwater drainage improvements for more than a decade and has modeled the effects of various combinations of development and stormwater drainage improvements in multiple studies[96], most recently in 2024 in the Utility Impact Study for the Ravenswood Business District/4 Corners Specific Plan (Specific Plan), approved in 2024.[97] Some stormwater drainage improvements have been implemented, but much of the area remains susceptible to flooding under current conditions. The Specific Plan calls for improvements to the storm drain system that include eliminating individual local gravity outfalls, onsite stormwater management, upgrading and adding storm drain piping, and two new pump stations. The Specific Plan's improvements have been evaluated with hydrology and hydraulics modeling that considers the 10-year precipitation event and future bay water elevated by 3.5 ft, consistent with the SAFER Bay Project's sea level rise design criteria. With these proposed improvements, the depth of flooding would be less than 0.5 ft within the area of East Palo Alto that is protected from coastal flooding by the proposed levee.

Although most developed land in East Palo Alto is connected to the stormwater drainage system, some areas along the eastern side of the city are served by gravity outfalls that allow drainage directly to San Francisco Bay (except during high tides). The proposed levee would eliminate these gravity outfalls. Pursuant to the Specific Plan, the function of these outfalls will be replaced with onsite stormwater management and connection to the stormwater network.

Eliminating the gravity outfalls indirectly adds developed areas to the stormwater drainage system. To the extent that undeveloped areas are on the inland side of the proposed levee, runoff from the undeveloped areas would be directly added to the drainage area of the existing stormwater drainage system. To accommodate this additional flow as well as address other stormwater management deficiencies, the city's stormwater system will be improved with greater conveyance and pumping capacity as part of the Specific Plan.

The 2024 Utility Impact Study evaluated stormwater drainage effects of (1) eliminating the eastern gravity outfalls from Weeks Street north (i.e., all gravity outfalls except Runnymede/Laumeister Marsh) and (2) adding to the drainage area of the stormwater drainage system the currently undeveloped land north of Bay Road and west of the proposed shoreline protection alignment.[98] The Project would

[96] The City of East Palo Alto prepared a Storm Drain Master Plan in 2014, which analyzed the existing storm drain capacity under the 10-year design storm event and resulted in recommendations for system improvements. The 2014 Storm Drain Master Plan did not study the potential for construction of a new levee along East Palo Alto's eastern shoreline.

[97] A Utility Impact Study for the Ravenswood Business District/4 Corners Specific Plan was prepared in 2024 and incorporated 2018 storm drainage infrastructure improvements into the existing conditions model from the 2014 Storm Drain Master Plan. The 2024 Utility Impact Study conducted for the Ravenswood Business District Specific Plan Update modeled changes in stormwater drainage and flood levels in East Palo Alto with future development in the area north of Bay Road. Schaaf & Wheeler Consulting Civil Engineers, Ravenswood Business District Specific Plan Update Utility Impact Study, prepared for Raimi & Associates and City of East Palo Alto, revised June 20, 2024. The Ravenswood Business District/4 Corners Specific Plan was adopted on December 17, 2024.

[98] Modeling conducted for the 2024 Utility Impact Study evaluated multiple scenarios. One scenario estimated flood levels during the 10-year design storm assuming the 2020 Bay development area was connected to the storm drainage system (representing an increase of 9.5 acres) and modified imperviousness of other developments around Bay Road (together called the "near-term development"). Another scenario modeled development in the Waterfront area, north of Bay Road, along with near-term development plus some new storm drainage system infrastructure (new pipelines north of Bay Road and a 50 cubic feet per second pump station at Bay Road and Pulgas Avenue). The Waterfront development includes eliminating outfalls along Illinois Street north of Bay Road and installing storm drainage system infrastructure north of Purdue Street. The Waterfront development connects 11 acres of new area to the storm drainage system and effectively adds a total of 133 acres to the Runnymede/O'Connor drainage system due to elimination of outfalls along Illinois Street.

effectively create a similar condition by preventing drainage from the gravity outfalls; the proposed North of Bay Road Reach alignment would also follow the eastern edge of existing and proposed development in the Specific Plan.[99]

Modeling in the 2024 Utility Impact Study found that storm drainage pipelines in Runnymede Street appear to be a primary path for drainage from a large portion of East Palo Alto to flow to O'Connor Pump Station; therefore, adding drainage area to the system affects flood depths throughout areas of East Palo Alto that drain to the O'Connor Pump Station. The 2024 Utility Impact Study indicated that new development just inland of the proposed shoreline protection alignment adds approximately 20 acres of area to the existing drainage system. Combined with eliminating the outfalls, directing runoff from areas west of the proposed shoreline protection alignment to the existing stormwater drainage system effectively adds approximately 133 acres to the drainage area of the Runnymede Street outfall and the O'Connor Pump Station.[100]

In November 2024 the City of East Palo Alto received a development proposal for the area north of Bay Road called the Waterfront development area (EPA Waterfront Phase 1 project). The development proposal is under review by city staff. If the EPA Waterfront Phase 1 project proceeds prior to the Project, then the eastern gravity outfalls would be eliminated and new drainage area added to the stormwater drainage system by the EPA Waterfront Phase 1 project, and not by the Project. However, this analysis conservatively assumes that the Project is built prior to the EPA Waterfront Phase 1 project.

The Project would increase the area draining to the O'Connor Pump Station. The Project would protect the O'Connor Pump Station in place. The existing stormwater drainage system does not have capacity to convey runoff from the 10-year storm, or larger storm events. Therefore, assuming no other development occurs north of Bay Road prior to levee construction, the Project would contribute runoff which would exceed the capacity of the existing stormwater drainage system, and could worsen flooding.

The 2024 Utility Impact Study identifies improvements to the stormwater drainage system that would avoid increased flood depths through the city caused by the combination of eliminating the eastern gravity outfalls and adding drainage area to the stormwater drainage system. As noted previously, stormwater drainage pipelines in Runnymede Street appear to be the primary path for drainage from large areas of East Palo Alto to flow to the O'Connor Pump Station. With outfalls north of Bay Road eliminated, the O'Connor Pump Station alone drains the majority of the stormwater drainage system in East Palo Alto.[101]

Some effects of the Project on the stormwater drainage system could be addressed by construction of previously identified stormwater drainage system improvements (i.e., improvements identified in the 2014 Storm Drain Master Plan). The 2024 Utility Impact Study identified additional changes to the stormwater drainage system that would be needed to avoid worsening flooding, consisting of either upsizing infrastructure built in Bay Road/Pulgas Avenue in 2018 or adding a new pump station at the

[99] The 2024 Utility Impact Study evaluated effects of the levee assuming it was constructed after development in the Ravenswood Business District Specific Plan area. The shoreline protection alignment evaluated in the 2024 Utility Impact Study is located east of the current proposed shoreline protection alignment.

[100] Schaaf & Wheeler Consulting Civil Engineers, 2024. *Ravenswood Business District Specific Plan Update Utility Impact Study.* Prepared for Raimi & Associates and City of East Palo Alto. Revised June 20, 2024.

[101] Schaaf & Wheeler Consulting Civil Engineers, 2024. *Ravenswood Business District Specific Plan Update Utility Impact Study*. Prepared for Raimi & Associates and City of East Palo Alto. Revised June 20, 2024.

eastern end of Runnymede Street. The Specific Plan includes a new Runnymede Pump Station among the required storm drainage capital improvements for the plan area.

The stormwater drainage system improvements identified in the 2014 Storm Drain Master Plan and the Specific Plan are considered planned improvements to the stormwater drainage system. The Project would generally be consistent with, or would not impair implementation of, planned stormwater drainage system improvements; however, depending on the location of the Runnymede Pump Station, additional stormwater infrastructure could be required to ensure the Project does not further expand the area draining to the O'Connor Pump Station. As currently proposed the Project would connect discharge from the existing Runnymede Street outfall to Runnymede Ditch and O'Connor Pump Station, inland of the proposed levee. Therefore, the proposed levee could further expand the area draining to the O'Connor Pump Station beyond what is currently planned and worsen flooding, a **significant impact**. Implementation of Mitigation Measure HYD-2a (Runnymede Pump Station Design) would reduce this impact by creating a path for discharge from the future Runnymede Pump Station to be conveyed to San Francisco Bay.

Mitigation Measure HYD-2a: Runnymede Pump Station Design

This measure applies to the South of Bay Road Reach. The Project Proponent shall include a pump station in the South of Bay Road Reach levee, a pipeline over the levee, or other method designed by a qualified engineer to convey discharge from the stormwater drainage system at the eastern end of Runnymede Street to San Francisco Bay. If the Runnymede Pump Station has been completed inland of the proposed shoreline protection, then the conveyance shall be sized to sufficiently convey the maximum flow from Runnymede Pump Station and shall include a discharge structure consistent with the proposed Runnymede Pump Station's discharge structure. If the Runnymede Pump Station has not been completed, then the Project proponent shall incorporate the Runnymede Pump Station into the proposed SAFER Bay Project. The conveyance or Runnymede Pump Station shall be operational prior to construction of the North of Bay Road shoreline protection.

Impacts of Mitigation Measure HYD-2a: The proposed outfall discussed in Mitigation Measure HYD-2a would generally be built within the footprint of the proposed levee and associated levee construction area. The discharge structure may extend beyond the outboard toe of the levee, which could cause biological resources impacts similar to those identified in Section 3.4, Biological Resources, related to special status species, wetlands, and other biological resources. Implementation of Mitigation Measures BIO-1, BIO-2, BIO-3, BIO-4, BIO-5, BIO-7, BIO-8, BIO-9, BIO-14, BIO-15, BIO-16, BIO-19, BIO-20, BIO-24, and BIO-25 would reduce or avoid the biological resources impacts of Mitigation Measure HYD-2a. Potential impacts on cultural resources or tribal cultural resources associated with ground disturbance outside the proposed levee footprint would be reduced to less than significant with implementation of Mitigation Measures CUL-1, CUL-2, and CUL-3. Construction activity associated with the discharge structure could temporarily increase ambient noise at nearby sensitive receptors. Temporary increases in ambient noise caused by implementation of Mitigation Measure HYD-2a would be reduced, although not to less-than-significant levels, by Mitigation Measure NOI-1. Ground disturbance for the discharge structure could disturb contaminated sediment, and dewatering could encounter contaminated groundwater; however, impacts on the public or environment would be reduced with implementation of Mitigation Measures HYD-1b, HAZ-1, and HAZ-2. Vehicles traveling to and from the discharge structure location could generate fugitive dust along

access roads or areas; impacts associated with fugitive dust would be addressed by Mitigation Measure AIR-1.

Future Groundwater Levels

The 2014 Storm Drain Master Plan describes methodologies used to model drainage in East Palo Alto. The amount of stormwater runoff generated during an event is estimated based on a combination of land use, soil characteristics, and antecedent moisture condition. Most soil in East Palo Alto is considered poor draining, meaning that during storm events only small amounts of water infiltrate into groundwater. The saturated hydraulic conductivity of the soil (i.e., the rate water moves through soil when wet) in shoreline areas of East Palo Alto is estimated to be 0.003 millimeters per second, or less than one-half an inch per hour.[102] In addition, most developed areas were estimated to be at least 60 percent and up to 98 percent impervious, and most of East Palo Alto is developed. Groundwater is estimated to be within 3 feet of the ground surface in shoreline areas of East Palo Alto (dark orange and purple areas on **Figure 3.11-2**).[103] Due to the shallow depths to groundwater, groundwater may be interacting with (i.e., entering) existing stormwater drainage system infrastructure in these areas under existing conditions.

For these reasons the amount of runoff generated in East Palo Alto during future conditions with shallower groundwater is likely to be similar to existing conditions, in which nearly all rainfall becomes runoff that enters the stormwater drainage system, and some groundwater is continuously entering the stormwater drainage system at a much slower rate than runoff.

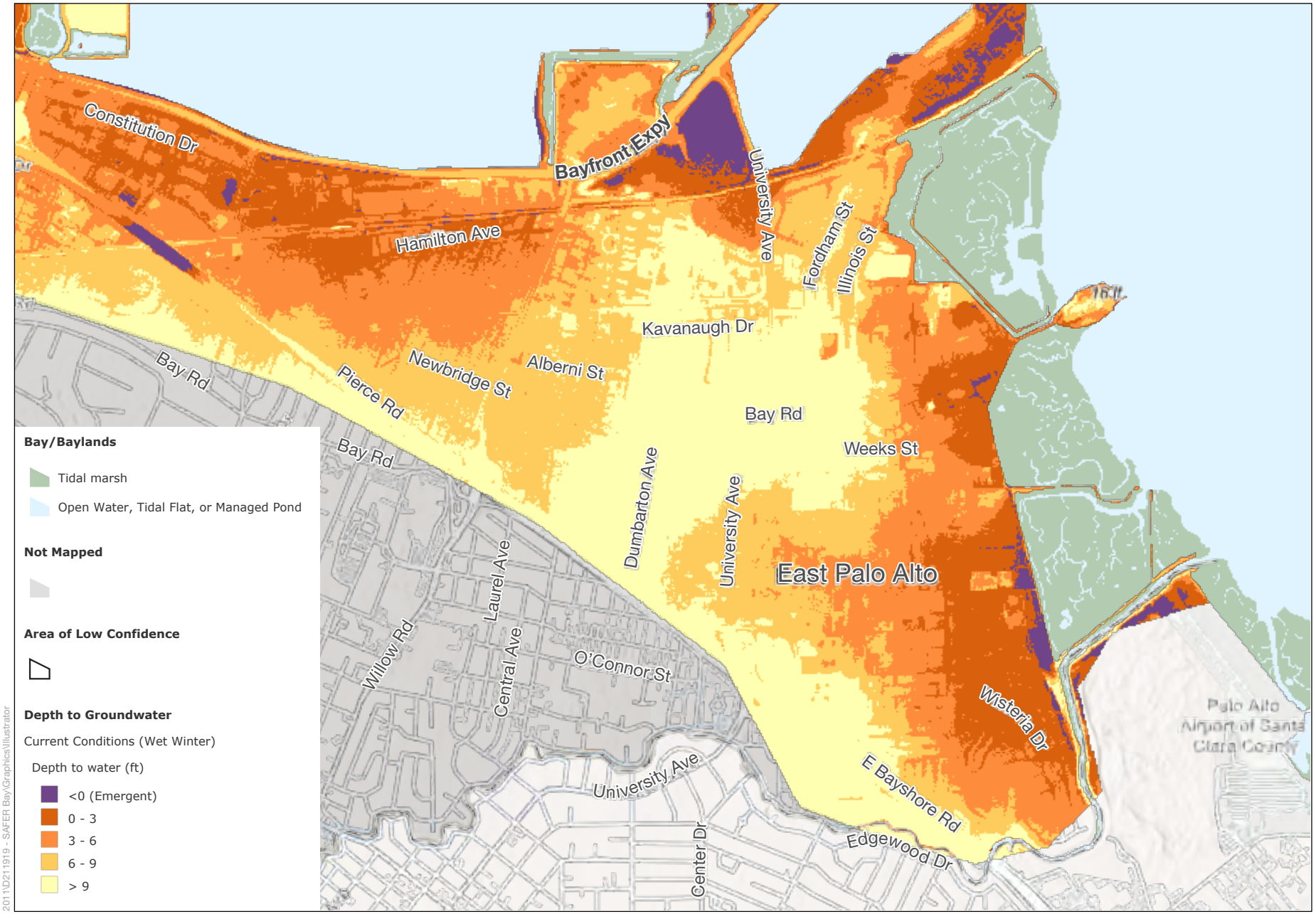
While the Project would not cause shallower groundwater levels, the Project's addition of drainage area to the O'Connor Pump Station watershed, discussed above, could exceed the capacity of the existing pump station and worsen flooding. Implementation of Mitigation Measure HYD-2a (Runnymede Pump Station Design) would reduce this impact by ensuring that the planned Runnymede Pump Station would discharge to the outboard side of the proposed levee. The planned Runnymede Pump Station would provide additional drainage capacity to the stormwater drainage system such that flooding would not be worsened.

Substation and Marsh Restoration Reach

The proposed levee would protect the Ravenswood Substation and retain some of the adjacent areas of Pond R2 on the inboard side of the levee. A preliminary water budget suggests the inboard portion of Pond R2 has the capacity to store the 30-day duration / 100-year recurrence interval precipitation falling on the pond itself and the substation parcel. A more detailed hydrologic assessment would be needed to determine whether the storage volume on this inboard portion of Pond R2 is sufficient to manage runoff from the substation or if additional stormwater management, such as a pump station servicing this parcel or piping to convey stormwater to another pump station, is needed. Therefore, the Project could

[102] NRCS (Natural Resources Conservation Service), 2024. *Saturated Hydraulic Conductivity, Standard Classes, San Mateo County, Eastern Part.* Survey Area Data: September 8, 2024.

[103] SFEI (San Francisco Estuary Institute), 2025. Depth to Groundwater: Current Conditions, Available online at sfei.maps.arcgis.com/apps/webappviewer/index.html?id=1f9f94366b3b491886f08acf080d01df. Accessed May 5, 2025.



2011\D211919 - SAFER Bay\Graphics\Illustrator

SOURCE: SFEI, 2025

SAFER Bay Project

Figure 3.11-2
Approximate Depth to Groundwater

ESA

exacerbate flooding at the Ravenswood Substation and adjacent frontage road, a potentially significant impact. Implementation of **Mitigation Measure HYD-2b** (Substation and Marsh Restoration Reach Stormwater Infrastructure) would reduce this impact by requiring construction of stormwater infrastructure that avoids increasing flooding at the Ravenswood Substation.

> **Mitigation Measure HYD-2b: Substation and Marsh Restoration Reach Stormwater Infrastructure**
>
> The Project Proponent shall conduct a detailed hydraulic analysis that assesses whether the portions of Pond R2 inboard of the proposed shoreline protection are sufficiently sized to detain runoff from the Ravenswood Substation during the 100-year recurrence interval precipitation event without flooding the Ravenswood Substation. If the portions of Pond R2 are not sufficient to detain runoff from the 100-year recurrence interval precipitation event, the Project proponent shall design and construct stormwater infrastructure that is sufficiently sized to accommodate the volume of runoff that exceeds the detention capacity of the portions of Pond R2 inboard of the levee. The stormwater infrastructure shall be designed by a qualified professional and could include extension of existing stormwater conveyance infrastructure in the frontage road to the Ravenswood Substation or other methods. The stormwater infrastructure shall be designed to prevent non-stormwater discharges from entering San Francisco Bay.
>
> **Impacts of Mitigation Measure HYD-2b:** The stormwater infrastructure identified in Mitigation Measure HYD-2b would be built on the inland side of the proposed shoreline protection, likely within developed areas or within portions of Pond R2 adjacent to the Ravenswood Substation. Disturbance or alteration of Pond R2 could result in impacts on special status species, wetlands, and other biological resources. Implementation of Mitigation Measures BIO-1, BIO-2, BIO-3, BIO-4, BIO-5, BIO-6, BIO-7, BIO-8, BIO-9, BIO-14, BIO-15, BIO-16, BIO-19, BIO-20, BIO-24, and BIO-25 would reduce or avoid the biological resources impacts of Mitigation Measure HYD-2b. Potential impacts on cultural resources or tribal cultural resources associated with ground disturbance outside the proposed shoreline protection footprint would be reduced to less than significant with implementation of Mitigation Measures CUL-1, CUL-2, and CUL-3. Ground disturbance for the stormwater infrastructure could disturb contaminated sediment, and dewatering could encounter contaminated groundwater; however, impacts on the public or environment would be reduced with implementation of Mitigation Measures HYD-1b, HAZ-1, and HAZ-2.

Dumbarton Approach and Tech Campus Reaches

The southern frontage road along SR 84 in the Dumbarton Approach reach drains to an existing concrete lined channel, which conveys runoff by gravity to an outfall into San Francisco Bay. The Project would include new drainage pipelines over or through the embankment to maintain the existing drainage pattern in this area.

A concrete wall along the southern edge of Moseley Tract serves as a barrier for runoff from the northern frontage road along SR 84. Storm drains collect runoff from the area and convey runoff to the existing pump station at the northeast end of the frontage road. The Project would relocate or protect in place the existing stormwater pump station that serves this area; therefore, the Project would not substantially alter existing drainage in this area.

The Project includes a new pump station outfall at the location where the Ravenswood Pump Station outfall (part of Ravenswood Slough) intersects the proposed levee in the Tech Campus Reach. The

proposed pump station outfall would replace the existing outfall channel. Therefore, the Project would not substantially alter existing drainage from the Ravenswood Pump Station outfall.

Bayfront Expressway, Bedwell Bayfront Park, and Marsh Road Reaches

In the Bayfront Expressway Reach stormwater runoff from SR 84 drains to collection pipelines that route the runoff to the Caltrans Drainage Channel or to Chrysler Drive Pump Station (at the western end of the proposed Bayfront Expressway Reach), which also discharges to the Caltrans Drainage Channel.[104] Therefore, the proposed levee would not alter drainage patterns along the Bayfront Expressway Reach. The Project would replace existing water control structures between ponds S5/R5-R3 and S5/R5-R4. As discussed in Section 3.11.1, the water control structures between these ponds are two-way gated structures with specific invert elevations designed to manage water levels in Ponds R3 and S5/R5 for flood storage and wetland habitat. Replacement of these water control structures with structures that have the same two-way flow controls and invert elevations, or protection of these structures in place, if feasible, would maintain the existing drainage patterns along the Bayfront Expressway Reach. In the Bedwell Bayfront Park reach, Marsh Road within Bedwell Bayfront Park would be replaced atop the proposed levee. Water levels in the Bayfront Canal and connected areas discharge via gravity to the Bay through two outfalls in the vicinity of the proposed shoreline protection: an existing gated concrete structure where Bayfront Canal connects to Flood Slough and a diversion tunnel that connects Bayfront Canal to the forebay of Pond R5/S5. The Bayfront Canal cannot currently pass 25-year event storm flows to Flood Slough. The Project would improve the existing tide gates at Bayfront Canal with a water control structure to convey storm flows across the shoreline protection into Flood Slough. The other three water control structures along the reach would be replaced as needed for levee construction.

In the Marsh Road Reach, the Project would protect the existing Bayfront Canal in place. The Bayfront Canal would be on the inboard (landward) side of the levee, similar to existing conditions, and the canal would drain to Flood Slough via a water control structure. The proposed levee would fill the existing Cargill brine channel which, if necessary, would be realigned away from the outboard side of the levee toe. The brine channel is used for conveying water between evaporative salt ponds and is separated from surrounding stormwater drainage channels and features by existing berms. Although the brine channel and salt ponds are separated from Bayfront Canal by berms, during larger rain events, water overtops the berms and flows from Bayfront Canal into the salt ponds.[105] The proposed levee would block Bayfront Canal overflows into the salt ponds and thereby increase the amount of water draining to the water control structure at Flood Slough.

Prior assessments of measures to reduce flooding from Bayfront Canal and Atherton Channel include the diversion from Bayfront Canal to Pond S5 and Pond R5 that has already been implemented.[106] In addition to this diversion, suggested measures from previous drainage studies include stormwater detention in the upper watershed, floodwalls along the canal and the channel, increasing the conveyance capacity under bridges in lower Atherton Channel, increasing pumping capacity at existing pump stations, and adding a pump station at the mouth of Bayfront Canal to supplement the gravity discharge with the tide gate outfall

[104] Wood Rodgers, 2023. *City of Menlo Park Stormwater Master Plan.* "Exhibit C2." Prepared for City of Menlo Park.

[105] Paradigm and Northwest Hydraulic Consultants, Inc., 2019. *Bayfront Canal and Atherton Channel Watershed Flood Management Plan: Draft Report.* Prepared for San Mateo County Department of Public Works.

[106] This work is called the Bayfront Canal and Atherton Channel Flood Protection and Ecosystem Restoration Project and was completed by the San Mateo County Flood and Sea Level Rise Resiliency District in 2022-2023.

with pumped discharge to Flood Slough.[107,108] The effects of the Project on drainage from Bayfront Canal could be addressed by the addition of a pump station at the mouth of Bayfront Canal, which is under consideration although not specifically planned or funded. However, current stormwater master planning does not address the potential water levels in Bayfront Canal with the Project or with sea level rise. Therefore, the proposed levee could reduce the storage capacity of Bayfront Canal and worsen flooding, resulting in a **significant impact**. Implementation of **Mitigation Measure HYD-2c** (Bayfront Canal Drainage Conveyance Design) would reduce this impact by requiring the Bayfront Canal drainage conveyance design to reflect the reduced Bayfront Canal storage capacity caused by the Project.

Mitigation Measure HYD-2c: Bayfront Canal Drainage Conveyance Design

This measure applies to the Marsh Road and Bedwell Bayfront reaches. The Project Proponent shall include a pump station in the Marsh Road or Bedwell Bayfront Reach levee, a pipeline over the levee, or other method designed by a qualified engineer to convey discharge from the Bayfront Canal to San Francisco Bay. The conveyance design shall be based on updated stormwater drainage system modeling that includes improvement projects to storm drain systems since 2023 and incorporates the effects of the Marsh Road Reach levee and expected cumulative projects on storage capacity in Bayfront Canal. The conveyance shall be designed with sufficient capacity to avoid increasing flood water surface elevations in developed areas near Bayfront Canal and Atherton Channel. The conveyance shall be operational prior to construction of the Marsh Road Reach.

Impacts of Mitigation Measure HYD-2c: The proposed conveyance discussed in Mitigation Measure HYD-2c would generally be built within the footprint of the proposed levee and associated levee construction area, or, in the case of a new pump station, just inboard of the levee. The discharge structure may extend beyond the outboard toe of the levee, which could cause biological resources impacts similar to those identified in Section 3.4, Biological Resources, related to special-status species, wetlands, and other biological resources. Implementation of Mitigation Measures BIO-1, BIO-2, BIO-3, BIO-4, BIO-5, BIO-7, BIO-8, BIO-9, BIO-10, BIO-12, BIO-13, BIO-14, BIO-15, BIO-16, BIO-17, BIO-18, BIO-19, BIO-20, BIO-24, BIO-25, and BIO-26 would reduce or avoid the biological resources impacts of Mitigation Measure HYD-2c. Potential impacts on cultural resources or tribal cultural resources associated with ground disturbance outside the proposed levee footprint would be reduced to a less-than-significant level with implementation of Mitigation Measures CUL-1, CUL-2, and CUL-3. Construction activity associated with the discharge structure could temporarily increase ambient noise at nearby sensitive receptors. Temporary increases in ambient noise caused by implementation of Mitigation Measure HYD-2c would be reduced, although not to less-than-significant levels, by Mitigation Measure NOI-1. Ground disturbance for the discharge structure could disturb contaminated sediment, and dewatering could encounter contaminated groundwater; however, impacts on the public or environment would be reduced with implementation of Mitigation Measures HYD-1b, HAZ-1, and HAZ-2. Vehicles traveling to and from the discharge structure location could generate fugitive dust along access roads or areas; impacts associated with fugitive dust would be addressed by Mitigation Measure AIR-1.

[107] Paradigm and Northwest Hydraulic Consultants, Inc., 2019. *Bayfront Canal and Atherton Channel Watershed Flood Management Plan: Draft Report.* Prepared for San Mateo County Department of Public Works.

[108] Wood Rodgers, 2023. *City of Menlo Park Stormwater Master Plan*. Prepared for City of Menlo Park.

Summary

The Project would have **less-than-significant** impacts related to redirecting coastal flooding to other portions of the bay shoreline outboard of the levee. The Project would generally maintain existing drainage patterns in the Project area by replacing or protecting existing stormwater infrastructure. However, in East Palo Alto and near Ravenswood Substation, where some gravity outfalls currently exist, and at Bayfront Canal, the Project could result in runoff amounts that would exceed the capacity of the existing or planned stormwater drainage system. Implementation of Mitigation Measure HYD-2a (Runnymede Pump Station Design), Mitigation Measure HYD-2b (Substation and Marsh Restoration Reach Stormwater Infrastructure), and Mitigation Measure HYD-2c (Bayfront Canal Pump Station Design), would reduce this potential impact to **less than significant with mitigation**.

Impact HYD-4: In a flood hazard, tsunami, or seiche zone, risk release of pollutants due to project inundation. (*Less than Significant*)

Construction and Operation

The Project would occur in a 100-year flood zone, defined by FEMA as a Special Flood Hazard Area (Zone AE with a base flood elevation of 12 feet). The Project would also occur within the regional tsunami inundation zone.[109] Seiches can result in long-period waves that cause run-up or overtopping of adjacent landmasses, similar to tsunami run-up, and therefore could affect the same area mapped in the tsunami inundation zone. However, the primary purpose of the Project is to protect existing land uses from coastal flooding. The proposed land use does not include activities that would introduce water quality pollutants. Specifically, the Project focuses on shoreline protection, recreation and habitat restoration, uses that are not associated with industrial or commercial activities that typically generate pollutants such as heavy metals, oils, or hazardous chemicals.

Project maintenance would involve routine inspections and repairs of shoreline protection facilities, flood gates, and interior drainage systems. Levee maintenance would include annual vegetation control through mowing or grazing, and T-zone habitat on levee slopes would be maintained and monitored. Flood gates would undergo annual testing and maintenance, coordinated with various agencies, and interior drainage would be managed by existing storm drain systems operated by Menlo Park, East Palo Alto, and Caltrans.

Therefore, the Project would have a **less-than-significant** impact related to releasing pollutants due to Project inundation.

Impact HYD-5: Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan. (*Less than Significant with Mitigation*)

Construction and Operation

The Project would not substantially decrease groundwater supplies or interfere with groundwater recharge, as it primarily involves shallow excavations within artificial fill materials and Young Bay Mud.

[109] CGS (California Geological Survey), 2025. "Tsunami Hazard Areas Map." Data updated 2020/2022. Available online at maps.conservation.ca.gov/cgs/informationwarehouse/ts_evacuation/. Accessed May 2025.

Any groundwater encountered would be in the Shallow Aquifer, and the Project would not require continuous groundwater extraction. Therefore, there would be no conflict with the implementation of a sustainable groundwater management plan.

The Project area is located within San Francisco Bay RWQCB jurisdiction. The regional board has adopted a water quality control plan (Basin Plan), which includes water quality objectives designed to preserve and enhance water quality and protect the beneficial uses of terrestrial surface waterbodies (e.g., creeks, rivers, streams, and lakes), groundwater, coastal drainages, estuaries, coastal lagoons, and enclosed bays within the jurisdictional area of the regional board. Both construction and operation of the Project would be required to adhere to all applicable local and state water quality regulations including the policies and objectives of the Basin Plan. Construction of the Project would comply with the requirements of the CGP, which is designed to ensure that all discharges comply with the Basin Plan narrative and numeric water quality objectives and requirements. Construction would also be required to comply with the 1990 Bay Road site CRMP and the Ravenswood Industrial Area Area-wide Risk Management Plan, where relevant. As stated under Impact HYD-1, with implementation of the required construction plans and Mitigation Measure HYD-1a (Master QAPP for Imported Terrestrial Fill), Mitigation Measure HYD-1b (Groundwater Handling Requirements), and Mitigation Measure BIO-10 (Minimize Dredging Impacts; refer to Section 3.4, Biological Resources), the Project would not cause any water quality degradation relative to baseline conditions. Therefore, impacts of the Project related to conflicts with a water quality control plan would be **less than significant with mitigation**.

Cumulative Impacts

Impact C-HYD-1: The Project, in combination with past, present, and probable future projects in the Project area, would result in significant adverse impacts related to hydrology and water quality. (*Less than Significant with Mitigation*)

The geographic scope for potential cumulative impacts on hydrology and water quality encompasses the Project area, receiving waterbodies, and groundwater underlying the Project areas. The Project would be built in areas that drain to Lower San Francisco Bay and South San Francisco Bay, either directly or via Ravenswood Slough, Flood Slough, San Francisquito Creek. All projects listed in Table 3.1-2 and shown on Figure 3.1-1 in Section 3.1, *Overview*, are within the geographic scope. Projects farther from the Project area but within the Lower San Francisco Bay and South San Francisco Bay watersheds could also affect water quality in San Francisco Bay.

Water Quality

As discussed in Section 3.11.1, Lower San Francisco Bay, South San Francisco Bay, and San Francisquito Creek are listed as impaired in accordance with CWA section 303(d). Cumulative projects and the proposed SAFER Bay Project could further exacerbate the high pollutant levels in central San Francisco Bay through erosion and sedimentation from construction site activities or stormwater runoff to the storm drain system and waterways, accidental releases of chemicals and fuels, or discharges of dewatered groundwater. The Project and all cumulative projects larger than 1 acre would be required to implement stormwater pollution controls consistent with the statewide CGP, which is intended to prevent cumulative water quality degradation from construction projects. The erosion and sediment control plan

and CGP would require implementation of best management practices for the management of construction stormwater and non-stormwater, which may include but not be limited to erosion control measures, containment measures, and monitoring and reporting requirements.

In addition to stormwater pollution control required consistent with the CGP, the Project and cumulative projects in Table 3.1-2 at 1990 Bay Road and within the Specific Plan area would be required to comply with the CRMP or area-wide risk management plan, respectively. These existing plans identify required soil and groundwater handling measures designed to prevent releasing water quality pollutants during construction and operations.

Along other reaches, the Project and cumulative projects could require groundwater dewatering from areas adjacent to known groundwater contamination. Without treatment, groundwater dewatering from multiple points adjacent to known groundwater contamination could release contaminants into impaired waterbodies, a potentially significant cumulative impact. To the extent that dewatering for the Project could release contaminants for which Lower San Francisco Bay and South San Francisco are impaired (refer to Section 3.11.1), the Project's contribution to the cumulative impact would be considerable. However, implementation of Mitigation Measure HYD-1b (Groundwater Handling Requirements) identified above, would reduce the Project's contribution to the potentially significant impact such that the impact would be **less than significant with mitigation**.

The Project would restore two former salt ponds to tidal action and enhance existing habitat in managed former salt ponds, potentially altering water quality in the ponds. The SBSPRP and South San Francisco Bay Shoreline Project would also modify or restore former salt ponds in the project vicinity and could result in similar water quality changes. Both the Project and the SBSPRP would implement the SBSPRP Adaptive Management Plan described in Section 3.11.1, which includes management actions to be taken should ongoing monitoring identify the potential for Project operations to degrade water quality. The South San Francisco Bay Shoreline Project includes a monitoring and Adaptive Management Plan for ecosystem restoration, which identifies management actions to avoid degrading water quality during former salt pond restoration. The Project and cumulative projects would not result in cumulative water quality impacts due to restoration of former salt ponds. Therefore, there would be **no significant cumulative impact** on water quality during operations to which the Project would contribute.

Erosion and Sedimentation

As discussed above in water quality, the Project and cumulative projects would be required to implement stormwater controls during construction consistent with the CGP. Compliance with CGP requirements would avoid creating adverse impacts related to erosion and sedimentation during construction, and therefore cumulative erosion and sedimentation impacts during construction would be less than significant.

The Project and cumulative projects that restore former salt ponds to tidal action would increase sedimentation in these areas; however, increased sedimentation in these areas would not result in adverse impacts related to hydrology.

The Project and cumulative projects would alter drainage patterns by eliminating gravity outfalls to San Francisco Bay along the East Palo Alto shoreline and creating additional impervious area. However, these

areas would all drain to existing or planned stormwater drainage systems, as discussed below, and would not result in adverse cumulative erosion and sedimentation impacts. Therefore, there would be **no significant cumulative impact** related to erosion and sedimentation to which the Project would contribute.

Flooding and Drainage

The Project along with the SBSPRP and South San Francisco Bay Shoreline Project would modify or construct new flood protection levees along the shoreline of South San Francisco Bay. The levees would protect developed areas from coastal flooding. The levees would be required to include interior drainage consistent with FEMA engineering guidance.

Cumulative development proposed in shoreline areas of East Palo Alto would result in runoff from the same areas as discussed in Impact HYD-3. Cumulative development would be required to implement stormwater drainage improvements consistent with the Specific Plan. Therefore, the cumulative impact of the Project and cumulative projects on flooding and drainage in East Palo Alto would be the same as the impact identified for the Project: potentially significant. Because cumulative development would result in most stormwater runoff draining to the O'Connor Pump Station or the planned Runnymede Pump Station, and the Project could obstruct the outfall of the planned Runnymede Pump Station, the Project's contribution to this impact would be considerable. However, implementation of Mitigation Measure HYD-2a (Runnymede Pump Station Design) identified above, would reduce the Project's contribution to the potentially significant impact such that the impact would be **less than significant with mitigation**.

Cumulative development proposed in shoreline areas of Menlo Park and Redwood City would also result in runoff from the same areas as discussed in Impact HYD-3. The Marsh Road Reach of the proposed levee would block Bayfront Canal overflows into the salt ponds and increase the amount of water draining to the water control structure at Flood Slough. The Redwood City Sea-Level Rise Vulnerability and Adaptation Planning Study project includes a potential levee along the shoreline between the Cargill salt ponds and the adjacent neighborhoods that would connect to the Project levee at Marsh Road Reach. The Project in combination with the Redwood City project levee could combine to further increase the amount of water draining to the water control structure at Flood Slough, a potentially significant cumulative impact. Although the volume of water contributed by the Project levee is uncertain, the Project's contribution to the impact could be considerable given the length of the Marsh Road Reach levee. However, implementation of Mitigation Measure HYD-2c (Bayfront Canal Pump Station Design) identified above, would reduce the Project's contribution to the potentially significant impact to be **less than significant with mitigation**.

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3.12 Land Use, Agriculture, and Forestry Resources

This section evaluates the potential impacts of the SAFER Bay Project (Project) on existing land use, agriculture, and forestry resources. This section presents information about the environmental and regulatory setting and identifies the criteria used to evaluate the significance of potential impacts, the methods used in evaluating these impacts, and the results of the impact assessment. The Project evaluated is described in Chapter 2, *Project Description*, of this EIR.

3.12.1 Environmental Setting

Existing and Designated Land Uses

Table 3.12-1 lists general plan designations, zoning designations, and current land uses within the Project reaches. Table 3.12-1 also identifies figures in Chapter 2, *Project Description,* that present photographs and aerial photographs of land uses within and near each reach.

East Palo Alto

The entire South of Bay Road Reach and the majority of the North of Bay Road Reach are in East Palo Alto within land use and zoning designations identified in **Table 3.12-1**.

Vista 2035 General Plan Land Use Designations[1]

The following uses are allowed within each land use designation pursuant to the City of East Palo Alto's *Vista 2035 General Plan*:

- *Resource Management* areas are designated for the conservation and preservation of environmentally sensitive open space lands and are designated to retain their natural biological function serving as defensive barriers to waves, high tides and storm surge and providing habitat for plants and animals. Land uses permitted within land designated as Resource Management are those required for the maintenance and security of the natural landscape.
- The *Parks/Recreation/Conservation* land use designation provides for public parks, including trails and other similar uses that provide open space resources to surrounding neighborhoods, communities, and the region. Land uses permitted within Parks/Recreation/Conservation are public recreational uses, including public parklands, open space, and associated recreational activities.
- The *High Density Residential* designation provides for higher density multifamily housing and a variety of high-density building types that are compatible in scale and character with existing structures and development standards. Allowable uses include a range of multifamily housing types ranging from townhomes to multifamily apartments at moderate to high densities. Education, cultural, and public assembly uses are conditionally allowed.
- The *Industrial Buffer* designation is intended to accommodate office and light industrial uses in areas that are near large clusters of single-family homes, while ensuring that the light industrial uses do not adversely affect nearby homes. Office buildings and a limited range of light industrial, manufacturing, and repair businesses are permitted within land designated as Industrial Buffer.

[1] City of East Palo Alto, 2017. *Vista 2035 General Plan*. Adopted October 4, 2016; Final Version March 2017. Available online at www.ci.east-palo-alto.ca.us/planning/page/vista-2035-general-plan.

Zoning[2]

The following uses are allowed within each area pursuant to the City of East Palo Alto's Development Code:

- *Resource Management* zone provides for the conservation and preservation of environmentally sensitive open space lands in a natural condition. This zone applies to the baylands, creeks, and other protected wetlands and allows for the maintenance and security of the natural landscape. This zone implements the Resource Management land use designation in the *Vista 2035 General Plan*.
- *Parks and Recreation* zone provides for public parks, such as trails, community gardens, and other similar uses providing open space and conservation resources and opportunities to surrounding neighborhoods, communities, and the region. Appropriate land uses include public recreational uses, including public parkland, open space, and associated recreational activities. This zone implements the Parks/Recreation/Conservation land use designation in the *Vista 2035 General Plan*.
- *Urban Residential* zone is intended to provide opportunities for the development of single-family and multifamily homes at a moderate density. This subdistrict of the greater Ravenswood Business District/4 Corners Specific Plan (Specific Plan) Overlay District anticipates a mix of small-lot, detached single-family homes; attached single-family homes, such as townhomes, duplexes, triplexes, and four-plexes; and multifamily apartments or condominiums.
- *Industrial Transition* zone is intended to accommodate light industrial uses and live-work units in areas that are near large clusters of single-family homes, while ensuring that the light industrial uses do not adversely affect nearby homes. This subdistrict of the greater Ravenswood Specific Plan Overlay District also allows low-intensity manufacturing and repair businesses that do not attract large amounts of traffic.
- *Ravenswood Flex Overlay* provides the developer of the greater Ravenswood Specific Plan Overlay District with options intended to accommodate high-quality office buildings, along with a limited range of manufacturing and repair businesses that do not adversely affect the offices' surroundings. This subdistrict accommodates professional offices, along with low-intensity manufacturing and repair businesses that do not attract large amounts of traffic.

Menlo Park

Portions of the North of Bay Road, Bedwell Bayfront Park, and Marsh Road reaches, as well as the entire Dumbarton Approach, Substation and Marsh Restoration, Tech Campus, and Bayfront Expressway reaches are in Menlo Park within the land use and zoning designations noted in Table 3.12-1. All habitat improvements described in Section 2.4, Project Components, are also in Menlo Park within land designated as Baylands.

[2] City of East Palo Alto, 2024. "Zoning Designation Interactive Map." [Online database.] Available online at www.cityofepa.org/planning/page/interactive-maps. Accessed November 27, 2024; City of East Palo Alto, 2018. Title 18 - Development Code, Article 2 – Zones, Allowable Uses, and Development Standards, August 2018. Available online at www.cityofepa.org/sites/default/files/fileattachments/community_amp_economic_development/page/2711/title_18_article_2_201809041616074328.pdf. Accessed October 22, 2025.

TABLE 3.12-1
LAND USE DESIGNATIONS, ZONING, AND EXISTING USES

Reaches	Jurisdiction [a]	General Plan Land Use Designation	Zoning	Existing Use within Reach	Figures in Chapter 2 Depicting Existing Uses within and Near the Reach
South of Bay Road	East Palo Alto	Mostly Resource Management. Small portions within Parks/Recreation/Conservation, High Density Residential, Industrial Buffer.	Mostly within Resource Management. Small portions within Parks and Recreation, Urban Residential, and Industrial Transition.	Bay Trail, Faber–Laumeister Trail, Faber and Laumeister marshes, stormwater management	Figures 2-6 and 2-7
North of Bay Road	East Palo Alto Menlo Park	*East Palo Alto:* Parks/Recreation/Conservation, Industrial Buffer *Menlo Park:* Baylands	*East Palo Alto:* Parks and Recreation, Ravenswood Flex Overlay *Menlo Park:* Flood Plain	Bay Trail, Ravenswood Open Space Preserve, Demeter Street Property, abandoned Southern Pacific Railroad	Figures 2-9 and 2-10
Dumbarton Approach [b]	Menlo Park	Baylands	Flood Plain	San Francisco Public Utilities Commission Property, Pond SF2, SF2 Trail, Bay Trail, Cargill Brine Maintenance Pond, Ravenswood Trail	Figures 2-12 and 2-13
Substation and Marsh Restoration [b]				PG&E Ravenswood Substation, Ponds R1 and R2	Figures 2-16 and 2-17
Tech Campus [b]		Baylands, Office	Flood Plain, Office-Corporate Housing	Ravenswood Slough, Public Shoreline Access Trail, Meta Headquarters, Pond R3	Figures 2-19 and 2-20
Bayfront Expressway [b]		Baylands	Flood Plain	Ponds R3, R4, S5, and R5, Flyaway Trail	Figures 2-21 and 2-22
Bedwell Bayfront Park	Menlo Park Redwood City	*Menlo Park:* Baylands, Parks and Recreation *Redwood City:* Open Space-Preservation	*Menlo Park:* Flood Plain *Redwood City:* Tidal Plain	Flood Slough, Tidal Pond, Bay Trail, Bedwell Bayfront Park, Marsh Road	Figures 2-23 and 2-24
Marsh Road	Menlo Park Redwood City	*Menlo Park:* No designation *Redwood City:* Open Space-Preservation	*Menlo Park:* Flood Plain *Redwood City:* Tidal Plain	Pond R7, Cargill Brine Channel, Bay Front Canal	Figures 2-25 and 2-26

NOTES: Bay Trail = San Francisco Bay Trail; PG&E = Pacific Gas and Electric Company

a. The Project includes actions within the Don Edwards National Wildlife Refuge (Refuge), including Refuge-managed land in Faber and Laumeister marshes, which are not located within the city of Palo Alto's jurisdiction, but are owned by the City of Palo Alto (specifically Assessor's Parcel Numbers 063-580-090 and 063-580-100). Pursuant to a letter from Jonathan Lait, Director of Planning & Development Services for the City of Palo Alto (June 6, 2022), "Because the project is not located within the City of Palo Alto's jurisdiction, it is not anticipated that permits from the City would be required. However, Council approval would be required for any proposed easements to construct and maintain flood infrastructure on the City's property."

b Includes habitat improvements in ponds indicated in Chapter 2, *Project Description*.

SOURCE: City of East Palo Alto, 2017. *Vista 2035 General Plan*. Adopted October 4, 2016; Final Version March 2017. Available online at www.ci.east-palo-alto.ca.us/planning/page/vista-2035-general-plan; City of East Palo Alto, 2024. "Zoning Designation Interactive Map." [Online database.] Available online at www.cityofepa.org/planning/page/interactive-maps; City of Menlo Park, 2016. *General Plan, City of Menlo Park*. Adopted November 29, 2016. Available online at www.menlopark.gov/files/sharedassets/public/v/1/community-development/documents/general-plan/land-use-and-circulation-element-adopted-20161129.pdf; City of Menlo Park, 2024. "City of Menlo Park General Plan Land Use and Zoning Map." Available online at menlopark.gov/Government/Departments/Community-Development/Planning-Division/Comprehensive-planning/General-Plan-land-use-and-zoning-map; City of Redwood City, 2023. *Redwood City General Plan*. Adopted October 11, 2010; Amended August 2023. Available online at www.redwoodcity.org/departments/community-development-department/planning-housing/planning-services/environmental-documents/general-plan-eir; City of Redwood City, 2024. "Community GIS." [Online database.] Available online at /webgis.redwoodcity.org/community/.

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City of Menlo Park General Plan Land Use Designations[3]

The following uses are allowed within each land use designation pursuant to the *City of Menlo Park General Plan*:

- The *Baylands* designation provides for the preservation of wildlife habitat and ecological values associated with the marshlands and former salt ponds bordering San Francisco Bay and similar and compatible uses.
- The *Office* designation permits office and research and development uses, business-oriented community education and training facilities, supportive sales and personal services, corporate housing, and hotel uses.
- The *Parks and Recreation* designation provides for open space and conservation areas, public and private golf courses, and passive and active recreational uses.

Zoning[4]

The following uses are allowed within each zoned area pursuant to the City of Menlo Park's Municipal Code:

- Permitted uses within the *Flood Plain* designation include agricultural uses, accessory buildings, accessory structures, extraction of chemicals from sea water, and dredging. Conditional uses include public or private recreational facilities, sanitary landfill, and kennels.
- The *Office-Corporate Housing* zoning district is part of the Office district in Menlo Park's zoning map. This designation allows corporate housing.

Redwood City

Redwood City General Plan Land Use Designations

A portion of the Bedwell Bayfront Park Reach and the majority of the Marsh Road Reach are in Redwood City and, as indicated in Table 3.12-1, are within land designated as Open Space–Preservation. Pursuant to the *Redwood City General Plan*, allowed uses within this designation must be complementary to resource preservation, enhancement, and management, including low-intensity recreational facilities, such as hiking and biking trails and related improvements.[5]

Zoning

Pursuant to the Redwood City Zoning Code, Tidal Plain areas were zoned to create a district for the marsh lands adjacent to San Francisco Bay and to permit certain types of development therein of a relatively temporary nature, which can ultimately be replaced by permanent development under another more appropriate zoning district. Allowable structures and uses within the Tidal Plain zone include

[3] City of Menlo Park, 2016. *General Plan, City of Menlo Park.* Adopted November 29, 2016. Available online at www.menlopark.gov/files/sharedassets/public/v/1/community-development/documents/general-plan/land-use-and-circulation-element-adopted-20161129.pdf.

[4] City of Menlo Park, 2024. "Title 16: Zoning. Menlo Park Municipal Code." November 19, 2024. Available online at www.codepublishing.com/CA/MenloPark/html/MenloPark16/MenloPark16.html.

[5] City of Redwood City, 2023. *Redwood City General Plan*. Adopted October 11, 2010; Amended August 2023. Available online at www.redwoodcity.org/departments/community-development-department/planning-housing/planning-services/environmental-documents/general-plan-eir.

agriculture, extraction of chemicals from sea water by natural evaporation and extraction of oyster shells or other deposits from San Francisco Bay, and public parks and public recreational areas or facilities.[6]

Agricultural and Forestry Resources

No designated Important Farmland or lands that are enrolled in a Williamson Act contract are within the Project site.[7,8] The California Department of Forestry and Fire Protection's (CAL FIRE's) California Multi-Source Vegetation Map depicts California Wildlife Habitat Relationship types, with classes grouped into 13 major land cover types. No designated forest lands mapped by CAL FIRE are within the Project area.[9] No land within the Project area is zoned by the City of East Palo Alto, Menlo Park, or Redwood City as forest land, timberland, or Timberland Production.

3.12.2 Regulatory Framework

Unless otherwise noted, the Project would be consistent with applicable plans and regulations outlined in this section.

Federal

Farmland Protection and Policy Act

The federal Farmland Protection and Policy Act defines high-value farmland categories that are used in implementing agricultural land use protection policies at the state and local levels. These categories include the following:

- ***Prime Farmland*** is land that has the best combination of physical and chemical characteristics for long-term production of food, feed, forage, fiber, oilseed, and other agricultural crops with minimum inputs of fuel, fertilizer, pesticides, and labor, and without intolerable erosion. It has the soil quality, growing season, and moisture supply needed to sustain high crop yields when appropriately treated and managed. Prime Farmland may be cropland, pastureland, rangeland, forestland, or other land, but not urban built-up land or water storage. Additionally, the land must have been used for irrigated agricultural production during the 4 years before the mapping date to qualify under this category.
- ***Unique Farmland*** is land that does not meet the criteria for Prime Farmland but has been used for the production of specific high-value food and fiber crops. It has the special combination of soil quality, location, growing season, and moisture supply needed to economically produce sustained high quality or high yields of specific crops when treated and managed according to acceptable farming methods. This land is usually irrigated but may include the types of non-irrigated orchards or vineyards that are found in some climatic zones of California. Unique Farmland must have been in agricultural production at some time during the 4 years before the mapping date.

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6 City of Redwood City, 2024. "Article 20: TP (Tidal Plain) District, Redwood City Zoning Code." Available online at library.municode.com/ca/redwood_city/codes/zoning_code?nodeId=ART20TPTIPLDI. Accessed October 29, 2024.

7 California Department of Conservation, 2022. "California Important Farmland Finder." [Online database.] Available online at www.conservation.ca.gov/dlrp/fmmp. Accessed November 22, 2024.

8 California Department of Conservation, 2023. "California Williamson Act Enrollment Finder." [Online database.] Available online at maps.conservation.ca.gov/dlrp/WilliamsonAct/App/index.html. Accessed November 27, 2024.

9 CAL FIRE (California Department of Forestry and Fire Protection), 2024. "California Vegetation – WHR13 Types." [Online database.] Available online at gis.data.cnra.ca.gov/maps/CALFIRE-Forestry::california-vegetation-whr13-types/explore?location=37.311623%2C-120.507750%2C6.82&path=. Accessed November 27, 2024.

- ***Farmland of Statewide Importance*** is land, in addition to Prime Farmland and Unique Farmland, that is of statewide importance for the production of food, feed, fiber, forage, and oil seed crops. This land is similar to Prime Farmland, but with minor shortcomings, such as greater slopes and less ability to store moisture. Land must have been used for irrigated agricultural production at some time during the 4 years before the mapping date.
- ***Farmland of Local Importance*** applies to land of importance to the local agricultural economy as determined by the appropriate unit of local government agency or agencies. This land either is currently producing crops or is capable of production but does not meet the criteria of the preceding categories.

Don Edwards San Francisco Bay National Wildlife Refuge Final Comprehensive Conservation Plan[10]

The U.S. Fish and Wildlife Service (USFWS) prepared the *Don Edwards San Francisco Bay National Wildlife Refuge Final Comprehensive Conservation Plan and Environmental Assessment (Don Edwards SFB NWR Final CCP/EA)* in 2012 to guide management of the Refuge. The Refuge manager must find a proposed appropriate use before undertaking a compatibility review. An appropriate use is defined as one that is a "wildlife-dependent recreational use as identified in the Improvement Act, contributes to fulfilling the refuge purpose(s), the Refuge System mission, or goals or objectives described in a refuge management plan; involves the take of fish and wildlife under State regulations; or has been found to be appropriate as specified in Section 1.11 (603 FW 1 of the Service Manual)."

State

McAteer-Petris Act and San Francisco Bay Plan

Section 3.2, Aesthetics, discusses the establishment and authority of the San Francisco Bay Conservation and Development Commission (BCDC) pursuant to the McAteer-Petris Act. BCDC is authorized to control both bay filling and dredging and bay-related shoreline development and manages its jurisdiction through the *San Francisco Bay Plan* (Bay Plan) and the Suisun Marsh Protection Plan, which acknowledge the potentially harmful effects of bay fill and in part are intended to balance harmful effects of fill with benefits of development.[11] As discussed in greater detail in Section 3.4, Biological Resources, implementation of the Project would occur within BCDC jurisdiction. The Bay Plan identifies policies to guide future uses of the San Francisco Bay and shoreline, including policies related to biological resources, environmental justice and social equity, climate change, safety of fills, shoreline protection, dredging, water-related industry, ports, airports, transportation, commercial fishing, recreation, public access, appearance/design/scenic views, salt ponds, managed wetlands, and other uses of the bay and shoreline. The Project's consistency with Bay Plan policies that correspond to relevant environmental topics are discussed in other sections of Chapter 3 (for example, recreation and public access policies are discussed in Section 3.15, Recreation). The proposed Project proposes shoreline protection and includes managed

[10] USFWS (U.S. Fish and Wildlife Service), 2012. *Don Edwards San Francisco Bay National Wildlife Refuge: Final Comprehensive Conservation Plan and Environmental Assessment*.

[11] San Francisco Bay Conservation and Development Commission, *San Francisco Bay Plan*, May 5, 2020. The Bay Plan was completed and adopted by BCDC in 1968 and was transmitted to the California Legislature and the Governor in 1969; the Bay Plan has since been amended, with the most recent document released in May 2020.

wetlands in areas where priority uses are wildlife refuge and managed wetland. The following Bay Plan policies are applicable to shoreline protection development or to conversion of managed wetlands:

Shoreline Protection

1. New shoreline protection projects and the maintenance or reconstruction of existing projects and uses should be authorized if: (a) the project is necessary to provide flood or erosion protection for (i) existing development, use or infrastructure, or (ii) proposed development, use or infrastructure that is consistent with other Bay Plan policies; (b) the type of the protective structure is appropriate for the project site, the uses to be protected, and the causes and conditions of erosion and flooding at the site; (c) the project is properly engineered to provide erosion control and flood protection for the expected life of the project based on a 100-year flood event that takes future sea level rise into account; (d) the project is properly designed and constructed to prevent significant impediments to physical and visual public access; (e) the protection is integrated with current or planned adjacent shoreline protection measures; and (f) adverse impacts to adjacent or nearby areas, such as increased flooding or accelerated erosion, are avoided or minimized. If such impacts cannot be avoided or minimized, measures to compensate should be required…

4. Authorized protective projects should be regularly maintained according to a long-term maintenance program to assure that the shoreline will be protected from tidal erosion and flooding and that the effects of the shoreline protection project on natural resources during the life of the project will be the minimum necessary.

5. All shoreline protection projects should evaluate the use of natural and nature-based features such as marsh vegetation, levees with transitional ecotone habitat, mudflats, beaches, and oyster reefs, and should incorporate these features to the greatest extent practicable. Ecosystem benefits, including habitat and water quality improvement, should be considered in determining the amount of fill necessary for the project purpose. Suitability and sustainability of proposed shoreline protection and restoration strategies at the project site should be determined using the best available science on shoreline adaptation and restoration…

6. Adverse impacts to natural resources and public access from new shoreline protection should be avoided. When feasible, shoreline protection projects should include components to retain safe and convenient water access, for activities such as fishing, swimming, and boating, especially in communities lacking such access. Where significant impacts cannot be avoided, mitigation or alternative public access should be provided.

Conversion of Wetlands

3. Any project for the restoration, enhancement or conversion of managed wetlands to subtidal or wetland habitat should include clear and specific long-term and short-term biological and physical goals, success criteria, a monitoring program, and provisions for long-term maintenance and management needs. Design and evaluation of the project should include an analysis of:

a. The anticipated habitat type that would result from managed wetland conversion or restoration, and the predicted effects on the diversity, abundance and distribution of fish, other aquatic organisms and wildlife;

b. Potential fill activities, including the use of fill material such as sediments dredged from the Bay and rock, to assist restoration objectives;

c. Flood management measures;

d. Mosquito abatement measures;

e. Measures to control non-native species;

f. Opportunities for a diversity of public access and recreational activities; and

g. Water quality protection measures that may include monitoring for constituents of concern, such as methylmercury.

State Designated Farmland

The California Department of Conservation, Division of Land Resource Protection administers the California Farmland Mapping and Monitoring Program. The Farmland Mapping and Monitoring Program maps farmlands throughout California, including Prime Farmland, Farmland of Statewide Importance, Unique Farmland, and Farmland of Local Importance (consistent with the definitions identified previously), as well as Grazing Land. The first three types of farmland described previously have been incorporated into Appendix G of the CEQA Guidelines. For ease of reference, Prime Farmland, Farmland of Statewide Importance, and Unique Farmland are collectively referred to herein as *Important Farmland*.

California Public Resources Code Definitions

The California Public Resources Code governs forestry, forests, forest resources, and range and forage lands in the state. *Forest land* is defined by Public Resources Code section 12220(g) as "land that can support 10-percent native tree cover of any species, including hardwoods, under natural conditions, and that allows for management of one or more forest resources, including timber, aesthetics, fish and wildlife, biodiversity, water quality, recreation, and other public benefits." *Timberland* is defined by Public Resources Code section 4526 in part as "land, other than land owned by the federal government . . . , which is available for, and capable of, growing a crop of trees of a commercial species used to produce lumber and other forest products, including Christmas trees."

California Department of Forestry and Fire Protection, Fire and Resource Assessment Program

CAL FIRE's Fire and Resource Assessment Program assesses the amount and extent of California's forests and rangelands, analyzes their conditions, and identifies alternative management and policy guidelines. CAL FIRE defines *forests* as "a biological community of plants and animals that is dominated by trees and other woody plants… all lands with greater than 10 percent tree canopy cover and including all California Wildlife Habitat Relationship types in the Conifer Forest, Conifer Woodland, Hardwood Forest and Hardwood Woodland land cover classes."[12] The Fire and Resource Assessment Program

[12] CAL FIRE (California Department of Forestry and Fire Protection), 2018. *California's Forests and Rangelands: 2017 Assessment.* Fire and Resource Assessment Program. August 2018.

provides vital data on California's forests and rangelands through a variety of mapping tools, including forest land designations that are mostly consistent with the definition of forestry, forests, and forestry resources within Public Resources Code section 12220(g).

California Government Code Sections 51100–51155

Government Code sections 51100–51155 regulates timberlands in California. *Timberland production zone* is defined in section 51104(g) as an area that has been zoned pursuant to Government Code section 51112 or section 51113 and is devoted to and used for growing and harvesting timber, or for growing and harvesting timber and compatible uses. In this context, *compatible uses* include any use that "does not significantly detract from the use of the property for, or inhibit, growing and harvesting timber" (Government Code section 51104(h)). The general plans of cities and counties may use the term *timberland preserve zone*, which Government Code section 51104(g) defines as equivalent to "timberland production zone."

California Land Conservation Act of 1965 (Williamson Act)

The Williamson Act is intended to reduce economic incentives to convert open spaces and agricultural land to developed uses through voluntary contracted agreements in which the property owner is granted property tax reductions in exchange for maintaining existing agricultural or open space uses of the property (Government Code section 51200 et seq.). The Williamson Act is a state program, implemented at the county level, that allows agricultural landowners to contractually agree to retain land included in an agricultural preserve in agricultural or open space uses for 10 years and, in return, to pay reduced property taxes. The term of the contract automatically renews each year unless not renewed or canceled, so that a contract normally has a 10-year period left.

Local

General Plans

The Project would be subject to local plans and policies of the jurisdictions where it is located, including East Palo Alto, Menlo Park, and Redwood City. **Table 3.12-2** presents local plans and policies regarding land use, agriculture, and forestry resources to support consideration of Project consistency with general plan policies. Regarding resource-specific plans and policies, refer to the respective sections in Chapter 3, *Environmental Setting, Impacts, and Mitigation Measures*.

Ravenswood Business District/4 Corners Specific Plan[13]

The Specific Plan, approved in December 2024, outlines the transformation of the Ravenswood Business District and 4 Corners area of East Palo Alto into mixed-use districts that provide residences, employment opportunities, parks and open spaces, transportation enhancements, effective utility infrastructure, and sea level rise protection. The shoreline protection features proposed in the South of Bay Road and North of Bay Road reaches are within the planning area for and would advance the goals of the Specific Plan. Individual projects proposed within the Specific Plan area will be required to dedicate land and/or provide easements for construction and maintenance of the SAFER Bay Project.

[13] City of East Palo Alto, 2024. *Ravenswood Business District/4 Corners Specific Plan*. December 17, 2024.

TABLE 3.12-2
LOCAL PLANS AND POLICIES RELEVANT TO THE PROJECT – LAND USE

CITY OF EAST PALO ALTO VISTA 2035 GENERAL PLAN
Goal SN-2: Provide adequate flood control and storm drainage facilities to minimize the risk of flooding.
Policy 2.7: San Francisquito Creek Joint Powers Authority. Continue to work with the [SFC]JPA on projects that will reduce the risk of flooding in East Palo Alto.
Goal LU-16: Enable new pedestrian connections, improve safety, and provide guidelines for incremental improvements to the neighborhood.
Policy 16.2: Flood Safety. Encourage flood-protection efforts in the Gardens neighborhood.
CITY OF MENLO PARK GENERAL PLAN
Goal LU-6: Preserve open space for recreation; protect natural resources and air and water quality; and protect and enhance scenic qualities.
Program LU-7.G: SAFER Bay Process. Coordinate with the SAFER Bay process to ensure that the Menlo Park community's objectives for sea level rise/flood protection, ecosystem enhancement, and recreational trails are adequately taken into consideration.
REDWOOD CITY GENERAL PLAN
Goal BE-1: Achieve complete and integrated neighborhoods, corridors, and centers.
Policy BE-24.11: Consider the impacts of global warming, such as rising sea levels and floodplain areas, when reviewing plans for new development.
Policy PS-6.9: Consider sea level rise in the development of watershed management plans and flood control infrastructure.
GOAL PS-7a: Provide adequate and appropriately-designed storm drainage and flood control facilities to meet current and future needs and minimize the risk of flooding.
Program PS-49: Levees Upgraded to FEMA Standards. Upgrade existing levees in accordance with FEMA standards and FEMA direction to protect residential and commercial areas against 100-year flood hazards and sea level rise.
Notes: FEMA = Federal Emergency Management Agency; SAFER = Strategy to Advance Flood Protection, Ecosystems, and Recreation along San Francisco; SFCJPA = San Francisquito Creek Joint Powers Authority
Sources: City of East Palo Alto, 2017. *Vista 2035 General Plan*. Adopted October 4, 2016; Final Version March 2017. Available online at www.ci.east-palo-alto.ca.us/planning/page/vista-2035-general-plan; City of Menlo Park, 2016. *General Plan, City of Menlo Park*. Adopted November 29, 2016. Available online at www.menlopark.gov/files/sharedassets/public/v/1/community-development/documents/general-plan/land-use-and-circulation-element-adopted-20161129.pdf; City of Redwood City, 2023. *Redwood City General Plan*. Adopted October 11, 2010; Amended August 2023. Available online at www.redwoodcity.org/departments/community-development-department/planning-housing/planning-services/environmental-documents/general-plan-eir.

3.12.3 Impacts and Mitigation Measures

Significance Criteria

In accordance with the CEQA Guidelines (including Appendix G), relevant plans, policies, guidelines, and agency standards, the Project could have a significant impact if it were to do any of the following:

- Physically divide an established community.
- Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect.
- Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Important Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use.
- Conflict with existing zoning for agricultural use, or a Williamson Act contract.

- Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220[g]), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104[g]).
- Result in the loss of forest land or conversion of forest land to non-forest use.
- Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use.

Methodology

Regarding conflicts with plans and policies, resource-specific plans and policies are addressed in other sections (e.g., Section 3.2, Aesthetics, and Section 3.13, Noise and Vibration).

The evaluation of Important Farmland (as defined under state law in Section 3.12.2) considers whether Project implementation would directly or indirectly result in its permanent conversion to non-agricultural use. (No federal laws pertaining to the protection of farmland apply to the proposed federal action.) The evaluation of impacts on forest land (as defined in Public Resources Code section 12220[g]) considers whether Project implementation would result in conversion of forest land to non-forest use by impairing the ability of affected forest land to: (a) support 10 percent native tree cover; and (b) be managed for public benefit (e.g., timber, aesthetics, fish and wildlife, biodiversity, water quality, or recreation).

This draft EIR evaluates proposed Project activities at a level of detail consistent with the best available information and specificity available at the time of EIR preparation. To the extent that activities necessary for Project completion are known, they are described in Chapter 2, *Project Description*, and evaluated in the impact analysis below. Key project information needed for the evaluation of land use, agriculture, and forestry impacts includes the locations of temporary and permanent ground disturbance and proposed land uses. Appendix INFRA identifies those changes to infrastructure and other encroachments that are evaluated programmatically. While the land use, agriculture, and forestry impact analysis is not anticipated to change with future design, the need for additional CEQA documentation would be evaluated once additional design details are developed as discussed in greater detail in Section 1.2.5, Program–Project EIR and Supplemental CEQA.

The following topics are not analyzed further in this section for the reasons described below:

- ***Physically divide an established community.*** Physical division of an established community would typically involve construction of a physical barrier, such as a freeway or bridge, that divides an existing neighborhood. Most of the Project's alignment is essentially at the boundary between established developed areas in East Palo Alto, Menlo Park, Redwood City, and the baylands (typically where informal levees already exist) by design since the intent of Project is to help protect these communities from bay flooding. Construction activities associated with the Project would temporarily disrupt access to Bayside trails and to the Cooley Landing Park and Education Center and construction would cause traffic disturbances that would temporarily affect roadway access, but the Project would not restrict access to any community. Therefore, the Project would not physically divide an established community, and this criterion is not applicable.
- ***Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance as shown on the maps prepared to the Farmland Mapping and Monitoring Program of the California Resources***

Agency, to non-agricultural use, or involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use. As noted in Section 3.12.1, no land within the Project area is mapped as Prime, Unique, or Farmland of Statewide Importance by the California Resources Agency. Additionally, none of the Project components would involve changes in the existing environment that would result in conversion of Important Farmland to non-agricultural use. Therefore, the Project would not convert farmland to non-agricultural use, and these criteria are not applicable.

- ***Conflict with existing zoning for agricultural use, or a Williamson Act contract.*** As noted in Section 3.12.1, no land within the Project area is zoned for agricultural use, and no parcels that could be affected by the Project are under a Williamson Act contract. Therefore, this criterion is not applicable.
- ***Conflict with existing zoning for, or cause rezoning of, forest land, timberland, or timberland zoned Timberland Production, result in the loss of forest land or conversion of forest land to non-forest use, or involve other changes in the existing environment which, due to their location or nature, could result in conversion of forest land to non-forest use.*** As noted in Section 3.12.1, no land within the Project area is zoned by the City of East Palo Alto, Menlo Park, and Redwood City as forest land, timberland, or Timberland Production. Additionally, none of the Project area is mapped by CAL FIRE as Forest land, and none of the Project components would involve changes in the existing environment which would result in conversion of forest land to non-forest use. Therefore, none of these criteria are applicable.

Impacts and Mitigation Measures

Table 3.12-3 summarizes the impact conclusions presented in this section.

TABLE 3.12-3
LAND USE, AGRICULTURE, AND FORESTRY IMPACT CONCLUSIONS

Impact	Level of Significance
Impact LU-1: Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect.	LTS
Impact C-LU-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse impacts related to land use, agriculture, and forestry.	NI

NOTES: LTS = Less than Significant; NI = No Impact

Impact LU-1: Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect. *(Less than Significant)*

This discussion on this topic is limited to addressing potential conflicts with land use plans and policies. Impacts on the physical environment associated with construction and operation of the Project are described in other sections, and potential inconsistencies with topic-specific policies related to aesthetics, noise, and biological resources are identified in the associated sections of Chapter 3, *Environmental Setting, Impacts, and Mitigation Measures*. In some cases, general plan policies or ordinances are used as

significance thresholds for the evaluation of impacts on the physical environment. For example, Section 3.2, Aesthetics, evaluates whether Project components in urbanized areas would conflict with city or county policies governing scenic quality, and Section 3.13, Noise and Vibration, evaluates whether noise generated by Project implementation would exceed standards established in applicable general plans and ordinances.

Regarding Project consistency with the Don Edwards SFB NWR Final CCP/EA, the USFWS is a member of the Bay Area Restoration Regulatory Integration Team (BRRIT). As described in Chapter 1, *Introduction*, Section 1.3, SFCJPA has participated in seven meetings with BRRIT as of May 2025, during which USFWS and other agencies have provided guidance for the Project. As indicated in Section 3.12.2, the Refuge manager would evaluate the appropriateness of a proposed use and then undertake a compatibility review for the Project. As indicated in Impact BIO-6 in Section 3.4, Biological Resources, Project activities align with Don Edwards SFB NWR Final CCP/EA objectives by contributing to the recovery of endangered, threatened, and other special-status species within the Refuge by conservation and management of the habitats on which these species depend, and enhancement and restoration of habitats to support the diversity and abundance of migratory birds and other native flora and fauna that depend on the South San Francisco Bay ecosystem.

Section 3.12.2 lists the Bay Plan policies applicable to shoreline protection projects and to uses of managed wetlands along the bay shoreline. The Project consists of new shoreline protection, habitat restoration, and public access improvements. The Project is proposed to provide shoreline protection for existing development based on the 100-year coastal flood event with future sea level rise, includes and ties into adjacent public access, and would not obviously conflict with Bay Plan policies relevant to shoreline protection. The Project's effects on physical and visual public access are discussed in Sections 3.15, Recreation, and 3.2, Aesthetics, respectively. The Project's design and effects related to flooding and erosion are discussed in Section 3.11, Hydrology and Water Quality.

The Project's habitat restoration includes enhancing existing managed wetlands and converting managed wetlands to subtidal and wetland habitat. Chapter 2, *Project Description*, includes information about the anticipated habitat types that would result from managed wetland conversion or restoration, and Section 3.4, Biological Resources, discusses the potential effects on biological resources. Chapter 2 also describes the Project's potential fill activities, flood management measures, and opportunities for public access and recreational activities. This Draft EIR evaluates the potential environmental effects of the Project, including effects on water quality (refer to Section 3.11, Hydrology and Water Quality). The Project's consistency with Bay Plan policies that correspond to relevant environmental topics are discussed in other sections of Chapter 3 (for example, recreation and public access policies are discussed in Section 3.15, Recreation). As discussed here and in relevant sections of Chapter 3 of this Draft EIR, the Project would not obviously conflict with Bay Plan policies.

Regarding Project consistency with local plans and policies, Section 3.12.1 summarizes general plan land use designations and allowable uses within the areas comprising the Project site. Table 3.12-2 outlines general plan policies relevant to the Project. The cities of East Palo Alto and Menlo Park are members of SFCJPA and would implement the SAFER Bay Project within their jurisdictions. Additionally, San Mateo County Flooding and Sea Level Rise Resiliency District—an SFCJPA member and a SAFER Bay Project proponent—includes Redwood City within its jurisdiction.

General plan consistency is reflected in the general plan policies presented in Table 3.12-2, which call for the provision of flood protection, reduction in flood risk, upgrade of existing levees to meet Federal Emergency Management Agency standards, and consideration of global warming and sea level rise—all aspects of the SAFER Bay Project. The Project includes levees, floodwalls, hybrid shoreline protection features, and flood risk reduction structures to protect parts of Menlo Park and East Palo Alto from coastal flooding, as well as improvements to trails and habitat restoration and enhancement. These components are designed to enhance coastal resilience while aligning with city policies for sustainable development, environmental protection, recreation and coastal access, and community safety. The construction and operation of these features would ensure long-term flood risk reduction. Although the SAFER Bay Project would provide limited flood protection for parts of Redwood City, it is Redwood City's intent to continue to implement its Sea-Level Rise Vulnerability and Adaptation Planning Study (described in Section 3.1.2, Cumulative Projects), which would connect to the SAFER Bay levee. Consequently, the SAFER Bay Project is considered consistent with the cities' general plans.

The zoning ordinances of the cities of East Palo Alto, Menlo Park, and Redwood City are the primary tools used to implement general plan policies and are implemented through the East Palo Alto Development Code, Menlo Park Municipal Code, and the City Code of Redwood City. Implementation of the SAFER Bay Project by SFCJPA member cities East Palo Alto and Menlo Park would require building permits, encroachment permits, and other forms of approval from the cities. Through these processes, the cities would resolve any potential conflicts with individual policies and regulations, make formal findings of consistency, and ensure the Project is implemented in a manner consistent with the East Palo Alto Development Code, Menlo Park Municipal Code, and the City Code of Redwood City. With implementation of these required processes, the Project would not conflict with plans and policies, and the impact would be **less than significant**.

Cumulative Impacts

Impact C-LU-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant cumulative impacts related to Land Use. ***(No Impact)***

The SAFER Bay Project would have no impact related to land use, agriculture, and forestry resources. Consequently, these topics are not addressed. As indicated under Impact LU-1, the SAFER Bay Project is considered consistent with the general plans of the Cities of East Palo Alto, Menlo Park, and Redwood City, and any potential policy inconsistencies with City policies and regulations would be resolved through the Cities' approval processes. Because this is an evaluation of plan and policy consistency, there is no residual contribution to a cumulative impact on the physical environmental impact associated with it (**no impact**).

For informational purposes, this discussion addresses the potential for conflicts associated with planned land uses with sites that overlap or border the SAFER Bay Project alignment, including the following (described in Table 3.1-2 in Section 3.1, Overview):

- ***Martin Luther King Jr. Park Master Plan***. The draft master plan for Martin Luther King Park calls for the development of park amenities in the area between existing playing fields and the existing levee and the San Francisco Bay Trail (Bay Trail) to the east. As indicated in Appendix CONST, the

SAFER Bay Project proposes to use this area for construction staging. Construction of the South of Bay Road Reach is expected to start in the second quarter of 2030 and last through the first quarter of 2031 (refer to Table 2-4 in Chapter 2, *Project Description*). No construction schedule has been published for the Park Master Plan. Provided the Park Master Plan is implemented after the SAFER Bay Project, no conflict between the land uses would occur.[14]

- ***1990 Bay Road***. This Project, located at the north end of the South of Bay Road Reach, involves mixed-use development. As indicated in Appendix CONST, the SAFER Bay Project proposes to use part of this area for construction staging. Construction of the South of Bay Road Reach is expected to start in the second quarter of 2030 and last through the first quarter of 2031. It is unlikely that the 1990 Bay Road Project would be completed before the SAFER Bay Project since it was only in the preapplication phase before being paused by the developer.
- The ***Ravenswood Business District/Four Corners Specific Plan Update*** (approved in 2024, construction dates unknown) would implement mixed-use development within a 350-acre area. The North of Bay Road Reach alignment passes through the Specific Plan area (refer to Figure 3.1-1 in Section 3.1, Overview). The approved Specific Plan recognizes the SAFER Bay Project throughout and the importance of integrating the SAFER Bay Project and Specific Plan. (The East Palo Alto Waterfront Project is a proposed mixed-use development on a 52-acre site within the Ravenswood Business District.) Consequently, no planning conflicts are anticipated.
- ***South Bay Salt Pond Restoration Project***. As discussed throughout this EIR, the SAFER Bay Project would facilitate implementation of restoration consistent with the South Bay Salt Pond Restoration Project. The South Bay Salt Pond Restoration Project authority has been and would continue to be consulted during development and implementation of the SAFER Bay Project.
- ***Sea-Level Rise Vulnerability and Adaptation Planning Study***. As indicated under Impact LU-1, this project includes a levee that would complement the SAFER Bay Project by extending shoreline protection to additional areas of Redwood City.
- ***Planned Segment of Bay Trail Improvements***. The Metropolitan Transportation Commission has proposed a segment of the Bay Trail between Bedwell Bayfront Park and Seaport Boulevard in Redwood City, a segment of which is generally aligned with the Marsh Road Reach. Although the SAFER Bay Project does not propose recreational improvements for the Marsh Road Reach, the current design (shown on Figure 2-11 in Chapter 2, *Project Description*) could accommodate a levee-top trail, should this planned segment of the Bay Trail be implemented in the future.

Refer to the other sections of Chapter 3 regarding the potential for the Project, in conjunction with these and other projects, to result in significant cumulative impacts.

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[14] Sections 3.3, Air Quality, and 3.13, Noise and Vibration, consider the potential for construction of the SAFER Bay Project to adversely affect park users.

3.13 Noise and Vibration

This section evaluates the potential impacts of the SAFER Bay Project (Project) on existing noise and vibration conditions in the Project area and the potential for the Project to affect noise levels or expose people or structures to vibration impacts. This section presents information about the environmental and regulatory setting and identifies the criteria used to evaluate the significance of potential impacts, the methods used in evaluating these impacts, and the results of the impact assessment. The Project evaluated is described in Chapter 2, *Project Description*, of this EIR.

3.13.1 Environmental Setting

Technical Background

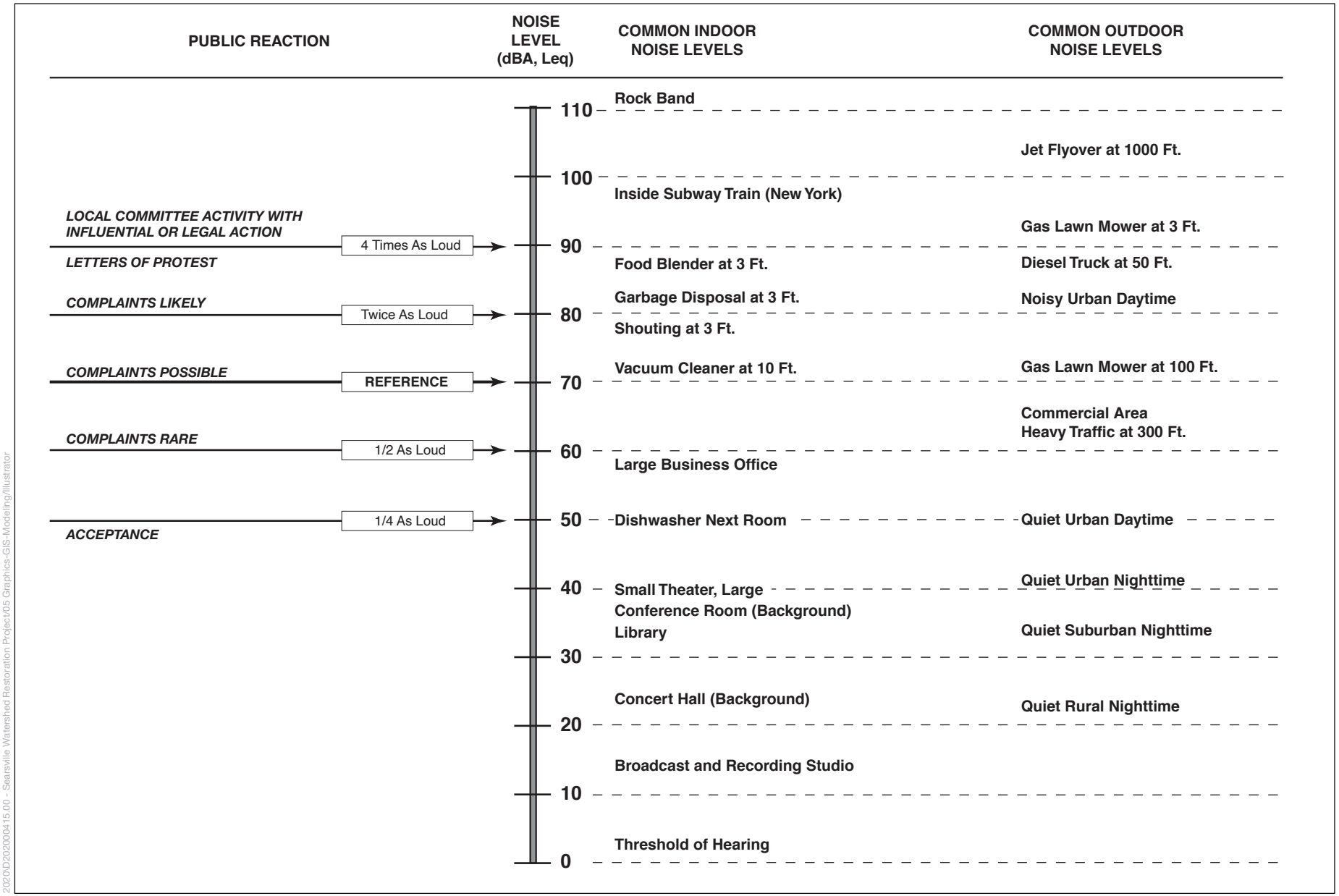
Sound is mechanical energy transmitted by pressure waves through a medium such as air. *Noise* is defined as unwanted sound. Sound is characterized by various parameters that include the rate of oscillation of sound waves (frequency), the speed of propagation, and the pressure level or energy content (amplitude). In particular, the *sound pressure level* has become the most common descriptor used to characterize the "loudness" of an ambient sound level. Sound pressure level is measured in decibels (dB), with 0 dB corresponding roughly to the threshold of human hearing and 120–140 dB corresponding to the threshold of pain.

Sound pressure fluctuations can be measured in units of hertz (Hz), which correspond to the frequency of a particular sound. Typically, sound does not consist of a single frequency, but rather a broad band of frequencies varying in levels of magnitude (sound power). The typical human ear is not equally sensitive to all frequencies of the audible sound spectrum. Consequently, when assessing potential noise impacts, sound is measured using an electronic filter that de-emphasizes frequencies below 1,000 Hz and above 5,000 Hz in a manner corresponding to the human ear's decreased sensitivity to low and extremely high frequencies. This method of frequency weighting is referred to as *A-weighting* and is expressed in units of decibels (dBA).[1] Frequency A-weighting follows an international standard methodology of frequency de-emphasis and is typically applied to community noise measurements.

Noise Exposure and Community Noise

Noise exposure for any individual is a measure of the noise experienced by the individual over a period of time. A *noise level* is a measure of noise at a given instant in time. The noise levels presented in **Figure 3.13-1** represent noise measured at a given instant in time; however, noise levels rarely persist consistently over a long period. Rather, community noise varies continuously because of the contributing sound sources of the community noise environment. Community noise is primarily the product of many distant noise sources, which constitute a relatively stable background noise, with individual contributors unidentifiable. The background noise level changes throughout a typical day, but does so gradually, corresponding with the addition and subtraction of distant noise sources such as traffic and wind. What makes community noise constantly variable throughout the day, besides the slowly changing background noise, is the addition of short-duration single-event noise sources (e.g., aircraft flyovers, motor vehicles, sirens), which are readily identifiable to the individual.

[1] All noise levels reported herein reflect A-weighted decibels unless otherwise stated.



2020\D2020000415.00 - Searsville Watershed Restoration Project\05 Graphics-GIS-Modeling/Illustrator

SOURCE: Caltrans Transportation Laboratory Noise Manual, 1982; and modification by ESA

SAFER Bay Project

Figure 3.13-1
Effects of Noise on People

ESA

These successive additions of sound to the community noise environment cause the community noise level to vary from instant to instant, requiring the measurement of noise exposure over a period of time to accurately characterize a community noise environment and evaluate cumulative noise impacts. This time-varying characteristic of environmental noise is described using statistical noise descriptors. The following are the most frequently used noise descriptors:

- **L_{eq}:** The *equivalent sound level*, which describes noise over a specified period of time, typically 1 hour, in terms of a single numerical value. The L_{eq} is the constant sound level, that would contain the same acoustic energy as the varying sound level during the same time period (i.e., the average noise exposure level for the given time period).
- **L_{max}:** The instantaneous maximum noise level for a specified period of time.
- **L_{dn}:** The *day/night average sound level*, which is the 24-hour day and night A-weighted noise exposure level. Also referred to as *DNL*, the L_{dn} accounts for the greater sensitivity of most people to nighttime noise by weighting noise levels experienced at night. Noise generated between 10:00 p.m. and 7:00 a.m. is weighted (penalized) by adding 10 dBA to take into account the greater annoyance caused by nighttime noise.
- **CNEL:** The *community noise equivalent level.* Similar to the DNL, the CNEL adds a 5-dBA "penalty" for the evening hours between 7:00 p.m. and 10:00 p.m. and a 10-dBA penalty between 10:00 p.m. and 7:00 a.m.

Effects of Noise on People

The effects of noise on people can be placed into the following three categories:

- Subjective effects of annoyance, nuisance, and dissatisfaction.
- Interference with activities, such as speech, sleep, and learning.
- Physiological effects, such as hearing loss or sudden startling.

Environmental noise typically produces effects that fall into the first two categories, the general effects of which are displayed on Figure 3.13-1. Workers in or near industrial plants may experience noise effects that fall into the last category. There is no completely satisfactory way to measure the subjective effects of noise or the corresponding reactions of annoyance and dissatisfaction. Individual thresholds of annoyance vary widely, and people's different tolerances to noise tend to develop based on their past experiences with noise.

Thus, an important way to predict humans' reaction to a new noise environment is to assess how it compares to the existing environment to which one has adapted: the so-called *ambient noise* level. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged by those hearing it. Regarding increases in A-weighted noise levels, the following relationships are known to exist:[2]

- Under controlled conditions in an acoustics laboratory, the trained healthy human ear is able to discern changes in sound levels of 1 dBA.

[2] Caltrans (California Department of Transportation), 2013. *Technical Noise Supplement to the Traffic Noise Analysis Protocol.* September 2013.

- Outside these controlled conditions, the trained ear can detect changes of 2 dBA in normal environmental noise.
- It is widely accepted that the average healthy ear can barely perceive changes in the noise level of 3 dBA.
- A change in level of 5 dBA is a readily perceptible increase in noise level.
- A 10 dBA change is recognized as twice as loud as the original source.

These relationships occur in part because of the logarithmic nature of sound and the decibel system. The decibel scale was developed to reflect that the human ear perceives sound in a non-linear fashion. Because the decibel scale is based on logarithms, two noise sources do not combine in a simple additive fashion but combine logarithmically. For example, if two identical noise sources produce noise levels of 50 dBA, the combined sound level would be 53 dBA, not 100 dBA.

Noise Attenuation

Stationary point sources of noise, including stationary mobile sources, such as idling vehicles, attenuate (lessen) at a rate of 6 to 7.5 dBA per doubling of distance from the source, depending on the topography of the area and environmental conditions (e.g., atmospheric conditions and noise barriers, vegetative or manufactured). Widely distributed noise, such as a large industrial facility spread over many acres or a street with moving vehicles (known as a *line source*), would typically attenuate at a lower rate, approximately 3 to 4.5 dBA each time the distance doubles from the source, which also depends on environmental conditions.[3] Noise from large construction sites exhibits characteristics of both point and line sources; therefore, attenuation will generally range between 4.5 and 7.5 dBA each time the distance doubles.

Vibration Background

Vibration is an oscillatory motion through a solid medium in which the motion's amplitude can be described in terms of displacement, velocity, or acceleration. Several different descriptors are used to quantify vibration. The peak particle velocity (PPV) is defined as the maximum instantaneous peak of the vibration signal. The PPV is most frequently used to describe physical vibration impacts on buildings. Typical groundborne vibration generated by human activities attenuates rapidly with distance from the source of the vibration. Sensitive receptors to vibration include people (especially residents, the elderly, and sick people), structures (especially older masonry structures), and vibration-sensitive equipment.

Another useful vibration descriptor is known as *vibration decibels*, or VdB. The term VdB is generally used when evaluating human response to vibration, as opposed to structural damage (for which PPV is the more commonly used descriptor). VdB levels are established relative to a reference quantity, typically 1×10^{-6} inch per second (in/sec).[4]

There are no major sources of vibration in the vicinity of the Project sites. Most motor vehicles and trucks have independent suspension systems that substantially reduce if not eliminate the generation of vibration, barring discontinuities in the roadway.

[3] Caltrans (California Department of Transportation), 2013. *Technical Noise Supplement to the Traffic Noise Analysis Protocol.* September 2013.

[4] FTA (Federal Transit Administration), 2018. *Transit Noise and Vibration Impact Assessment Manual*. September 2018.

Existing Noise Sources and Levels

Transportation sources, such as automobiles, trucks, trains, and aircraft, are the principal sources of noise in the urban environment. Along major transportation corridors, noise levels can reach 80 dBA (peak-hour L_{eq}), while along arterial streets, noise levels typically range from 65 to 70 dBA. However, noise levels on roadways, as in all areas, can be affected by intervening development, topography, or landscaping. Industrial and commercial equipment and operations also contribute to the ambient noise environment in their vicinities.

The following are the primary noise sources in the immediate vicinity of the various Project reaches/ components:

- **South of Bay Road:** Traffic on the network of local streets, aircraft operations, and the East Palo Alto Charter School playground.
- **North of Bay Road**: Traffic on the network of local streets and aircraft operations.
- **Dumbarton Approach:** Traffic on the network of local streets and aircraft operations.
- **Substation and Marsh Restoration:** Traffic on the network of local streets and aircraft operations.
- **Tech Campus:** Traffic on the network of local streets and aircraft operations.
- **Bayfront Expressway:** Traffic on the network of local streets and aircraft operations.
- **Bedwell Bayfront Park Reach:** Natural environment sounds (rushing water, ducks, and geese squawking), distant traffic, and pedestrian vocalization.
- **Marsh Road Reach:** Natural environment sounds (rushing water, ducks, and geese squawking), distant traffic, and pedestrian vocalization.
- **Habitat Improvement Sites in Ponds R1/R2, SF2, and R3:** Natural environment sounds (rushing water, ducks, and geese squawking) and distant traffic.

To characterize the noise environment on and around the Project sites, short-term noise monitoring[5] was conducted on December 5, 2024. The conditions during the noise monitoring were typical of conditions when construction work would generally occur: weekday daytime hours with school in session. Because this was attended monitoring, the monitoring technician was able to observe any isolated conditions that might represent an anomalous event. Short-term monitoring of daytime conditions was conducted at six locations at the residential areas located nearest to proposed active construction site (refer to **Figure 3.13-2** for the noise monitoring locations). The short-term daytime noise measurement locations are representative of the ambient noise levels at all affected receptors near the Project sites. The monitoring locations represent a mix of surrounding land uses (e.g., commercial and multi-family residential) and a range of exposure to noise sources (e.g., natural sounds from ponds, transportation noise from United States Route [U.S.] 101 and other major roadways). **Table 3.13-1** presents a summary of the noise monitoring results.

[5] Short-term daytime noise monitoring was conducted because construction activities would occur during daytime hours. Long-term monitoring is typically conducted in cases when operational activities or compatibility with operational noise thresholds must be evaluated. Refer to the discussion under Methodology in Section 3.13.3 regarding operational noise.



2011\D211919 - SAFER Bay\Graphics\Illustrator

SOURCES: NAIP Imagery, 2024; HDR, 2024; ESA, 2025

SAFER Bay Project

Figure 3.13-2
Noise Monitoring Locations

ESA

TABLE 3.13-1
MONITORED NOISE ENVIRONMENTS

Noise Monitoring Site and Location		Date/Time	Noise Levels (dBA), Average L_{eq}	Primary Noise Sources
ST-1	230 feet north of Bayshore Villa	12/6/2024 9:34–9:49 a.m.	50.0	Natural sources (birds, ducks, geese)
ST-2	145 feet north of ROEN Menlo Park Apartments	12/6/2024 9:55–10:10 a.m.	45.2	Natural sources (birds, ducks, geese).
ST-3	Cul-de-sac of Windermere Avenue, 777 Hamilton Apartments	12/6/2024 10:25–10:40 a.m.	56.5	Opening and closing of gate, motor vehicles entering and exiting apartment.
ST-4	Cul-de-sac of Fordham Street	12/6/2024 10:57–11:12 a.m.	59.3	Plane flyby overhead, helicopter in distance.
ST-5	Cul-de-sac of Runnymede Street	12/6/2024 11:22–11:37 a.m.	58.5	Plane flyby overhead, motor vehicles entering and exiting school.
ST-6	Cul-de-sac of O' Connor Street	12/6/2024 11:44–11:59 a.m.	52.5	Plane flyby overhead.

NOTES: dBA = A-weighted decibels; L_{eq} = equivalent sound level
Refer to Figure 3.13-2 for noise measurement locations.
SOURCE: Data compiled by Environmental Science Associates in 2024 (see Appendix NOI).

Sensitive Receptors and Land Uses

Human response to noise varies considerably from one individual to another. Effects of noise at various levels can include interference with sleep, concentration, and communication; physiological and psychological stress; and hearing loss. Given these effects, some land uses are considered more sensitive to ambient noise levels than others. In general, residences, schools, hospitals, and nursing homes are considered the most sensitive to noise. Commercial and industrial uses are considered the least noise sensitive. **Table 3.13-2** presents the locations and distances of noise-sensitive receptors closest to each Project component.

Construction-related vibration has the potential to adversely affect adjacent and nearby buildings, particularly historic buildings or older masonry structures, which tend to be fragile and thus, more susceptible to vibration impacts. No historic structures are located within the vicinity of the Project construction site (refer to Section 3.6, Cultural Resources, for further details).

3.13.2 Regulatory Framework

Federal

There are no federal standards that directly pertain to the evaluation of noise impacts on the human environment.

TABLE 3.13-2
DISTANCE BETWEEN PROJECT COMPONENTS AND NOISE-SENSITIVE RECEPTORS

Component	Reach	Location of Sensitive Receptor		Distance from Nearest Sensitive Receptor (feet)
Shoreline Protection, Recreational Features	South of Bay Road	Runnymede Street Residences	East Palo Alto	45
		East Palo Alto Charter School		170
	North of Bay Road	Illinois Street Residences		90
	Dumbarton Approach	Fordham Street Residences		530
	Substation and Marsh Restoration	Tulane Avenue Residences		2,700
	Tech Campus	777 Hamilton Apartments	Menlo Park	960
	Bayfront Expressway	777 Hamilton Apartments		840
	Bedwell Bayfront Park	ROEN Menlo Park Apartments		600 (740 from pile driving)
	Marsh Road	Anton Menlo Apartments		150
		Bayshore Villa Mobile Home Park	Redwood City	220
Habitat Improvements	Tidal Marsh Restoration in Ponds R1 and R2	Tulane Avenue Residences	Menlo Park	2,790
	Western Snowy Plover Breeding Habitat Enhancement (Pond SF2)	Tulane Avenue Residences		340
	Western Snowy Plover Breeding Habitat Enhancement (Pond R3)	777 Hamilton Apartments		900

SOURCE: Data compiled by Environmental Science Associates in 2025.

Federal Transit Administration Vibration Criteria

The Federal Transit Administration (FTA) has adopted vibration criteria that are used to evaluate the potential for building damage impacts from construction activities. **Table 3.13-3** shows FTA's vibration damage criteria.

TABLE 3.13-3
CONSTRUCTION VIBRATION DAMAGE CRITERIA

Building Category	PPV (in/sec)	RMS VdB
I. Reinforced concrete, steel, or timber (no plaster)	0.5	102
II. Engineered concrete and masonry (no plaster)	0.3	98
III. Non-engineered timber and masonry buildings	0.2	94
IV. Buildings extremely susceptible to vibration damage	0.12	90

NOTES: in/sec = inches per second; PPV = peak particle velocity; RMS VdB = root mean square vibration decibel; VdB in micro-inches per second
SOURCE: Federal Transit Administration, 2018. *Transit Noise and Vibration Impact Assessment Manual*. September 2018.

In addition, FTA has adopted standards related to human annoyance for groundborne vibration impacts for the following three land use categories: Vibration Category 1, High Sensitivity; Vibration Category 2, Residential; and Vibration Category 3, Institutional. FTA defines these categories as follows:

- ***Category 1:*** Buildings where vibration would interfere with operations within the building, including vibration-sensitive research and manufacturing facilities, hospitals with vibration-sensitive equipment, and university research operations. Vibration-sensitive equipment includes, but is not limited to, electron microscopes, high-resolution lithographic equipment, and normal optical microscopes.
- ***Category 2:*** All residential land uses and any buildings where people sleep, such as hotels and hospitals.
- ***Category 3:*** Institutional land uses, such as schools, churches, other institutions, and quiet offices that do not have vibration-sensitive equipment but still have the potential for activity interference.

FTA's thresholds for conditions where events per day are infrequent (fewer than 30 vibration events of the same kind per day) are 65 vibration decibels (VdB) for Category 1 buildings, 80 VdB for Category 2 buildings, and 83 VdB for Category 3 buildings. For conditions where events per day are occasional (30–70 vibration events of the same source per day), FTA's thresholds are 65 VdB for Category 1 buildings, 75 VdB for Category 2 buildings, and 78 VdB for Category 3 buildings. No thresholds have been adopted or recommended for commercial and office uses.

State

State Noise Standards

The State of California establishes noise limits for vehicles licensed to operate on public roads (California Vehicle Code sections 27200–27207). For heavy trucks, such as those that would be used to transport Project-related soils and demolition debris, the state pass-by standard is 80 dBA. The state pass-by standard for light trucks and passenger cars (less than 4.5 tons, gross vehicle rating) is also 80 dBA at 15 meters from the centerline. These standards are considered in the Federal Highway Administration (FHWA) traffic noise model, which is used in the impact analysis of construction activities.

State Vibration Standards

No state vibration standards are applicable to the Project. Moreover, according to the California Department of Transportation's (Caltrans's) *Transportation and Construction Vibration Guidance Manual,*[6] there are no official Caltrans standards for vibration. However, this manual provides guidelines for assessing the potential for vibration damage to various types of buildings, ranging from 0.08 to 0.12 in/sec PPV for extremely fragile historic buildings, ruins, and ancient monuments to 0.50 to 2.0 in/sec PPV for modern industrial/commercial buildings. These state vibration standards are generally consistent with the federal standard identified in Table 3.13-3.

[6] Caltrans (California Department of Transportation), 2013. *Technical Noise Supplement to the Caltrans Noise Analysis Protocol.* September 2013.

Local

General Plans and Municipal Codes

The Project would be subject to local plans and policies of the jurisdictions in which it is located, including East Palo Alto, Menlo Park, and Redwood City. **Table 3.13-4** presents local plans and policies regarding noise and vibration to support consideration of Project consistency with general plan policies. **Table 3.13-5** presents local plans and policies regarding noise and vibration to support consideration of Project consistency with municipal codes.

TABLE 3.13-4
LOCAL PLANS AND POLICIES RELEVANT TO THE PROJECT – NOISE AND VIBRATION

CITY OF EAST PALO ALTO VISTA 2035 GENERAL PLAN
Goal SN-7. Minimize transportation- and non-transportation-related noise impacts, especially on noise-sensitive land uses.
6.1 Noise standards. Use the Interior and Exterior Noise Standards ([General Plan] Table 10-1) for transportation noise sources. Use the City's Noise Ordinance for evaluating non-transportation noise sources when making planning and development decisions. Require that applicants demonstrate that the noise standards will be met prior to project approval.
7.1 Noise ordinance. Require an acoustical analysis to evaluate mitigation measures for noise generating projects that are likely to cause the following criteria to be exceeded or to cause a significant adverse community response: • Cause the Ldn/CNEL at noise-sensitive uses to increase by 3 dBA or more and exceed the "normally acceptable" level. • Cause the Ldn/CNEL at noise- sensitive uses to increase 5 dBA or more and remain "normally acceptable."
7.2 CEQA acoustical analysis. Require an acoustical analysis to evaluate mitigation measures for noise generating projects that are likely to cause the following criteria to be exceeded or to cause a significant adverse community response: • Cause the Ldn/CNEL at noise-sensitive uses to increase by 3 dBA or more and exceed the "normally acceptable" level. • Cause the Ldn/CNEL at noise- sensitive uses to increase 5 dBA or more and remain "normally acceptable."
7.11 Construction noise. The City shall require that contractors use available noise suppression devices and techniques and limit construction hours near residential uses. Reasonable noise reduction measures shall be incorporated into the construction plan and implemented during all phases of construction activity to minimize the exposure of neighboring properties. The City considers significant construction noise impacts to occur if a project located within 500 feet of residential uses or 200 feet of commercial or office uses would: • Involve substantial noise generating activities (such as building demolition, grading, excavation, pile driving, use of impact equipment, or building framing) continuing for more than 12 months. For such large or complex projects, a construction noise logistics plan that specifies hours of construction, noise and vibration minimization measures, posting or notification of construction schedules, and designation of a noise disturbance coordinator who would respond to neighborhood complaints will be required to be in place prior to the start of construction and implemented during construction to reduce noise impacts on neighboring residents and other uses. A typical construction noise logistics plan would include, but not be limited to, the following measures to reduce construction noise levels as low as practical: A. Limit construction activity to weekdays between 7:00 am and 7:00 pm and Saturdays and holidays between 9:00 am and 7:00 pm, with no construction on Sundays; B. Utilize 'quiet' models of air compressors and other stationary noise sources where technology exists; C. Equip all internal combustion engine-driven equipment with mufflers, which are in good condition and appropriate for the equipment; D. Locate all stationary noise-generating equipment, such as air compressors and portable power generators, as far away as possible from adjacent land uses; E. Locate staging areas and construction material areas as far away as possible from adjacent land uses; F. Prohibit all unnecessary idling of internal combustion engines; G. If impact pile driving is proposed, multiple pile drivers shall be considered to expedite construction. Although noise levels generated by multiple pile drivers would be higher than the noise generated by a single pile driver, the total duration of pile driving activities would be reduced; H. If impact pile driving is proposed, temporary noise control blanket barriers shall shroud pile drivers or be erected in a manner to shield the adjacent land uses. Such noise control blanket barriers can be rented and quickly erected; I. If impact pile driving is proposed, foundation pile holes shall be pre-drilled to minimize the number of impacts required to seat the pile. Pre-drilling foundation pile holes is a standard construction noise control technique. Pre-drilling reduces the number of blows required to seat the pile. Notify all adjacent land uses of the construction schedule in writing;

J. Designate a "disturbance coordinator" who would be responsible for responding to any local complaints about construction noise. The disturbance coordinator will determine the cause of the noise complaint (e.g., starting too early, bad muffler, etc.) and will require that reasonable measures warranted to correct the problem be implemented; and

K. Conspicuously post a telephone number for the disturbance coordinator at the construction site and include it in the notice sent to neighbors regarding the construction.

CITY OF MENLO PARK GENERAL PLAN

Goal N1: Achieve acceptable noise levels.

N1.1: Compliance with Noise Standards. Consider the compatibility of proposed land uses with the noise environment when preparing or revising community and/or specific plans. Require new projects to comply with the noise standards of local, regional, and building code regulations, including but not limited to the City's Municipal Code, Title 24 of the California Code of Regulations, and subdivision and zoning codes.

N1.3: Exterior and Interior Noise Standards for Residential Use Areas. Strive to achieve acceptable interior noise levels and exterior noise levels for backyards and/or common usable outdoor areas in new residential development, and reduce outdoor noise levels in existing residential areas where economically and aesthetically feasible.

N1.4: Noise Sensitive Uses. Protect existing residential neighborhoods and noise sensitive uses from unacceptable noise levels and vibration impacts. Noise sensitive uses include, but are not limited to, hospitals, schools, religious facilities, convalescent homes and businesses with highly sensitive equipment. Discourage the siting of noise-sensitive uses in areas in excess of 65 dBA CNEL without appropriate mitigation and locate noise sensitive uses away from noise sources unless mitigation measures are included in development plans.

N1.6: Noise Reduction Measures. Encourage the use of construction methods, state-of-the-art noise abating materials and technology and creative site design including, but not limited to, open space, earthen berms, parking, accessory buildings, and landscaping to buffer new and existing development from noise and to reduce potential conflicts between ambient noise levels and noise-sensitive land uses. Use sound walls only when other methods are not practical or when recommended by an acoustical expert.

N1.8: Potential Annoying or Harmful Noise. Preclude the generation of annoying or harmful noise on stationary noise sources, such as construction and property maintenance activity and mechanical equipment.

N1.9: Transportation Related Noise Attenuation. Strive to minimize traffic noise through land use policies, traffic-calming methods to reduce traffic speed, law enforcement and street improvements, and encourage other agencies to reduce noise levels generated by roadways, railways, rapid transit, and other facilities.

N1.10: Nuisance Noise. Minimize impacts from noise levels that exceed community sound levels through enforcement of the City's Noise Ordinance. Control unnecessary, excessive and annoying noises within the City where not preempted by Federal and State control through implementation and updating of the Noise Ordinance.

REDWOOD CITY GENERAL PLAN

GOAL PS-13: Minimize the impact of point source noise and ambient noise levels throughout the community.

Policy PS-13.4: In accordance with the Municipal Code and noise standards contained in the General Plan, strive to provide a noise environment that is at an acceptable noise level near schools, hospitals, and other noise sensitive areas.

Policy PS-13.5: Limit the hours of operation at all noise generation sources that are adjacent to noise sensitive areas, wherever practical.

Policy PS-13.6: Require all exterior noise sources (construction operations, air compressors, pumps, fans, and leaf blowers) to use available noise suppressions devices and techniques to bring exterior noise down to acceptable levels that are compatible with adjacent land uses.

Policy PS-13.8: Implement appropriate standard construction noise controls for all construction projects.

Policy PS-13.9: Require noise created by new non-transportation noise sources to be mitigated so as not to exceed acceptable interior and exterior noise level standards.

Sources: City of East Palo Alto, 2017. *Vista 2035 General Plan*. Adopted October 4, 2016; Final Version March 2017. Available online at www.ci.east-palo-alto.ca.us/planning/page/vista-2035-general-plan; City of Menlo Park, 2016. *General Plan, City of Menlo Park*. Adopted November 29, 2016. Available online at www.menlopark.gov/files/sharedassets/public/v/1/community-development/documents/general-plan/land-use-and-circulation-element-adopted-20161129.pdf; City of Redwood City, 2023. *Redwood City General Plan*. Adopted October 11, 2010; Amended August 2023. Available online at www.redwoodcity.org/departments/community-development-department/planning-housing/planning-services/environmental-documents/general-plan-eir.

TABLE 3.13-5
CITY MUNICIPAL CODE SECTIONS GOVERNING NOISE

CITY OF EAST PALO ALTO

Chapter 8.52, Section 8.52.320: Exterior noise standards. It is unlawful for any person at any location within the city to create any noise, or to allow the creation of any noise on property owned, leased, occupied or otherwise controlled by such person which causes the exterior noise level when measured at any single or multiple family residence, school, hospital, church or public library situated in either the incorporated or unincorporated area adjacent to the city to exceed the noise level standards as set forth in **Table I** following:

Table I. Receiving Land Use: Single or Multiple Family Residence, School, Hospital, Church or Public Library Properties Noise Level Standards, dBA

Category	Cumulative Number of Minutes in Any One Hour Time Period	Daytime (seven a.m.—ten p.m.)	Nighttime (ten p.m.—seven a.m.)
1	30	55	50
2	15	50	55
3	5	65	60
4	1	70	60
5	0	75	70

A. In the event the measured background noise level exceeds the applicable noise level standard in any category above, the applicable standard shall be adjusted in five dBA increments so as to encompass the background noise level,

B. Each of the noise level standards specified above shall be reduced by five dBA for simple tone noises, consisting primarily of speech or music, or for recurring or intermittent impulsive noises.

C. If the intruding noise source is continuous and cannot reasonably be stopped for a period of time whereby the background noise level measured while the source is in operation shall be compared directly to the noise level standards in Table I.

Chapter 8.52, Section 8.52.350(E): Exemptions. The following activities shall be exempted from the provisions of this chapter: Noise sources associated with demolition, construction, repair, remodeling or grading of any real property, provided such activities do not take place between the hours of eight p.m. and seven a.m.

CITY OF MENLO PARK

Chapter 8.06, Section 8.06.030: Noise Limitations.

a) Except as otherwise permitted in this chapter, any source of sound in excess of the sound level limits set forth in Section 8.06.030 shall constitute a noise disturbance. For purposes of determining sound levels from any source of sound, sound level measurements shall be made at a point on the receiving property nearest where the sound source at issue generates the highest sound level. Sound level measurements shall be made with a precision sound level meter (Type 1 or 2) set to A-weighting, and "fast" response for fluctuating sound. Slow or fast response may be used for continual sources. For repetitive, impulsive sound, the one (1) second [root mean square] maximum level (Lmax) shall be used. For continuous sound, use the average level or Leq. In multifamily residential structures, the microphone shall be placed no closer than three and one-half (3 1/2) feet from the wall through which the source of sound at issue is transmitting. The microphone shall also be placed five (5) feet above the floor regardless of whether the source of sound at issue transmits through the floor, ceiling or wall.
   1. For all sources of sound measured from any residential property:
      (A) "Nighttime" hours—fifty (50) dBA,
      (B) "Daytime" hours—sixty (60) dBA;
   2. For all sources of sound within a multifamily residential structure transmitting through a common interior partition (wall, floor or ceiling) from one (1) dwelling unit to another:
      (A) "Nighttime" hours—thirty-five (35) dBA,
      (B) "Daytime" hours—forty-five (45) dBA;
   3. Corrections for character of sound: In the event the alleged offensive noise contains a steady, audible tone, such as a whine, screech, beating, pulsating, throbbing or hum the standards set forth in Section 8.06.030(a)(1) and (2) shall be reduced by five (5) dB.

b) Any and all excessively annoying, loud or unusual noises or vibrations such as offend the peace and quiet of persons of ordinary sensibilities and which interfere with the comfortable enjoyment of life or property and affect at the same time an entire neighborhood or any considerable number of persons shall be considered a noise disturbance.

c) It shall be unlawful to create, permit, allow or maintain a noise disturbance in Menlo Park.

Chapter 8.06, Section 8.06.040: Exceptions. The following are exceptions to the noise limitations set forth in Section 8.06.030. These activities may occur at other times provided they meet the noise levels set forth in Section 8.06.030.

a) *Construction Activities*.

1. Construction activities between the hours of eight (8) a.m. and six (6) p.m. Monday through Friday,
2. Residents/property owners personally undertaking construction activities to maintain or improve their property on Saturdays, Sundays or holidays between the hours of nine (9) a.m. and five (5) p.m.,
3. A sign, containing the permitted hours of construction activities exceeding the noise limits set forth in Section 8.06.030, shall be posted at all entrances to a construction site upon the commencement of construction, for the purpose of informing contractors and subcontractors and all other persons at the construction site of the basic requirements of this chapter. The sign shall be at least five (5) feet above ground level and shall consist of a white background with black letters,
4. Notwithstanding any other provision set forth above, all powered equipment shall comply with the limits set forth in Section 8.06.040(b);

b) *Powered Equipment*.

1. Powered equipment used on a temporary, occasional or infrequent basis operated between the hours of eight (8) a.m. and six (6) p.m. Monday through Friday. No piece of equipment shall generate noise in excess of eighty-five (85) dBA at fifty (50) feet,
2. Residents/property owners personally using powered equipment to maintain their property and/or residence on Saturdays, Sundays or holidays between the hours of nine (9) a.m. and five (5) p.m. No piece of equipment shall generate noise in excess of eighty-five (85) dBA at fifty (50) feet.

Chapter 8.06, Section 8.06.050: Exemptions. *The* following **noise** disturbances shall be exempt from the **noise** limitations set forth in Section 8.06.030:

a) *Sound Generated by Motor Vehicles.* Sound generated by motor vehicles, trucks and buses operated on streets and highways, aircraft, trains, and other public transport.

1. This exemption shall not apply to the operation of any vehicle including any equipment attached to any vehicle (such as attached refrigeration and/or heating units or any attached auxiliary equipment) for a period in excess of ten (10) minutes in any hour while the vehicle is stationary, for reasons other than traffic congestion.

REDWOOD CITY

Division 3, Section 24.30: Excessive and Unreasonable Noises. The following are deemed to be excessive and unreasonable noises:

A. Noise levels generated by loud equipment or construction activities, including demolition, alteration, repair, landscaping, or remodeling of or to existing structures and construction of new structures on property within the City, at more than one hundred ten (110) dB measured at any point within a residential district of the City and outside of the plane of said property**;**

B. Any noise generated by construction activities that persists for ten (10) continuous minutes or more outside of the hours identified in Section 24.32 of this Code;

C. Noise levels generated by an individual item of machinery, equipment or device used during construction activities, including demolition, alteration, repair or remodeling of or to existing structures and construction of new structures on property within the City, at more than one hundred ten (110) dB measured within a residential district of the City at a distance of twenty-five (25) feet from said machinery, equipment or device. If said machinery, equipment or device is housed within a structure on the property, then the measurement shall be made at a distance as near to twenty-five (25) feet from said machinery, equipment or device as possible.

Division 3, Section 24.31: Prohibited Noise Levels. It shall be unlawful for any person to suffer or allow noise levels to be generated by:

A. Construction activities, including demolition, alteration, repair or remodeling of or to existing structures and construction of new structures on property within the City, at more than 110 dB measured at any point within a residential district of the City and outside of the plane of said property; or

B. An individual item of machinery, equipment or device used during construction activities, including demolition, alteration, repair or remodeling of or to existing structures and construction of new structures on property within the City, at more than 110 dB measured within a residential district of the City at a distance of twenty-five feet (25′) from said machinery, equipment or device. If said machinery, equipment or device is housed within a structure on the property, then the measurement shall be made at a distance as near to twenty-five feet (25′) from said machinery, equipment or device as possible.

Division 3, Section 24.32: Time Limitations.

A. General construction noise on private projects shall be limited to weekdays from seven o'clock (7:00) A.M. to eight o'clock (8:00) P.M. Excessive or unreasonable construction noises, as identified under Section 24.30, shall be limited to weekdays from nine o'clock (9:00) A.M. to four o'clock (4:00) P.M. General and excessive or unreasonable construction noise is prohibited during holiday periods, as indicated on the City website.

B. Preconstruction noise including, but not limited to, loading and unloading, cleaning of mechanical toilets, maintenance of vehicles, deliveries, truck idling, backup beeps, yelling and radios is also limited to the general and excessive or unreasonable construction noise hours.

C. The Building Official or their designee may approve construction work occurring outside the times described in Section A and B above for private projects. A request for work outside the designated periods must be received by the Building Official or their designee prior to construction. A copy of the approved request shall be kept on the site of the work.

Division 3, Section 24.33: Construction Site Notice.

A. Generally: The owner of any property in a residential district of the City or of any property located within five hundred feet (500′) of any such district upon which construction activities, including demolition, alteration, repair or remodeling of or to existing structures, and construction of new structures are proposed to occur, shall post a sign at all entrances to the work site prior to commencement of the work for the purpose of informing all contractors and subcontractors, their employees, agents, materialmen and all other persons at the property of the basic limitations upon noise and construction activities provided in this Division. Said sign(s) shall be posted at least five feet (5′) above ground level and shall be on a white background with black lettering, which lettering shall be a minimum of one and one-half inches (1 ½″) in height.

B. Sign Text: Said sign(s) shall read as follows:

NOISE LIMITATIONS UPON WORK ON PROPERTIES IN OR NEAR RESIDENTIAL DISTRICTS

(Includes any and all deliveries)

NOISE PROHIBITED: MONDAYS through FRIDAYS 8:00 p.m. to 7:00 a.m., SATURDAYS, SUNDAYS and HOLIDAYS ALL DAY

During the foregoing periods, no noise above the local ambient level in Residential Districts shall be generated by construction work or activities.

WORK NOISE LIMITS AT ALL OTHER TIMES:

1. No individual item of machinery, equipment, or device used in or near a residential district shall produce sound in excess of 110 dBA, measured twenty five feet (25′) from such machinery, equipment, or device.
2. Work noise level at any point outside of the construction site property plane shall not exceed 110 dBA within any part of a residential district.
3. The foregoing provisions are requirements of the Noise Regulations of the City, violations of which are punishable pursuant to the provisions of this Chapter.

Division 3, Section 24.34: Exceptions; Permits. Upon a showing by a property owner to the enforcement officer that a diligent investigation of available noise abatement techniques indicates that compliance with the requirements of this Division would be impracticable or unreasonable, the enforcement officer may issue a permit allowing an exception to the provisions contained in all or any portion of this Division subject to such reasonable and appropriate conditions as the enforcement officer may impose, including, but not limited to, a compliance schedule, restrictions upon construction methods or use of machinery, equipment or devices, permission to engage in construction activities on Saturdays, Sundays, and holidays only between the hours of nine o'clock (9:00) A.M. and eight o'clock (8:00) P.M., or implementation of such other practices as the enforcement officer deems appropriate. Any such permit shall be effective for a period not to exceed six (6) months and shall be of such reasonably short duration as the enforcement officer shall determine giving due regard to the extent and the complexity of the construction to which it pertains.

Any person aggrieved by the decision of the enforcement officer in issuing or denying the issuance of a permit pursuant to this Section may appeal the enforcement officer's decision to the Community Development Director. Such appeal shall be filed, processed and heard in accordance with the provisions of Chapter 1 of this Municipal Code.

Division 3, Section 24.35: Exemptions. Noise levels generated by construction activities, including demolition, alteration, repair or remodeling of or to existing structures and the construction of new structures on property within the City: a) in the course or within the scope of emergency work; and b) in the course of work performed personally by the owner or resident of a dwelling unit with respect to said unit on Mondays through Fridays between the hours of seven o'clock (7:00) A.M. and eight o'clock (8:00) P.M. and on Saturdays, Sundays, and holidays between the hours of nine o'clock (9:00) A.M. and eight o'clock (8:00) P.M., are exempt from the provisions of this Division.

Sources: City of East Palo Alto, 2023. *City of East Palo Alto Municipal Code.* Available online at library.municode.com/ca/east_palo_alto/codes/code_of_ordinances?nodeId=TIT8HESA_CH8.52NOCO_ARTVNOST_8.52.320EXNOST; City of Menlo Park, 1999. *City of Menlo Park Municipal Code*. Available online at www.codepublishing.com/CA/MenloPark/#!/MenloPark08/MenloPark0806.html#8.06.030; City of Redwood City, 1999. *City of Redwood City Municipal Code, Division 3, Section 24.* Available online at library.municode.com/ca/redwood_city/codes/city_code?nodeId=CH24NORE_ARTIIEXUNNO_DIV3CO.

3.13.3 Impacts and Mitigation Measures

Significance Criteria

In accordance with CEQA, CEQA Guidelines (including Appendix G), relevant plans, policies, and/or guidelines, and agency standards, the Project could have a significant impact if it were to do any of the following:

- Generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the Project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- Generate excessive groundborne vibration or groundborne noise levels; or
- For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, expose people residing or working in the Project area to excessive noise levels.

Methodology

This analysis assesses potential noise and vibration impacts associated with Project implementation. Data for this section were generated based on site visits and a review of the planning and policy documents and mapping and imagery software of cities and counties within the Project study area. This Draft EIR evaluates Project activities at a level of detail consistent with the best available information at the time of EIR preparation. To the extent that activities necessary for Project completion are known, they are described in Chapter 2, *Project Description*, and evaluated in the impact analysis below. Key information needed for the evaluation of noise and vibration impacts includes detailed construction assumptions, such as worker trips, vehicle trips, and equipment usage, along with proposed land use. Design engineers provided detailed construction assumptions (e.g., equipment usage and vehicle trips) for all reaches. Those reaches for which conceptual (generally 10-percent) design information is available, depicted with dashed lines on Figure 2-1 in Chapter 2, *Project Description*, lack information for certain components (e.g., ramps, relocation of the pedestrian bridge at Bay Road). Where site-specific information was not available or known, the analysis relied on reference equipment noise levels and typical noise assumptions for infrastructure projects. Appendix INFRA identifies those changes to infrastructure and other encroachments that are evaluated in the EIR programmatically, including improvements to stormwater management systems. Table 3.11-6, in Section 3.11, Hydrology and Water Quality, indicates reaches where changes to stormwater pumping may be needed. Supplemental analysis could be needed once additional design and construction details (e.g., the location of construction staging areas for program-level reaches, the location and design characteristics of upgraded or new stormwater pump stations) are known. The need for additional CEQA documentation would be evaluated once these design details are developed as discussed in greater detail in Section 1.2.5, Program–Project EIR and Supplemental CEQA.

Construction Noise

The Project site is located in three local jurisdictions and the property is owned by the state and federal governments. Local noise standards are presented in Table 3.13-4. To provide a consistent approach across all jurisdictions while complying with CEQA requirements, the approach to assessing noise impacts used in this section follows FTA guidelines while employing the FHWA Roadway Construction Model, includes an evaluation of increases over existing noise levels, and uses Caltrans standards for increases in roadway noise, as described below.

The quantitative evaluation of daytime construction noise effects is based on the general assessment methodology and criterion identified by the FTA guidelines[7] for residential land uses: an hourly 90 dBA

[7] FHWA (Federal Transit Administration), 2018. *Transit Noise and Vibration Impact Assessment Manual.* September 2018.

Leq during daytime hours. FTA's methodology for general assessment of construction noise entails calculating the hourly dBA Leq for each construction stage and location considering the following:

(1) The reference noise emission level at 50 feet for equipment to be used for each construction stage;

(2) The usage factor for each piece of equipment; and

(3) The distance between the center of the project construction area and receptors.[8] Under this methodology, the resultant noise levels are calculated for the two noisiest pieces of equipment expected to be used during each stage of construction.

FTA does not publish a software noise model; therefore, this analysis used the FHWA Roadway Construction Noise Model (RCNM), FHWA's national standard for predicting construction noise. The RCNM analysis involves calculating noise levels (Lmax and Leq) at incremental distances for a variety of types of construction equipment. The model inputs include acoustical use factors and Leq values at various distances depending on the receptor locations analyzed. FTA's general assessment approach recommends assessing the two noisiest pieces of construction equipment operating concurrently at the center of a project site; however, to provide a conservative analysis, and given the Project's expansive work areas, this analysis assumed that equipment noise would occur in the likely work areas located closest to a sensitive receptor, rather than at the center of the site. As stated in Section 2.6, Construction Details, in Chapter 2, *Project Description*, construction would occur Monday through Saturday, with crew members working between the hours of 8:00 a.m. and 5:00 p.m. Consequently, only daytime noise thresholds apply. The FTA guidelines identify daytime criteria of 90 dBA for residential land uses and 100 dBA for all other land uses.

This analysis also assesses potential noise impacts related to an increase in construction noise over existing noise levels. This analysis finds that construction noise control measures should be implemented if noise levels at sensitive receptor locations would increase by 10 dBA or more over existing noise. Such an increase corresponds to a perceived doubling of loudness.[9] In general, due to the measured ambient noise levels identified in this EIR (see Tabel 3.13-1), a 10 dBA increase over existing noise levels is the most restrictive numerical standard applied to the evaluation of construction noise impacts.

The quantitative criteria identified here are only part of the evaluation of construction noise. The evaluation also considers the duration and intensity of any quantitative noise exceedance. Consistent with FTA and FHWA methodology, this increase in construction noise is assessed relative to an hourly L_{eq} and also accounts for equipment percentage uses as inventoried by FHWA. As a general rule, if an exceedance of the quantitative standards would persist on a daily basis for more than 2 weeks, the impact is considered significant and mitigation is identified. Public works projects (e.g., for pipeline installations or minor roadway improvements and maintenance) commonly require construction work along roadways adjacent to residences and other sensitive uses, and such work proceeds linearly at rates of 50 to 200 feet

[8] In urban areas, such as downtown San Francisco, that have acoustically non-absorptive ground conditions, the ground factor for this analysis is taken to be zero.

[9] Caltrans (California Department of Transportation), 2020. *Transportation and Construction Vibration Guidance Manual.* April 2020.

per day. Therefore, a temporary exceedance of these quantitative noise standards for 2 weeks or less by these types of construction efforts is considered a less-than-significant impact.

Project construction would generate haul and vendor truck trips. The analysis of construction roadway noise focuses on the estimate of hourly truck trips generated and the degree to which they would add to the existing noise levels measured at representative locations in each area. If the contribution of hourly construction trucks would be equivalent to the existing measured daytime noise level, then the potential exists for a doubling of sound energy and an increase of 3 dBA. A 3 dBA increase is applied because the roadways examined are arterial roadways where existing noise levels already exceed the normally acceptable noise exposure category for residential land uses established by the East Palo Alto Safety and Noise Element (65 CNEL); the Menlo Park General Plan Open Space, Conservation, Noise, and Safety Element (60 CNEL); and the Redwood City Public Safety Element (65 CNEL). As indicated in Section 3.13.1, Caltrans characterizes an increase in traffic noise of 3 dBA as barely perceptible.

Construction Vibration

The study area for evaluation of vibration impacts from construction encompasses the construction site and the nearest potentially affected sensitive receptors to that site. Vibration levels are predicted at various distances for equipment reasonably expected to be involved with demolition and construction activities and impacts to receptors assessed based on methodology and criteria established by Caltrans and FTA. Construction vibration impacts are analyzed in terms of the potential for Project-related vibrations to result in damage to nearby structures or buildings, based on thresholds established by Caltrans.[10] The Caltrans thresholds for potential architectural damage due to groundborne vibrations is 0.5 in/sec PPV for new residential structures and modern commercial buildings and 0.25 in/sec PPV for historic and older buildings. With respect to human annoyance, Caltrans considers vibrations of 0.04 in/sec PPV to be strongly perceptible, and this is the threshold applied for vibration impacts during sensitive nighttime hours when people are likely to be sleeping. The threshold for vibration-sensitive equipment is 65 VdB, as published by FTA and based on the root mean square velocity amplitude.[11]

Operational Noise

The Project's operational activities would be minimal, consisting of occasional levee maintenance and operation on the new pump station in the Tech Campus Reach. The following analysis assesses the potential noise impact on the degree feasible based on the specifications provided and compares it to the applicable noise standard for noise generated by pump stations for the nearest receptors, which are located in the city of Menlo Park. Specifically, the City of Menlo Park Ordinance Code (chapter 8.06, Noise) restricts exterior noise levels to 60 dBA during daytime hours and 50 dBA during nighttime hours for single-family residential uses.

Cumulative Impacts

Section 3.1.4, Approach to Cumulative Impacts Analysis and Cumulative Projects, describes the overall approach to the cumulative impact analysis for those topics using a list-based approach and summarizes past, present, and reasonably foreseeable future projects that could contribute to cumulative impacts. The

[10] Caltrans (California Department of Transportation), 2020. *Transportation and Construction Vibration Guidance Manual.* April 2020.

[11] FTA (Federal Transit Administration), 2018. *Transit Noise and Vibration Impact Assessment Manual*. September 2018.

cumulative impacts analysis for noise and vibration uses a list-based approach to analyze the effects of the Project in combination with other past, present, and probable future projects in the immediate vicinity.

Impacts and Mitigation Measures

Table 3.13-6 summarizes the impact conclusions presented in this section.

TABLE 3.13-6
NOISE AND VIBRATION IMPACT CONCLUSIONS

Impact	Level of Significance
Impact NOI-1: Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.	SUM
Impact NOI-2: Generation of excessive groundborne vibration or groundborne noise levels.	LTS
Impact NOI-3: For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels.	LTS
Impact C-NOI-1: The Project, in combination with past, present, and probable future projects in the Project area, would result in significant adverse impacts related to noise and vibration.	SUM

Notes: LTS = Less than Significant; SUM = Significant and Unavoidable despite Mitigation

Impact NOI-1: Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies. *(Significant and Unavoidable Despite mitigation)*

The Project would require the use of heavy-duty construction equipment in each reach and would generate truck trips on different roadways during different periods of the construction schedule (refer to Table 2-4 in Chapter 2, *Project Description*, for the anticipated Project construction schedule).

Equipment operating during demolition, pile installation, and grading would contribute to localized increases in noise levels (refer to Table 2-8 in Chapter 2, *Project Description*, for expected construction equipment). Construction activities would also involve the use of smaller power tools, generators, and other noise sources. The mix of equipment types would change throughout each construction stage, and construction noise levels at and near the Project sites would fluctuate depending on the type, number, and duration of use of the various pieces of construction equipment. Additionally, trucks would travel on local roads during construction. The following discussion addresses the activities that would occur in each reach and the noise that would result.

Construction

South of Bay Road Reach

Table 3.13-7 shows the associated maximum noise levels at a reference distance of 50 feet. The total noise level increase at the nearest noise-sensitive receptor from the concurrent/overlapping operation of the two noisiest pieces of equipment was calculated using FHWA's RCNM. This model considers the usage percentages of specific equipment types to calculate the 1-hour L_{eq} from the given L_{max} values in Table 3.13-7.

TABLE 3.13-7
TYPICAL MAXIMUM NOISE LEVELS FROM CONSTRUCTION EQUIPMENT

Construction Equipment	Noise Level (dBA, L_{max} at 50 feet)
Impact and Vibratory Pile Drivers	101
Other Construction Equipment	85
Grader	85
Dozer	82
Excavator	81
Forklifts (gradall)	83
Loader	79
Tractors	84
Rollers	80
Backhoe	78
Cranes	81
Generators	81
Bore/Drill Rig	84
Pavers	77

NOTES: dBA = A-weighted decibels; L_{max} = maximum, instantaneous noise level experienced during a given period of time
Noise levels are maximum field measured values at 50 feet as reported from multiple samples.

SOURCE: FHWA (Federal Highway Administration), 2006. *Roadway Construction Noise Model User's Guide*.

Table 3.13-8 presents the results of the RCNM modeling for construction in the South of Bay Road Reach, showing predicted noise levels at the nearest sensitive land use. The closest noise-sensitive receptors to the South of Bay Road Reach, where pile driving would occur for the construction of the levee, are residences on Runnymede Street approximately 45 feet to the west (refer to Table 3.13-2 for a list of sensitive receptors). Installation of sheet piles would likely be the noisiest activity occurring within the South of Bay Road Reach.

Noise at the nearest receptor from sheet pile driving activities would be 95 dBA, which is above FTA's daytime criterion of 90 dBA L_{eq} for residential uses (Table 3.13-8). This predicted noise level would also represent an increase of more than 10 dBA over existing daytime ambient levels at this receptor. Sheet pile driving along this reach is predicted to occur for approximately 25 workdays for the 1,000-foot segment that extends from Cypress Street to Runnymede Street, which is adjacent to residential land uses and East Palo Alto Charter School. There would be temporary sheet pile installations for one 25-workday period and, several months later, permanent sheet piles would be installed over a similar duration. Therefore, while the duration of activity proximate to any given receptor would be temporary, given that the quantitative criterion would be exceeded and pile driving in proximity to receptors would occur for more than 2 work weeks, construction noise from pile driving would result in a potentially significant impact.

TABLE 3.13-8
DAYTIME NOISE LEVELS FROM CONSTRUCTION IN THE SOUTH OF BAY ROAD REACH

Representative Receptor	Existing Daytime Noise Level (dBA L_{eq})	Loudest Two Noise Sources	Reference Noise Level (dBA)[a]	Distance to Receptor (feet)[b]	Usage Factor	Adjusted L_{eq} Level Contribution (dBA)[c]	Exceed 90 dBA L_{eq} Daytime Standard?	Sum of Construction Noise Level and Existing (dBA)[d]	Increase over Existing Noise Level (dBA)
Pile Driving of Sheet Piles									
Runnymede Street Residences	–	Impact Pile Driver	101	45	20%	95	Yes	NA	NA
	–	Forklift	83	45	40%	80	No	NA	NA
	59	Combined Total	NA	45	NA	95	Yes	95	+36
Demolition									
Runnymede Street Residences	–	Roto Miller	85	60	50%	80	No	NA	NA
	–	Grader	85	60	40%	79	No	NA	NA
	59	Combined Total	NA	60	NA	83	No	83	+24
Grading									
Runnymede Street Residences	–	Tractor	84	60	40%	78	No	NA	NA
	–	Grader	85	60	40%	79	No	NA	NA
	59	Combined Total	NA	60	NA	82	No	82	+23

NOTES: dBA = A-weighted decibels; L_{eq} = equivalent sound level; NA = not applicable

a. The instantaneous maximum noise level (L_{max}) at 50 feet.
b. Distance between the approximate location of equipment and the property line of the sensitive receptor.
c. The L_{eq} level is adjusted for distance and percentage of usage.
d. This resultant noise level is the logarithmic sum of the existing noise level with the contribution of the construction activity.

SOURCES: FHWA (Federal Highway Administration), 2006. *Roadway Construction Noise Model User's Guide*; data compiled by Environmental Science Associates in 2025 (see Appendix NOI).

Additionally, the loudest construction noise would be generated by the demolition and grading phases. Therefore, the assessment of construction noise impacts focuses on the pile driving, demolition, and grading phases. Demolition and grading would occur as close as approximately 60 feet east of existing residences on Runnymede Street in the city of East Palo Alto. As indicated in Table 3.13-8, noise at the nearest receptor from the demolition and grading would be 83 dBA and 82 dBA, respectively, which is less than FTA's daytime criterion of 90 dBA L_{eq} for residential uses. However, the predicted noise levels would represent an increase of more than 10 dBA over existing daytime ambient levels at this receptor. The duration of these phases would also extend for several weeks in proximity to the same receptors.

Overall, the daytime construction noise at the South of Bay Road Reach would create a substantial increase in ambient noise, resulting in a potentially significant impact. **Mitigation Measure NOI-1** (presented at the end of this impact analysis) would be implemented to reduce potential construction noise by employing site-specific noise attenuation measures identified in a Noise Control Plan. Although implementation of the Noise Control Plan is expected to reduce demolition and grading noise by up to 10 dBA to 73 dBA, feasible alternative locations and/or methods for the driving of sheet piles necessary

for the Project are not available. Therefore, even with implementation of Mitigation Measure NOI-1, the impact would remain **significant and unavoidable despite mitigation**.

North of Bay Road Reach

Table 3.13-9 presents the results of the RCNM modeling for construction in the North of Bay Road Reach, showing predicted noise levels at the nearest sensitive land use. Construction noise generated during the demolition and grading phases would be located as close as approximately 90 feet east of existing residences on Illinois Street in the city of East Palo Alto (no nearby sensitive receptors in the portion of the reach are in Menlo Park). As shown in Table 3.13-9, noise at the nearest receptor during the demolition and grading phases would be 79 dBA, which is less than FTA's daytime criterion of 90 dBA L_{eq} for residential uses. However, this predicted noise level would represent an increase of more than 10 dBA over existing daytime ambient levels at this receptor.

Although daytime construction noise levels would be below the FTA's daytime criteria of 90 dBA Leq for residential uses, the impact with respect to daytime construction noise resulting in a substantial increase in ambient noise is considered to be potentially significant. Mitigation Measure NOI-1 would be implemented to reduce potential construction noise by employing site-specific noise attenuation measures identified in a Noise Control Plan. With implementation of Mitigation Measure NOI-1, construction noise would be reduced to approximately 69 dBA, and the impact would be **less than significant with mitigation**.

TABLE 3.13-9
DAYTIME NOISE LEVELS FROM CONSTRUCTION IN THE NORTH OF BAY ROAD REACH

Representative Receptor	Existing Daytime Noise Level (dBA L_{eq})	Loudest Two Noise Sources	Reference Noise Level (dBA)[a]	Distance to Receptor (feet)[b]	Usage Factor	Adjusted L_{eq} Level Contribution (dBA)[c]	Exceed 90 dBA L_{eq} Daytime Standard?	Sum of Construction Noise Level and Existing (dBA)[d]	Increase over Existing Noise Level (dBA)
Demolition									
Illinois Street Residences	–	Roto Miller	85	90	50%	77	No	NA	NA
	–	Tractor	84	90	40%	75	No	NA	NA
	59	Combined Total	NA	90	NA	79	No	79	+20
Grading									
Illinois Street Residences	–	Tractor	84	90	40%	75	No	NA	NA
	–	Grader	85	90	40%	76	No	NA	NA
	59	Combined Total	NA	90	NA	79	No	79	+20

NOTES: dBA = A-weighted decibels; L_{eq} = equivalent sound level; NA = not applicable

a. The instantaneous maximum noise level (L_{max}) at 50 feet.
b. Distance between the approximate location of equipment and the property line of the sensitive receptor.
c. The Leq level is adjusted for distance and percentage of usage.
d. This resultant noise level is the logarithmic sum of the existing noise level with the contribution of the construction activity.

SOURCES: FHWA (Federal Highway Administration), 2006. *Roadway Construction Noise Model User's Guide*; data compiled by Environmental Science Associates in 2025 (see Appendix NOI).

Dumbarton Approach Reach

Table 3.13-10 presents the results of the RCNM modeling for construction in the Dumbarton Approach Reach, showing predicted noise levels at the nearest sensitive land use. Construction noise would be generated by the site preparation, grading, and closeout phases. These areas would be located as close as approximately 530 feet northeast of existing residences on Fordham Street in the city of East Palo Alto. As indicated in Table 3.13-10, noise at the nearest receptor from the site preparation, grading, and closeout phases would be 62 dBA, 63 dBA, and 64 dBA, respectively, which is less than FTA's daytime criterion of 90 dBA L_{eq} for residential uses. Additionally, as shown in Table 3.13-10, this would not result in an increase of more than 10 dBA over existing daytime ambient levels. Therefore, the impact related to increased noise levels during construction for the Dumbarton Approach Reach would be **less than significant**.

TABLE 3.13-10
DAYTIME NOISE LEVELS FROM CONSTRUCTION IN THE DUMBARTON APPROACH REACH

Representative Receptor	Existing Daytime Noise Level (dBA L_{eq})	Loudest Two Noise Sources	Reference Noise Level (dBA)[a]	Distance to Receptor (feet)[b]	Usage Factor	Adjusted L_{eq} Level Contribution (dBA)[c]	Exceed 90 dBA L_{eq} Daytime Standard?	Sum of Construction Noise Level and Existing (dBA)[d]	Increase over Existing Noise Level (dBA)
Site Preparation									
Fordham Street Residences	–	Forklift	83	530	40%	59	No	NA	NA
Fordham Street Residences	–	Tractor	84	530	40%	60	No	NA	NA
Fordham Street Residences	59	Combined Total	NA	530	NA	62	No	64	+5
Grading									
Fordham Street Residences	–	Tractor	84	530	40%	60	No	NA	NA
Fordham Street Residences	–	Grader	85	530	40%	61	No	NA	NA
Fordham Street Residences	59	Combined Total	NA	530	NA	63	No	64	+6
Closeout									
Fordham Street Residences	–	Tractor	84	530	40%	60	No	NA	NA
Fordham Street Residences	–	Other	85	530	50%	62	No	NA	NA
Fordham Street Residences	59	Combined Total	NA	530	NA	64	No	65	+6

NOTES: dBA = A-weighted decibels; L_{eq} = equivalent sound level; NA = not applicable

a. The instantaneous maximum noise level (L_{max}) at 50 feet.
b. Distance between the approximate location of equipment and the property line of the sensitive receptor.
c. The L_{eq} level is adjusted for distance and percentage of usage.
d. This resultant noise level is the logarithmic sum of the existing noise level with the contribution of the construction activity.

SOURCES: FHWA (Federal Highway Administration), 2006. *Roadway Construction Noise Model User's Guide*; data compiled by Environmental Science Associates in 2025 (see Appendix NOI).

Substation and Marsh Restoration Reach

As indicated in Table 3.13-2, no sensitive receptors are within 1,000 feet of proposed construction activities within the Substation and Marsh Restoration Reach. Because the nearest residential receptors are over 1,000 feet away, construction noise levels at those receptors would not result in a substantial temporary increase in ambient noise levels. Therefore, the construction noise impact within the Substation and Marsh Restoration Reach would be **less than significant.**

Tech Campus Reach

Table 3.13-11 presents the results of the RCNM modeling for construction in the Tech Campus Reach, showing predicted noise levels at the nearest sensitive land use. Construction noise generated by grading and closeout activities would be as close as approximately 960 feet from the 777 Hamilton Apartments in the city of Menlo Park. Activities during the site preparation phase would be similar to, or less than, those associated with grading phase. As indicated in Table 3.13-11, noise at the nearest receptor during grading and closeout activities would be 69 dBA and 58 dBA, which is less than FTA's daytime criterion of 90 dBA L_{eq} for residential uses. Additionally, as shown in Table 3.13-11, this would result in an increase of more than 10 dBA over existing daytime ambient levels for the grading phase.

TABLE 3.13-11
DAYTIME NOISE LEVELS FROM CONSTRUCTION IN THE TECH CAMPUS REACH

Representative Receptor	Existing Daytime Noise Level (dBA L_{eq})	Loudest Two Noise Sources	Reference Noise Level (dBA)[a]	Distance to Receptor (feet)[b]	Usage Factor	Adjusted L_{eq} Level Contribution (dBA)[c]	Exceed 90 dBA L_{eq} Daytime Standard?	Sum of Construction Noise Level and Existing (dBA)[d]	Increase over Existing Noise Level (dBA)
Grading									
777 Hamilton Apartments	–	Grader	85	960	40%	55	No	NA	NA
	–	Impact Pile Driver	101	960	20%	69	No	NA	NA
	57	Combined Total	NA	**960**	NA	69	No	69	+12
Closeout									
777 Hamilton Apartments	–	Forklift	83	960	40%	54	No	NA	NA
	–	Other	85	960	50%	56	No	NA	NA
	57	Combined Total	NA	**960**	NA	58	No	61	+4

NOTES: dBA = A-weighted decibels; L_{eq} = equivalent sound level; NA = not applicable

a. The instantaneous maximum noise level (L_{max}) at 50 feet.
b. Distance between the approximate location of equipment and the property line of the sensitive receptor.
c. The L_{eq} level is adjusted for distance and percentage of usage.
d. This resultant noise level is the logarithmic sum of the existing noise level with the contribution of the construction activity.

SOURCES: FHWA (Federal Highway Administration), 2006. *Roadway Construction Noise Model User's Guide*; data compiled by Environmental Science Associates in 2025 (see Appendix NOI).

Overall, the daytime construction noise at the Tech Campus Reach would create a substantial increase in ambient noise, resulting in a potentially significant impact. **Mitigation Measure NOI-1** (presented at the end of this impact analysis) would be implemented to reduce construction noise by employing site-specific noise attenuation measures identified in a Noise Control Plan. Although implementation of the

Noise Control Plan is expected to reduce noise from grading by up to 10 dBA, feasible alternative locations and/or methods for the driving of sheet piles necessary for the Project are not available. Therefore, even with implementation of Mitigation Measure NOI-1, the impact would remain **significant and unavoidable despite mitigation**.

Bayfront Expressway Reach

Table 3.13-12 presents the results of the RCNM modeling for construction in the Bayfront Expressway Reach, showing predicted noise levels at the nearest sensitive land use. Construction noise generated by the grading and closeout phases would be as close as approximately 840 feet from the 777 Hamilton Apartments in the city of Menlo Park. Activities during the site preparation phase would be similar to, or less than, those associated with grading phase. As indicated in Table 3.13-12, noise at the nearest receptor to grading and closeout would be 59 dBA, which is less than FTA's daytime criterion of 90 dBA L_{eq} for residential uses. Additionally, as shown in Table 3.13-12, this would not result in increase of more than 10 dBA over existing daytime ambient levels. Therefore, the impact related to increased noise levels during construction within the Bayfront Expressway Reach would be **less than significant**. While the impact related to residents would be less than significant, measures included in Mitigation Measure NOI-1 may be implemented to reduce the potential for construction activities to disturb recreational users at Bedwell Bayfront Park, which is adjacent to the northwest terminus of the alignment.

TABLE 3.13-12
DAYTIME NOISE LEVELS FROM CONSTRUCTION IN THE BAYFRONT EXPRESSWAY REACH

Representative Receptor	Existing Daytime Noise Level (dBA L_{eq})	Loudest Two Noise Sources	Reference Noise Level (dBA)[a]	Distance to Receptor (feet)[b]	Usage Factor	Adjusted L_{eq} Level Contribution (dBA)[c]	Exceed 90 dBA L_{eq} Daytime Standard?	Sum of Construction Noise Level and Existing (dBA)[d]	Increase over Existing Noise Level (dBA)
Grading									
777 Hamilton Apartments	–	Grader	85	840	40%	57	No	NA	NA
	–	Tractor	84	840	40%	56	No	NA	NA
	57	Combined Total	NA	**840**	NA	59	No	61	+4
Closeout									
777 Hamilton Apartments	–	Forklift	83	840	40%	55	No	NA	NA
	–	Other	85	840	50%	58	No	NA	NA
	57	Combined Total	NA	**840**	NA	59	No	61	+4

NOTES: dBA = A-weighted decibels; L_{eq} = equivalent sound level; NA = not applicable

a. The instantaneous maximum noise level (L_{max}) at 50 feet.
b. Distance between the approximate location of equipment and the property line of the sensitive receptor.
c. The L_{eq} level is adjusted for distance and percentage of usage.
d. This resultant noise level is the logarithmic sum of the existing noise level with the contribution of the construction activity.

SOURCES: FHWA (Federal Highway Administration), 2006. *Roadway Construction Noise Model User's Guide*; data compiled by Environmental Science Associates in 2025 (see Appendix NOI).

Bedwell Bayfront Park Reach

Table 3.13-13 presents the results of the RCNM modeling for construction in the Bedwell Bayfront Park Reach, showing predicted noise levels at the nearest sensitive land use. The closest noise-sensitive

receptors to the Bedwell Bayfront Park Reach is the ROEN Menlo Park Apartments, approximately 740 feet southwest of where pile driving would occur (refer to Table 3.13-2 for a list of sensitive receptors). Installation of sheet piles would likely be the noisiest activity for bridge construction.

As indicated in Table 3.13-13, noise at the nearest receptor from sheet pile driving activities would be 71 dBA, which is less than FTA's daytime criterion of 90 dBA L_{eq} for residential uses. However, this predicted noise level would represent an increase of more than 10 dBA over existing daytime ambient levels at this receptor.

Less intensive construction noise would be generated by the grading and structural sections phases, as close as approximately 600 feet from the ROEN Menlo Park Apartments. As indicated in Table 3.13-13, noise at the nearest receptor from both grading and structural sections phases would be 62 dBA, which is less than FTA's daytime criterion of 90 dBA L_{eq} for residential uses. However, this predicted noise level would represent an increase of more than 10 dBA over existing daytime ambient levels at this receptor.

Although daytime construction noise levels would be below the FTA's daytime criteria of 90 dBA Leq for residential uses, the impact with respect to daytime construction noise resulting in a substantial increase in ambient noise would be potentially significant. Mitigation Measure NOI-1 would be implemented to reduce potential construction noise by employing site-specific noise attenuation measures identified in a Noise Control Plan. With implementation of Mitigation Measure NOI-1, construction noise would be reduced to approximately 52 dBA for grading activity; because these measures are not available for pile driving, the impact remain **significant and unavoidable despite mitigation**.

TABLE 3.13-13
DAYTIME NOISE LEVELS FROM CONSTRUCTION IN THE BEDWELL BAYFRONT PARK REACH

Representative Receptor	Existing Daytime Noise Level (dBA L_{eq})	Loudest Two Noise Sources	Reference Noise Level (dBA)[a]	Distance to Receptor (feet)[b]	Usage Factor	Adjusted L_{eq} Level Contribution (dBA)[c]	Exceed 90 dBA L_{eq} Daytime Standard?	Sum of Construction Noise Level and Existing (dBA)[d]	Increase over Existing Noise Level (dBA)
Pile Driving for Bridge									
ROEN Menlo Park Apartments	–	Impact Pile Driver	101	740	20%	71	No	NA	NA
	–	Tractor	84	740	40%	57	No	NA	NA
	45	Combined Total	NA	740	NA	71	No	71	+26
Grading/Structural Sections									
ROEN Menlo Park Apartments	–	Tractor	84	600	40%	58	No	NA	NA
	–	Grader	85	600	40%	59	No	NA	NA
	45	Combined Total	NA	600	NA	62	No	62	+17

NOTES: dBA = A-weighted decibels; L_{eq} = equivalent sound level; NA = not applicable

a. The instantaneous maximum noise level (L_{max}) at 50 feet.
b. Distance between the approximate location of equipment and the property line of the sensitive receptor.
c. The L_{eq} level is adjusted for distance and percentage of usage.
d. This resultant noise level is the logarithmic sum of the existing noise level with the contribution of the construction activity.

SOURCES: FHWA (Federal Highway Administration), 2006. *Roadway Construction Noise Model User's Guide*; data compiled by Environmental Science Associates in 2025 (see Appendix NOI).

Marsh Road Reach

Table 3.13-14 presents the results of the RCNM modeling for construction in the Marsh Road Reach, showing predicted noise levels at the nearest sensitive land use. Construction noise generated during the grading and closeout phases would be located as close as approximately 150 feet from the Anton Menlo Apartments in Menlo Park and 220 feet from Bayshore Villa Mobile Home Park in Redwood City. Activities during the site preparation phase would be similar to, or less intensive than, those associated with grading phase. As indicated in Table 3.13-14, noise at the nearest receptor from both grading and closeout activities would be 74 dBA, which is less than FTA's daytime criterion of 90 dBA L_{eq} for residential uses. However, this predicted noise level would represent an increase of more than 10 dBA over existing daytime ambient levels at this receptor.

TABLE 3.13-14
DAYTIME NOISE LEVELS FROM CONSTRUCTION IN THE MARSH ROAD REACH

Representative Receptor	Existing Daytime Noise Level (dBA L_{eq})	Loudest Two Noise Sources	Reference Noise Level (dBA)[a]	Distance to Receptor (feet)[b]	Usage Factor	Adjusted L_{eq} Level Contribution (dBA)[c]	Exceed 90 dBA L_{eq} Daytime Standard?	Sum of Construction Noise Level and Existing (dBA)[d]	Increase over Existing Noise Level (dBA)
Grading/Structural Sections									
Anton Menlo Apartments	–	Tractor	84	150	40%	71	No	NA	NA
	–	Grader	85	150	40%	72	No	NA	NA
	45	Combined Total	NA	150	NA	74	No	74	+29
Bayshore Villa	–	Tractor	84	220	40%	67	No	NA	NA
	–	Grader	85	220	40%	68	No	NA	NA
	50	Combined Total	NA	220	NA	71	No	70	+21
Closeout									
Anton Menlo Apartments	–	Forklift	83	150	40%	70	No	NA	NA
	–	Other Construction Equipment	85	150	50%	72	No	NA	NA
	45	Combined Total	NA	150	NA	74	No	74	+29
Bayshore Villa	–	Forklift	83	220	40%	67	No	NA	NA
	–	Other Construction Equipment	85	220	50%	69	No	NA	NA
	50	Combined Total	NA	220	NA	71	No	70	+21

NOTES: dBA = A-weighted decibels; L_{eq} = equivalent sound level; NA = not applicable

a. The instantaneous maximum noise level (L_{max}) at 50 feet.
b. Distance between the approximate location of equipment and the property line of the sensitive receptor.
c. The L_{eq} level is adjusted for distance and percentage of usage.
d. This resultant noise level is the logarithmic sum of the existing noise level with the contribution of the construction activity.

SOURCES: FHWA (Federal Highway Administration), 2006. *Roadway Construction Noise Model User's Guide*; data compiled by Environmental Science Associates in 2025 (see Appendix NOI).

Although daytime construction noise levels would be below the FTA's daytime criteria of 90 dBA Leq for residential uses, the impact with respect to daytime construction noise resulting in a substantial increase in ambient noise is considered potentially significant. Mitigation Measure NOI-1 would be implemented to reduce potential construction noise by employing site-specific noise attenuation measures identified in a Noise Control Plan. Implementation of Mitigation Measure NOI-1 would reduce construction noise to approximately 64 dBA, which would still be 19 dBA over existing daytime ambient levels at the nearest sensitive receptor. Because the predicted noise level would represent an increase of more than 10 dBA even with implementation of Mitigation Measure NOI-1, the impact would remain **significant and unavoidable despite mitigation**.

Habitat Improvements

Ponds R1 and R2. No sensitive receptors are within 1,000 feet of proposed construction activities associated with tidal marsh restoration in Ponds R1 and R2. Because the nearest residential receptors are over 1,000 feet away, construction noise levels at the receptors on Tulane Avenue would not result in a substantial temporary increase in ambient noise levels. Therefore, construction noise impacts from habitat improvements in Ponds R1 and R2 would be **less than significant**.

Ponds SF2 and R3. As indicated in Table 3.13-2, sensitive receptors are approximately 340 feet from western snowy plover breeding habitat enhancements in Pond SF2 and approximately 900 feet from enhancements in Pond R3. No dredging would occur in SF2 or R3 and the only construction activity in these areas would be related to site preparation and grading. **Table 3.13-15** presents the results of the RCNM modeling for habitat restoration construction in SF2 and R3, showing predicted noise levels at the nearest sensitive land use. As indicated in Table 3.13-15, noise at the nearest receptor from site preparation and grading activities would be 57 dBA and 65 dBA, which is less than FTA's daytime criterion of 90 dBA L_{eq} for residential uses. Additionally, this predicted noise level would represent an increase of less than 10 dBA over existing daytime ambient levels at these receptors. Therefore, construction noise impacts associated with habitat restoration in Ponds SF2 and R3 would be **less than significant**.

Roadway Noise from Construction Trucks

Construction activities would generate new truck trips to and from the Project sites. For the South of Bay Road and the North of Bay Road reaches, trucks would use local roadways within the city of East Palo Alto with residential uses that could be adversely affected by a substantial increase in truck traffic. The Substation and Marsh Restoration Reach, Tech Campus Reach, Bayfront Reach, and Marsh Road Reach would use Willow Road (State Route [SR] 114), which has adjacent residential uses. Most of the construction sites would also use SR 84 or Marsh Road, which would not result in a substantial increase in hourly truck noise as these roadways generally do not have residential uses.

TABLE 3.13-15
DAYTIME NOISE LEVELS FROM HABITAT IMPROVEMENT CONSTRUCTION IN SF2 AND R3

Representative Receptor	Existing Daytime Noise Level (dBA L_{eq})	Loudest Two Noise Sources	Reference Noise Level (dBA)[a]	Distance to Receptor (feet)[b]	Usage Factor	Adjusted L_{eq} Level Contribution (dBA)[c]	Exceed 90 dBA L_{eq} Daytime Standard?	Sum of Construction Noise Level and Existing (dBA)[d]	Increase over Existing Noise Level (dBA)
Site Preparation/Grading									
777 Hamilton Apartments	–	Tractor	84	900	40%	52	No	NA	NA
	–	Excavator	85	900	40%	55	No	NA	NA
	57	Combined Total	NA	900	NA	57	No	60	+3
Tulane Avenue Residences	–	Tractor	84	340	40%	63	No	NA	NA
	–	Grader	85	340	40%	60	No	NA	NA
	59	Combined Total	NA	340	NA	65	No	66	+7

NOTES: dBA = A-weighted decibels; L_{eq} = equivalent sound level; NA = not applicable

a. The instantaneous maximum noise level (Lmax) at 50 feet.
b. Distance between the approximate location of equipment and the property line of the sensitive receptor.
c. The Leq level is adjusted for distance and percentage of usage.
d. This resultant noise level is the logarithmic sum of the existing noise level with the contribution of the construction activity.

SOURCES: FHWA (Federal Highway Administration), 2006. *Roadway Construction Noise Model User's Guide*; data compiled by Environmental Science Associates in 2025 (see Appendix NOI).

Haul and vendor trucks for the South of Bay Road Reach are anticipated to use O'Conner, Cypress, and Weeks streets to access the Project site via Clark Avenue, Donohoe Street, and University Avenue (SR 109). The peak daily number of truck trips are expected to occur during the site prep/mobilization phase, amounting to approximately 23 one-way truck trips per day. Distributed over an 9-hour workday, this would reflect an average increase of approximately three truck trips every hour. The City of East Palo Alto General Plan Safety and Noise Element shows existing vehicle noise levels of up to 60 dBA on these local streets. An addition of three truck trips every hour on these roadways would generate a noise level of approximately 53 dBA at a distance of 30 feet from the roadway, and increase existing vehicle noise levels from 60 dBA to 61 dBA, an increase of 1 dBA (refer to Appendix NOI for traffic noise calculations). Such an increase would be less than a 3 dBA increase that Caltrans associates with a barely perceptible noise increase.

Haul and vendor trucks for the Substation and Marsh Restoration Reach, Tech Campus Reach, Bayfront Reach, and Marsh Road Reach would use Willow Road. Based on estimated percentages of travel on Willow Road for each reach, the peak daily number of truck trips are expected to occur during the site preparation/mobilization phase of the Tech Campus Reach, amounting to approximately 144 one-way truck trips per day. Distributed over an 9-hour workday, this would reflect an average increase of approximately 16 truck trips per hour, which would result in a noise level of approximately 62 dBA at a distance of 30 feet from the roadway. The City of East Palo Alto General Plan Safety and Noise Element shows existing noise levels along Willow Road to be 75 dB or more from Bayfront Expressway to U.S. 101. An additional contribution of 62 dBA to an existing noise level of 75 dBA would change total traffic noise levels by 0.2 dBA, which would be less than a 3 dBA increase that Caltrans associates with a barely perceptible noise increase.

Haul and vendor trucks for the North of Bay Road Reach would generally use Bay Road and University Avenue to access the Project sites via local roadways, potentially Notre Dame Avenue, Purdue Avenue, and Fordham Street. The peak daily number of truck trips are expected to occur during the grading phase, amounting to approximately 122 one-way truck trips per day. Distributed over an 9-hour workday, this would reflect an average increase of approximately 14 truck trips per hour. The City of East Palo Alto General Plan Safety and Noise Element shows existing noise levels along Bay Road to be 70 dBA or more. On Bay Road, the addition of 14 truck trips per hour would generate a noise level of 61 dBA at 30 feet from the roadway and result in total vehicle noise levels of 71 dBA, an increase of 1 dBA, which would not exceed the 3 dBA increase that Caltrans associates with a barely perceptible noise increase. The City of East Palo Alto General Plan Safety and Noise Element shows existing noise levels on Purdue Avenue range from 65 dBA near University Avenue to 60 dBA near Illinois Street. On Purdue Avenue and similar residential streets with a slower speed limit, the addition of 14 truck trips per hour would generate a noise level of 59 dBA 30 feet from the roadway and result in total vehicle noise levels between 66 dBA (near University Avenue) and 63 dBA (near Illinois Avenue). Thus, the addition of haul and vendor truck trips to Purdue Avenue and other similar roadways could increase total traffic noise levels between 1 dBA and 3 dBA, which would be equal to, but not exceed the 3 dBA increase that Caltrans associates with a barely perceptible noise increase. However, due to the local nature of these roadways and potential constraints that may limit the amount of trucks that could access the North of Bay Road Reach at the same time (e.g., limited work areas), it is possible that queuing of haul trucks could occur on Purdue Avenue, which could result in engine and traffic-related noise levels that would be more than 3 dBA above the ambient noise environment. Mitigation Measure NOI-1 would limit and reduce construction truck traffic noise levels on local, non-arterial roadways; however, the actual increase in vendor and haul traffic noise levels on local roads would depend on the routes developed by the Traffic Control Plan required by Mitigation Measure TRA-1, the amount and duration of potential queuing that occurs on local roads (if any), and the time of day these trips occur. Because local construction traffic may temporarily increase noise levels by more than 3 dBA at sensitive receptor locations in the North of Bay Road Reach even with implementation of Mitigation Measure NOI-1, the impact would remain **significant and unavoidable** despite mitigation.

Mitigation Measure NOI-1: Construction Noise Control Plan

This measure applies to construction of the South of Bay Road, North of Bay Road, Tech Campus, Bayfront Expressway, Bedwell Bayfront Park, and Marsh Road reaches. The Project Proponent or its contractors shall develop and implement a Construction Noise Control Plan(s) that shall require implementation of specific noise attenuation measures during construction of these reaches to reduce the generation of construction noise. The Noise Control Plan(s) shall be submitted for review and approval by the City of East Palo Alto Community & Economic Development, City of Menlo Park Community Development Department, and City of Redwood City Community Development Department, as applicable. The Construction Noise Control Plan shall include, but not be limited to, the following measures:

- Designation of an onsite construction noise manager responsible for receiving and investigating construction noise complaints;
- Notification of the noise sensitive receptors identified in Table 3.13-2, as well as noise-sensitive receptors along local road use for haul truck access, at least 30 days prior to the start of construction activities. This notice shall provide contact information for the designated

onsite construction noise manager responsible for receiving and investigating construction noise complaints;

- A procedure for notifying the appropriate planning or public works department of any noise complaints within 1 week of receiving a complaint;
- A description of the measures that will be implemented to reduce construction noise levels, including, but not limited to:
    - Equipment and trucks used for construction shall use the best available noise control techniques (e.g., improved mufflers, equipment redesign, use of intake silencers, ducts, engine enclosures, and acoustically attenuating shields or shrouds).
    - Impact tools (e.g., jack hammers, pavement breakers, and rock drills) used for construction shall be hydraulically or electrically powered wherever possible to avoid noise associated with compressed air exhaust from pneumatically powered tools. Where use of pneumatic tools is unavoidable, an exhaust muffler on the compressed air exhaust shall be used; this muffler can lower noise levels from the exhaust by up to about 10 dBA. External jackets on the tools themselves shall be used where feasible; this could achieve a reduction of 5 dBA. Quieter procedures, such as use of drills rather than impact tools, shall be used where feasible.
    - Stationary noise sources shall be located as far from adjacent receptors as possible, and shall be muffled and shielded from sensitive residential receptors by temporary barriers or enclosures.
    - Off-site truck queuing and staging on residential roads shall be prohibited unless specifically authorized by the Project's traffic control plan(s) required under Mitigation Measure TRA-1. All on-site queueing and staging of trucks shall occur as far from sensitive residential receptors as possible.

Operation and Maintenance

During operation and maintenance, routine inspections of the shoreline protection facilities, operating flood gates, managing interior drainage, and maintaining the San Francisco Bay Trail would be conducted by member agencies.

Operation and maintenance activities would result in an estimated two truck trips per month, which would be distributed along local roadways to U.S. 101 and SR 84. Using the algorithms of the FHWA traffic noise model, these truck trips would contribute approximately 62 dBA to the hourly noise level along the local roadways used to access the locations. This relatively minor noise contribution would not be expected to substantially increase roadside noise levels, given the presence of the adjacent freeway. Because of the limited number of expected daily truck trips, the impact related to an increase in ambient noise levels during operation and maintenance would be **less than significant**.

Shoreline Protection

Levee maintenance would generally include vegetation control. Construction equipment would be dispersed in various areas of the site for vegetation maintenance, would not consist of heavy machinery, and would be used for a short intermittent period (annual mowing would likely occur over 2 days per reach). Therefore, there would be no substantial increase in noise from levee maintenance.

This analysis conservatively assumes a 400-horsepower pump at the new pump station proposed within the Tech Campus Reach. Pumps at these horsepower ratings can generate noise levels of 96 dBA at 3 feet[12], which corresponds to a noise level of 78 dBA at 25 feet. The new pump would be located approximately 960 feet from the nearest sensitive receptor on 777 Hamilton Residences in the city of Menlo Park. The calculated noise level of the new pump at the nearest receptor would be 46 dBA. Additionally, it is assumed that the new pump would be enclosed within a building that would provide additional noise attenuation, and therefore would not be expected to have a perceptible noise impact. The pump would not be expected to exceed the 60 dBA L_{eq} daytime and 50 dBA L_{eq} nighttime noise standards for stationary sources in the City of Menlo Park Municipal Code section 8.06.030, which would be applicable to sources located within the city of Menlo Park.[13] Therefore, the noise increase associated with operation and maintenance of the new shoreline protection features would not result in a substantial increase in operational noise, and the impact would be **less than significant**.

Impact NOI-2: Generation of excessive groundborne vibration or groundborne noise levels. ***(Less than Significant)***

A variety of construction activities can propagate groundborne vibration, such as using vibratory rollers for soil compaction and vibratory pile drivers or hammers for temporary (water control) and/or permanent (installation of sheet pile floodwalls or flood gates) features.

As discussed under *Methodology*, the Caltrans thresholds for potential architectural damage due to groundborne vibrations is 0.5 in/sec PPV for new residential structures and modern commercial buildings and 0.25 in/sec PPV for historic and older buildings. No historic structures are located within the vicinity of the Project construction sites (refer to Section 3.4, Cultural Resources, for further details).

Groundborne vibration from Project pile driving, grading, excavation, compaction, and building construction could produce temporary vibration levels at nearby sensitive receptors and nearby structures. The extent to which these receptors and structures would be affected by groundborne vibration depends largely on soil conditions, building design and materials, construction techniques employed, distance from the construction site to the receptor and structure, and the age and condition of the structure.

Table 3.13-16 lists typical reference vibration levels for various pieces of construction equipment.

[12] Hoover and Keith, 2000. Noise Control for Buildings and Manufacturing Plants, Thirteenth Printing, 2000.

[13] City of Menlo Park, 1999. City of Menlo Park Municipal Code. Available online at www.codepublishing.com/CA/MenloPark/#!/html/MenloPark08/MenloPark0806.html.

TABLE 3.13-16
TYPICAL VIBRATION LEVELS FOR CONSTRUCTION ACTIVITY

Equipment	Estimated Peak Particle Velocity (inches per second)				
	At 25 Feet (reference)	At 50 Feet	At 75 Feet	At 100 Feet	At 170 Feet
Jackhammer	0.035	0.016	0.010	0.008	0.004
Loaded Truck	0.076	0.035	0.023	0.017	0.009
Drill Rig	0.089	0.041	0.027	0.019	0.011
Vibratory Roller	0.20	0.100	0.063	0.046	0.025
Vibratory Pile Driver	0.65	0.303	0.194	0.141	0.079

NOTE:
Dark-shaded areas indicate distances where vibration levels would exceed the criterion for conventional structures.
Lighter shaded areas indicate the distances at which the criterion for historic structures or buildings to be structurally weakened would be exceeded.
SOURCES: Caltrans (California Department of Transportation), 2020. Transportation and Construction Vibration Guidance Manual. April 2020; FTA (Federal Transit Administration), 2018. Transit Noise and Vibration Impact Assessment Manual. September 2018.

Table 3.13-16 identifies the types of equipment used during construction activities proposed for the Project that would generate vibration, along with their associated vibration levels at a reference distance of 25 feet and other distances out to 170 feet. Beyond 170 feet, vibration levels would be attenuated to less than 0.1 in/sec PPV and no vibration impacts are expected. Pile drivers are the equipment type that could generate the greatest vibration levels during construction. Based on the vibration velocities listed in Table 3.13-16, impact or vibratory pile driving occurring within approximately 150 feet of a historic building or structure would have the potential to damage the structure, but no historic structures are in the area. Approximately 150 feet is also the distance from residential land uses at which the adverse human reaction of 0.1 in/sec would start to be exceeded.

The likely use of a vibratory pile driver for the installation of temporary and permanent sheet piles along the South of Bay Road Reach would be expected to generate the highest vibration levels during Project construction. According to the Caltrans *Transportation and Construction Vibration Manual*, both impact pile driving and vibratory pile driving typically generate vibration levels of 0.65 inch/second PPV at a distance of 25 feet.[14] The closest existing offsite building to Project construction activities that would involve vibratory pile driving are residential structures on Runnymede Street, approximately 45 feet west of the South of Bay Road Reach. Residences would be exposed to a vibration level of 0.269 inch/second PPV, which is equivalent to 96 VdB. At this distance, vibration levels would be well below the building damage threshold (0.5 in/sec PPV) but would be above FTA's 80 VdB criterion for infrequent (construction-related) events at residential receptors during nighttime hours when people would be likely to be sleeping. However, pile driving activity would be limited to daytime hours and would not occur during periods when most people would reasonably be expected to be sleeping. Accordingly, Project impacts from a vibratory pile driver use on nearby buildings during construction of the South of Bay Road Reach would be **less than significant**.

[14] Caltrans (California Department of Transportation), 2020. *Transportation and Construction Vibration Guidance Manual*. April 2020.

Construction vibration for the other reaches where vibratory pile driving is anticipated would occur farther from existing buildings compared to the South of Bay Road Reach. Construction of shoreline protection features near SR 84 in some areas (e.g., levees in the Dumbarton Approach and Bayfront Expressway reaches) would occur less than 50 feet from the roadway structure. The floodwall beneath SR 84 in the Dumbarton Approach Reach could be as close as 10 feet from the SR 84 structure; in that reach the SFCJPA is proposing to implement a T wall consisting of precast concrete. Caltrans designed and constructed SR 84 to withstand substantially greater vibration levels than would be expected for a typical residence. The SFCJPA or its member agencies would obtain and comply with the terms of an encroachment permit for construction within the SR 84 right-of-way. Through the encroachment permit process, Caltrans would ensure that construction of shoreline protection features occurs in a manner consistent with its requirements. Therefore, the impact related to construction vibration would be **less than significant**.

Impact NOI-3: For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, would the Project expose people residing or working in the Project area to excessive noise levels. ***(Less than Significant)***

The end of the Palo Alto Airport runway is approximately 0.38 mile south of the South of Bay Road Reach, the nearest Project reach/component. The Federal Aviation Administration considers all land uses to be compatible when aircraft noise effects are less than 65 dB CNEL. The Project site is located outside the 65 dB CNEL noise contour of airport operations.[15] As such, no exceedances of Federal Aviation Administration criteria within the Project site would occur, and the impact would be considered **less than significant**.

Cumulative Impacts

Impact C-NOI-1: The Project, in combination with past, present, and probable future projects in the Project area, would result in significant adverse impacts related to noise and vibration. ***(Significant and Unavoidable Despite Mitigation)***

The geographic scope for cumulative effects on noise and vibrations consists of an area approximately 900 feet around the perimeter of the Project area. This distance was selected because typical construction noise levels can affect a sensitive receptor at 900 feet if there is a direct line-of-sight between a noise source and a noise receptor (i.e., a piece of equipment generating 85 dBA would attenuate to 60 dBA at 900 feet).

Table 3.1-2 in Section 3.1.5, Approach to Cumulative Impacts Analysis and Cumulative Projects, presents the list of reasonably foreseeable future projects in the vicinity that could contribute to

[15] Santa Clara County ALUC (Santa Clara County Airport Land Use Commission), 2020. *Palo Alto Airport Land Use Compatibility Plan.* Amended November 18, 2020. Available online at stgenpln.blob.core.windows.net/document/ALUC_PAO_CLUP.pdf.

cumulative construction noise. Many of these cumulative projects would be within 900 feet of construction areas for the Project (refer to Figure 3.1-1).

As discussed in Impact NOI-1, noise levels from construction and demolition activities under the Project at the closest receptors would exceed existing noise levels by more than 10 dBA, a significant impact. The duration of these impacts would be on the order of several weeks. Mitigation Measures NOI-1 (presented in Impact NOI-1) would be implemented to reduce potential construction noise by employing site-specific noise attenuation measures identified in a Noise Control Plan.

The righthand column of Table 3.1-2 indicates what was known regarding the construction schedules for cumulative projects at the time of this analysis. As indicated, the timing of construction for many of these cumulative projects is generally unknown and, therefore, has the potential to overlap with Project construction. Therefore, depending on the distance from Project construction activities, construction of other cumulative projects could further exacerbate significant noise levels. Although Mitigation Measure NOI-1 would be implemented during Project construction, as indicated in Impact NOI-1, impacts would remain significant and unavoidable. Therefore, for purposes of a conservative analysis, the impact of Project construction noise with that of other nearby projects is considered cumulatively considerable, and this impact is **significant and unavoidable despite mitigation**.

3.14 Population and Housing

This section evaluates the potential impacts of the SAFER Bay Project (Project) on population and housing resources. This section presents information about the environmental and regulatory setting and identifies the criteria used to evaluate the significance of potential impacts, the methods used in evaluating these impacts, and the results of the impact assessment. The Project evaluated is described in Chapter 2, *Project Description*, of this EIR.

3.14.1 Environmental Setting

The Project is located west of the San Francisco Bay within the cities of East Palo Alto, Menlo Park, and Redwood City in San Mateo County. The population and housing setting for the Project is discussed for San Mateo County and the San Francisco Bay Area (Bay Area). Refer to **Table 3.14-1** for 2020 population, household, and employment numbers and 2040 projections for San Mateo County and **Table 3.14-2** for 2020 population, household, and employment numbers and 2040 and 2050 projections for the Bay Area.

TABLE 3.14-1
POPULATION, HOUSEHOLD, AND EMPLOYMENT ACTUAL NUMBERS AND PROJECTIONS: SAN MATEO COUNTY

	U.S. Census Bureau 2020 Statistics	ABAG Projected 2040 Numbers	Change (2020–2040)	
			Net	Percent
Population	764,442	916,590	152,148	19.9%
Households	283,693	317,965	34,272	12.1%
Employment	413,687	446,040	32,353	7.8%

NOTES: ABAG = Association of Bay Area Governments

SOURCES: ABAG (Association of Bay Area Governments and Metropolitan Transportation Commission), 2018. *Plan Bay Area Projections 2040: A Companion to Plan Bay Area 2040*. Accessed December 2024; U.S. Census Bureau, 2020. *Selected Economic Characteristics*. Accessed December 2024; U.S. Census Bureau and U.S. Department of Commerce, 2020. *Profile of General Population and Housing Characteristics*. Accessed December 2024.

TABLE 3.14-2
POPULATION, HOUSEHOLD, AND EMPLOYMENT, ACTUAL NUMBERS AND PROJECTIONS: BAY AREA

	2020	2040	2050
Population	7.94 million	9.49 million	10.33 million
Households	2.76 million	3.71 million	4.04 million
Employment	4.08 million	5.05 million	5.41 million

NOTE: 2020 actual numbers, 2040 estimates, and 2050 estimates are from *Plan Bay Area 2050*.

SOURCE: ABAG (Association of Bay Governments and Metropolitan Transportation Commission), 2021. *Final Regional Housing Needs Allocation Plan: San Francisco Bay Area, 2023–2031*.

A variety of factors may influence new development or population growth in San Mateo County, which could include the region's economic conditions, adopted growth management policies of communities,

and the availability of adequate infrastructure (e.g., water service, sewer service and associated wastewater treatment capacity, public schools, and roadways).

3.14.2 Regulatory Framework

Unless otherwise noted, the Project would be consistent with applicable plans and regulations outlined in this section.

Federal and State

No federal or state laws or regulations related to population, housing, or employment are relevant for the Project.

Local

Association of Bay Area Governments and Metropolitan Transportation Commission

The California Department of Housing and Community Development is required to allocate the region's share of the statewide housing needs to local councils of government based on the State Department of Finance's population projections and regional population forecasts. The Association of Bay Area Governments (ABAG, the local council of government) and the Metropolitan Transportation Commission (MTC) are responsible for regional planning for the nine Bay Area counties. ABAG population projections for San Mateo County are presented in Table 3.4-1. ABAG and MTC regularly undertake planning efforts to implement state regulations and support its member agencies.

ABAG prepares a Regional Housing Needs Allocation (RHNA) Plan during each 8.5-year housing element cycle. The RHNA Plan is a key tool for ABAG and its member agencies to prepare for population and housing growth. The RHNA Plan assesses the region's future housing needs and defines the housing need allocation for each member agency. The most recently published (Sixth Cycle) RHNA Plan covered the period of 2023 to 2031 and indicated that the population of San Mateo County is expected to increase over this timeframe. On a regional level, the RHNA Plan determined that 441,176 housing units must be constructed in the Bay Area by 2031, with roughly 41 percent of those units affordable for lower income households, 17 percent for moderate income households, and 43 percent for above-moderate income households.[1]

Plan Bay Area

ABAG and MTC prepare and periodically update Plan Bay Area, a state-mandated, integrated long-range transportation and land use plan for the nine Bay Area counties. This Regional Transportation/Sustainable Communities Strategy Plan covers population, housing, and employment; discusses how the Bay Area will grow; and identifies strategies to enable a more sustainable, equitable, and economically vibrant future. The current version, *Plan Bay Area 2050*, was adopted in October 2021. The population, housing, and employment metrics for the Bay Area presented in Table 3.14-2 derive from *Plan Bay Area 2050*.

[1] ABAG (Association of Bay Area Governments), 2021. *Final Regional Housing Needs Allocation (RHNA) Plan: San Francisco Bay Area, 2023-2031*. Accessed January 2025.

General Plans

Although the general plans of East Palo Alto, Menlo Park, and Redwood City contain policies and objectives that guide land use decisions, including those related to housing and population growth, the Project does not propose the construction of new housing or create long-term job-generating uses; therefore, such policies are not directly applicable.

3.14.3 Impacts and Mitigation Measures

Significance Criteria

In accordance with CEQA, CEQA Guidelines (including Appendix G), relevant plans, policies, guidelines, and agency standards, the Project could have a significant impact if it were to do any of the following:

- Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure); or
- Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere.

The following topic is not analyzed further in this section for the reasons described below:

- **Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere**. As described in Chapter 2, Project Description, the Project would involve construction of shoreline protection, habitat improvement, and recreation features within the cities of East Palo Alto, Menlo Park, and Redwood City. Construction activities may occur within the vicinity of residential areas, but such activities would not involve demolition or relocation of housing, would be temporary, and would not displace residents. Thus, neither construction nor operation of the Project would displace any people or housing, nor would it necessitate construction of replacement housing elsewhere. Therefore, this criterion does not apply.

Methodology

The evaluation of the potential for Project construction to induce substantial unplanned population growth or create demand for additional housing in the area compares the number of construction jobs that would be generated to the size of the local and regional labor force. This comparison serves as a means to assess whether Project construction jobs are likely to be filled primarily by the local and regional labor force or to attract a substantial number of construction workers from outside the region. The evaluation of the potential for Project operation to induce substantial population growth or create demand for housing, either directly or indirectly, considers whether jobs associated with operations would attract workers from outside the area, among other considerations, as discussed below.

This Draft EIR evaluates proposed Project activities at a level of detail consistent with the best available information and specificity available at the time of EIR preparation. To the extent that activities necessary for Project completion are known, they are described in Chapter 2, *Project Description*, and evaluated in the impact analysis below. Key Project information needed for the evaluation of population and housing impacts includes estimates of construction workforce and proposed land uses. Additionally, the overall

need for the Project and the Project purpose and objectives detailed in Section 2.3, Project Need, Purpose, and Objectives, apply to both program and project-level reaches and are not expected to change as design progresses. Appendix INFRA identifies those changes to infrastructure and other encroachments that are evaluated programmatically. Although the analysis related to the Project's potential to induce substantial unplanned population growth or create demand for additional housing in the area is not expected to change with future design, the need for additional CEQA documentation would be evaluated once additional design details are developed as discussed in greater detail in Section 1.2.5, Program–Project EIR and Supplemental CEQA.

Impacts and Mitigation Measures

Table 3.14-3 summarizes population and housing-related impacts of the Project.

TABLE 3.14-3
POPULATION AND HOUSING IMPACT CONCLUSIONS

Impact	Level of Significance
Impact POP-1: Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure).	NI
Impact C-POP-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse impacts related to population and housing.	NI

Note: NI = No Impact

Impact POP-1: Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure). *(No Impact)*

Construction

A project could have a direct impact on population and housing resources if it were to induce substantial unplanned population growth in an area.

Project construction would occur in phases and would be implemented by member agencies that would determine the ultimate construction schedule. The preliminary schedule (Table 2-4 in Chapter 2, *Project Description*) indicates that construction would begin in early–mid 2029 and end in 2034.

Project construction would require a maximum of approximately 40 construction workers per day (refer to Table 2-7 for estimated worker information for each reach and construction phase). Given the size of the regional (county and Bay Area-wide) construction workforce relative to the number of workers needed to construct the Project, and considering the temporary nature of construction, construction workers would likely be drawn primarily from the local and regional construction workforce or would commute from elsewhere in the Bay Area, rather than relocating from more distant cities or towns.

As a result, Project construction would not be expected to induce unplanned population growth by attracting a substantial number of workers from outside the region to relocate to the area, and it would not generate demand for additional housing or other facilities and services associated with unplanned

population growth. Therefore, Project construction would not induce unplanned population growth in the area, either directly or indirectly, and **no impact** would occur.

Operation and Maintenance

As indicated in Section 2.7, Operation and Maintenance, the Project would not result in the creation of new permanent jobs. The Project would not include the development of new homes or businesses, so it would not directly induce permanent population growth in the Project area once operational. Therefore, there would be no *direct* population growth impacts associated with Project operation.

The Project could have an *indirect* impact on population growth if it were to generate growth or produce a concentration of people above what is assumed in local and regional land use plans, or what is assumed in projections made by regional planning authorities. As indicated in Chapter 2, *Project Description*, the purpose of the Project is to reduce risks to people, property, and infrastructure from current tidal flooding and projected sea level rise, among other objectives. The Project would construct shoreline protection infrastructure, potentially enabling future development in currently flood-prone areas. However, some land inward have deed restrictions prohibiting residential development, and other land surrounding the reaches are generally developed. Undeveloped areas (e.g., limited areas adjacent to the South of Bay Road and North of Bay Road reaches) are accounted for in regional and local growth planning documents like *Plan Bay Area 2050,* general plans, and other area plans, such as the Ravenswood Business District/4 Corners Specific Plan.[2] Construction of recreational features (i.e., replacing or expanding segments of the San Francisco Bay Trail) would not result in unplanned population growth due to the number of existing trails and other recreational features in the immediate vicinity (refer to Figure 2-5). Other factors such as the region's economic conditions, adopted growth management policies of communities, and the availability of adequate infrastructure are more closely tied to population growth.

In summary, Project operation would not directly or indirectly induce substantial unplanned population growth in an area, and **no impact** would occur.

Cumulative Impacts

Impact C-POP-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse impacts related to population and housing. *(No Impact)*

Pursuant to CEQA Guidelines section 15130(a)(1), an EIR should not discuss impacts that do not result in part from the Project evaluated in the EIR. As discussed previously, the Project would not directly or indirectly induce substantial unplanned population growth. Therefore, the Project would not contribute to cumulative substantial unplanned population growth, and **no impact** would occur.

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[2] City of East Palo Alto, 2024. *Ravenswood Business District/4 Corners Specific Plan*. Accessed January 2025.

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3.15 Recreation

This section evaluates the potential impacts of the SAFER Bay Project (Project) on existing recreational facilities and uses in the study area. For this assessment, *recreational resources* are generally defined as the natural and built features that people use for recreation (e.g., parks, trails, and playgrounds), including facilities associated with the recreational resources that enable recreation, such as parking facilities and restrooms. This section presents information about the environmental and regulatory setting and identifies the criteria used to evaluate the significance of potential impacts, the methods used in evaluating these impacts, and the results of the impact assessment. The Project evaluated is described in Chapter 2, *Project Description*, of this EIR.

3.15.1 Environmental Setting

Study Area for Recreational Resources

The geographic scope for the analysis of impacts on recreational resources encompasses recreational facilities (e.g., trails, parks, open space, and golf courses) within approximately 0.25 mile of Project components, as well as similar recreational facilities farther away that might be used by the same recreationists.

Recreational Resources in the Study Area

Table 3.15-1 identifies public recreational resources near Project components; refer to Figure 2-5 in Chapter 2, *Project Description*, for the locations of these resources. In addition to the recreational resources noted in Table 3.15-1, East Palo Alto has 7 parks, Menlo Park has 17 parks, and Redwood City has 30 parks that are available for public use.

3.15.2 Regulatory Framework

Unless otherwise noted, the Project would be consistent with applicable plans and regulations outlined in this section. Agencies with discretionary approval authority over the Project would make formal determinations of Project consistency with their respective plans and policies.

Federal

The Project includes actions within the Don Edwards San Francisco Bay National Wildlife Refuge (Refuge), which is owned by the federal government, managed by the U.S. Fish and Wildlife Service (USFWS), and governed by laws, executive orders, and directives that guide public use and recreation on National Wildlife Refuges. These orders and directives cover a range of topics, including administration, management, planning, special areas, and public use (e.g., fees, concessions, visitor protection, waterfowl hunting, fishing, trails, trapping, off-road vehicles, and motorboats). The following paragraphs summarize the federal plans and regulations that guide recreational use of federally owned and managed land.

Administration Act and Refuge Recreation Act of 1962

The Refuge Recreation Act of 1962, with subsequent amendments, authorizes the Secretary of the Interior to administer refuges for recreational use when such uses do not interfere with the primary purposes

(identified below for the Refuge) for which these areas were established.[1] The Act provides for public use fees and permits, and penalties for violation of regulations.

TABLE 3.15-1
NEARBY PARKS AND RECREATIONAL FACILITIES

Reach	Recreational Facility	Description
Multiple Reaches	San Francisco Bay Trail	The Bay Trail is a joint project between the Metropolitan Transportation Commission and the Association of Bay Area Governments and consists of more than 350 miles of paved and natural surface trails that circle San Francisco Bay and offer paths for walking, biking, running, and rolling.
	Don Edwards San Francisco Bay National Wildlife Refuge (Refuge)	The Refuge includes approximately 30,000 acres of habitat for migratory birds and endangered species. The Refuge is managed by the U.S. Fish and Wildlife Service and provides numerous recreation opportunities including walking/biking trails, wildlife viewing, and weekend interpretive programs. Faber and Laumeister marshes are part of the Refuge, as are several of the ponds.
South of Bay Road	Baylands Golf Links	An 18-hole golf course, practice greens, and driving range in the city of Palo Alto.
	Martin Luther King Park	A community park managed by the City of East Palo Alto. This park has a soccer field, baseball field, playground area, picnic tables, and barbeque pits.
	Faber–Laumeister Trail	An approximately 0.4-mile unpaved trail between Faber and Laumeister marshes that connects to the Bay Trail. The trail is in East Palo Alto and is part of the Refuge.
Between South of Bay Road and North of Bay Road	Cooley Landing Park and Education Center	Cooley Landing Park is located on a peninsula at the eastern end of Bay Road and is within and operated by the City of East Palo Alto. Cooley Landing Education Center is within the park and is used by the community for rentals and educational events.
North of Bay Road	Ravenswood Open Space Preserve	The 376-acre preserve is operated by Midpeninsula Regional Open Space District and features marshland, observation decks, and portions of the Bay Trail.
Dumbarton Approach	SF2 Trail	An approximately 0.7-mile trail along the eastern side of Pond SF2 that has two observation platforms. The trail is within Menlo Park and is part of the Refuge.
Substation and Marsh Restoration (including habitat improvements in Ponds R1/R2)	Ravenswood Trail	An approximately 3.3-mile trail along Ponds R1 and R2 that traverses tidal slough, tidal marsh, bay shoreline, and a managed wildlife pond. The trail is within Menlo Park and is part of the Refuge.
Tech Campus	Public Shoreline Access Trail	This approximately 0.8-mile paved walking/biking trail wraps around Meta Headquarters adjacent to Ravenswood Slough and is operated by the San Francisco Bay Conservation and Development Commission.
Bayfront Expressway	Meta Park	Publicly accessible open space between Chilco Street and Bayfront Expressway. The park is owned by Meta and features a bike/pedestrian bridge that spans Bayfront Expressway and connects to the Bay Trail and nearby Bedwell Bayfront Park from Menlo Park's Belle Haven neighborhood.
Bedwell Bayfront Park	Bedwell Bayfront Park	Owned by the City of Menlo Park, the park's 160 acres are surrounded on three sides by the Refuge. The interior of the park contains a network of trails; a 2.3-mile segment of the Bay Trail surrounds the park.

NOTES: Bay Trail = San Francisco Bay Trail; Refuge = Don Edwards San Francisco Bay National Wildlife Refuge.
Refer to Figure 2-5 for facility locations.
SOURCE: Data compiled by Environmental Science Associates in 2025.

[1] *Refuge Recreation Act of 1962*. U.S. Code title 16, sections 460k–460k-4. 1962.

Don Edwards San Francisco Bay National Wildlife Refuge Final Comprehensive Conservation Plan[2]

The USFWS prepared the Don Edwards San Francisco Bay National Wildlife Refuge Final Comprehensive Conservation Plan and Environmental Assessment (Don Edwards SFB NWR Final CCP/EA) in 2012 to guide management of the Refuge for 15 years. The Don Edwards SFB NWR Final CCP/EA identified hunting, fishing, wildlife observation, photography, environmental education, and interpretation as priority public uses offered on the Refuge. For determining allowable uses on a refuge, the appropriate use policy of the Don Edwards SFB NWR Final CCP/EA is as follows:

> *[D]escribes the initial decision process the refuge manager follows when first considering whether to allow a proposed use on a refuge. The refuge manager must find a use appropriate before undertaking a compatibility review of the use. An appropriate use is defined as an existing or proposed use that meets at least one of the following conditions:*
>
> - *The use is a wildlife-dependent recreational use as identified in the Improvement Act.*
> - *The use contributes to fulfilling the refuge purpose(s), the Refuge System mission, or goals or objectives described in a refuge management plan approved after October 9, 1997, the date the Improvement Act was signed into law.*
> - *The use involves the take of fish and wildlife under State regulations.*
> - *The use has been found to be appropriate as specified in Section 1.11 (603 FW 1 of the Service Manual).*

State

McAteer-Petris Act and San Francisco Bay Plan

Section 3.2, Aesthetics, discusses the establishment and authority of the San Francisco Bay Conservation and Development Commission (BCDC) pursuant to the McAteer-Petris Act. BCDC is authorized to control both bay filling and dredging and bay-related shoreline development and manages its jurisdiction through the *San Francisco Bay Plan* (Bay Plan) and the Suisun Marsh Protection Plan.[3] As discussed in greater detail in Section 3.4, Biological Resources, implementation of the Project would occur within BCDC jurisdiction. Part IV, Development of the Bay and Shoreline: Findings and Policies, contains the following recreation and public access policies that are applicable to the Project:

> **Recreation, *Policies:***
>
> 6. To enhance the appearance of shoreline areas, and to permit maximum public use of the shores and waters of the Bay, flood control projects should be carefully designed and landscaped and, whenever possible, should provide for recreational uses of channels and banks.

[2] USFWS (U.S. Fish and Wildlife Service), 2012. *Don Edwards San Francisco Bay National Wildlife Refuge: Final Comprehensive Conservation Plan and Environmental Assessment*.

[3] San Francisco Bay Conservation and Development Commission, *San Francisco Bay Plan*, May 5, 2020. The Bay Plan was completed and adopted by BCDC in 1968 and was transmitted to the California Legislature and the Governor in 1969; the Bay Plan has since been amended, with the most recent document released in May 2020.

Public Access, *Policies:*

1. A proposed fill project should increase public access to the Bay to the maximum extent feasible, in accordance with the policies for Public Access to the Bay.
2. In addition to the public access to the Bay provided by waterfront parks, beaches, marinas, and fishing piers, maximum feasible access to and along the waterfront and on any permitted fills should be provided in and through every new development in the Bay or on the shoreline, whether it be for housing, industry, port, airport, public facility, wildlife area, or other use, except in cases where 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…
6. Public access should be sited, designed, managed and maintained to avoid significant adverse impacts from sea level rise and shoreline flooding.
13. The Public Access Design Guidelines should be used as a guide to siting and designing public access consistent with a proposed project…

Local

General Plans

The Project would be subject to local plans and policies of the jurisdictions in which it is located, including East Palo Alto, Menlo Park, and Redwood City. **Table 3.15-2** presents local plans and policies regarding recreation to support consideration of Project consistency with general plan policies.

San Francisco Bay Trail Design Guidelines and Toolkit[4]

In 2016, the Metropolitan Transportation Commission (MTC) developed the original San Francisco Bay Trail Design Guidelines and Toolkit to provide the region with a design resource applicable to any project that includes the San Francisco Bay Trail (Bay Trail). The guidelines provide goals and direction for site planning and trail design to facilitate achievement of the Bay Trail vision. They also establish a set of design principles aimed at developing and managing the Bay Trail while providing for the protection of bay resources, regional livability, and local economic prosperity.

In February 2024, MTC kicked off the process to update the document, with an expected completion date in 2025. The Bay Trail Design Guidelines and Toolkit 2.0 will incorporate policy and strategy changes at MTC as well as changes in trends in active transportation and trail design (e.g., new mobility, resilience, climate change, green infrastructure, etc.).

As indicated in Section 2.4.1, Proposed Shoreline Protection, Habitat Improvement, and Recreation Features, the reconstructed portions of the Bay Trail along the new levee tops would be paved; would include signage, viewing points, benches, and access points; and would be designed in accordance with the latest MTC guidance and in compliance with the Americans with Disabilities Act (ADA).

[4] Metropolitan Transportation Commission, Bay Trail Design Guidelines & Toolkit 2.0, available online at mtc.ca.gov/operations/regional-trails-parks/san-francisco-bay-trail/bay-trail-design-guidelines-toolkit-20. Accessed on November 7, 2024; 2M Associates, et al., San Francisco Bay Trail Design Guidelines and Toolkit, June 2016.

TABLE 3.15-2
LOCAL PLANS AND POLICIES RELEVANT TO THE PROJECT

CITY OF EAST PALO ALTO VISTA 2035 GENERAL PLAN
Policy 17.5: Network of trails. Improve connections and trails to the Baylands Open Space area.
1.9: Measure AA projects. With the financial and administrative support of Mid-Peninsula Regional Open Space, build new Bayfront trails and City-to-Bay trails. Support wetland restoration and science education exhibits.
1.10: New trails and paths. Construct new trails or multiuse paths, particularly along the San Francisquito Creek or in the Baylands.
1.11: Gap closure. Work to fill critical gaps in the City's trail network, particularly completing the Bay Trail and other planned connections in the Ravenswood Employment District, and along San Francisquito Creek between O'Connor and University Avenue.
1.14: Connections to Bay Trail. Explore new and improved connections to the Bay Trail in key locations.
Goal POC-2: Improve and enhance existing parks and trail.
2.7: Baylands use. Encourage public recreational use and access to the Baylands, South Bay Salt Pond, and other nearby open space, in coordination with the Don Edwards San Francisco Bay National Wildlife Refuge and other partners and in a manner that does not adversely impact the natural environment.
CITY OF MENLO PARK GENERAL PLAN
GOAL LU-6: Preserve open-space lands for recreation; protect natural resources and air and water quality; and protect and enhance scenic qualities.
Policy LU-6.6: Public Bay Access. Protect and support public access to the Bay for the scenic enjoyment of open water, sloughs, and marshes, including restoration efforts, and completion of the Bay Trail.
Program LU-7.G: SAFER Bay Process. Coordinate with the SAFER Bay process to ensure that the Menlo Park community's objectives for sea level rise/flood protection, ecosystem enhancement, and recreational trails are adequately taken into consideration.
REDWOOD CITY GENERAL PLAN
None directly related to Project implementation.
Note: SAFER = Strategy to Advance Flood Protection, Ecosystems, and Recreation along San Francisco
Sources: City of East Palo Alto, 2017. *Vista 2035 General Plan*. Adopted October 4, 2016; Final Version March 2017. Available online at www.ci.east-palo-alto.ca.us/planning/page/vista-2035-general-plan; City of Menlo Park, 2016. *General Plan, City of Menlo Park*. adopted November 29, 2016. Available online at www.menlopark.gov/files/sharedassets/public/v/1/community-development/documents/general-plan/land-use-and-circulation-element-adopted-20161129.pdf; City of Redwood City, 2023. *Redwood City General Plan*. Adopted October 11, 2010; Amended August 2023. Available online at www.redwoodcity.org/departments/community-development-department/planning-housing/planning-services/environmental-documents/general-plan-eir.

3.15.3 Impacts and Mitigation Measures

Significance Criteria

In accordance with CEQA, CEQA Guidelines (including Appendix G), relevant plans, policies, and/or guidelines, and agency standards, the Project would have a significant impact if it were to do any of the following:

- Include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment; or
- 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.

Methodology

This analysis involved determining whether the Project would increase the use of existing recreational facilities such that substantial physical deterioration of those facilities might occur or be accelerated. Data for this section were developed based on site visits and a review of the websites, planning and policy documents, and maps of recreational resources in the Project area.

Sections 3.3, Air Quality, 3.13, Noise and Vibration, and 3.16, Transportation, address potential impacts on recreationists from dust, noise, and construction-related traffic, respectively.

Section 3.1.5, Approach to Cumulative Impacts Analysis and Cumulative Projects, describes the approach to the cumulative impact analysis and summarizes past, present, and reasonably foreseeable future projects in the vicinity of the components of the alternatives that could contribute to a cumulative impact. Refer to Table 3.1-2 and Figure 3.1-1 for descriptions and the locations of potential cumulative projects in the Project vicinity. The cumulative impact analysis for recreation uses a list-based approach to analyze the effects of the Project in combination with other past, present, and probable future projects in the immediate vicinity.

The geographic scope of cumulative impacts on recreational facilities is the same study area identified in Section 3.15.1 and encompasses recreational facilities within or near components of the alternatives, as well as more distant, similar recreational facilities that might be used by the same recreationists.

This draft EIR evaluates proposed Project activities at a level of detail consistent with the best available information and specificity available at the time of EIR preparation. To the extent that activities necessary for Project completion are known, they are described in Chapter 2, *Project Description*, and evaluated in the impact analysis below. Appendix INFRA identifies those changes to infrastructure and other encroachments that are evaluated programmatically. While the analysis related to the Project's recreation impacts are not anticipated to change with future design, the need for additional CEQA documentation would be evaluated once additional design details are developed as discussed in greater detail in Section 1.2.5, Program–Project EIR and Supplemental CEQA.

The following topic is not analyzed further in this section for the reasons described below:

- Include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment. The Project includes improvements to existing trails and construction of new trails as part of the shoreline protection features. The impacts of constructing those trail improvements on the physical environment are evaluated throughout Chapter 3, Environmental Setting, Impacts, and Mitigation Measures, of this EIR. For example, impacts associated with construction vehicle trips, including trips to bring paving materials for trail construction to the site, are evaluated in Sections 3.3, Air Quality, 3.9, Greenhouse Gas Emissions, 3.13, Noise and Vibration, and 3.16, Transportation. Because the Project does not require the construction or expansion of trails beyond that which is proposed, this significance criterion is not addressed further in this section. For more detail, please refer to the other sections of Chapter 3, *Environmental Setting, Impacts, and Mitigation Measures*, of this EIR.

Impacts and Mitigation Measures

Table 3.15-3 summarizes the impact conclusions presented in this section.

TABLE 3.15-3
RECREATION IMPACT CONCLUSIONS

Impact	Level of Significance
Impact REC-1: 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.	LTS
Impact C-REC-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse impacts related to recreational resources.	LTS

NOTES: LTS = Less than Significant

Impact REC-1: 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. *(Less than Significant)*

Construction

Figure 2-5 in Chapter 2, *Project Description,* identifies existing recreational facilities in the Project area. As described in Chapter 2, the Project includes improvements to existing sections of the Bay Trail, construction of new trail segments, and decommissioning of a portion of the Ravenswood Trail. Refer to **Table 3.15-4** for the approximate mileage of improvements, new trail segments, and the decommissioned trail segment. Section 2.2, Project Location, describes changes to recreational features by reach, which is summarized in Table 2-2. As shown in Figure 2-5 (upper half), the Project alignment overlaps many trail segments, most of which are atop existing levees that do not provide adequate shoreline protection from flooding. Where the Project overlaps with segments of the Bay Trail, the trail would be reconstructed atop the new levee and would incorporate design standards adopted for the Bay Trail. In some reaches, the Project would construct new trail segments (refer to the solid green lines in the bottom half of Figure 2-5). Within the Bayfront Expressway Reach, the Project includes a new levee-top trail that would parallel the existing Bay Trail and would reestablish views of the salt ponds and Bay to the north. The reach plans presented in Chapter 2 (Figures 2-7, 2-10, 2-13, 2-17, 2-20, 2-22, and 2-25) depict potential pedestrian access ramps for levee-top trails.

Portions of the Bay Trail would be closed while Project construction progresses in different reaches, as described in Chapter 2, Section 2.6.4, Trail Closures. Table 2-4 in Section 2.5, Project Phasing and Schedule, depicts the proposed Project implementation schedule. When a given reach is under construction, trail segments within that reach would be closed for the duration of construction. Access to segments of existing trails that intersect with a given reach and associated recreation destinations would also be disrupted, including access to the Faber–Laumeister Trail. Access to the Cooley Landing Park and Education Center would also be disrupted, particularly when the gate structure at Bay Road is constructed.

The establishment of detour routes and the protocols associated with detour routing (e.g., trail closure mechanisms, signage) would be at the discretion of the local agency that operates each portion of the Bay Trail. No detour routing has been proposed, and for purposes of evaluation, this analysis does not assume that detour routing for closed trail segments would be implemented during Project construction.

TABLE 3.15-4
APPROXIMATE MILES OF CREATED, IMPROVED, AND DECOMMISSIONED TRAILS

Reach	Improvements to Existing Trails	New Trail	Decommissioned Trail
South of Bay Road	1	0	0
North of Bay Road	0.25	0.56	0
Dumbarton Approach	0.34	0.4	0
Substation Marsh Restoration[a]	0	0	1.8
Tech Campus	0.6	0.31	0
Bayfront Expressway	0.5	0.78	0
Bedwell Bayfront Park	0	0.06	0
Marsh Road[b]	0	0	0
Totals	**2.69**	**2.11**	**1.8**

NOTES: Refer to Figure 2-5 for a depiction of trail changes.

a. Two segments of the Ravenswood Trail (totaling approximately 1.9 miles) would be retained as spur trails, and one segment (1.8 miles) would be decommissioned. Approximately 1,500 feet of the western spur trail would be opened to the public seasonally, while the remaining spur trail would be opened year-round.

b. No recreation improvements are proposed under the Project for the Marsh Road Reach, which is on private property, although the proposed levee design could accommodate a trail. The Metropolitan Transportation Commission has identified a proposed trail between Bedwell Bayfront Park (in Menlo Park) and Seaport Boulevard in Redwood City, a segment of which is generally aligned with the Marsh Road Reach levee alignment. Refer to Table 3.1-2 in Chapter 3, *Environmental Setting, Impacts, and Mitigation Measures*, for more information about the proposed trail project.

SOURCE: Data compiled by Environmental Science Associates in 2025.

As indicated in Section 3.15.1, East Palo Alto, Menlo Park, and Redwood City feature a total of 54 parks and the Bay Trail offers more than 350 miles of trails that circle the San Francisco Bay. Recreationists using the Bay Trail and those using other affected trails and facilities would be expected to use other facilities during construction-related closures, thereby increasing the use of existing neighborhood and regional parks and trails. However, due to the progression of reach construction (i.e., not all SAFER Bay reaches and segments of reaches would be under construction at the same time), the duration of closures, and the number and variety of existing facilities in the surrounding areas, this temporary shift in usage would not be expected to cause substantial physical deterioration of those recreational facilities. Therefore, the impact during Project construction would be **less than significant**.

Operation

Trail access would largely be restored following cessation of construction. An approximately 1.8-mile portion of the Ravenswood Trail would be decommissioned and restored to transition-zone habitat and breached at two locations to accommodate tidal restoration in Ponds R1 and R2, and an approximately 1,500-foot section of the Ravenswood Trail (near proposed nesting islands) would be closed during the breeding season for seabirds. However, as shown in Table 3.15-4, the Project also includes improvements to approximately 2.69 miles of existing trail and construction of approximately 2.11 miles of new trail in addition to the more than 350 miles of Bay Trail around the bay. Consequently, the Project would have a net benefit on recreational facilities. Therefore, **no impact** would occur from Project operation.

Cumulative Impacts

Impact C-REC-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse impacts related to recreational resources. (*Less than Significant*)

This discussion focuses on whether the Project, in combination with past, present, and probable future projects in the area, could 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.

The geographic scope for cumulative impacts on recreational uses is the Project area, including areas along the Project site. Several of the cumulative projects listed in Table 3.1-2 could also temporarily disrupt recreational uses in the Project vicinity, including implementation of the Martin Luther King Jr. Park Master Plan, O'Connor Pump Station Stormwater Management Improvements, East Palo Alto Waterfront Project, and 1990 Bay Road (The Landing). Construction of improvements to and expansion of Martin Luther King Jr. Park may temporarily impact existing park operations. The O'Connor Pump Station Stormwater Management Improvements, East Palo Alto Waterfront Project, and The Landing Project sites are directly adjacent to the Bay Trail along South of Bay Road and North of Bay Road reaches and may also require temporary closures to trails serving the area. However, because potential trail closures from construction would be temporary and likely would not overlap temporally with Project construction, and because a total of 54 parks and more than 350 miles of trails are in East Palo Alto, Menlo Park, and Redwood City, cumulative projects would not be expected to result in substantial physical deterioration of existing recreational facilities. Additionally, The Landing and Willow Village described in Table 3.1-2 include construction of new parks to serve the area, and a new segment of the Bay Trail is planned west of the Project in Redwood City. Therefore, the Project's incremental effect related to recreation resources would not be cumulatively considerable and the impact would be **less than significant**.

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3.16 Transportation

This section evaluates the potential impacts of the SAFER Bay Project (Project) on existing transportation resources. This section presents information about the environmental and regulatory setting and identifies the criteria used to evaluate the significance of potential impacts, the methods used in evaluating these impacts, and the results of the impact assessment. The Project evaluated is described in Chapter 2, *Project Description*, of this EIR.

3.16.1 Environmental Setting

Roadway System

Major roadways serving the Project area include the following:

- *United States Route 101 (U.S. 101),* also known as the *Bayshore Freeway,* is an eight-lane freeway (three general purpose lanes and one high-occupancy vehicle lane in each travel direction) and principal north–south roadway connection between San Francisco, San José, and intermediate San Francisco Peninsula cities.
- *State Route (SR) 84,* also known as the *Bayfront Expressway*, is a six-lane freeway that runs east–west from SR 1 in San Gregorio to Menlo Park, across the Dumbarton Bridge through Fremont and Newark and ending at Interstate 580 in Livermore. According to a recent traffic count from the City of Menlo Park, an average of approximately 52,000 daily trips occur across key roadway segments.[1]
- *University Avenue* connects SR 84 in the north with El Camino Real (SR 82) in the south, passing through downtown Palo Alto. The portion of University Avenue between SR 84 and U.S. 101 is also known as SR 109. This two- to four-lane facility provides a full-access interchange with U.S. 101. The roadway has a posted speed limit of 25 miles per hour.
- *Bay Road* is a two-lane, east–west minor arterial roadway with a posted speed limit of 30 miles per hour. Bay Road extends east to Cooley Landing from its intersection with Saratoga Avenue. According to a recent traffic count from the City of Menlo Park, an average of approximately 5,400 daily trips occur across key roadway segments.
- *Chilco Street* is a two-lane, north–south local roadway with a posted speed limit of 15 miles per hour. Chilco Street extends from SR 84 to the north southeast to Hamilton Avenue. According to a recent traffic count from the City of Menlo Park, an average of approximately 5,300 daily trips occur across key roadway segments.
- *Marsh Road* is a four-lane, north–south minor arterial roadway with a posted speed limit of 35 miles per hour, extending south from Bedwell Bayfront Park. According to a recent traffic count from the City of Menlo Park, an average of approximately 34,000 daily trips occur across key roadway segments.

Pedestrian Facilities

Refer to Table 3.15-1 in Section 3.15, Recreation, for a list of recreational facilities, including pedestrian trails within or near Project components. Several pedestrian facilities currently exist along the San

[1] City of Menlo Park, 2024. Traffic Counts Collected December 12, 2024 from 0:00 to 23:00.

Francisco Bay Trail (Bay Trail) and other trails that provide access to the Project area (refer to Figure 2-5 in Chapter 2 for existing trails). Additionally, a pedestrian bridge spans SR 84 and connects the Bay Trail with Meta Park, and pedestrian access (a sidewalk) is provided along the length of University Avenue.

Bicycle Network

Bicycle facilities consist of separated bikeways, bicycle lanes, routes, trails, and paths, as well as bike parking, bike lockers, and showers for cyclists. The California Department of Transportation (Caltrans) recognizes the following four classifications of bicycle facilities:

- **Class I: Shared-Use Pathway.** Provides a completely separated right-of-way for the exclusive use of cyclists and pedestrians, with cross-flow minimized (e.g., off-street bicycle paths).
- **Class II: Bicycle Lane.** Provides a striped lane for one-way travel on a street or highway. May include a "buffer" zone consisting of a striped portion of roadway between the bicycle lane and the nearest vehicle travel lane.
- **Class III: Bicycle Route.** Provides for shared use with motor vehicle traffic; however, this type of facility is often signed or includes a striped bicycle lane.
- **Class IV: Separated Bikeway.** Provides a right-of-way designated exclusively for bicycle travel adjacent to a roadway and protected from vehicular traffic. Some examples of types of separation include grade separation, flexible posts, inflexible physical barriers, and on-street parking.

The following bikeways are present near the Project sites:[2]

- **South of Bay Road/North of Bay Road Reaches.** A Class I Shared-Use Pathway exists along the Bay Trail as well as Class II Bicycle Lanes along O'Connor Street and Pulgas Avenue.
- **Dumbarton Approach Reach.** The Class I Shared-Use Pathway extends north on the Bay Trail through the Dumbarton Approach Reach.
- **Tech Campus Reach.** An unnamed Class I Shared-Use Pathway exists along the perimeter of the Tech Campus Reach.
- **Bayfront Expressway/Bedwell Bayfront Park/Marsh Road Reaches.** The Class I Shared-Use Pathway extends along the Bay Trail through the Bayfront Expressway, Bedwell Bayfront Park, and Marsh Road reaches. A Class IV Separated Bikeway exists just south on Chilco Street.

Transit Service

Transit facilities that provide direct access to the Project sites are limited. The San Mateo County Transit District (SamTrans) operates the following services near the Project area:[3]

- *SamTrans Route 81* is a school-oriented route that traverses East Palo Alto, providing service near the South of Bay Road and North of Bay Road reaches.

[2] Google, 2025. "Google Maps." Available online at: https://www.google.com/maps.

[3] SamTrans (San Mateo County Transit District), 2025. "Schedules & Maps." Available online at: www.samtrans.com/schedulesmaps?active_tab=route_map_tab&center=-122.39822%7E37.70741&zoom=11.00&suggested_routes=12169%7E713%7EFCX%7EEPX%7Ecaltrain%7E292%7E397&map_query=-122.39822%7E37.70741.

- *SamTrans Dumbarton Express Service Route* extends from Palo Alto to East Palo Alto and Menlo Park adjacent to the Dumbarton Approach and Substation Marsh Restoration reaches.
- *SamTrans Route 397* is an express route that serves East Palo Alto, including portions of Bay Road and University Avenue, and extends north past Redwood City.
- *SamTrans Route 280* serves Palo Alto and East Palo Alto, extending from the Palo Alto Transit Center to Purdue/Fordham adjacent to the North of Bay Road reach.
- *Sam Trans Route 296* provides service through Redwood City, Menlo Park, and East Palo Alto. This route provides connections to SamTrans EPX and 280 routes.
- *SamTrans EPX Route* extends north–south from San Francisco through San Bruno and to East Palo Alto near the North and South of Bay Road reaches.

3.16.2 Regulatory Framework

Federal

Americans with Disabilities Act

The Americans with Disabilities Act of 1990 prohibits discrimination and ensures equal opportunity and access for persons with disabilities. The Federal Transit Administration works to ensure the nondiscriminatory provision of public transit services such as door-to-door or curb-to-curb "complementary paratransit" services.

State

Senate Bill 743

Senate Bill 743 designates vehicle miles traveled (VMT) as the performance metric to be used for the analysis of transportation impacts in documents prepared pursuant to CEQA. VMT is a measure of the total number of miles driven to or from a development and is sometimes expressed as an average per trip or per person. This focus on VMT aligns transportation impact analyses and mitigation outcomes with the state's goals to reduce greenhouse gas emissions, encourage infill development, and improve public health through the development of multimodal transportation networks. Pursuant to Senate Bill 743, CEQA Guidelines section 15064.3 includes modifications geared toward the effects of long-term VMT (i.e., Project operations) rather than short-term VMT (i.e., Project construction), providing a framework for evaluating the former while stating that "…a qualitative analysis of construction traffic may be appropriate."

Technical Advisory on Evaluating Transportation Impacts in CEQA

To assist lead agencies in implementing Senate Bill 743 requirements, the Governor's Office of Planning and Research, now called the Governor's Office of Land Use and Climate Innovation, published the *Technical Advisory on Evaluating Transportation Impacts in CEQA* (Technical Advisory),[4] which provides guidance about the variety of implementation questions agencies face when shifting to a VMT metric. The Technical Advisory focuses on two types of projects that could be expected to generate long-term VMT: land use projects (e.g., residential, office, retail) or transportation projects that expand capacity for motor vehicles.

[4] OPR (Office of Planning and Research), 2018. *Technical Advisory on Evaluating Transportation Impacts in CEQA.* December 2018. Available online at lci.ca.gov/ceqa/docs/20190122-743_Technical_Advisory.pdf.

California Department of Transportation

Caltrans is responsible for planning, designing, constructing, operating, and maintaining the state highway system, including freeways, interchanges, and defined arterial routes. In California, Caltrans implements federal highway standards. Any improvements or modifications to the state highway system would need to be approved by Caltrans. The *Highway Design Manual* (2020) provides guidelines for the design of roadways and bicycle facilities. The *California Manual on Uniform Traffic Control Devices* (2014) adapts federal standards for street markings, traffic signals, and street signs. Several other Caltrans guidelines inform the regulatory setting on state highway facilities, including the following:

- ***Interim Land Development Intergovernmental Review Safety Review Practitioners Guidance.*** The purpose of this document is to provide immediate direction for safety review while final guidance is being developed. The interim guidance is intended to apply to proposed land use projects (as opposed to a transportation project) and plans affecting the state highway system. The interim guidance does not establish thresholds of significance for determining safety impacts under CEQA.[5]
- ***Transportation Analysis under CEQA, First Edition*, and *Transportation Analysis Framework*.** These documents guide transportation impact analyses for projects on the state highway system. Although the SAFER Bay Project is not on the state highway system, these guidelines provide insight as to how Caltrans considers the effects of project construction activities on the state highway system. Specifically, Section 5.3.3 of the *Transportation Analysis under CEQA* states, "Generally, a qualitative analysis of VMT impacts associated from the construction of the project would be appropriate… Vehicle trips used for construction purposes would be temporary, and any generated VMT would generally be minor and limited to construction equipment and personnel and would not result in long-term trip generation."[6]
- **Caltrans *Construction Manual*.** Caltrans has adopted procedures to oversee construction activities on and around its facilities. The Caltrans *Construction Manual* describes best practices for construction activities, including personnel and equipment safety requirements, temporary traffic control, signage, and other requirements aimed at reducing construction-related hazards and constructing projects safely and efficiently. Any work proposed on Caltrans facilities would be required to abide by these requirements.[7]

Local

The Project would be subject to local plans and policies of the jurisdictions in which it is located, including East Palo Alto, Menlo Park, and Redwood City. **Table 3.16-1** presents local plans and policies regarding transportation to support consideration by these cities of Project consistency with general plan policies.

[5] Caltrans (California Department of Transportation), 2020a. *Traffic Safety Bulletin 20-02-R1: Interim Local Development Intergovernmental Review Safety Review Practitioners Guidance*. December 18, 2020.

[6] Caltrans (California Department of Transportation), 2020b. *Transportation Analysis Framework under CEQA. First Edition*. September 2020.

[7] Caltrans (California Department of Transportation), Undated. *Construction Manual.* Dates vary by chapter.

TABLE 3.16-1
LOCAL PLANS AND POLICIES RELEVANT TO THE PROJECT - TRANSPORTATION

CITY OF EAST PALO ALTO VISTA 2035 GENERAL PLAN
Goal T-1: Improve safety through the design and maintenance of sidewalks, streets, intersections, and other roadway improvements.
Policy 1.4: ADA-compliant Sidewalks. Ensure sidewalks are ADA compliant and free of blockage resulting from parked vehicles or other obstructions.
Policy 1.5: Coordination with public safety. Ensure that the Menlo Park Fire Protection District (MPFPD) and the City's Police Department review construction plans for roadway modifications, internal circulation, and establish, if needed, temporary alternative emergency routes to be used for the duration of any construction project. During design review, ensure that roads and driveways are established that meet applicable code requirements for emergency access, including potentially including signal preemption mechanisms. Ensure that MPFPD reviews related building plans for compliance with the Fire Code and establishes a future inspection schedule for continued compliance. Continue the existing practice of informing the MPFPD and the Police Department of projects and proactively engaging with the MPFPD and the Police Department through the Development Review Committee (DRC) and the plan check process.
Goal T-2: Foster the creation of complete, multimodal streets.
Policy 2.1: Accommodating all modes. Plan, design, and construct transportation projects to safely accommodate the needs of pedestrians, bicyclists, transit riders, motorists, people with disabilities, and persons of all ages and abilities.
Goal T-3: Create a complete, safe, and comfortable pedestrian network for people of all ages and abilities.
Policy 3.1: Active transportation. Increase the levels of active transportation.
Goal T-7: Adopt transportation performance measures.
Policy 7.1: Automobile Level of Service Standards. Improve the East Palo Alto circulation system roadways in concert with land development to maintain adequate levels of service for automobile travel. Automobile Level of Service (LOS) performance can be measured using a volume-to-capacity (V/C) ratio. V/C ratios are calculated based on existing or future average daily traffic (ADT) volumes and daily capacity values for various types of roadways. A level of service scale is used to evaluate roadway performance based on V/C ratios. These levels range from "A" to "F", with LOS A representing free flow conditions and LOS F representing severe traffic congestion. Descriptions of traffic flow for the different levels of service are provided in Table 6-4 Standards for Roadway Levels of Service. The performance criteria for evaluating volumes and capacities of the East Palo Alto roadway system is LOS D. At a signalized intersection, an impact is considered significant if it causes operations to degrade from LOS D or better to LOS E or F; or exacerbates LOS E or F conditions by increasing critical delay by >4 seconds and increasing volume to capacity ratio (V/C ratio) by 0.01; or increases the V/C ratio by > 0.01 at an intersection that exhibits unacceptable operations, even if the calculated LOA is acceptable. At an unsignalized intersection, an impact is considered significant if it: causes operations to degrade from LOS D or better to LOS E or F; or exacerbates LOS E or F conditions by increasing control delay; or causes volumes under project conditions to exceed the Caltrans Peak Hour Volume Warrant Criteria. Where the City determines that proposed development projects will cause LOS standards to be exceeded, appropriate mitigation will be required to improve roadways to meet LOS standards.
CITY OF MENLO PARK GENERAL PLAN
Goal CIRC-1: Provide and maintain a safe, efficient, attractive, user-friendly circulation system that promotes a healthy, safe, and active community and quality of life throughout Menlo Park.
Policy CIRC-1.6: Emergency Response Routes. Identify and prioritize emergency response routes in the citywide circulation system.
Policy CIRC-1.7: Bicycle Safety. Support and improve bicyclist safety through roadway maintenance and design efforts.
Policy CIRC-1.8: Pedestrian Safety. Maintain and create a connected network of safe sidewalks and walkways within the public right of way ensuring that appropriate facilities, traffic control, and street lighting are provided for pedestrian safety and convenience, including for sensitive populations.
Goal CIRC-3: Increase mobility options to reduce traffic congestion, greenhouse gas emissions, and commute travel time.
Policy CIRC-3.4: Level of Service. Strive to maintain level of service (LOS) D at all City-controlled signalized intersections during peak hours, except at the intersection of Ravenswood Avenue and Middlefield Road and at intersections along Willow Road from Middlefield Road to US 101. The City shall work with Caltans to ensure that average stopped delay on local approaches to State-controlled signalized intersections does not exceed LOS E.
Goal CIRC-4: Improve Menlo Park's overall health, wellness, and quality of life through transportation enhancements.
Policy CIRC-4.3: Active Transportation. Promote active lifestyles and active transportation, focusing on the role of walking and bicycling, to improve public health and lower obesity.

REDWOOD CITY GENERAL PLAN
Goal BE-25: Maintain a local transportation system that balances the needs of bicyclists, pedestrians, and public transit with those of private cars.
Policy BE-25.4: Consider impacts on overall mobility and various travel modes when evaluating transportation impacts of new developments or infrastructure projects.
Goal BE-26: Improve walking, bicycling, and electric bicycle/scooter facilities to be more convenient, comfortable, and safe, and therefore more common transportation modes in Redwood City.
Policy BE-26.18: Maintain and encourage the use of existing pedestrian walkways that enhance pedestrian connectivity throughout the city.
Implementation Programs – Procedures, Permits, Agreements, Ordinances
Program BE-55: Multi-Modal Level of Service Standards. Develop and adopt multi-modal level of service (LOS) standards that address each travel mode. Vary the standard by facility type, travel mode, and location. This approach will help to apply a preference for selected modes based on the street type and/or location.

Note: ADA = Americans with Disabilities Act

Source: City of East Palo Alto, 2017. *Vista 2035 General Plan*. Adopted October 4, 2016; Final Version March 2017. Available online at www.ci.east-palo-alto.ca.us/planning/page/vista-2035-general-plan; City of Menlo Park, 2016. *General Plan, City of Menlo Park*. Adopted November 29, 2016. Available online at www.menlopark.gov/files/sharedassets/public/v/1/community-development/documents/general-plan/land-use-and-circulation-element-adopted-20161129.pdf; City of Redwood City, 2023. *Redwood City General Plan*. Adopted October 11, 2010; Amended August 2023. Available online at www.redwoodcity.org/departments/community-development-department/planning-housing/planning-services/environmental-documents/general-plan-eir.

San Mateo County

City/County Association of Governments of San Mateo County Congestion Management Program

The purpose of the City/County Association of Governments of San Mateo County (C/CAG) Congestion Management Plan is to identify strategies to respond to future transportation needs, develop procedures to alleviate and control congestion, and promote countywide transportation solutions. To monitor attainment of the Congestion Management Plan, the C/CAG adopted roadway level of service (LOS) standards. The LOS standards established for San Mateo County vary by roadway segment and conform to current land use plans and development differences among the coast, bayside, older downtowns, and other areas of San Mateo County.

Countywide Comprehensive Bicycle and Pedestrian Plan

The Countywide *Comprehensive Bicycle and Pedestrian Plan*[8] was developed by the C/CAG with support from the San Mateo County Transportation Authority[9] to address the planning, design, funding, and implementation of bicycle and pedestrian projects countywide. The relevant goals and policies are as follows:

Goal 1: Establish a Connected Network of Facilities for Bicyclists and Pedestrians

> ***Policy 1.1:*** Encourage local jurisdictions to plan, develop, fund, install, and maintain bicycle, pedestrian, and accessibility improvements in order to create complete networks of facilities for people using active transportation.

Goal 2: Promote More People Riding and Walking for Transportation and Recreation

[8] C/CAG (City/County Association of Governments of San Mateo County), 2021. *Comprehensive Bicycle and Pedestrian Plan*.

[9] The San Mateo County Transportation Authority plans, funds, and delivers transportation programs and projects throughout San Mateo County.

> ***Policy 2.1:*** Work with local, county, and regional agencies and organizations—including those with a focus on zoning, public health, etc.—to develop effective encouragement programs that promote bicycling and walking as safe, convenient, and healthy modes of transportation.

Vehicle Miles Traveled as Metric to Determine Transportation Impacts under CEQA

In September 2020, the San Mateo County Board of Supervisors adopted VMT significance thresholds and screening criteria consistent with the requirements set forth by Senate Bill 743. This action formalized San Mateo County's transition from LOS to VMT as the preferred performance measure to evaluate transportation impacts under CEQA. Baseline VMT for a project site located within the county can be identified using maps developed by C/CAG with inputs from the Valley Transportation Authority Travel Demand Model. San Mateo County's VMT thresholds are evaluated against the county average and are consistent with the statewide guidance identified previously in the description of Senate Bill 743. Adopted screening criteria, which are used to screen a project from a detailed VMT analysis and conclude a less-than-significant impact determination, are also consistent with the statewide guidance. San Mateo County developed the C/CAG VMT Estimation Tool, which can be used by member agencies to screen and estimate project-generated VMT for certain types of land use projects in San Mateo.

3.16.3 Impacts and Mitigation Measures

Significance Criteria

In accordance with CEQA, CEQA Guidelines (including Appendix G), relevant plans, policies, and/or guidelines, and agency standards, the Project could have a significant impact if it were to do any of the following:

- Conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities;
- Conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b);
- Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment); or
- Result in inadequate emergency access.

Methodology

The Project would pose a significant impact if it would conflict with a program, plan, ordinance, or policy addressing the circulation system including transit, roadway, bicycle, and pedestrian facilities. Section 3.16.2, Regulatory Framework, describes the general plans and local/regional programs, plans, ordinances, and policies applicable to this analysis. The impact analysis considers conditions anticipated to prevail during construction of the Project components and their long-term operations.

With respect to VMT, the increase in vehicle trips from Project implementation is associated primarily with construction activities during the construction phase. Project implementation is not expected to substantially increase the level of ongoing operation and maintenance activities. Operation and maintenance activities for shoreline protection features is not expected to exceed two trips per month. Furthermore, section 15064.3(a) specifies that, in the context of the CEQA transportation analysis, VMT refers to the amount and distance of automobile travel attributable to a project. The Technical Advisory

further explains that the term *automobile* in section 15064.3(a) "refers to on-road passenger vehicles, specifically cars and light trucks."

The criterion for analyzing transportation impacts in CEQA Guidelines section 15064.3(b) is concerned with VMT from Project operations and does not require evaluating temporary construction-phase VMT. As described previously, the Project would not result in a substantial change in operational VMT relative to existing operational VMT. Further, the San Mateo County C/CAG VMT Estimation Tool does not analyze projects that fall within multiple jurisdictions, such as the SAFER Bay Project. Therefore, a qualitative operational VMT analysis is sufficient and consistent with the guidance provided in part (3) of CEQA Guidelines section 15064.3(b).

With respect to hazards, the Project would result in a significant impact if a substantial increase in hazards would occur due to a geometric design feature or incompatible uses. For the purposes of this analysis, a significant impact would occur if one or both of the following statements are true:

- The Project proposed modifications to a public road or would require the use of access points that would create a hazard for any or all modes of travel (e.g., locating a temporary or permanent driveway on a blind curve); and/or
- The Project would increase truck traffic on public roads that would degrade pavement quality and potentially create a hazard for any or all modes of travel (e.g., gravel left in the roadway that results in vehicles or bicyclists sliding).

With respect to emergency access, the Project would result in a significant impact if it would result in inadequate emergency access, such as obstructions in the roadway, or would otherwise substantially affect emergency response times.

This Draft EIR evaluates Project activities at a level of detail consistent with the best available information and specificity available at the time of EIR preparation. To the extent that activities necessary for Project completion are known, they are described in Chapter 2, *Project Description*, and evaluated in the impact analysis below. Key Project information needed for the evaluation of transportation impacts includes estimated vehicle trip volumes for all reaches, staging area locations, pedestrian and vehicular access locations, and changes to infrastructure and appurtenant features. Appendix INFRA identifies those changes to infrastructure and other encroachments that are evaluated programmatically. Additionally, no staging areas have been identified for the "program-level" reaches. Transportation impacts from these Project components cannot be evaluated due to the level of detail available. The need for additional supplemental CEQA documentation would be evaluated once these design details are developed as discussed in greater detail in Section 1.2.5, Program–Project EIR and Supplemental CEQA.

Impacts and Mitigation Measures

Table 3.16-2 summarizes the impact conclusions presented in this section.

The evaluation of transportation and traffic impacts is based on design and construction information for the Project, as described in Chapter 2, *Project Description*, and summarized below.

TABLE 3.16-2
TRANSPORTATION IMPACT CONCLUSIONS

Impact	Level of Significance
Impact TRA-1: Conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities.	LSM
Impact TRA-2: Conflict or be inconsistent with CEQA Guidelines § 15064.3, subdivision (b).	LTS
Impact TRA-3: Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment).	LSM
Impact TRA-4: Result in inadequate emergency access.	LSM
Impact C-TRA-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse impacts related to transportation.	LSM

NOTES: LSM = Less than Significant with Mitigation; LTS = Less than Significant

Construction-phase vehicle trips. The estimated number of construction trips associated with the Project, presented in **Table 3.16-3** (and Table 2-7), takes into account the number of truck trips and worker trips assumed to occur during each construction phase within each reach. To calculate the number of daily one-way worker trips to and from the Project site, the maximum number of construction workers per day was multiplied by two trips per worker. The number of daily vendor and haul truck trips was determined by the number of one-way truck trips that would be arriving or departing the reaches each day during construction based on estimates prepared by Project engineers. These numbers indicate the highest amount of traffic anticipated to occur at least one day during construction.

Staging areas and haul routes. Staging areas have been identified for the South of Bay Road, Dumbarton Approach, and Substation and Marsh Restoration reaches, and are shown on Figure 2-26 in Chapter 2, *Project Description*. Staging areas for other reaches would be determined as planning and design progress. As indicated in Chapter 2, construction workers and vehicles would access Project construction sites via major roadways such as U.S. 101, SR 84, Willow Road (SR 114), and University Avenue (SR 109), connecting to smaller adjacent roads, such as Bay Road, Clark Avenue, Weeks Street, Donohoe Street, O'Connor Street, Purdue Avenue, Fordham Street, Marsh Road, and a privately owned railroad/pipeline access road.

Proposed changes to trails; pedestrian and vehicular access. Figure 2-5 in Chapter 2 depicts proposed changes to trails, described by reach in Section 2.4.2. The reach plans, shown on Figures 2-7, 2-10, 2-13, 2-17, 2-20, 2-22, 2-24, and 2-25 in Chapter 2, indicate potential access points locations for shoreline protection features and trails for pedestrians and operation and maintenance vehicles. Trails would be designed consistent with Bay Trail standards, and vehicular access points from public roadways would adhere to applicable local and state design requirements.

TABLE 3.16-3
PROJECT DAILY TRIP GENERATION DURING CONSTRUCTION

Project Reach[a]	Maximum[b]		Construction Years
	Daily Worker Vehicle Trips[c]	Daily Truck Trips (Vendor + Haul)[d]	
South of Bay Road	50	23	2030 – 2031
North of Bay Road	28	122	2031 – 2032
Dumbarton Approach	80	169	*Shoreline Protection/Recreation:* Levee through Pond SF2: 2029 – 2030 Remaining portion: 2032 – 2033
			Habitat Improvements: 2030–2031
Substation and Marsh Restoration	58	422	*Shoreline Protection/Recreation:* 2029–2030
			Habitat Improvements: 2029 – 2031
Tech Campus	58	192	2031 – 2032
Bayfront Expressway	38	74	*Shoreline Protection/Recreation:* 2032
			Habitat Improvements: 2030 – 2031
Bedwell Bayfront Park	28	57	2032 – 2033
Marsh Road	28	43	2033 – 2034

NOTES:

a. Includes vehicle trips associated with shoreline protection features, recreational features, and habitat improvements within each reach. Refer to Table 2-7 in Chapter 2, *Project Description*, for complete estimates of construction worker and vehicle trips per construction phase by reach.
b. Maximum trips per day across all construction phases at this reach.
c. **Worker Vehicle Trips:** Trips made by workers to and from the jobsite for purposes unrelated to material haul-off or material placement. One-way worker trips are based on an estimate of two one-way trips per worker per day.
d. **Vendor Truck Trips:** Trips made for the sole purpose of loading and unloading material destined for permanent disposal outside the Project area or destined for onsite staging. Construction trucks would have a capacity of between 10 to 20 cubic yards.
Haul Truck Trips: Trips made by workers to haul import materials or material generated by construction (e.g., grading activities) within the jobsite, and away from the jobsite for disposal. Haul trucks would likely have a capacity of 10 cubic yards for onsite hauling and 15 cubic yards for offsite hauling.

SOURCES: HDR, Inc. 2025; H.T. Harvey & Associates 2025

Impact TRA-1: Conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities. *(Less than Significant with Mitigation)*

Refer to Table 3.16-3 for the maximum daily vehicle trips and truck trips that would occur during construction of the Project components within each reach. As indicated in the table, although some overlap in the construction schedules for the reaches is anticipated, the maximum daily vehicle trips for all reaches is not additive as construction would be phased over 5 or more years. As indicated under *Methodology*, general operation and maintenance activities at the Project sites would continue to generate the same low levels of intermittent vehicular traffic as currently occur. The highest number of daily worker vehicle trips anticipated to occur during construction is 80 trips, while the highest number of truck trips anticipated to occur during construction is 422 trips. These trips would be temporary in nature and would cease once construction of the Project components is complete.

As described in Section 3.16.2, several local regulatory policies focus on:

- Maintaining and improving safety;

- Accommodating all modes of travel;
- Establishing a complete pedestrian network; and
- Maintaining emergency response access.

Specifically, Goal T-1 and Policy 1.5 from the City of East Palo Alto General Plan are aimed at maintaining and improving safety; Goal T-2 and Policy 2.1 from the City of East Palo Alto General Plan, Goal CIRC-1 and Policies CIRC-1.7 and CIRC-1.8 from the City of Menlo Park General Plan, as well as Goals BE-25 and BE-26 from the City of Redwood City General Plan are aimed at accommodating all modes of travel. The C/CAG Comprehensive Bicycle and Pedestrian Plan also contains goals and policies which focus on accommodating all modes of travel. Goal T-3 and Policy 3.1 from the City of Palo Alto General Plan as well as Goal CIRC-4 and Policy CIRC-4.3 from the Menlo Park General Plan aim to establish a complete pedestrian network. Policy CIRC-1.6 from the Menlo Park General Plan and the C/CAG Congestion Management Program focus on maintaining emergency response access. Additionally, policies within each jurisdiction focus on establishing and maintaining LOS standards, including Policy 7.1 from the City of East Palo Alto General Plan, Policy CIRC-3.4 from the City of Menlo Park General Plan, and Program BE-55 from the City of Redwood City General Plan.

As described in Section 3.16.1, recent traffic count data shows approximate average daily traffic on key Project roadways. Based on the information in Table 3.16-3, there would be a peak of 422 truck trips occurring in 1 day for the Substation and Marsh Restoration Reach. Over a 9-hour work day, this would result in approximately 47 truck trips during the peak hour on Project roadways. The addition of these trips to the existing roadway volume has the potential to temporarily contribute to peak traffic conditions which may cause roadways to temporarily operate below City standards as listed in the policies above. Additionally, proposed construction trips could increase the likelihood of conflicts between construction traffic and bicycle and pedestrian facilities at Project access locations, which would experience an increase in use during Project construction. This could constitute physical interference with pedestrian or bicycle access, potentially resulting in conflicts with programs and policies to maintain multimodal access and safety.

To reduce the potential for Project construction to contribute to conditions that would conflict with existing programs, plans, ordinances, or policies addressing the circulation system, the Project Proponent would implement **Mitigation Measure TRA-1** (Implement Traffic Control Plan). Implementation of Mitigation Measure TRA-1 includes preparation of a traffic control plan and would reduce: potential traffic conditions that could conflict with LOS policies by directing traffic outside of peak hours where feasible, potential access conflicts with alternative transportation facilities, and potential impacts on emergency response access.

At the time of operation and maintenance, the Project would provide pedestrian access and recreational opportunities, furthering multimodal connectivity while maintaining emergency access at all Project sites. Therefore, full buildout of the Project would not conflict with a program, plan, ordinance, or policy addressing the circulation system including transit, roadway, bicycle, and pedestrian facilities.

Implementation of Mitigation Measure TRA-1 would reduce potentially significant construction impacts to a **less-than-significant** level.

Mitigation Measure TRA-1: Implement Traffic Control Plan.

This measure applies to all reaches. The Project Proponent shall require contractors to develop and implement traffic control plans. The traffic control plans shall be developed in coordination with SFCJPA member agencies, the City of Redwood City (for reaches within that city), other contractors constructing Project components, and Caltrans and emergency service providers (e.g., Menlo Park Fire Protection District) as applicable in developing circulation and detour plans. The traffic control plans shall address transportation facilities adjacent to and directly affected by the Project. The traffic control plans shall address the transportation impact(s) of Project construction trips related to conflicts with applicable policies related to transportation safety, the circulation system, and emergency access. The traffic control plans shall include, but not be limited to, the following:

- Identification of full and partial closure of transportation facilities, including vehicle, bicycle, and pedestrian facilities.
- Circulation and detour plans that include the use of signage, flagging, fences, barriers, lights, and/or guards as necessary to guide vehicles, pedestrians, and cyclists through or around the construction zone and any temporary traffic control devices.
- Bicycle or pedestrian detour plans, where applicable.
- Identification of parking for construction workers along public roadways.
- Haul routes for construction trucks and staging areas for instances when multiple trucks arrive at the work sites.
- Protocols for updating traffic control plans to account for delays or changes in the Project construction schedule.
- Opportunities to direct construction traffic outside of peak hours where feasible.

The contractors shall submit draft traffic control plans to the Project Proponent for review not less than 30 days prior to construction. The Project Proponent implementing each Project component shall verify that the appropriate agencies have been consulted in the assembly of each plan and that all appropriate measures are included in the plan.

Impact TRA-2: Conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b). ***(Less than Significant)***

As discussed previously in *Methodology*, the criteria for analyzing transportation impacts in CEQA Guidelines section 15064.3 is concerned with VMT by passenger vehicles during operations and does not require evaluation of temporary construction VMT. Operation and maintenance activities at the Project site would generate low levels of intermittent vehicular traffic (estimated to be two truck trips per month, except during high-water events, which may require daily inspection). Maintenance activities would be completed by existing staff, and no new staff would be hired for operation and maintenance. Because of the temporary nature of construction and the lack of long-term operational changes, the statewide and local-jurisdiction VMT significance thresholds previously described are not be applicable to the Project. The Project is neither a land use nor transportation development, and would not generate a substantial increase in long-term VMT. Therefore, impacts related to a potential conflict with CEQA Guidelines section 15064.3(b) would be **less than significant**.

Impact TRA-3: Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment). ***(Less than Significant with Mitigation)***

As discussed in Section 2.4.2, Proposed Design by Reach, and shown on the figure of each reach plan in Chapter 2, *Project Description*, the Project includes modifications to pedestrian and vehicle access points. For instance, the proposed reconstruction of portions of the Bay Trail atop the new levee would involve new pedestrian and vehicular access points. These access points would be designed in accordance with Bay Trail design standards and applicable local and state standards, and thus, would facilitate travel to the sites without introducing any incompatible features or roadway hazards during construction or operation. None of the Project components propose incompatible uses, such as farm equipment on city streets.

Potential hazards introduced by the use of large trucks and/or equipment on public roadways during construction or operation of the Project would be reduced by implementation of Mitigation Measure TRA-1, which includes preparation of traffic control plan that would require installation of signage, flagging, fences, barriers, lights, and/or guards as determined appropriate by the agency having jurisdiction (i.e., the cities of East Palo Alto or Menlo Park) to give adequate warning to the public of the construction and of any dangerous condition to be encountered as a result thereof.

Project-generated construction traffic would use authorized truck routes and other local roadway facilities that are not designated for truck traffic to access the project site. As the Project includes a substantial number of haul trips which will use segments of roadways that are not designated truck routes and may not be designed to accommodate the weight of haul trucks, Project construction would be anticipated to result in degradation of those roadways, such that they may become a hazard for other drivers, bicyclists or pedestrians. This impact would be potentially significant. The implementation of **Mitigation Measure TRA-2** (Implement Roadway Maintenance Plan) would require the Project Proponent to maintain and restore local roadways impacted by construction traffic. With implementation of Mitigation Measures TRA-1 and TRA-2, Project impacts related to a substantial increase in hazards due to a geometric design features or the introduction of incompatible uses would be reduced to a **less-than-significant** level.

> **Mitigation Measure TRA-1: Implement Traffic Control Plan**. (Refer to Impact TRA-1)
>
> **Mitigation Measure TRA-2: Implement Roadway Maintenance Plan.**
>
> This measure applies to all reaches that require truck trips on residential streets. The Project Proponent shall implement a Roadway Maintenance Plan for roadway segments that will be utilized by Project haul trips that are not designated truck routes. The Roadway Maintenance Plan shall maintain sufficient roadway quality to serve all existing modes served by affected roadways to be utilized by the proposed project under existing conditions. The Roadway Maintenance Plan shall include the following elements:
>
> 1. Prior to the start of construction, the Project Proponent shall or its contractor shall:
>
>   a. Identify designated haul routes for the Project, identifying roadway segments to be utilized that are not designated haul routes which shall be subject to the Roadway Maintenance Plan.

b. Perform a preconstruction survey to assess and document the pre-Project baseline conditions of roadway segments subject to the Roadway Maintenance Plan.

2. During construction, the Project Proponent shall periodically assess the conditions of roadways included in the Roadway Maintenance Plan and shall implement repairs to affected facilities to the extent that function and the safe use of such facilities is maintained throughout the duration of Project construction, except where temporary facilities closures are implemented.

3. At completion of Project construction, the Project Proponent shall improve roadway segments included in the Roadway Maintenance Plan such that roads damaged by Project construction will be repaired to a structural condition equal to that which existed prior to construction activity.

Impact TRA-4: Result in inadequate emergency access. (*Less than Significant with Mitigation*)

Ease of access and travel time are critical for first responders when traveling in emergency vehicles. Obstructions in the roadway, detours, and slow-moving vehicles (i.e., large trucks) are among the factors that can affect emergency response times. The Project would add vehicle and truck traffic to Project area roadways during construction activities, which could be encountered by emergency response vehicles. Truck routes are generally located on flat terrain and have shoulders that allow heavy vehicles to pull over if necessary to allow emergency response vehicles to pass, reducing the effect of added vehicle and truck traffic from Project construction on emergency vehicle response. However, there would still be a potentially significant impact on emergency access resulting from construction traffic given the size of the Project and the number of roadways that would be affected. Mitigation Measure TRA-1 would be implemented to reduce the potential for inadvertent roadway closures or obstacles to emergency access during construction.

Project operational trips would not have the potential to result in inadequate emergency access, as maintenance activities would be completed by existing staff who would take an estimated two truck trips per month total to complete such activities, except during high-water events. There would be no delay in emergency response or adverse impact on emergency access during Project operations.

The proposed traffic control plan included in Mitigation Measure TRA-1 would ensure that construction activities are coordinated with local agencies, such as the Menlo Park Fire Protection District, and that emergency access and response times are not compromised. Therefore, with implementation of Mitigation Measure TRA-1, the impact would be reduced to **less than significant.**

Mitigation Measure TRA-1: Implement Traffic Control Plan (refer to Impact TRA-1)

Cumulative Impacts

Impact C-TRA-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse impacts related to transportation. (*Less than Significant with Mitigation*)

This section presents an analysis of the cumulative effects of the Project in combination with other past, present, and reasonably foreseeable future projects that could cause cumulatively considerable impacts. The geographic scope of the analysis for cumulative transportation impacts is the transportation network serving the Project area. Section 3.1.5, Approach to Cumulative Impacts Analysis and Cumulative Projects, describes the overall approach to the cumulative analysis and provides a full list of cumulative projects (refer to Table 3.1-2).

Construction traffic associated with the cumulative projects could potentially overlap with construction traffic for the Project that would use surrounding roadways. Additionally, the construction schedules of some of the cumulative land use and transportation development projects identified in Table 3.1-2, including the 123 Independence Drive and the Dumbarton Corridor projects and potentially others that have currently unknown construction schedules, could overlap with Project construction. These projects, in conjunction with the Project, could contribute to cumulative conditions that increase congestion and intersection with multimodal transportation. However, as discussed in Impact TRA-1, the Project would maintain roadway access during construction and would further implement multimodal transportation (e.g., bicycle and pedestrian trails) upon completion. Additionally, Mitigation Measure TRA-1 would require preparation of traffic control plan for construction within all reaches. The cumulative projects noted in Table 3.1-2 would likely also require preparation of similar plans to reduce impact related to transportation and traffic. As a result, the Project would not contribute to cumulative conflicts with a program, plan, ordinance, or policy addressing the circulation system including transit, roadway, bicycle, and pedestrian facilities.

The projects described previously, in conjunction with the Project, could generate temporary construction traffic that would contribute to cumulative congestion, resulting in inadequate emergency access. As described in the Impact TRA-4 discussion, the truck routes for the Project are generally located on flat terrain and have shoulders that allow heavy vehicles to pull over if necessary to allow emergency response vehicles to pass. This reduces the potential effect on emergency vehicle response of added vehicle and truck traffic from Project construction. The contribution of the Project to potential impacts on emergency access would be temporary and is not considered cumulatively considerable.

With respect to CEQA Guidelines section 15064.3, the measure of VMT is, by nature, a cumulative measure, in that travel demand modeling by San Mateo County to calculate VMT includes all reasonably foreseeable cumulative development. As discussed previously under Impact TRA-2, the Project would not generate an increase in long-term VMT and is neither a land use nor transportation project for which VMT significance criteria have been established at either the statewide or local level. Therefore, the Project would not contribute to a cumulative impact related to CEQA Guidelines section 15064.3.

As discussed under Impact TRA-3, the Project would generate construction traffic that would utilize roadway segments that are not designated truck routes and may not be designed to accommodate haul truck usage. Cumulative projects described previously, in conjunction with the Project, could result in

combined usage of roadway segments that are not designed to accommodate haul trucks or the transport of heavy construction equipment, resulting in degradation of existing facilities that may have an adverse effect on the safe function of those facilities. This would be a cumulative effect that would be potentially significant. Implementation of Mitigation Measure TRA-2 would ensure that Project contributions to cumulative degradation of roadways segments that are not designated for truck travel would be reduced through the implementation of a Roadway Maintenance Plan. Due to the uncertainty of effects from cumulative projects, this cumulative impact could be significant and unavoidable. However, with implementation of Mitigation Measure TRA-2, Project contributions to safety hazards due to the introduction of incompatible uses would not be cumulatively considerable.

Overall, the Project's contribution to transportation impacts would not be cumulatively considerable and would be **less than significant** with implementation of Mitigation Measures TRA-1 and TRA-2.

3.17 Utilities, Service Systems, and Public Services

This section evaluates the potential impacts of the SAFER Bay Project (Project) on existing utilities, service systems, and public services. For the purpose of this EIR, utilities and service systems include water supply, wastewater collection, natural gas, electricity, telecommunications, and solid waste disposal. Section 3.11, Hydrology and Water Quality, addresses the potential for the Project to affect stormwater drainage facilities. This section presents information about the environmental and regulatory setting and identifies the criteria used to evaluate the significance of potential impacts, the methods used in evaluating these impacts, and the results of the impact assessment. The Project evaluated is described in Chapter 2, *Project Description*, of this EIR.

3.17.1 Environmental Setting

The geographic scope for the analysis of impacts on utilities, service systems, and public services encompasses the areas that are served by the utility and public service providers within the Project area.

Utilities and Service Systems

Water Supply

East Palo Alto Water

Most East Palo Alto residents and businesses receive water from the City of East Palo Alto, which delivers water to residential, commercial, industrial, and governmental customers. The City purchases most of its potable water supplies from the San Francisco Public Utilities Commission (SFPUC) Regional Water System.[1] The City also operates one groundwater well, with an additional standby well and water storage facility to meet fire demand. The City's water system is operated as a public-private partnership between the City of East Palo Alto and Veolia North America. Two private water supply companies—Palo Alto Park Mutual Water Company in East Palo Alto and O'Connor Tract Cooperative Water Company in Menlo Park—provide water supplies via groundwater wells to portions of East Palo Alto and Menlo Park.

East Palo Alto last updated its Urban Water Management Plan in 2020 and identified projected water demands, water supplies, and reliability over a 20-year planning horizon. The 2020 Urban Water Management Plan projects that water use will increase from 692 million gallons (MG) in 2025 to 1,078 MG in 2045. Through 2045, the City of East Palo Alto anticipates continuing to purchase up to 1,264 MG annually from SFPUC and operating its groundwater well periodically, withdrawing up to approximately 7 MG annually.[2]

[1] The Cities of East Palo Alto, Menlo Park, and Redwood City are SFPUC Regional Water System wholesale customers. The SFPUC's current water supply planning indicates that with the Bay-Delta Plan Amendment, SFPUC will have adequate supplies to meet its projected wholesale customer demands in normal years. During single dry years and multiple dry years, wholesale water shortages between 30–49 percent are expected. Without the Bay-Delta Plan Amendment, wholesale water shortages up to 15 percent are expected during multiple dry years but no shortages are expected in normal or single dry years. (SFPUC [San Francisco Public Utilities Commission], *2020 Urban Water Management Plan for the City and County of San Francisco*, adopted June 11, 2021).

[2] City of East Palo Alto and EKI, 2021. *2020 Urban Water Management Plan*. Accessed March 2025.

Menlo Park Municipal Water[3]

Menlo Park Municipal Water provides water to approximately 22,000 residents through 4,400 service connections within two service areas: the Upper Zone (providing water to the Sharon Heights area south of Interstate 280) and the Lower Zone (providing water to areas east of El Camino Real).[4] All of the water provided is purchased from the SFPUC Regional Water System. For 2025, Menlo Park Municipal Water's projected water demand is 1,355 MG with an estimated available water supply of 1,630 MG. Menlo Park's Urban Water Management Plan indicates that supplies are expected to meet projected water demand for Menlo Park through 2040.[5]

As noted previously, Palo Alto Park Mutual Water Company in East Palo Alto and O'Connor Tract Cooperative Water Company in Menlo Park provide water supplies via groundwater wells to portions of East Palo Alto and Menlo Park.

City of Redwood City

The City of Redwood City serves water to over 24,000 customers within the incorporated limits of Redwood City as well as portions of San Carlos, Woodside, and unincorporated San Mateo County.[6] Redwood City delivers water to residential, commercial, industrial, and governmental customers and purchases its potable water supplies from the SFPUC Regional Water System. Redwood City also serves recycled water to its customers via its recycled water program.[7] Redwood City's 2020 Urban Water Management Plan projected that water use will increase from 10,806 acre-feet per year[8] in 2025 to 11,923 acre-feet per year in 2045, and that estimated available water supply over the same period will increase from 13,529 acre-feet per year to 15,481 acre-feet per year.[9]

West Bay Sanitary District

West Bay Sanitary District provides wastewater collection and conveyance services to Menlo Park, Atherton, and Portola Valley; areas of East Palo Alto and Woodside; and portions of unincorporated Santa Clara and San Mateo counties. West Bay Sanitary District conveys raw wastewater, via the Menlo Park Pump Station and force main, to Silicon Valley Clean Water Wastewater Treatment Plant (SVCWWTP) for treatment and discharge to San Francisco Bay.[10] The SVCWWTP can treat up to 29 MG of wastewater daily.[11]

Silicon Valley Clean Water

Silicon Valley Clean Water is a Joint Powers Authority that conveys and treats wastewater for more than 220,000 people and businesses in their service area, which includes the communities of Belmont,

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3 Although California Water Service provides water to parts of Menlo Park and Redwood City, it does not serve the Project area.

4 City of Menlo Park, 2025. "Menlo Park Municipal Water." Available online at menlopark.gov/Government/Departments/Public-Works/Utilities/Menlo-Park-Municipal-Water. Accessed January 2025.

5 Menlo Park Municipal Water and EKI, 2021. *2020 Urban Water Management Plan*. 2021. Accessed January 2025.

6 City of Redwood City, 2025. "Water." Available online at www.redwoodcity.org/residents/water. Accessed February 13, 2025.

7 City of Redwood City and EKI, 2021. *2020 Urban Water Management Plan*. June 2021. Accessed March 2025.

8 One million gallons is equivalent to approximately 3.5 acre-feet.

9 City of Redwood City and EKI, 2021. *2020 Urban Water Management Plan*. June 2021. Accessed March 2025.

10 West Bay Sanitary District, 2025. "Areas of Coverage." Available online at www.westbaysanitary.org/areas-of-coverage. Accessed February 12, 2025.

11 Silicon Valley Clean Water, 2023. *Order R2-2023-0003 NPDES Permit CA0038369*. Accessed January 2025.

Redwood City, San Carlos, and the West Bay Sanitary District. Silicon Valley Clean Water treats wastewater at the SVCWWTP before discharging to San Francisco Bay.[12]

East Palo Alto Sanitary District

East Palo Alto Sanitary District, established in 1939, maintains sanitary sewers in a portion of the cities of East Palo Alto and Menlo Park. The collection system carries wastewater from the district's service area to the Regional Water Quality Control Plant (RWQCP) in Palo Alto where it is treated and disposed of in a manner that meets federal and state standards. The RWQCP is owned and operated by the City of Palo Alto and treats up to 20 MG of wastewater daily.[13] The RWQCP serves the East Palo Alto Sanitary District and the communities of Los Altos, Los Altos Hills, Mountain View, Palo Alto, and Stanford University.[14]

Electric Power and Natural Gas

For electric power, the communities of East Palo Alto, Menlo Park, and Redwood City are served by Pacific Gas and Electric Company (PG&E) and Peninsula Clean Energy (PCE). Incorporated in California in 1905, PG&E is one of the largest utility companies in the United States. PG&E provides electric service and natural gas to approximately 16 million people throughout a 70,000-square-mile service area in Northern and Central California. PG&E manages 106,681 circuit miles of electric distribution lines and 18,466 circuit miles of interconnected transmission lines.[15]

PCE is a community-controlled, not-for-profit, joint powers agency formed as a Community Choice Aggregation program by San Mateo County and all 20 of its cities and towns in 2016. PCE provides electricity from clean energy sources (e.g., solar, hydro, wind, geothermal), then distributes power to customers using PG&E's distribution system. As a Community Choice Aggregation, PCE has the flexibility and local control to provide various energy source options for residents and business (i.e., generate and provide clean and renewable energy at lower rates than PG&E).[16]

For natural gas, the communities of East Palo Alto, Menlo Park, and Redwood City are served by PG&E. Overall, PG&E manages 42,141 miles of natural gas distribution pipelines and 6,428 miles of transmission pipelines.[17]

Telecommunication Facilities

Telephone, television, and internet service are provided by multiple telecommunications companies, including AT&T, Xfinity/Comcast, and Verizon/MCI. Telecommunications infrastructure includes telecommunications lines (aboveground telephone lines and belowground cable lines) and service centers.

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[12] Silicon Valley Clean Water, 2025. "About Us." Available online at svcw.org/about/. Accessed June 12, 2025.

[13] City of Palo Alto, 2025. "Regional Water Quality Control Plant." Available online at www.paloalto.gov/Departments/Public-Works/Regional-Water-Quality-Control-Plant. Accessed November 3, 2025.

[14] City of Palo Alto, 2025. "Regional Water Quality Control Plant." Available online at www.paloalto.gov/Departments/Public-Works/Regional-Water-Quality-Control-Plant. Accessed November 3, 2025.

[15] PG&E (Pacific Gas and Electric Company), 2024. "Company Profile." Available online at www.pge.com/en/about/company-information/company-profile.html. Accessed January 2025.

[16] PCE (Peninsula Clean Energy), 2020. *Community Impact Report.* Accessed February 26, 2025.

[17] PG&E (Pacific Gas and Electric Company), 2024. "Company Profile." Available online at www.pge.com/en/about/company-information/company-profile.html. Accessed January 2025.

Solid Waste Management

RethinkWaste[18]

RethinkWaste, also known as the South Bayside Waste Management Authority, is a Joint Powers Authority formed by 11 local government jurisdictions (City of Belmont, City of Burlingame, City of East Palo Alto, City of Foster City, Town of Hillsborough, City of Menlo Park, City of Redwood City, City of San Carlos, City of San Mateo, the County of San Mateo, and the West Bay Sanitary District) in San Mateo County. RethinkWaste's core responsibilities include the following:

1. Owns and manages the Shoreway Environmental Center[19] in San Carlos, which receives all the recyclables, green waste, and garbage collected from the Member Agencies.
2. Provides strategic oversight, support, and management of service providers that collect, process, recycle, and dispose of materials on behalf of RethinkWaste.
3. Educates Member Agency residents and businesses through innovative and cost-effective waste reduction, recycling, and solid waste programs.
4. Advocates for environmental best practices through policy and legislation.

Recology San Mateo County provides recycle, compost, and garbage collection services for the 420,000 RethinkWaste residents and 11,000 businesses.

San Mateo County Health Solid Waste Program

San Mateo County Environmental Health Services' Solid Waste Program ensures that businesses, garbage collection and disposal companies, and individual residents follow federal, state, and local standards and permitting requirements for proper handling and disposal of solid waste. The Solid Waste Program permits and regulates Corinda Los Trancos Sanitary Landfill, also known as Ox Mountain, an active Class III Municipal Solid Waste Landfill in Half Moon Bay (approximately 15 miles northwest of the Project).[20]

As indicated in Chapter 2, *Project Description*, the Project would off-haul solid waste to Ox Mountain and would deliver material that could be recycled to Stevens Creek Quarry. The California Department of Resources Recycling and Recovery (CalRecycle) maintains facility information and waste stream profiles for all counties and jurisdictions in California. **Table 3.17-1** shows the permitted capacity, remaining capacity, and landfill classification of Ox Mountain and other landfills and recycling centers in the region.

[18] RethinkWaste, 2025. "About." Available online at rethinkwaste.org/about/rethinkwaste/about/. Accessed February 13, 2025.

[19] The Shoreway Environmental Center is owned by RethinkWaste and operated by South Bayside Industries. South Bayside Industries is responsible for delivering materials to their next destination: organic waste to Blossom Valley Organics in Vernalis and Newby Island in San José, landfill waste to Ox Mountain in Half Moon Bay, construction and demolition waste to Zanker Recycling in San José, and recyclable waste to domestic and international markets. (RethinkWaste, 2025. "About Shoreway." Available online at rethinkwaste.org/shoreway-environmental-center/about/. Accessed February 13, 2025.)

[20] San Mateo County Health, 2025. "Solid Waste Program." Available online at www.smchealth.org/solidwaste. Accessed February 13, 2025.

TABLE 3.17-1
REGIONAL LANDFILL CLASSIFICATIONS AND CAPACITIES

Landfill	Classification	Daily Capacity (tons/day)	Total Capacity (cubic yards)	Remaining Air Capacity (cubic yards)
Corinda Los Trancos Sanitary Landfill/Ox Mountain (41-AA-0002)	III[a]	3,598	60,500,000	14,988,245 as of 01/01/2024
Kirby Canyon Landfill (43-AN-0008)		2,600	36,400,000	12,162,389 as of 2/21/2024
Newby Island Landfill (43-AN-0003)		4,000	57,500,000	10,139,931 as of 1/1/2025
Guadalupe Sanitary Landfill (43-AN-0015)		3,650	28,238,855	7,518,220 as of 10/23/2023
	Totals	13,848	182,638,855	44,808,785

NOTES:

a. As recognized by the California State Water Resources Control Board's Waste Discharge Requirements Program, Class III landfills are facilities that are allowed to only dispose of non-hazardous waste and are prohibited from accepting hazardous waste.

SOURCES: CalRecycle, 2025. SWIS Facility/Site Activity Details Corinda Los Trancos Landfill (Ox Mtn) (41-AA-0002). Available online at www2.calrecycle.ca.gov/SolidWaste/SiteActivity/Details/1561?siteID=3223. Accessed February 13, 2025; CalRecycle, 2025. SWIS Facility/Site Activity Details Newby Island Sanitary Landfill (43-AN-0003). Available online at www2.calrecycle.ca.gov/SolidWaste/SiteActivity/Details/1362?siteID=3388. Accessed February 13, 2025; CalRecycle, 2025. SWIS Facility/Site Activity Details Zanker Material Processing Facility (43-AN-0001). Available online at www2.calrecycle.ca.gov/SolidWaste/SiteActivity/Details/1359?siteID=3386. Accessed February 13, 2025; A. Chiu (San Mateo County) and V. Molina (ESA), personal communications regarding landfill capacity, March 2025; P. Harden (City of San Jose) and V. Molina (ESA), personal communications regarding landfill capacity, March 2025.

Public Services

Fire Protection and Emergency Services

East Palo Alto and Menlo Park

Menlo Park Fire Protection District (MPFPD), established in 1916, provides emergency medical and fire services for the communities of Menlo Park, East Palo Alto, Atherton, and some unincorporated areas of San Mateo County. MPFPD's service area is approximately 30 square miles with an estimated population of 90,000.[21] MPFPD has seven stations throughout the service area that are strategically placed to provide efficient response times. The closest fire stations to the Project sites include the following:[22]

- Station 2, located at 2290 University Avenue, East Palo Alto, approximately 0.7 mile west of the South of Bay Road Reach.
- Station 4, located at 4101 Fair Oaks Avenue, Menlo Park, approximately 1 mile southwest of the Bedwell Bayfront Park Reach.
- Station 77, located at 1467 Chilco Street, Menlo Park, approximately 0.25 mile south of the Bayfront Expressway Reach.

[21] MPFPD (Menlo Park Fire Protection District), 2025. "Our Fire District." Available online at www.menlofire.gov/our-fire-district. Accessed February 26, 2025.

[22] City of Redwood City, 2025. "Fire Stations." Available online at www.redwoodcity.org/departments/fire-department/about-the-department/fire-stations. Accessed February 26, 2025.

In addition to the fire stations, the Menlo Park Fire Rescue Training site is adjacent to the Ravenswood Substation (Substation and Marsh Restoration Reach).

Redwood City

The Redwood City Fire Department serves the cities of Redwood City and San Carlos and includes seven fire stations housing seven engines, one truck, and currently has over 90 staff members, including firefighters and firefighter/paramedics among others.[23] The closest fire station to the Project sites is Station 11, located at 1091 Second Avenue, Redwood City, approximately 0.75 mile southwest of the Marsh Road Reach.

Police Services

East Palo Alto

Police services for East Palo Alto are served by the East Palo Alto Police Department, located at 141 Demeter Street, East Palo Alto.[24]

Menlo Park

Police services for Menlo Park are served by the Menlo Park Police Department, which includes Patrol Operations, Special Operations, and Communications and Records Operations. The Menlo Park Police Department is located at 701 Laurel Street, Menlo Park.[25]

Redwood City

Police services for Redwood City are served by the Redwood City Police Department. The department has an Investigations Division, an Administration Division, and a Patrol Division, which includes emergency and non-emergency services as well as specialized functions, such as the Patrol Unit and Canine Officers.[26] The Redwood City Police Department is located at 1301 Maple Street, Redwood City.

Palo Alto

Although none of the Project components are within Palo Alto, the Laumeister and Faber marshes are owned by the City of Palo Alto and would therefore be serviced by the Palo Alto Police Department. The Palo Alto Police Department is located at 275 Forest Avenue, Palo Alto.

Public Education Services

The Project area is served by Sequoia Union High School District, Redwood City School District, and Ravenswood City School District. In addition to these school districts, several private schools are in the general vicinity of the Project sites. The only school within 0.25 mile of where Project construction or operation would occur is East Palo Alto Charter School at 1286 Runnymede Street, East Palo Alto. East Palo Alto Charter School is approximately 150 feet from the proposed construction at the South of Bay Road Reach, with about half the reach being within 0.25 mile of the school. Refer to Section 3.10, Hazards,

[23] City of Redwood City, 2025. "About the Department." Available online at www.redwoodcity.org/departments/fire-department/about-the-department. Accessed January 2025.

[24] City of East Palo Alto, 2025. "Police Department." Available online at www.ci.east-palo-alto.ca.us/police. Accessed January 2025.

[25] City of Menlo Park, 2025. *Current Organizational Chart*. Available online at menlopark.gov/files/sharedassets/public/v/1/police/documents/organizational-chart-0421_202104271335594567.pdf. Accessed January 2025.

[26] City of Redwood City, 2025. "Patrol Division." Available online at www.redwoodcity.org/departments/police-department/police-divisions/patrol-division. Accessed January 2025.

Hazardous Materials, and Wildfire, for a discussion of impacts related to Project construction and operation within 0.25 mile of schools.

Parks and Recreational Facilities

Refer to Figure 2-5 in Chapter 2, *Project Description*, for the location of existing trails and other recreational facilities near the Project sites in relation to the SAFER Bay Project alignment. Parks and recreational facilities in the Project area are under the jurisdiction of the following public agencies:

- The City of East Palo Alto's Community Services & Recreation department manages seven parks and three facilities that are available for public reservations.[27]
- The Midpeninsula Regional Open Space District owns and operates the 376-acre Ravenswood Open Space Preserve.
- The City of Palo Alto owns and operates the Baylands Nature Preserve, which includes the Laumeister and Faber marshes in East Palo Alto.
- The City of Menlo Park's Recreation and Sports Department manages approximately 19 recreational facilities, which include parks, school fields, and elementary and middle schools; it also operates a range of recreation and sports programs.[28,29]
- The City of Redwood City's Recreation and Community Services department manages 30 parks and operates a number of recreation programs and services, including bocce and horseshoe pits, community centers, pickleball, and tennis.[30,31]
- The Metropolitan Transportation Commission and Bay Conservation and Development Commission jointly operate the San Francisco Bay Trail, which consists of more than 350 miles of trails that circle the San Francisco Bay.[32]

Refer to Section 3.15, Recreation, for a list of recreational facilities in the Project vicinity, as well as a discussion of potential impacts related to Project construction and operation relative to recreational facilities.

3.17.2 Regulatory Framework

Unless otherwise noted, the Project would be consistent with applicable plans and regulations outlined in this section.

[27] City of East Palo Alto, 2025. "Facility Reservations." Available online at www.ci.east-palo-alto.ca.us/reservations. Accessed January 2025.

[28] City of Menlo Park, 2025. "Recreation and Sports." Available online at menlopark.gov/Government/Departments/Library-and-Community-Services/Recreation-and-sports. Accessed January 2025.

[29] City of Menlo Park, 2023. *City of Menlo Park – Park Amenities*. Accessed January 2025.

[30] City of Redwood City, 2025. "Parks Make Life Better." Available online at www.redwoodcity.org/departments/parks-recreation-and-community-services/about-us/parks-make-life-better. Accessed January 2025.

[31] City of Redwood City, 2025. "Facilities." Available online at www.redwoodcity.org/departments/parks-recreation-and-community-services/facilities. Accessed January 2025.

[32] MTC (Metropolitan Transportation Commission), 2025. "San Francisco Bay Trail." Available online at mtc.ca.gov/operations/regional-trails-parks/san-francisco-bay-trail. Accessed February 13, 2025.

Federal

No federal laws or requirements for utilities, service systems, and public services are applicable to the Project.

State

California Integrated Waste Management Act

The Integrated Waste Management Act (Public Resources Code section 40050 et seq.), enacted through Assembly Bill (AB) 939, required all California cities, counties, and approved regional solid waste management agencies to divert a minimum of 50 percent of solid waste from landfills by 2000. In 2011, Assembly Bill 341 amended Assembly Bill 939 to establish a statewide policy goal that not less than 75 percent of solid waste generated would be source reduced, recycled, or composted by the year 2020, and annually thereafter.

Diversion includes waste prevention, reuse, and recycling. The Integrated Waste Management Act led to the creation of CalRecycle. Under this law, jurisdictions must submit solid waste planning documentation to CalRecycle. The Integrated Waste Management Act also established a comprehensive statewide system of permitting, inspections, and maintenance for solid waste facilities, and authorized local jurisdictions to impose fees based on the types and amounts of waste generated. The Integrated Waste Management Act guided preparation of the waste management plan for San Mateo County, which is described in length below.

California Code of Regulations

California Code of Regulations title 22, division 4.5 includes an array of requirements for the disposal and recycling of hazardous and universal wastes that the Project may generate. Title 22 includes specific standards and requirements for the identification, collection, transport, disposal, and recycling of hazardous wastes. Additional standards are included for the collection, transport, disposal, and recycling of universal wastes, defined as those wastes identified in California Code of Regulations title 22, section 66273.9, including batteries, electronic devices, mercury-containing equipment, lamps, cathode ray tubes, and aerosol cans. Requirements include recycling, recovery, the return of spent items to the manufacturer, or disposal at an appropriately permitted facility. Title 22, division 4.5 also provides restrictions and standards relevant to waste destination facilities, as well as authorization requirements for various waste handlers. Title 22 includes California's Universal Waste Rule and other additional waste handling and disposal requirements.

Utility Notification Requirements

Utility regulations under California Code of Regulations title 8, section 1541, require excavators to determine the approximate locations of subsurface installations, such as sewer, telephone, fuel, electric, and water lines (or any other subsurface installations that may reasonably be encountered during excavation work) before opening an excavation. The California Government Code (section 4216 et seq.) requires owners and operators of underground utilities to become members of and participate in a regional notification center. According to Government Code section 4216.1, operators of subsurface installations that are members of, participate in, and share the costs of a regional notification center, such as Underground Services Alert of Northern California and Nevada, more commonly referred to as USA

North, are in compliance with this section of the code. USA North receives planned excavation reports from public and private excavators and transmits those reports to all participating members that may have underground facilities at the location of excavation. Members will mark or stake their facilities, provide information, or give clearance to dig. This notification requirement would apply to the Project because of the proposed excavation activities.

California Public Utilities Commission

The California Public Utilities Commission (CPUC) regulates services and utilities and helps ensure California's access to safe and reliable utility infrastructure and services. The essential services regulated include electric, natural gas, telecommunications, water, railroad, rail transit, and passenger transportation companies. CPUC regulates utility construction by PG&E and the other investor-owned utilities under its jurisdiction, including the location and relocation of PG&E power lines. CPUC would have authority over changes to PG&E facilities that may be needed for Project implementation.

2022 California Green Building Standards Code

The provisions of the 2022 California Green Building Standards Code (made effective January 1, 2023) feature regulations for planning and design, energy efficiency, water efficiency and conservation, material conservation and resources efficiency, and indoor environmental quality of every newly constructed building or structure in California, unless otherwise indicated in the code.

Section 5.408, Construction Waste Reduction, Disposal, and Recycling, of the 2022 California Green Building Standards Code requires non-residential development, like the Project, to meet a local construction and demolition waste management ordinance, or to recycle and/or salvage for reuse a minimum of 65 percent of the development's non-hazardous construction and demolition waste, in accordance with one of the following:

- **Construction waste management plan.** A local jurisdiction must submit a construction waste management plan that identifies the construction and demolition waste materials to be diverted from disposal and how they will be sorted (onsite or bulk mixed), the amount of construction and demolition waste materials diverted (calculated by weight or volume), and diversion facilities where construction and demolition waste materials will be taken.
- **Waste management company.** A waste management company may be used if it can provide verifiable documentation that the percentage of construction and demolition waste material diverted from the landfill complies with section 5.408.
- **Waste stream reduction alternative.** The combined weight of new construction disposal that does not exceed 2 pounds per square foot of building area may be deemed to meet the 65 percent minimum requirement as approved by the enforcing agency.

Pursuant to chapter 15.11, Green Building Code, in the East Palo Alto Municipal Code, East Palo Alto has adopted by reference the 2022 California Green Building Standards Code.[33] Pursuant to section 12.18.050 of the Menlo Park Municipal Code, Menlo Park has amended section 4.408.1 of the California Green Building Standards Code to require developers to "[r]ecycle and/or salvage for reuse a minimum of

[33] City of East Palo Alto, 2022. Chapter 15.11 – Green Building Code. *East Palo Alto Municipal Code*, passed December 6, 2022. Accessed January 2025.

65 percent of both inert and non-inert non-hazardous demolition waste and 65 percent of both inert and non-inert non-hazardous construction waste."[34] Pursuant to chapter 9, article XI, section 9.193, of the Redwood City Municipal Code, Redwood City requires that all new construction projects "shall be required to divert a minimum of 60 percent of total generated [construction and demolition] debris tonnage".[35]

California Master Mutual Aid Agreement

The California Master Mutual Aid Agreement is a framework agreement between the State of California and local governments for aid and assistance by the interchange of services and facilities, such as fire, police, medical and health, communication, and transportation services and facilities, to cope with the problems of rescue, relief, evacuation, rehabilitation, and reconstruction. The California Master Mutual Aid Agreement is essentially a mechanism to help ensure the adequate provision of services in areas such as the Project area.

California Fire Code

State fire regulations are set forth in sections 13000 et seq. of the California Health and Safety Code. These regulations address building standards (as identified in California Code of Regulations title 24, the California Building Code), fire protection and notification systems, fire protection devices (such as fire extinguishers and smoke alarms), high-rise building and childcare facility standards, and fire suppression training. These regulations would apply to Project facilities such as the pump station proposed in the Tech Campus Reach.

California Water Code

California Water Code section 10910 requires that, if a proposed project is subject to CEQA, and it is also a "project" within the meaning of California Water Code section 10912 subdivision (a), a water supply assessment is required. California Water Code section 10912 subdivision (a) defines a project as:

- A shopping center or business employing over 1,000 people or exceeding 500,000 square feet of floor space;
- A commercial building with more than 1,000 employees or over 250,000 square feet of floor space;
- A hotel or motel with more than 500 rooms;
- An industrial, manufacturing, or processing facility, or industrial park, planned for over 1,000 people, covering more than 40 acres or having more than 650,000 square feet of floor area;
- A mixed-use development incorporating one or more of these elements; or
- A project generating demand equivalent to 500 residential units.

[34] City of Menlo Park, 2024. Chapter 12.18, California Green Building Standards Code Amendments, Section 12.18.050 Amendment of Section 4.408.1 – Construction Waste Management. *Menlo Park Municipal Code*, current through November 19, 2024. Accessed January 2025.

[35] City of Redwood City, 2024. Chapter 9, Article XI, Section 9.193 – Landfill Diversion Requirements. *Redwood City Municipal Code*, passed November 25, 2024. Accessed February 2025.

If the public water system has fewer than 5,000 service connections, any residential, commercial, hotel, or industrial development that increases service connections by 10% or more also qualifies as a "project."

The Project is not within one of the land use types listed in California Water Code section 10912 subdivision (a); therefore, a water supply assessment is not required.

Local

San Mateo County Countywide Integrated Waste Management Plan

The San Mateo County Countywide Integrated Waste Management Plan is the guiding document for attaining and maintaining the goals of the Integrated Waste Management Act of 1989 in San Mateo County. Pursuant to Public Resources Code section 41822, San Mateo County reviews the Countywide Integrated Waste Management Plan at least once every 5 years to correct any deficiencies in the plan's elements; comply with the source reduction and recycling requirements established under Public Resources Code section 41780 (the 50 percent reduction by 2000 requirement); and revise the documents as necessary. These requirements would apply to Project activities.

General Plans

The Project would be subject to local plans and policies of the jurisdictions where it is located, including East Palo Alto, Menlo Park, and Redwood City. **Table 3.17-2** presents local plans and policies regarding utilities, service systems, and public services to support the consideration of Project consistency with general plan policies.

TABLE 3.17-2
LOCAL PLANS AND POLICIES RELEVANT TO THE PROJECT – UTILITIES AND SERVICES

City of East Palo Alto Vista 2035 General Plan
GOAL ISF-3: Use best practices to reduce and manage solid waste.
Policy 4.2: Waste reduction. Seek to reduce East Palo Alto's rate of waste disposal per capita, and to increase the diversion rate of recycling and green waste.
Policy 4.4: Construction waste. Encourage all construction projects to divert 80% of their construction waste away from landfills, exceeding CalGreen requirements.
Policy 4.7: Recycled building material. Encourage the use of recycled building and infrastructure materials in City operations and construction.
GOAL ISF-10: Provide excellent emergency services to the community.
Policy 10.3: Fire and emergency services. Continue to coordinate with the Menlo Park Fire Protection District (MPFPD) to ensure excellent fire and emergency services.
Policy 10.4: Excellent police service. Strive to continuously improve the performance and efficiency of the East Palo Alto Police Department.
Goal SN-5: Provide efficient and effective emergency response in the immediate aftermath of a natural or human caused disaster.
Policy 5.5: Fire suppression. Ensure potable water and water for fire suppression can be available in an emergency.

Menlo Park General Plan
Goal S1: Assure a safe community.
Policy S1.31: Coordination with the Menlo Park Fire District. Encourage City-Fire District coordination in the planning process and require, where appropriate, development applications to be reviewed by the Menlo Park Fire Protection District prior to project approval by the City.
Goal LU-7: Promote the implementation and maintenance of sustainable development, facilities and services to meet the needs of Menlo Park's residents, businesses, workers, and visitors.
Policy LU-7.1: Sustainability. Promote sustainable site planning, development, landscaping, and operational practices that conserve resources and minimize waste.
Program LU-7.F: Adaptation Plan. Work with emergency service providers to develop an adaptation plan, including funding mechanisms, to help prepare the community for potential adverse impacts related to climate change, such as sea level rise, extreme weather events, wildfire, and threats to ecosystem and species health.
Redwood City General Plan
GOAL BE-42: Provide adequate and reliable wastewater collection and treatment facilities that meet current and future needs
Policy BE-42.1: Continue to ensure adequate treatment capacity and collection system for Redwood City's wastewater conveyed to South Bayside System Authority (SBSA) treatment facilities while protecting water quality and public health and minimizing adverse impacts to the environment.
Policy BE-42.2: Work with South Bayside System Authority (SBSA) member agencies to ensure that the treatment facility has sufficient capacity to meet future wastewater treatment needs.
Policy BE-42.3: Minimize groundwater infiltration and inflow to the wastewater collection system to maintain sufficient peak wet weather capacity and continue to explore other possible options to reduce peak wet weather flow.
GOAL BE-43: Support reliable, high quality, and environmentally sound energy distribution systems to meet current and future needs.
Policy BE-43.1: Require that improvements and maintenance to electric and gas transmission and distribution systems that are made to accommodate new growth be performed in a manner that maintains safety, reliability, and environmental compatibility.
GOAL BE-46: Minimize the volume of solid waste that enters regional landfills.
Policy BE-46.1: Meet or exceed State mandates regarding the diversion of waste from landfills.
Policy BE-46.2: Encourage recycling, composting, and source reduction by residential and non-residential sources in Redwood City.
Policy BE-46.3: Promote green building practices with respect to recycling material from building demolition and using recycled building materials in new construction.
GOAL PS-11: Provide a high level of public safety services.
Policy PS-11.1: Work with the Police Department to determine and meet community needs for law enforcement services.
Policy PS-11.2: Work with the Fire Department to determine and meet community needs for fire protection and related emergency services.
SOURCE: City of East Palo Alto, 2017. *Vista 2035 General Plan*. Adopted October 4, 2016; Final Version March 2017. Available online at www.ci.east-palo-alto.ca.us/planning/page/vista-2035-general-plan; City of Menlo Park, 2024. *Open Space/Conservation, Noise and Safety Elements*. Adopted May 21, 2013; Safety Element adopted September 4, 2024. City of Redwood City, 2023. *Redwood City General Plan*. Adopted October 11, 2010; Amended August 2023. Available online at www.redwoodcity.org/departments/community-development-department/planning-housing/planning-services/environmental-documents/general-plan-eir.

3.17.3 Impacts and Mitigation Measures

Significance Criteria

In accordance with CEQA, CEQA Guidelines (including Appendix G), relevant plans, policies, and/or guidelines, and agency standards, the Project could have a significant impact if it were to do any of the following:

- Require or result in the relocation or construction of new or expanded water, wastewater treatment or stormwater drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects.
- Have insufficient water supplies available to serve the Project and reasonably foreseeable future development during normal, dry, and multiple dry years.
- Result in a determination by the wastewater treatment provider, which serves or may serve the project that it has inadequate capacity to serve the project's projected demand in addition to the provider's existing commitments.
- Generate solid waste in excess of state or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals.
- Fail to comply with federal, state, and local management and reduction statutes and regulations related to solid waste.
- Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:
  - Fire Protection;
  - Police Protection;
  - Schools;
  - Parks; and
  - Other public facilities.

Methodology

Data used in this section include construction-related information compiled by the Project's design team, inventories of utility and service system infrastructure, and online resources such as CalRecycle's website. Public services and utilities in the study area were identified as potentially subject to be directly or indirectly affected by Project implementation because of their location/service area. For purposes of this EIR, Project impacts on stormwater drainage facilities are discussed in Section 3.11, Hydrology and Water Quality.

The evaluation of the first significance criterion involves determining whether: (a) the Project would require or result in the construction of new or the relocation or expansion of existing utilities; and (b) the construction or relocation of utilities could cause substantial environmental effects. Because, as discussed in Chapter 2, utility construction and relocation are part of the overall Project, the construction-related impacts associated with new, relocated, or expanded facilities for Project-level components are addressed in the impact analyses in other Chapter 3, *Environmental Setting, Impacts, and Mitigation Measures*, sections (e.g., refer to Section 3.3, Air Quality, for discussions of impacts related to exposing receptors to pollutant concentrations and Section 3.11, Hydrology and Water Quality, for discussions of water quality impacts).

Section 3.14, Population and Housing, evaluates the Project's potential to directly or indirectly induce population or housing growth. The following analysis considers whether Project implementation would

increase the use of or otherwise affect existing utilities and public services, based in part on the analysis and conclusions in Section 3.14.

Section 3.1.5, Approach to Cumulative Impacts Analysis and Cumulative Projects, describes the overall approach to the cumulative analysis. The cumulative analysis for utilities, service systems, and public services uses a list-based approach to analyze the effects of the Project in combination with other past, present, and probable future projects in the immediate vicinity. The geographic scope of cumulative impacts on utilities, service systems, and public services addresses the areas that are served by the utility and public service providers within the Project area.

Based on previous work completed for South Bay Salt Pond Restoration Project Phase 2, which included restoration of tidal action to Pond A2W, PG&E transmission towers in Ponds R1 and R2 could require reinforcement up to the high tide line to account for the introduced tidal flux. PG&E would evaluate information concerning tidal flux associated with proposed restoration and determine the need for improvements. SFCJPA would engage with PG&E to ensure that changes to transmission towers would be implemented before breaching the existing levees for Ponds R1 and R2. Given that it is uncertain whether and what improvements would be needed, for informational purposes, Appendix PGE presents a brief description and environmental impact analysis of potential PG&E tower reinforcements.

This draft EIR evaluates proposed project activities at a level of detail consistent with the best available information and specificity available at the time of EIR preparation. To the extent that activities necessary for Project completion are known, they are described in Chapter 2, *Project Description*, and evaluated in the impact analysis below. Appendix INFRA identifies whether infrastructure and other encroachments at and near the Project site would be protected in place or would require changes, and whether such changes are evaluated at a project or program level of detail. As indicated in Appendix INFRA, several utilities within the South of Bay Road, Dumbarton Approach, and Substation and Marsh Restoration reaches are evaluated at a program level due to the lack of design details. As indicated previously, although this section and other Chapter 3, *Environmental Setting, Impacts, and Mitigation Measures*, sections address impacts related to utility construction and relocation as part of the Project to the extent possible, the need for additional CEQA documentation would be evaluated once additional design details are developed as discussed in greater detail in Section 1.2.5, Program–Project EIR and Supplemental CEQA.

Based on the nature of the Project, there would be no impact related to the following criteria regarding utilities, service systems, and public services:

- ***Result in a determination by the wastewater treatment provider, which serves or may serve the Project that it has inadequate capacity to serve the Project's projected demand in addition to the provider's existing commitments.*** As indicated in Chapter 2, *Project Description*, during Project construction, there would be a maximum of 40 workers per day. Assuming that each worker would generate 2.81 gallons per day of wastewater via portable toilets,[36] the total increase in wastewater volumes would be less than approximately 0.0002 MG per day, a negligible increase that would be well within the dry-weather capacity of the existing wastewater system. The wastewater would be pumped to existing sewer lines, then to sanitary waste facilities in the Project area (e.g., RWQCP and/or SVCWWTP). Discharges associated with the sanitary needs of construction workers would be

[36] This calculation is based on compliance with the 2013 California Green Building Code's water use baseline values. The total construction worker water use for sanitary purposes is estimated to average at 2.81 gallons per day.

well within the remaining dry-weather capacity of the RWQCP or the SVCWWTWP, and no new or additional staff would be required for Project operation and maintenance. Therefore, this criterion is not applicable to Project construction or operation, and no impact would occur.

Impacts and Mitigation Measures

Table 3.17-3 summarizes utilities, service systems, and public services-related impacts of the Project.

TABLE 3.17-3
UTILITIES, SERVICE SYSTEMS, AND PUBLIC SERVICES IMPACT CONCLUSIONS

Impact	Level of Significance
Impact USP-1: Require or result in the relocation or construction of new or expanded water, wastewater treatment, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects.	LTS
Impact USP-2: Have insufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years.	LTS
Impact USP-3: Generate solid waste in excess of state or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals.	LTS
Impact USP-4: Fail to comply with federal, state, and local management and reduction statutes and regulations related to solid waste.	LTS
Impact USP-5: Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for fire protection, police protection, schools, parks, or other public facilities.	LTS
Impact C-USP-6: The Project, in combination with past, present, and probable future projects in the Project area, would result in significant adverse impacts related to utilities, service systems, and public services.	LTS

NOTES: LTS = Less than Significant

Impact USP-1: Require or result in the relocation or construction of new or expanded water, wastewater treatment, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects. *(Less than Significant)*

As indicated in Section 3.14, Population and Housing, Project implementation would not induce significant population or housing growth either directly (e.g., by constructing housing) or indirectly (e.g., by removing an obstacle to growth such as inadequate water supply). Therefore, the Project would not require or result in the construction of new or expansion of existing utilities due to population growth.

As indicated in Chapter 2, *Project Description*, the Project would involve relocation, replacement, or removal of existing infrastructure, including various water and wastewater conveyance infrastructure. Appendix INFRA summarizes known encroachments, utilities, and penetrations along the Project reaches and indicates where existing infrastructure may need to be modified to accommodate proposed shoreline protection and recreational features. Appendix INFRA was prepared by Project engineers based on a review of as-built documents, inspection reports, and site reconnaissance. Generally, unpermitted encroachments and penetrations are assumed to be removed, and permitted encroachments and penetrations are assumed to be improved to meet current design standards. No natural gas or telecommunication facilities are known to occur within the footprint of the Project (refer to Appendix

INFRA); therefore, the Project is assumed to not require or result in the relocation or construction of natural gas or telecommunication facilities. Modifications to other types of utilities are discussed below.

Sections 3.2 through 3.17 of this EIR include descriptions of physical effects on the environment associated with Project construction. Some modifications to utilities necessitated by Project implementation have been incorporated into the proposed design (e.g., realignment of the Runnymede Drainage Ditch in the South of Bay Road Reach); consequently, the impacts of such modifications on the physical environment are reflected in the evaluations in Sections 3.2 through 3.17. However, in many cases, although the location of existing utilities that may require relocation is indicated in Appendix INFRA, no information on specific utility modifications (including where such utilities may be relocated) is available because they have not been designed; consequently, such modifications and relocations are not analyzed in this EIR. Refer to Appendix INFRA for a list of which utilities are evaluated at a project level and program level of detail based on available information. In some cases, utilities are operated by an entity that is not a member of the SFCJPA. The cities of East Palo Alto, Menlo Park, and Redwood City or other service providers would go through the process of evaluating the need for, designing, and then constructing these utility modifications. Once specific design information needed for evaluation of environmental impacts is developed, the applicable lead agency would then evaluate those actions as part of a project-level CEQA document (e.g., an addendum to this EIR).

The Project would not result in additional foreseeable environmental effects related to requiring or resulting in the construction of new or expansion or relocation of existing facilities beyond those identified in other sections of the draft EIR. Therefore, the impacts would be **less than significant**.

Impact USP-2: Have insufficient water supplies available to serve the Project and reasonably foreseeable future development during normal, dry, and multiple dry years. ***(Less than Significant)***

As indicated in Table 2-9 in Chapter 2, *Project Description*, Project construction would use a total of approximately 108 MG of potable water, with between 4,500 and 106,300 gallons used each day of construction. Active construction sites would be watered up to three times per day for dust suppression with water provided by potable water fire hydrants adjacent to the Project sites (i.e., along the shoreline protection reaches). The increase in potable water use during construction would be temporary, terminating with the completion of construction. Following construction, the proposed Project would initially require up to 73 MG of water annually for irrigation of grass cover on the levee slopes.[37] However, as the grass cover is established the amount of irrigation required is anticipated to decline because of USACE requirements (e.g., that perennial grasses on levees be maintained to function reliably against erosion, be appropriate to the local climate conditions, and preferably be native to the region).[38]

[37] Calculated for buffalo grass (warm season turfgrass) in Palo Alto using the Simplified Landscape Irrigation Demand Estimation (SLIDE) equation (University of California, Agriculture and Natural Resources, Center for Landscape and Urban Horticulture, https://ucanr.edu/site/center-landscape-urban-horticulture/using-ansi/asabe-s623-slide-estimate-landscape-water.

[38] U.S. Army Corps of Engineers, Guidelines for Landscape Planting and Vegetation Management at Levees, Floodwalls, Embankment Dams, and Appurtenant Structures. ETL 110-2-583, April 30, 2014, Section 4-8.

As described in Section 3.17.1, Environmental Setting, East Palo Alto, Menlo Park, and Redwood City procure water supplies primarily through the SFPUC Regional Water System. East Palo Alto, Menlo Park, and Redwood City estimate that available supply exceeds projected water demand through 2045. The Project's construction and operations water demand in combination with existing demand would not exceed available supplies in East Palo Alto, Menlo Park, or Redwood City. Active Project construction would be temporary (approximately 1 year per reach) and, as shown in Table 2-4 in Chapter 2, *Project Description,* would have varying and/or offset construction schedules for each reach, and irrigation demand would decline as grasses establish. Therefore, the impact on available water supplies for Project construction would be **less than significant**.

Impact USP-3: Generate solid waste in excess of state or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals. (*Less than Significant*)

Solid waste generated during Project construction would come from the demolition of existing infrastructure (e.g., utilities, walkways, gates, signs) and removal of existing berm spoils that are not expected to be geotechnically suitable for development of the levee foundations. Such spoils would likely be stockpiled onsite and used to construct habitat improvements in Ponds R1 and R2, as described in Section 2.4.1, or off-hauled to Stevens Creek Quarry to be recycled.

As outlined in Table 2-10 in Chapter 2, *Project Description*, several reaches are not expected to generate debris for off-haul to a landfill; rather, these reaches would generate a total of approximately 447,900 cubic yards (CY) of spoils for reuse. Table 2-10 also presents the volume of solid waste that would be generated from the Project off-hauled to Ox Mountain, which totals approximately 58,040 CY. As shown in Table 3.17-1, Ox Mountain and/or the surrounding landfills would have the capacity to meet the solid waste disposal needs of the Project given that construction is expected to generate approximately 58,040 CY of waste. Assuming that demolition debris from all applicable reaches would be taken to nearby landfills regularly throughout their demolition phases (i.e., not all at once), estimated daily levels of debris are expected to be approximately 1,050 CY for South of Bay Road, 810 CY for North of Bay Road, 650 CY for Tech Campus, and 100 CY for Bedwell Bayfront Park. When converted to tons per day, none of these volumes would exceed the daily capacity of the surrounding landfills.[39]

Given that only about 11.5 percent of total construction debris would be landfilled, the amount of non-hazardous construction and demolition waste would be consistent with requirements in the San Mateo County Countywide Integrated Waste Management Plan described in Section 3.17.2, and the 2022 California Green Building Standards Code (which requires non-residential development to reuse or recycle a minimum of 65 percent of non-hazardous construction and demolition waste).

The amount of waste generated during periodic operations and maintenance would likely to similar to that generated under current conditions since the activities would be similar (vegetation management). Area

[39] Asphalt weighs approximately 2.025 tons per CY. (WasteCap Resource Solutions, Inc., 2011. *Construction and Demolition Debris Weight to Conversion*. Available online at syracuselandbank.org/wp-content/uploads/2014/07/CD-weight-to-volume-calculation-Waste-Cap-from-other-sources.pdf. Accessed October 23, 2025.)

landfills and other waste disposal sites would continue to have the capacity to accept the limited quantities of solid waste generated by the Project during operation and maintenance.

For these reasons, the Project would not generate solid waste in excess of state or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals. Therefore, this impact would be **less than significant**.

Impact USP-4: Fail to comply with federal, state, and local management and reduction statutes and regulations related to solid waste. (*Less than Significant*)

As indicated in Section 3.17.2, Regulatory Framework, no federal regulations pertaining to utilities or service systems are applicable to the Project. Construction-related solid waste would be disposed of in accordance with regulations described in Section 3.17.2, including the California Integrated Waste Management Act and 2022 California Green Building Standards Code (which requires non-residential development to reuse or recycle a minimum of 65 percent of non-hazardous construction and demolition waste). As described under Impact USP-3 and in Chapter 2, *Project Description*, materials generated during Project construction and operation would either be reused onsite (e.g., for habitat restoration in Ponds R1 and R2) or disposed of at a landfill that is permitted for the waste with adequate capacity. Of the approximately 504,540 CY of construction debris detailed in Table 2-10, only approximately 11.5 percent (58,040 CY) is expected to be off-hauled for landfill disposal.

New structures (e.g., pump stations) would be constructed in compliance with the 2022 California Green Building Standards Code. Therefore, the Project's impact related to solid waste management and compliance with applicable regulations would be **less than significant**.

Impact USP-5: Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for fire protection, police protection, schools, parks, or other public facilities. (*Less than Significant*)

Construction

The Project sites currently receive services from the providers identified in Section 3.17.1, Environmental Setting. Project construction would occur pursuant to the schedule outlined in Table 2-4 in Chapter 2, *Project Description*, and would employ up to a maximum of approximately 40 construction workers at one time (refer to Table 2-7 in Chapter 2, *Project Description*). Construction workers would likely come from within San Mateo County or commute from other locations in the San Francisco Bay Area. Construction workers who reside in San Mateo County are served by existing public services provided by local jurisdictions, and thus, would not create an increase in demand for these services.

Although it is possible that some workers might temporarily relocate from other areas, the Project is not expected to result in a substantial increase in the local population (refer to Section 3.14, Population and Housing). Therefore, the Project is not expected to result in unacceptable service ratios or increased

response times such that new or physically altered facilities would be required to maintain service. Incidents requiring law enforcement, fire protection, or emergency medical services could occur during construction. Any incremental increase in demand for these services during construction would be temporary. Given the number of public service providers listed in Section 3.17.1, Environmental Setting, and the requirements of the California Master Mutual Aid Agreement, this increased demand could be accommodated by existing services and would not require construction of new or physically altered facilities to maintain service. Therefore, the impact of Project construction on public services would be **less than significant**.

Refer to Section 3.15, Recreation, regarding impacts on recreational resources, which would be less than significant.

Operation and Maintenance

The Project would not involve the construction of residences or businesses and would not require hiring additional maintenance staff. Therefore, the Project would not result in a substantial permanent increase in the local population. As indicated in Section 3.17.2, Regulatory Framework, project facilities would be constructed in compliance with all applicable fire codes and public safety standards. Thus, Project operation would not result in substantial increases in demand for public services, including law enforcement, fire protection, emergency medical services, schools, or libraries. Therefore, **no impact** on public services would occur.

Cumulative Impacts

Impact C-USP-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse impacts related to utilities, service systems, and public services. (*Less than Significant*)

As indicated in Impact USP-1, the Project would result in a less-than-significant impact related to the relocation or construction of new utilities. Projects listed in Table 3.1-2 like 1990 Bay Road/The Landing and East Palo Alto Waterfront Project would be constructed directly adjacent to the Project reaches (refer to Figure 3.1-1) and may require construction or relocation of utilities. Sections 3.2 through 3.17 of this EIR provide analyses of the cumulative environmental effects associated with the relocation of existing and construction of new utilities (e.g., refer to Section 3.3, Air Quality, for the analysis of cumulative air quality effects from Project implementation in combination with projects listed in Table 3.1-2).

Regarding solid waste, as discussed in Section 3.17.2, and Impact USP-4, section 5.408 of the 2022 California Green Building Standards Code requires all non-residential construction and demolition projects to reuse or recycle at least 65 percent of generated materials. San Mateo County also implements its own integrated waste management plan. All projects within California, San Mateo County, and surrounding counties would be required to implement these or similar regulatory requirements. Additionally, as noted in Impact USP-1 and Impact USP-3, local and regional landfills have sufficient capacity to accommodate waste from the Project, and would likely accommodate the other projects listed in Table 3.1-2. Therefore, cumulative impacts related to utilities and service systems would be **less than significant**.

Regarding public services, as indicated under Impact USP-5, incidents requiring law enforcement, fire protection, or emergency medical services could occur during construction. Any incremental increase in demand for these services during construction would be temporary and could likely be accommodated by the number of existing services. Multiple projects identified in Table 3.1-2 may be under construction at the same time as the Project and could also require law enforcement, fire protection, or emergency medical services. However, as noted in Section 3.17.2, multiple agencies and facilities provide public services to the Project area and surrounding jurisdictions, and the need for such services would be episodic, not continuous. The likelihood that the Project would require law enforcement, fire protection, and emergency medical services simultaneously is considered remote, but in any case, would not result in the need for new or expanded services. Therefore, cumulative impacts related to the provision of utilities, service systems, and public services would be **less than significant**.

CHAPTER 4
Alternatives

4.1 Overview

4.1.1 Purpose of this Chapter

As required by the California Environmental Quality Act (CEQA), this chapter presents the alternatives analysis for the Strategy to Advance Flood Protection, Ecosystems, and Recreation along San Francisco Bay (Project or SAFER Bay Project) proposed by the San Francisquito Creek Joint Powers Authority (SFCJPA). This chapter describes the methodology used to screen and select CEQA alternatives for analysis as well as the results of the alternatives analysis. For the alternatives selected for analysis, the chapter compares the potential impacts of the alternatives with those of the Project. Based on this analysis, this chapter then identifies the environmentally superior alternative. Finally, other alternatives that were considered but eliminated from detailed consideration are presented together with the reasons for their elimination.

4.1.2 CEQA Requirements

CEQA Guidelines section 15126.6(a) states that an environmental impact report (EIR) must describe and evaluate alternatives to a project that feasibly attain most of the project's basic objectives but avoid or substantially lessen any identified significant environmental impacts. Specifically, the CEQA Guidelines (section 15126.6) set forth the following criteria for selecting and evaluating alternatives:

- **Identification of Alternatives.** The selection of alternatives is limited to those capable of avoiding or substantially lessening any of the significant environmental effects of the project, are potentially feasible, and would attain most of the basic objectives of the project. An EIR need not consider an alternative for which impacts cannot be reasonably ascertained or for which implementation is remote and speculative.
- **No Project Alternative.** The specific alternative of "no project" must be evaluated.
- **Range of Alternatives.** CEQA requires consideration of a reasonable range of alternatives to the project, or to the location of a project. An EIR need not consider every conceivable alternative but must consider and discuss a reasonable range of potentially feasible alternatives in a manner that will foster informed decision-making and public participation. The "rule of reason" governs the selection and consideration of EIR alternatives, requiring that an EIR set forth only those alternatives necessary to permit a reasoned choice. The lead agency (the SFCJPA) is responsible for selecting a range of project alternatives to be examined and for disclosing its reasons for the selection of alternatives. An EIR is not required to consider alternatives that are infeasible.

- **Evaluating Alternatives.** EIRs are required to include sufficient information about each alternative to allow meaningful evaluation, analysis, and comparison with the Project. Matrices may be used to display the major characteristics and the environmental impacts of each alternative. If an alternative could cause one or more significant effects in addition to those that would be caused by the project as proposed, the significant effects of the alternative must be discussed, but in less detail than the significant effects of the proposed Project.

SFCJPA or its member agencies could approve an alternative, or part of an alternative, in lieu of the Project as proposed.

4.2 Alternatives Screening and Selection

4.2.1 Screening Process

The alternatives screening process conducted for this EIR involved reviewing significant impacts attributable to Project implementation, identifying ways to avoid or reduce significant impacts, and screening out potential alternatives—including previously evaluated alternatives, alternatives suggested during scoping, and alternatives identified after completion of impact evaluations—that failed to meet the following criteria:

- *Is the alternative potentially feasible?*
- *Does the alternative reduce the severity of one or more of the Project's significant impacts?*
- *Does the alternative meet most of the basic objectives of the Project?*
- *Does the alternative foster informed decision-making and public participation?*

CEQA defines "feasible" as capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors.[1] CEQA Guidelines section 15126.6(f)(1) identifies factors that may be considered when addressing the feasibility of an alternative, which include site suitability, availability of infrastructure, general plan consistency, other plans or regulatory limitations, jurisdictional boundaries, economic viability, and whether the proponent can reasonably acquire, control, or otherwise have access to an alternative site.

Consistent with the intent of CEQA,[2] SFCJPA has incorporated consideration of environmental impacts as well as environmental benefits into planning and design for the Project as proposed. This effort included consultation with regulators and subsequent adoption of strategies to avoid or reduce the Project's significant environmental impacts; additional consideration of environmental constraints during Project planning; and input from subject matter experts engaged in evaluating the Project's environmental impacts.

[1] California Public Resources Code Section 21061.1; CEQA section 15364.

[2] CEQA section 15004(b)(1) states that "With public projects, at the earliest feasible time, project sponsors shall incorporate environmental considerations into project conceptualization, design, and planning."

4.2.2 Identification of Candidate Alternatives

Candidate alternatives were identified through review of previous reports and suggestions made during scoping and from input during design and environmental evaluation of the Project. This section summarizes the candidate alternatives.

SAFER Bay Feasibility Report

In 2016, SFCJPA released the Strategy to Advance Flood Protection, Ecosystems, and Recreation along San Francisco Bay – East Palo Alto and Menlo Park Public Draft Feasibility Study (Feasibility Report).[3] The overall purpose of the Feasibility Report was to evaluate flood protection alternatives to address current tidal flooding and projected sea level rise along the San Francisco Bay shoreline. SFCJPA provided the Feasibility Report to interested parties, including regulatory agencies, and conducted six public engagement events. The Feasibility Report identified different options for each reach. The options were then combined into four alternatives, one of which (the "Optimized" Alternative) was identified as the SFCJPA's preferred alternative. That alternative evolved into the proposed Project based on input from interested parties, subsequent investigations, design development, and studies in the area prepared by others.[4]

The alternatives screened out in the Feasibility Study (Low Cost, Restoration, and Recreation) were reconsidered during the alternatives screening process for this EIR and ultimately eliminated from further consideration (refer to Section 4.6).

Dumbarton Bridge Western Approach Alternatives

In 2020, the Metropolitan Transportation Commission, in collaboration with the California Department of Transportation (Caltrans), SFCJPA and its member agencies, and others, published the *Dumbarton Bridge West Approach + Adjacent Communities Resilience Study Technical Report* (DBWA Study),[5] the purpose of which was to develop a sea level rise adaptation strategy for the western approach to the bridge and adjacent communities. The study documented preliminary planning for sea level rise adaptation in the Project vicinity and included two long-term alternatives with similar objectives to the SAFER Bay Project and corresponding to the North of Bay Road, Dumbarton Approach, Substation and Marsh Restoration, and Tech Campus reaches. The DBWA Study anticipated that components of the alternatives identified in the study would be completed as separate projects based on common landowners and stakeholders.

The long-term alternatives described in the DBWA Study, including DBWA Alternative 2: Protect in Place and DBWA Alternative 3: Raise the Road, were considered during the alternatives screening process for this EIR and ultimately eliminated from further consideration in this EIR (refer to Section 4.6).

[3] SFCJPA (San Francisquito Creek Joint Powers Authority), 2016. Strategy to Advance Flood Protection, Ecosystems and Recreation along San Francisco Bay – East Palo Alto and Menlo Park Public Draft Feasibility Study.

[4] Other studies consulted included the June 2020 Dumbarton Bridge West Approach + Adjacent Communities Resilience Study, (MTC [Metropolitan Transportation Commission], 2020. Dumbarton Bridge West Approach + Adjacent Communities Resilience Study Technical Report. June 2020), 2019 San Francisco Bay Shoreline Adaptation Atlas (San Francisco Estuary Institute and SPUR, April 2019), and the 2017 Resilient by Design challenge (Bay Area Regional Collaborative, "What is Resilient by Design?". Available online https://barc.ca.gov/our-work/past-projects/what-resilient-design).

[5] MTC, 2020. Dumbarton Bridge West Approach + Adjacent Communities Resilience Study Technical Report. June.

Alternatives Suggested During Scoping

Numerous alternatives were suggested in comments on the notice of preparation (NOP) during the Project's scoping period (refer to Appendix SCOP). Many of the suggestions for alternatives focused on reducing the Project's impacts on biological resources; some focused on specific reaches. **Table 4-1** presents suggestions for alternatives from the NOP comments and their disposition. As indicated in the table, some suggestions in NOP comments were incorporated into the Project described in Chapter 2, *Project Description*, incorporated into Section 4.3, Selected CEQA Alternatives Evaluated in this Chapter, and/or are summarized in Section 4.6, Alternatives Considered but Eliminated from Further Analysis.

Other Alternatives Identified During Project Planning

Several other candidate alternatives were identified during design and EIR preparation based on the Project's impacts, including (for example) a Floodwall Only alternative.

4.2.3 Strategies to Avoid Significant Impacts

The primary goal of the alternatives selection process is to identify alternatives that could substantially reduce or avoid one or more of the significant impacts attributable to the Project, in accordance with CEQA Guidelines section 15126.6(b). The following sections summarize the significant impacts identified in Chapter 3, *Environmental Setting, Impacts*, *and Mitigation Measures*, and describe strategies that were considered for inclusion in the alternatives analysis based on their ability to avoid or lessen significant or potentially significant impacts. Refer to Chapter 3 for details regarding the impacts of the Project.

Significant and Unavoidable Impacts

As described in Chapter 3, the Project was determined to have the following significant and unavoidable impacts:

- **Aesthetics: South of Bay Road, Dumbarton Approach, Substation and Marsh Restoration, Tech Campus, and Bayfront Expressway Reaches**. Public viewing opportunities toward Faber Marsh and the East Bay Hills (e.g., from Beech, Cypress, and Garden streets in East Palo Alto, South of Bay Road Reach) and toward Ponds R1, R2, R3, SF2, and Ravenswood Slough (Dumbarton Approach, Substation and Marsh Restoration, Tech Campus, and Bayfront Expressway reaches) would be interrupted by proposed shoreline protection and recreational features (refer to Figures 3.2-5 and 3.2-6 in Section 3.2). Implementation of Mitigation Measure AES-1 (Floodwall Design and Landscaping Treatments) would reduce visual contrast for the affected views but would not eliminate view obstruction; consequently, this impact would be significant and unavoidable despite mitigation. (Impact AES-1)

TABLE 4-1
SCOPING COMMENTS PERTAINING TO ALTERNATIVES

Summary of Suggestions pertaining to Alternatives in Scoping Comments (Notice of Preparation Commenter indicated in parentheses)		Part of Project	Part of Alternative	Eliminated[a]	Additional Information
Evaluate options to avoid, minimize, or compensate for impacts to waters of the State (Regional Water Quality Control Board [RWQCB]).		√	√		The Project incorporates strategies to address impacts to waters of the State. After Project impacts were evaluated, additional means to reduce impacts to waters of the State were identified and incorporated into the Modified Footprint Alternative (refer to Section 4.3.2).
Consider aligning shoreline protection landward in areas of low-density land uses, parking (RWQCB).				√	Refer to discussions of eliminated alternatives in Section 4.6, Alternatives Considered by Eliminated from Further Analysis (Low Cost Alternative, North of Bay Road Reach: Landward Alignment, and Tech Campus Reach).
Incorporate “marsh mounds” (in-marsh high-tide refugia berms) into the design (California Department of Fish and Wildlife [CDFW]).		√			The Project incorporates marsh mounds (refer to the seabird nesting islands on Figure 2-3 in Chapter 2, Project Description).
Use nature-based approaches such as ecotone slopes and engineered features that incorporate habitat enhancements (multiple comments).		√			The Project incorporates ecotone slopes (refer to discussion under Tidal Salt Marsh-to-Upland Transition Zone Habitat in Section 2.4.1 in Chapter 2).
Include alternative options to reduce impacts to snowy plover habitat through enhancements in Ponds SF2 and R3 (multiple comments).		√			The Project includes enhancements to snowy plover habitat in Ponds SF2 and R3 (refer to discussion under “Western Snowy Plover Breeding Habitat Enhancement” in Section 2.4.1 in Chapter 2).
Consider alternatives to reduce conflicts between recreation and native species (Midpeninsula Open Space District [MidPen]).		√			Refer to Chapter 2 regarding features to avoid conflicts between recreation and native species (e.g., seasonal trail closures).
Consider alternatives to construction methods that minimize impacts to public use of the Bay Trail (State Lands Commission).				√	Refer to discussion in Section 4.6 (Minimize Impacts to Public Use of the Bay Trail).
Analyze alternatives that prioritize broad sloped levees where possible, retain Ravenswood Bay Trail, and evaluate restoration of the Ravenswood Triangle (Midpen).[b]		√		√	Refer to Section 2.4.1 in Chapter 2 regarding proposed levees and retained trails, including the Ravenswood Bay Trail. Refer to Section 4.6 regarding restoration of the Ravenswood Triangle.
Reach-Specific Comments					
South of Bay Road Reach	Levee at 1990 Bay Road: Incorporate hybrid levee that includes steeper 2:1 slopes (Harvest Properties).	√		√	Refer to Section 2.4.1 in Chapter 2 regarding shoreline protection proposed in this area. Refer also to discussion in Section 4.6 (South of Bay Road Reach: Hybrid Levee with Steeper Slopes – 1990 Bay Road).
	Minimize fill on the bayward side of the levee given the importance of and future accretion in Laumeister Marsh (Citizen’s Committee to Complete the Refuge [CCCR]).	√		√	The proposed design (levee/floodwall hybrid with a 3:1 bayward slope) is intended to minimize impacts to the marsh. Refer to discussion under Tidal Salt Marsh-to-Upland Transition Zone Habitat in Section 2.4.1 in Chapter 2 and Section 4.3.2 regarding proposed levee transition zones. Refer to Section 4.6 regarding constraints to shifting the levee alignment landward.
North of Bay Road Reach	Implement the landward levee alignment in NOP, implement a levee and Bay Trail similar to South of Bay Road Reach (multiple comments).	√	√		The landward alignment in the NOP was selected for the Project. The proposed design for this reach is a traditional levee. The Modified Footprint Alternative incorporates the levee/floodwall hybrid design for some segments of the North of Bay Road Reach (note that much of the alignment is in upland habitat and not in the marsh).
	Consider a design that pushes into the wetlands (Ravenswood Shores Business District).			√	Refer to discussion in Section 4.6 (North of Bay Road Reach: Bayward Alignment).
North of Bay Road and Dumbarton Approach Reaches	Consider potential future improved tidal marsh when developing alternatives (Midpen).	√			Refer to Chapter 2 regarding proposed improvements to tidal marsh and other habitat in these reaches.
Dumbarton Approach, Substation and Marsh Restoration Reaches	Consider a University Avenue levee alignment to avoid snowy plover habitat (CCCR).			√	Refer to discussion in Section 4.6 (Low Cost Alternative).
	Consider elevating State Route 84 (RWQCB).			√	Refer to discussion in Section 4.6 (DBWA Alternative 3: Raise the Road – both options).
	Consider an alternative without the broad habitat transition zone in Pond R2 (South Bay Salt Ponds Restoration Project).	√			Following scoping, the width of the transition zone in Pond R2 was narrowed (from 30:1 to 10:1).
	Consider relocating the PG&E substation (RWQCB).			√	Refer to discussion in Section 4.6 (DBWA Alternative 3: Raise the Road (Option 2)).
Tech Campus Reach	Narrow the transition zone to minimize impacts to Ravenswood Slough wetlands and endangered species in Pond R3 (CCCR).	√			The transition zone was narrowed following publication of the Notice of Preparation.
	Reconsider levee/floodwall hybrid or another design that eliminates permanent fill in Ravenswood Slough (CCCR).	√		√	Following the scoping period, the levee design along Ravenswood Slough was changed from levee to levee/floodwall hybrid, narrowing its footprint (refer to Chapter 2, Section 2.4). Refer also to Section 4.6 for other alternatives considered.
	Locate levee inland of Ravenswood Slough toward Hacker Way to minimize loss of habitat, impacts on wildlife (Sierra Club).			√	Refer to discussion in Section 4.6 (Tech Campus Reach).
Marsh Road Reach	Design should accommodate or not preclude the future addition of a 30:1 slope on the bayward side (CCCR).	√			The proposed design for the Marsh Road Reach does not preclude a future addition of a 30:1 slope on the bayward side.

NOTES:

a. Refer to Section 4.6 for the reasons candidate alternatives were eliminated from further consideration.
b. Ravenswood Triangle is not part of the Project site.

SOURCE: Table compiled by Environmental Science Associates in 2025.

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- **Noise: South of Bay Road, North of Bay Road, Tech Campus, Bedwell Bayfront Park, and Marsh Road Reaches.** Construction activities in the South of Bay Road, North of Bay Road, Tech Campus, Bedwell Bayfront Park, and Marsh Road reaches would expose nearby sensitive receptors to noise levels that would either exceed the Federal Transit Authority's daytime criterion of 90 A-weighted decibels (dBA) L_{eq}[6] for residential uses or represent an increase of more than 10 dBA over existing daytime ambient levels at the receptors. Implementation of Mitigation Measure NOI-1 (Construction Noise Control Measures) would attenuate construction noise; however, existing daytime ambient levels could still be exceeded by more than 10 dBA. Construction traffic would temporarily increase noise levels by more than 3 dBA at sensitive receptors in the North of Bay Road Reach despite implementation of Mitigation Measure NOI-1. Therefore, impacts within these reaches would remain significant and unavoidable even with implementation of Mitigation Measure NOI-1. In addition, the construction of other projects near the Project site (listed in Table 3.1-2 in Section 3.1, Overview) could overlap with the proposed Project, further exacerbating significant noise levels. (Impacts NOI-1 and C-NOI-1)

Significant Impacts that can be Mitigated to Less Than Significant

Project implementation would result in the following significant impacts, all of which could be mitigated to less-than-significant levels with the implementation of mitigation measures identified in Chapter 3, *Environmental Setting, Impacts, and Mitigation Measures,* under the respective impact evaluations:

Aesthetics

- Construction activities would require nighttime lighting adjacent to sensitive land uses that could adversely affect people and the environment. With implementation of Mitigation Measure AES-2 (Nighttime Security Lighting), this impact would be less than significant (Impact AES-3).

Air Quality

- Construction activities could result in fugitive dust emissions at levels that could exceed criteria air pollutant emissions thresholds and conflict with or obstruct implementation of the 2017 Clean Air Plan. With the implementation of Mitigation Measure AIR-1 (Best Management Practices for Construction-Related Fugitive Dust Emissions), these impacts would be less than significant. (Impacts AIR-1, AIR-2)

Biological Resources

- Project implementation could have a substantial adverse effect, either directly or through habitat modifications, on species identified as candidate, sensitive, or special-status in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife (CDFW) or U.S. Fish and Wildlife Service. Impacts to these species would be less than significant with implementation of Mitigation Measures BIO-1 through BIO-25. (Impact BIO-1)

[6] L_{eq} is the equivalent sound level, which describes noise over a specified period, typically 1 hour, in terms of a single numerical value. The L_{eq} is the constant sound level, that would contain the same acoustic energy as the varying sound level during the same period (i.e., the average noise exposure level for the given period).

- Construction activities could have a substantial adverse effect on state or federally protected wetlands through direct removal, filling, hydrological interruption, or other means. With the implementation of Mitigation Measure BIO-26, this impact would be less than significant. (Impact BIO-2)
- Project implementation could have a substantial adverse effect on riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the CDFW or U.S. Fish and Wildlife Service. With the implementation of Mitigation Measure BIO-26, this impact would be less than significant. (Impact BIO-3)
- Construction activities could conflict with local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance, by removing trees. This impact would be less than significant through implementation of Mitigation Measure BIO-27. (Impact BIO-5)
- The Project, in combination with past, present, and probable future projects in the Project area, would result in significant adverse impacts related to biological resources. Cumulative impacts would be less than significant with implementation of Mitigation Measures BIO-1 through BIO-27. (Impact C-BIO-1)

Cultural and Tribal Cultural Resources

- Construction ground disturbance could cause a substantial adverse change in the significance of an archaeological resource pursuant to CEQA Guidelines section 15064.5. This impact would be less than significant with implementation of Mitigation Measures CUL-1, CUL-2, and CUL-3. (Impact CUL-2)
- Construction ground disturbance could disturb human remains, including those interred outside of dedicated cemeteries. This impact would be less than significant with implementation of Mitigation Measure CUL-4. (Impact CUL-3)
- The Project, in combination with past, present, and probable future projects in the Project area, could result in significant adverse impacts related to cultural resources. Cumulative impacts would be reduced to a less-than-significant level through implementation of Mitigation Measures CUL-1, CUL-2, CUL-3, and CUL-4. (Impact C-CUL-1)
- Construction ground disturbance could cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, or cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe. This impact would be less than significant with implementation of Mitigation Measures CUL-1, CUL-2, CUL-3, and CUL-4. (Impact TCR-1)
- The Project, in combination with past, present, and probable future projects in the Project area could cause significant adverse impacts related to tribal cultural resources. Cumulative impacts would be reduced to a less-than-significant level through implementation of Mitigation Measures CUL-1, CUL-2, CUL-3, and CUL-4. (Impact C-TCR-1)

Hazards, Hazardous Materials, and Wildfire

- Construction activities could create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials, or reasonably foreseeable upset or accident conditions involving the release of hazardous materials into the environment. This impact would be

less than significant with implementation of Mitigation Measures HAZ-1, HAZ-2, and HYD-1b and best management practices required pursuant to adopted plans. (Impact HAZ-1)

- The Project would be located on or adjacent to sites included on a list of hazardous materials sites compiled pursuant to Government Code section 65962.5 and, as a result, would create a significant hazard to the public or the environment. This impact would be less than significant with implementation of Mitigation Measures HAZ-1, HAZ-2, and HYD-1b and best management practices required pursuant to adopted plans. (Impact HAZ-3)
- The Project could impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plans. This impact would be less than significant with implementation of Mitigation Measure TRA-1. (Impact HAZ-5)
- The Project, in combination with past, present, and probable future projects in the Project area, could result in significant adverse impacts related to hazards, hazardous materials, and wildfire. Cumulative impacts would be reduced to a less-than-significant level through implementation of Mitigation Measures HAZ-1, HAZ-2, and HYD-1b and best management practices required pursuant to adopted plans. (Impact C-HAZ-1)

Hydrology and Water Quality

- Construction activities could violate water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality. This impact would be less than significant with implementation of Mitigation Measures HYD-1a, HYD-1b, and BIO-10 and best management practices required pursuant to adopted plans. (Impact HYD-1)
- Project implementation could substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or impede or redirect flood flows. This impact would be less than significant with implementation of Mitigation Measures HYD-2a, HYD-2b, and HYD-2c. (Impact HYD-3)
- Construction activities could conflict with or obstruct implementation of a water quality control plan. This impact would be less than significant with the implementation of Mitigation Measures HYD-1a, HYD-1b, and BIO-10 and best management practices required pursuant to adopted plans. (Impact HYD-5)
- The Project, in combination with past, present, and probable future projects in the Project area, would result in significant adverse impacts related to hydrology and water quality. Cumulative impacts would be reduced to a less-than-significant level through implementation of Mitigation Measures HYD-1a, HYD-1b, HYD-2a, HYD-2b, HYD-2c, and BIO-10 and best management practices required pursuant to adopted plans. (Impact C-HYD-1)

Transportation

- Project construction truck traffic could contribute to conditions that would conflict with existing plans and policies related to roadway safety, accommodating all modes of travel, and maintaining emergency response access. With implementation of Mitigation Measure TRA-1, this impact would be less than significant. (Impact TRA-1, TRA-4)
- Construction truck trips will use segments of roadways that may not be designed to accommodate the weight of haul trucks and could result in degradation of those roadways, such that they may become a

hazard for other drivers, bicyclists or pedestrians. With implementation of Mitigation Measures TRA-1 and TRA-2, this impact would be less than significant. (Impact TRA-3)

- The Project, in combination with part, present, and probable future projects in the Project area, could contribute to degradation of roadways not designed for haul trucks. This impact would be less than significant with implementation of Mitigation Measures TRA-1 and TRA-2. (Impact C-TRA-1)

Impact Avoidance and Reduction Strategies

Strategies considered to avoid significant impacts or to reduce impact magnitude or severity include the following:

- Reducing the height of shoreline protection;
- Changing the proposed alignment;
- Employing alternative designs for shoreline protection;
- Using different construction techniques or equipment; and
- Reducing the width of shoreline protection.

Regarding significant and unavoidable aesthetic impacts, the interruption of public views of the bay and the East Bay Hills (e.g., looking east at the end of Cypress Street in East Palo Alto) is associated with construction of shoreline protection and recreational features. As indicated in Chapter 2, *Project Description*, the overall purpose of the Project is to reduce risks to people, property, and infrastructure from current tidal flooding and projected sea level rise through engineered and natural features that enhance shoreline ecosystems and improve recreational opportunities. Reducing the height of shoreline protection would be counter to the purpose of the Project and its objective to reduce the risk of flooding from San Francisco Bay waters, including consideration of up to 3.5 feet of future sea level rise, and the communities' objective to be removed from the Federal Emergency Management Agency (FEMA) floodplain. Consequently, the strategy of reducing the height of shoreline protection was eliminated from further consideration. (The use of transparent flood barriers is not considered sufficiently feasible, in terms of technology and cost, for the Project.)

Significant and unavoidable construction-phase noise impacts are associated with the use of heavy-duty construction equipment and the distance between equipment and sensitive receptors (residents and schools) for the South of Bay Road, Bedwell Bayfront Park, and Marsh Road reaches. The impact would affect receptors intermittently between a minimum of 10 work days (Marsh Road Reach) and up to 220 work days (South of Bay Road Reach).[7] Strategies considered to reduce noise impacts and eliminated from further consideration included:

- ***Changing the Alignment*** could increase the distance between sensitive receptors and construction. However, shifting the Project alignment farther from residents to offset a temporary impact would worsen permanent impacts on biological resources (waters of the U.S., waters of the state, and

[7] For the South of Bay Road Reach, noise at nearby receptors would exceed applicable thresholds during the demolition and grading phases for an estimated 220 work days over a 10-month period (from heavy construction equipment) and for about 25 days from sheet pile driving. For the Bedwell Bayfront Park Reach, noise at nearby receptors would exceed thresholds during sheet pile driving for bridge construction at Marsh Road for about 10 working days. For the Marsh Road Reach, noise from heavy construction equipment would exceed thresholds at nearby receptors during grading (approximately 61 work days) and closeout activities (10 work days).

associated special-status species habitat), particularly in the South of Bay Road Reach, given the sensitivity of habitat within Faber and Laumeister marshes, and would be inconsistent with Project objectives regarding enhancing the shoreline ecosystem and enabling adaptation to climate change by implementing flood protection in ways that sustain and restore marsh habitat.

- ***Changing Shoreline Protection Design***. Traditional levees typically do not require sheet pile driving unlike the levee/floodwall hybrid or floodwall design. The Bedwell Bayfront Park and Marsh Road reaches are already traditional levees (significant unavoidable noise impacts result from the use of heavy construction equipment near residents, not sheet pile drivers per se). The design for the South of Bay Road Reach is levee/floodwall hybrid but sheet piles are also required for keeping water out of the construction work zone, and the design was proposed to reduce permanent impacts on sensitive habitat within Faber and Laumeister marshes.
- ***Changing the Types of Equipment used in Construction***. Although less noisy equipment can be used for the installation of sheet piles, the assured availability of such equipment for a project of this scale cannot be assumed. If it is available, Mitigation Measure NOI-1 already requires that "Quieter tools, such as use of drills rather than impact tools, shall be used where feasible." The significant and unavoidable noise impacts expected to occur for the South of Bay Road and Marsh Road reaches are also associated with the use of heavy construction equipment (i.e., not just sheet pile drivers) less than 50 feet and 150 feet from sensitive receptors, respectively. Consequently, reliance on the use of alternative equipment capable of reducing noise levels below the applicable threshold for the duration of construction is not considered feasible.

Reducing the width of shoreline protection could reduce multiple impacts, although mitigation would still be required to reduce impacts to less than significant. Regarding significant but mitigable impacts to cultural resources, as described under Impacts CUL-2 and CUL-3 in Section 3.5, there are no recorded archaeological resources or areas containing human remains within the Project site. Mitigation measures for impacts related to cultural resources address encountering *undiscovered* resources and would be included for any alternative. Regarding significant but mitigable impacts related to air quality, hazards, hazardous materials, hydrology and water quality, and transportation, the mitigation measures for these resources address impacts that may result from Project construction and would be included for any alternative. Consequently, the focus of alternatives screening shifted to reducing the severity and magnitude of long-term mitigable impacts, primarily impacts on biological resources.

Screening Results

After considering the scope and severity of the Project's impacts and screening potential alternatives, including those previously evaluated or suggested, two alternatives were determined to satisfy CEQA criteria for inclusion in the EIR. These alternatives are described below in Section 4.3. Other potential alternatives were eliminated from further consideration in this EIR as discussed in Section 4.6.

4.3 Selected CEQA Alternatives Evaluated in this Chapter

The alternatives to the Project selected for analysis in this EIR are:

- No Project Alternative; and
- Modified Footprint Alternative.

4.3.1 No Project Alternative

Description

As required by CEQA Guidelines section 15126.6(e), the No Project Alternative is evaluated to allow decision-makers to compare the environmental effects of approving the Project with the effects of not approving the Project. The No Project Alternative represents what would reasonably be expected to occur in the foreseeable future if the Project were not approved.

Under this alternative, the Project would not be constructed. None of the actions described in Chapter 2, *Project Description*, would occur. There would be no construction of shoreline protection features, and no new recreational facilities or improvements to existing recreational features would be constructed. In addition, tidal marshes that were previously lost to diking and filling would not be restored because tidal marsh restoration cannot happen until adequate flood protection for landward uses is in place. No nesting and foraging habitat for western snowy plover would be created, and existing western snowy plover habitat would not be protected from coastal flooding. Consequently, land uses in East Palo Alto and Menlo Park, including residential development, commercial development, public infrastructure (e.g., electrical substations, drinking water facilities, state highways), and existing trails along the shoreline, would remain vulnerable to coastal flooding and existing habitat would remain in its current condition.

Under the No Project Alternative, SFCJPA member agencies, Caltrans, and the Refuge (for berms impounding former salt ponds) would continue to monitor existing shoreline protection features and may periodically implement repairs to address erosion. If required to protect public safety or infrastructure from damage due to sudden risk of exposure (e.g., resulting from failure of an existing levee due to an unusually strong storm season causing accelerated erosion), temporary emergency shoreline protection measures (e.g., placement of revetment rock or sandbags) would be implemented if authorized by regulatory agencies with jurisdiction (e.g., the Bay Conservation and Development Commission).

With sea level rise increasing the vulnerability of existing land uses to bay flooding, SFCJPA member agencies and Caltrans may pursue other options to provide shoreline protection, which could include alternatives previously considered (such as those evaluated in the SAFER Bay Feasibility Report) or projects that benefit the individual cities (e.g., levees that terminate in high ground within the host city) or parcels (e.g., placing fill under individual buildings to raise them above floodwater levels) but are not regionally integrated.

Evaluation

If the SAFER Bay Project is not implemented, then none of the environmental impacts attributable to Project construction, described in Chapter 3, would occur. There would be no new air pollutant or greenhouse gas emissions, disturbance to biological resources would not occur, there would be no potential to encounter unrecorded cultural resources, existing contaminated materials would not cause new or changed adverse impacts related to hazardous materials and water quality, and construction-phase transportation impacts would not occur. Additionally, there would be no significant and unavoidable impacts related to aesthetics and construction noise.

As described in Section 2.3.1, Need for the Project, parts of East Palo Alto and Menlo Park are currently exposed to coastal flooding from San Francisco Bay, and this flood hazard is expected to worsen with sea

level rise. FEMA identifies the Project area as being within the 100-year flood hazard zone (refer to Appendix FEMA for a map depicting existing flood hazard zones near the SAFER Bay Project area). The proposed shoreline protection features associated with the Project are designed to protect against 100-year coastal flooding exacerbated by 3.5 feet of future sea level rise. Without the shoreline protection provided by the Project, during future coastal floods, existing levees and berms along the bay shoreline in East Palo Alto and Menlo Park would experience erosion and scour and could be overtopped, at which point these communities would experience coastal flooding. The adverse effects on the environment attributable to coastal flooding would depend on the specific location affected but likely effects include: damage to properties within the flood plain; release of contaminants into floodwaters and the environment; disruption of public services and utilities, including stormwater and wastewater management, electrical, and transportation systems, and recreational facilities; and potential air pollutant emissions associated with repairs and reconstruction of damaged development. Coastal flooding would also damage existing segments of the Bay Trail and other trails atop levees and berms, impairing recreational access.

In the long term, the adverse impacts associated with coastal flooding would be exacerbated by sea level rise. California's Ocean Protection Council predicts that by 2100, bay water levels are most likely to rise about 3.1 feet (Intermediate Scenario) and higher amounts cannot be ruled out.[8] A 100-year water level in the bay combined with 3 feet (36 inches) of sea level rise is expected to result in flood depths up to approximately 8 feet in developed shoreline areas of East Palo Alto and Menlo Park.[9] The depth and extent of more frequent coastal flooding (i.e., from more common events like the annual king tides) could also increase with sea level rise, potentially causing up to 5 feet of flooding in portions of East Palo Alto and Menlo Park.[10] Sea level rise could be higher than 3 feet by 2100 or into the next century, which would cause even greater depth and extent of inundation.[11]

It is reasonable to expect that repairs to existing flood protection infrastructure would be needed, which would result in impacts to the physical environment, but the location, timing, and nature of such repairs cannot be foreseen at this time. Implementation of any projects to replace the SAFER Bay Project could result in other potentially severe impacts on the environment.[12]

Without Project implementation, proposed tidal marsh restoration and managed pond enhancement within the Ravenswood Pond Complex, including Ponds R1, R2, R3, and SF2, would not occur. In some areas of the Project site, tidal salt marsh habitat could not be restored until adequate flood protection for landward uses was in place. Consequently, benefits to the habitat of species in the vicinity, including western snowy plover and special-status species associated with salt marsh would not occur. As a result, existing conditions

[8] OPC (California Ocean Protection Council), 2024. "State of California Sea Level Rise Guidance: 2024 Science and Policy Update – Draft Released for Public Comment – Deadline Extended to March 8." Updated September 20, 2024. Available online at opc.ca.gov/2024/01/draft-slr-guidance-2024/. Accessed June 10, 2025.

[9] BCDC (San Francisco Bay Conservation and Development Commission), 2025. Bay Shoreline Flood Explorer. Available online at explorer.adaptingtorisingtides.org/explorer. Accessed June 10, 2025. Total water level reflecting 36 inches of sea level rise and 100-year storm surge.

[10] BCDC (San Francisco Bay Conservation and Development Commission), 2025. "Bay Shoreline Flood Explorer." Available online at explorer.adaptingtorisingtides.org/explorer. Accessed November 5, 2025. Total water level reflecting 36 inches of sea level rise and king tide.

[11] OPC (California Ocean Protection Council), 2024. *Draft State of California Sea Level Rise Guidance: 2024 Science and Policy Update.* January 2024. Intermediate-High and High scenarios estimate 4.9 and 6.6 feet of sea level rise, respectively, by 2100.

[12] The cities of East Palo Alto and Menlo Park do not consider the concept of managed retreat—the planned, deliberate relocation of people and infrastructure away from areas vulnerable to sea level rise and coastal erosion—to be a viable response to managing flood hazards in these communities and thus would not pursue it.

within the Ravenswood Pond Complex would be expected to persist in the near term (e.g., approximately 10 to 20 years). In the longer term without the Project, Ponds R1 and R2 would likely naturally breach to tidal action and develop tidal marsh habitat, although breaching would increase the risk of coastal flooding of shoreline development. However, in a natural breach scenario, the rate of tidal marsh establishment would be slower and the habitat quality would be less than that which would be constructed as part of the Project's restoration plan.[13] Moreover, accidental tidal breaching of Ponds R1 or R2 would adversely affect snowy plover breeding habitat without the Project's construction of expanded and improved snowy plover habitat in Ponds SF2 and R3. Finally, the existing snowy plover breeding habitat in Pond SF2 would be at greater risk of coastal flooding without the SAFER Bay Project's proposed levee to protect that habitat.

Without Project implementation, there would also not be any improvements to recreational access, which would likely become more limited due to aging infrastructure not built to withstand sea level rise.

As indicated in Chapter 2, the overall purpose of the Project is to reduce risks to people, property, and infrastructure from coastal flooding and projected sea level rise through engineered and natural features that enhance shoreline ecosystems and improve recreational opportunities. As shown in detail in Section 4.4, below, the No Project Alternative would not meet any of the Project objectives.

4.3.2 Modified Footprint Alternative

Description

This alternative involves changing shoreline protection to reduce the magnitude of impacts to waters of the U.S. and State and associated special-status species.

The potential for changing the proposed alignment and/or design was evaluated for each reach and for segments within reaches. This alternative incorporates changes in the alignment and design (e.g., by incorporating a levee/floodwall hybrid design or a floodwall instead of a traditional levee) that are potentially feasible and would reduce impacts to waters of the U.S. and State. **Figure 4-1** depicts the alternative; **Table 4-2** summarizes key characteristics of the alternative in comparison to the Project by reach.

With this alternative, the design of shoreline protection changes from levee to levee/floodwall hybrid with a 3:1 horizontal to vertical transition zone in all or a portion of the North of Bay Road, Dumbarton Approach (through Pond SF2), Substation and Marsh Restoration, Bayfront Expressway, Bedwell Bayfront Park, and Marsh Road reaches and from levee/floodwall hybrid to floodwall for part of the Tech Campus Reach.

The floodwall included in part of the Tech Campus Reach under this alternative, with a wall top elevation of 18- to 19-feet North American Vertical Datum of 1988 (NAVD88), would be constructed between State Route (SR) 84 and the eastern side of the Meta Headquarters, around a section of slough that receives flows from Caltrans' Ravenswood Pump Station (refer to Figure 4-1). Ravenswood Pump Station operations (as well as an adjacent gravity stormwater drainage feature) would be incorporated into the floodwall design to allow discharges to the slough; consequently, there would be no need for a pump station through the levee (as proposed under the Project for the Tech Campus Reach). Changes to utilities are otherwise assumed to be similar to the proposed Project. With respect to habitat restoration, the slope

[13] Geomorphic modeling suggests that without the Project tidal habitats would establish in Ponds R1 and R2 through the end of the century, although after 2100, marshes may convert to mudflat (ESA [Environmental Science Associates], 2025. *SAFER Bay Project – Tidal Marsh Evolution and Blue Carbon Assessment Technical Memorandum FINAL*. April 4, 2025).

of the transition zone habitat around the Ravenswood Substation would be 3:1 instead of 10:1 to reduce direct impacts on waters of the U.S. and state. With respect to recreation, under this alternative an approximately 600-foot pedestrian bridge (refer to red line on Figure 4-1) would be constructed between the proposed segment of Bay Trail adjacent to and north of SR 84 and the existing Public Shoreline Access Trail around Meta Headquarters. The trail that currently follows the section of slough between the Meta Headquarters and SR 84 would be decommissioned (displaced by the floodwall, refer to Figure 4-1), and the levee around the Ravenswood Substation would be topped by a trail.

This alternative also incorporates floodwalls and a flood gate at the Ravenswood Substation access point. Incorporation of this configuration would provide flood protection to the Ravenswood Substation irrespective of the timing and design of Caltrans' plans for providing flood protection for the western approach to the Dumbarton Bridge.

Project phasing, schedule, construction details (work hours, staging, workforce, trail closures), and operation and maintenance are assumed to be the same as or similar to the proposed Project, although there would be no need to replace the Ravenswood Pump Station.

Evaluation

Table 4-3 compares the significant impacts of the Project with those of the Modified Footprint Alternative. The table also lists impacts that would be less than significant for the Project but would be worse with this alternative. The primary differences between the environmental impacts of the Project and the Modified Footprint Alternative are summarized in Section 4.5, Comparison of Alternatives.

4.4 Ability to Meet the Project's Objectives

As indicated in Section 2.3.2 in Chapter 2, *Project Description,* the overall purpose of the Project is to reduce risks to people, property, and infrastructure from current tidal flooding and projected sea level rise through engineered and natural features that enhance shoreline ecosystems and improve recreational opportunities. **Table 4-4** (presented following Table 4-3) summarizes the ability of the SAFER Bay Project, the No Project Alternative, and the Modified Footprint Alternative to meet the Project objectives.

As indicated in Table 4-4, the No Project Alternative would not meet any of the Project objectives. The No Project Alternative would not reduce the risk of flooding within the cities of East Palo Alto and Menlo Park from San Francisco Bay waters nor support the communities' objective to be removed from the FEMA floodplain; existing flood hazards and designations would persist. The No Project Alternative would not enable adaptation to climate change in ways that sustain and restore marsh habitat to support sensitive marsh species and enhance and protect habitat for western snowy plover because proposed shoreline protection and habitat restoration would not occur. Nor would the No Project Alternative expand opportunities for recreation and community connectivity since no improvements to trails would occur. Future maintenance requirements would be required for existing former salt pond berms that provide flood protection which would be at increased risk of failure. Lastly, the No Project Alternative essentially would remove a vehicle (the SAFER Bay Project) for coordinating with other agencies pursuing flood protection, restoration, and recreation goals in the region.

Table 4-4 summarizes the ability of the Modified Footprint Alternative to meet the Project objectives. The Modified Footprint Alternative would meet most Project objectives but would not satisfy the following objectives as well as the proposed Project:

- Minimize future maintenance requirements.
- Enable adaptation to our changing climate by implementing flood protection in ways that sustain and restore marsh habitat, support sensitive tidal marsh species, and enhance and protect habitat for western snowy plover, consistent with the South Bay Salt Ponds Restoration Project and other restoration efforts.

The Modified Footprint Alternative involves substantially more shoreline protection using the levee/floodwall hybrid design. This design involves installation of steel floodwalls up to 40 feet below sea level (-40 feet NAVD88). Steel is susceptible to corrosion and may ultimately require wholesale replacement whereas earthen levees, with proper annual maintenance and augmented with additional material as needed, are more adaptive to climate change and can persist without need of wholesale replacement. The wholesale replacement of levee/floodwall hybrids would cause additional environmental impacts in the future at greater cost. In addition, a traditional levee through Pond SF2 (as proposed under the Project) is considered ecologically preferable to the levee/floodwall hybrid design due to a traditional levee's ability to provide substantially more upland high-tide refugia without adverse effects to sensitive marsh habitat (Pond SF2 is open water).



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SOURCES: County of Santa Clara, 2024; Sanborn Map Company, 2024; NAIP, 2024; ESA, 2025

SAFER Bay Project

Figure 4-1
Modified Footprint Alternative

ESA

TABLE 4-2
OVERVIEW OF MODIFIED FOOTPRINT ALTERNATIVE

Reach	Proposed Project			Modified Footprint Alternative		
	Shoreline Protection	**Habitat Improvements**	**Recreation**	**Shoreline Protection**	**Habitat Improvements**	**Recreation**
South of Bay Road—East Palo Alto	Levee/floodwall hybrid Flood gate at Bay Road	Transition Zone (T-zone) habitat adjacent to Faber, Laumeister marshes. Realign channel segments near bayward levee toe.	Realign and widen Bay Trail; reestablish connection to Faber-Laumeister Trail, create pedestrian access points.	Same as Project	Same as Project	Same as Project
North of Bay Road—East Palo Alto	Levee Flood gate at railroad tracks	T-zone habitat adjacent to Ravenswood Open Space Preserve. Realign channel segments near levee toe, providing tidal connectivity west of existing Bay Trail.	Realign and widen Bay Trail from Bay Road to Bay Trail boardwalk, route boardwalk section over proposed levee.	Levee/floodwall hybrid with 3H:1V slopes for two segments, otherwise same as Project Same as Project: Flood gate at railroad tracks		
Dumbarton Approach	Levee Levee/floodwall hybrid Floodwall	T-zone habitat adjacent to Moseley Tract Marsh. Expand and enhance western snowy plover habitat in Pond SF2.	Southern portion of SF2 Trail would terminate at new levee. Construct new Bay Trail north of SR 84. Widen affected existing portions of the Bay Trail south of the eastbound lanes of SR 84. Relocate viewing platforms near Pond SF2.	Levee/floodwall hybrid through San Francisco Public Utilities Commission property and Pond SF2 Same as Project: levee/floodwall hybrid with 3H:1V slopes adjacent to SR 84 and floodwall under SR 84		
Substation and Marsh Restoration	Levee	10:1 T-zone habitat adjacent to Pond R2. Restore tidal salt marsh in Ponds R1/R2. Create seabird nesting islands in Pond R1.	Decommission a portion of the looped Ravenswood Trail, leaving two spur trails.	Levee/floodwall hybrid with 3H:1V slopes for entire reach Flood wall and flood gate entrance to Ravenswood Substation	3H:1V T-zone habitat adjacent to Pond R2; otherwise, same as Project	Construct trail around Ravenswood Substation
Tech Campus	Levee/floodwall hybrid	T-zone habitat adjacent to Ravenswood Slough. Enhance western snowy plover habitat in Pond R3.	Extend Bay Trail from Substation and Marsh Restoration Reach to Public Shoreline Access Trail at Meta Headquarters; replace public shoreline access trail around Meta Headquarters.	Floodwall routed around segment of Ravenswood Slough between SR 84 and Meta Headquarters Same as Project: levee/floodwall hybrid with 3H:1V slopes on eastern segment along SR 84 and around Meta Headquarters	Same as Project	Construct trail bridge across Ravenswood Slough between SR 84 and Meta Headquarters. Decommission trail segment around the reach of slough channel located between the west side of Bayfront Expressway and the east side of Meta Headquarters.
Bayfront Expressway	Levee	T-zone habitat adjacent to Pond R4. Enhance western snowy plover habitat in Pond R3.	Create levee-top trail (would parallel existing Bay Trail which is landward/south of proposed levee); improve existing Flyway Trail.	Levee/floodwall hybrid with 3H:1V slopes for entire reach		Same as Project
Bedwell Bayfront Park		T-zone habitat adjacent to Flood Slough.	Extend Bay Trail west to Marsh Road Reach.	Levee and levee/floodwall hybrid		
Marsh Road			No improvements proposed (levee alignment is on private property).	Levee/floodwall for entire reach		

NOTES: H:V = horizontal to vertical
SOURCE: HDR 2024; ESA 2025.

TABLE 4-3
COMPARISON OF ENVIRONMENTAL IMPACTS OF PROJECT TO MODIFIED FOOTPRINT ALTERNATIVE

Environmental Resource	SAFER Bay Project	Alternative[14]
Aesthetic Resources	**Impact AES-1:** Substantially degrade the existing visual character or quality of public views of the site and its surroundings or conflict with applicable zoning and other regulations governing scenic quality. (*Significant and Unavoidable*)	**Greater than the Project** *(Significant and Unavoidable)* For the most part, the significant aesthetic impacts would be the same as the proposed Project because the alignment and height of shoreline protection and recreation features would be the same. As indicated on Figure 4-1, the alignment of the Tech Campus Reach between Meta Headquarters and SR 84 to the east would differ from the Project as would the design: a floodwall would be implemented instead of a floodwall/levee hybrid. The floodwall would most likely be constructed of concrete, and would extend approximately 9 to 11 feet above the existing grade to an elevation of approximately 18 to 19 feet NAVD88. As shown on Figure 4-1, this alternative includes a pedestrian bridge that would connect the levee-top trail north of Meta Headquarters to the levee-top trail extending from the Ravenswood Substation, as well as a trail around the Ravenswood Substation. Compared to the Project, the floodwall would incrementally worsen SR 84 motorists' views, interrupting viewing opportunities of the Ravenswood Slough side channel. The floodwall would also have higher visual contrast than the proposed levee with vegetated slopes. While the floodwall would displace a segment of the Bay Trail adjacent to SR 84 shown in Viewpoint 5 on Figure 3.2.3 in Section 3.2, Aesthetics, this alternative also includes a trail around the Ravenswood Substation, which would provide recreationists with viewing opportunities of the restored tidal marshes. Implementation of Mitigation Measure AES-1 would help reduce the severity of this impact, but the impact would remain significant. Effects on visual quality from other changes in alignment and design under this alternative would not otherwise materially alter the severity or magnitude of aesthetic impacts. Overall, this impact would remain significant and unavoidable.
	Impact AES-2: Have a substantial adverse effect on a scenic vista. (*Less than Significant*)	**Greater than the Project** (*Less than Significant*) As indicated in Section 3.2, the Menlo Park General Plan designated a view corridor/scenic vista extending east along SR 84 toward the Dumbarton Bridge from Willow Road. The characteristics of the existing foreground view would be changed by the presence of the floodwall, as described in the preceding impact. Consequently, effects on a scenic vista would be incrementally greater under this alternative than with the Project, but are still anticipated to be less than significant given the limited effect of the floodwall in the context of the view corridor and that long-range views of the East Bay Hills would be preserved .
	Impact AES-3: Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area. (*Less than Significant with Mitigation*)	**Same as the Project** (*Less than Significant with Mitigation*) The need for temporary security lighting at construction staging areas would be the same as the Project. Mitigation Measure AES-1 would be implemented to reduce potential impacts related to creating a new source of substantial light or glare to less than significant.
	Impact C-AES-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse impacts related to aesthetic resources. (*Less than Significant*)	**Similar to the Project** (*Less than Significant*) Given the location of cumulative development identified in Table 3.2-1 relative to the view corridors/scenic vistas and existing visual conditions within viewsheds affected by the Project, this alternative's contribution to cumulative effects on aesthetic resources would be similar to the Project and less than significant.
Air Quality	**Impact AIR-1:** Conflict with or obstruct implementation of the applicable air quality plan. (*Less than Significant with Mitigation*)	**Same as the Project** (*Less than Significant with Mitigation*) For reasons described under Impact AIR-2, below, the potential to conflict with or obstruct implementation of the Clean Air Plan would be less than significant with implementation of Mitigation Measure AIR-1.
	Impact AIR-2: Result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is in nonattainment under an applicable federal or state ambient air quality standard. (*Less than Significant with Mitigation*)	**Similar to the Project** (*Less than Significant with Mitigation*) Impacts associated with criteria air pollutant emissions are based on daily emissions for the Project. Although this alternative would alter construction techniques for different reaches, as indicated in Table 3.3-8 in Section 3.3, Air Quality, there is not a direct correlation between the type of shoreline protection and emissions. Overall, the magnitude of construction-phase emissions generated during construction would be expected to be similar to emissions associated with the proposed Project and would be reduced to less-than-significant levels with implementation of Mitigation Measure AIR-1.
	Impact AIR-3: Expose sensitive receptors to substantial pollutant concentrations. (*Less than Significant*)	**Similar to the Project** (*Less than Significant*) This alternative would not materially change the distance between sensitive receptors and the Project site, would not substantially change construction, and would not change operation and maintenance activities. Consequently, exposure of sensitive receptors to substantial pollutant concentrations would be similar to the Project and less than significant.
	Impact AIR-4: Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people. (*Less than Significant*)	**Same as the Project** (*Less than Significant*) This alternative would not materially change the distance between receptors and the Project site, and would not result in potential new sources of odors. The potential for this alternative to expose a substantial number of people to other emissions such as odors would therefore be the same as for the Project (and less than significant).
	Impact C-AIR-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse impacts related to air quality. (*Less than Significant*)	**Similar to the Project** (*Less than Significant*) Because this alternative would not materially change the distance between sensitive receptors and the Project site, would not substantially change construction, and would not change operation and maintenance activities, cumulative risks at the maximally impacted individual receptor would be expected to be similar to the Project and well below the Air District thresholds. (and less than significant).

[14] "Greater than the Project" indicates that the severity or magnitude of the impact would be greater than under the proposed Project; "Same as the Project" means the impact (e.g., consistency with a plan) would be the same as under the proposed Project; "Similar to the Project" indicates that there may be differences between the alternative and the proposed Project (e.g., that air pollutant emissions would not be identical because different construction techniques would be used in some locations) but not enough to change the overall severity or magnitude of the impact; "Less than the Project" indicates that the severity or magnitude of the impact is less than under the proposed Project.

Environmental Resource	SAFER Bay Project	Alternative[14]
Biological Resources	**Impact BIO-1:** 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 the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service. *(Less than Significant with Mitigation)*	**Similar to the Project** (*Less than Significant with Mitigation*) This alternative would reduce the magnitude of impacts to wetlands by constructing a levee/floodwall hybrid with 3H:1V slopes in several areas rather than a traditional levee. The reduced impact on wetlands would reduce impacts to tidal salt marsh by about 5.9 acres, allowing this habitat to remain for sensitive marsh species, including the federal and state endangered California Ridgway's rail and salt marsh harvest mouse, state threatened California black rail, and California species of special concern salt marsh wandering shrew. There would also be a reduced impact on non-tidal/muted tidal salt marsh by 1.1 acres, allowing this habitat to remain for the salt marsh harvest mouse and salt marsh wandering shrew. Constructing a levee/floodwall hybrid with 3H:1V slopes would not change the levee slope in most segments of the alignment; however, it would reduce the width of the T-zone by approximately 72 feet around the Ravenswood Substation in the Substation and Marsh Restoration Reach, where the Project calls for a 10H:1V sloped T-zone. This reduction in T-zone width would reduce the amount of high-tide upland refugia provided for sensitive marsh species targeted by the tidal restoration of Ponds R1 and R2; reduce the acreage available for marsh migration to provide habitat for these species in response to sea level rise; and reduce the amount of suitable breeding and foraging habitat for California species of special concern Bryant's savannah sparrow and San Francisco common yellowthroat. Construction of levee/floodwall hybrid and floodwall segments would also impact the movement of wildlife over and along the alignment. A levee/floodwall hybrid in Pond SF2 would prevent the movement of precocial shorebird chicks, such as the federally threatened western snowy plover, over the Project alignment due to the presence of the floodwall at the top of the levee crest. Where floodwalls are constructed, there would be a lack of adequate vegetative cover to support the dispersal of small mammals, such as the salt marsh harvest mouse and salt marsh wandering shew, inadequate high-tide refugia to support sensitive marsh species where it is adjacent to tidal marsh and would reduce the viability of future tidal marsh restoration efforts in adjacent areas due to the lack of high-tide refugia. Both levee/floodwall hybrids and floodwalls would provide perches from which avian predators could hunt sensitive marsh species, western snowy plovers, and other breeding birds. The combination of increased tidal marsh habitat, reduced high-tide upland refugial habitat, reduced acreage for marsh migration, elimination of small mammal dispersal corridors, limitations on future tidal marsh restoration, and increased perches near sensitive wildlife habitat would result in overall similar impacts to those of the proposed Project, and this impact would be less than significant with implementation of Mitigation Measures BIO-1 through BIO-25.
	Impact BIO-2: Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means. *(Less than Significant with Mitigation)*	**Less than the Project** (*Less than Significant with Mitigation*) This alternative reduces the overall magnitude of the levee footprint, which reduces the impact on wetlands and aquatic habitats. This is accomplished through changing the design of the flood protection infrastructure to narrower shoreline protection features (such as a floodwall or levee/floodwall hybrid in place of a traditional levee) as indicated in Table 4-2 and shown on Figure 4-1. Consequently, this alternative results in about 19.5 fewer acres of permanent impacts to (i.e., fill placement in) wetland and aquatic habitats. More than half (13.5 acres) of the avoided impacts would be in Pond R2, resulting from replacing an earthen levee and 10H:1V T-zone slope with a levee/floodwall hybrid with a 3H:1V T-zone slope. Although this would reduce the quality of the marsh restoration elements in Pond R1/R2 because of the lack of a broad T-zone, the overall area of tidal marsh plain restoration would increase slightly because the area not converted to T-zone would convert to marsh. Overall, as in the Project, the restoration of more than 576 acres of tidal marsh habitat as well as restoration and enhancement of 456 acres of western snowy plover breeding habitat is more than sufficient to compensate for the 42.8 acres of permanent impacts to wetland and aquatic habitats in this alternative. In addition, the impacts associated with program- and project-level activities during construction would be restored in place following construction. Like the Project, implementation of Mitigation Measure BIO-26 would reduce this impact to be less than significant.
	Impact BIO-3: Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service. *(Less than Significant with Mitigation)*	**Same as the Project** (*Less than Significant with Mitigation*) As with the Project, all impacts to sensitive natural communities are discussed under Impact BIO-2. Therefore, in this alternative, as described under Impact BIO-2, with implementation of Mitigation Measure BIO-26, this impact would be less than significant.
	Impact BIO-4: 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. *(Less than Significant)*	**Greater than the Project** (*Less than Significant with Mitigation*) This alternative includes construction of floodwalls in some locations rather than traditional levees with T-zones. Elimination of these T-zones around a segment of Ravenswood Slough in the Tech Campus Reach would reduce the amount of vegetative cover present adjacent to flood protection infrastructure and restrict the movement of terrestrial wildlife, thereby reducing the quality of wildlife corridors along the levee alignment. In other areas, a levee/floodwall hybrid would be constructed rather than traditional levees. These structures include a floodwall on top of the levee crest that would prevent the movement of precocial shorebird chicks, such as western snowy plovers, between the Project area of Pond SF2 and Cell U1 in Pond SF2. Despite the reduction in wildlife corridor quality and reduced movement of wildlife, this impact would remain less than significant, as the levee reaches where a vegetated T-zone would be replaced by a floodwall are not particularly important for regional movements of animals and the movement of precocial chicks between the Pond SF2 Project area and Cell U1 would be infrequent and not vital to their survival.
	Impact BIO-5: Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance. *(Less than Significant with Mitigation)*	**Similar to the Project** (*Less than Significant with Mitigation*) Impacts associated with this criterion were those that conflicted with local tree protection policies from the Cities of East Palo Alto, Menlo Park, and Redwood City. This alternative alters the flood protection alignment and type where Ravenswood Slough terminates at SR 84 by changing from a levee crossing Ravenswood Slough to a floodwall surrounding it. Therefore, the new alignment may conflict with trees in the adjacent Meta Headquarters. Despite this, with implementation of Mitigation Measure BIO-27, impacts would be similar to the proposed Project.
	Impact BIO-6: Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan. *(Less than Significant)*	**Same as the Project** (*Less than Significant*) The applicable Natural Community Conservation Plan (CCP) is the *Don Edwards San Francisco Bay National Wildlife Refuge: Final Comprehensive Plan*, which applies to Project areas within the Don Edwards National Wildlife Refuge (Refuge). The alternative includes the same habitat and climate change adaptation improvement elements in the Refuge as the Project. Therefore, the alternative is also consistent with the CCP and impacts would be less than significant.
	C-BIO-1: The Project, in combination with cumulative projects, would result in significant cumulative impacts on biological resources. *(Less than Significant with Mitigation)*	**Same as the Project** (*Less than Significant with Mitigation*) While the magnitude of impact on wetlands would be reduced under this alternative, similar impacts to biological resources as the Project would occur. As with the Project, this alternative's contribution to cumulative biological resource impacts would not be cumulatively considerable with implementation of Mitigation Measures BIO-1 through BIO-27.

Environmental Resource	SAFER Bay Project	Alternative[14]
Cultural Resources	**Impact CUL-1:** Cause a substantial adverse change in the significance of a historical resource pursuant to § 15064.5. *(No Impact)*	**Same as the Project** *(No Impact)* While the footprint of components would be reduced under this alternative, shoreline protection features would generally be constructed along the same alignment and with similar construction methods as those described for the Project. While the floodwalls south of the Ravenswood Substation and east of Meta Headquarters (refer to Figure 4-1) would be a different alignment than the Project, the new floodwall segments are adjacent to the Project alignment and were determined to have no historical resources. For these reasons, no new historical resources would be along the shoreline protection alignments and like the Project, there would be no impact related to historical resources under this alternative.
	Impact CUL-2: Cause a substantial adverse change in the significance of an archaeological resource pursuant to § 15064.5. *(Less than Significant with Mitigation)*	**Same as the Project** *(Less than Significant with Mitigation)* While the footprint of components would be reduced under this alternative, shoreline protection features would generally be constructed along the same alignment (with the exception of the floodwalls south of the Ravenswood Substation and east of Meta Headquarters) and with similar construction methods as those described for the Project. Like the Project, there is some degree of sensitivity for buried pre-contact archaeological resources in the Project area and vicinity, and the discovery of buried pre-contact archaeological resources during implementation of this alternative cannot be entirely discounted. This impact would be mitigated through implementation of Mitigation Measures CUL-1, CUL-2, and CUL-3.
	Impact CUL-3: Disturb any human remains, including those interred outside of dedicated cemeteries. *(Less than Significant with Mitigation)*	**Same as the Project** (*Less than Significant with Mitigation*) While the footprint of components would be reduced under this alternative, shoreline protection features would generally be constructed along the same alignment (with the exception of the floodwalls south of the Ravenswood Substation and east of Meta Headquarters) and with similar construction methods as those described for the Project. Like the Project, while unlikely, the discovery of human remains during implementation of this alternative cannot be entirely discounted. This impact would be mitigated through implementation of Mitigation Measure CUL-4.
	Impact C-CUL-1: The Project, in combination with past, present, and probable future projects in the Project area, could result in significant adverse impacts related to cultural resources. *(Less than Significant with Mitigation)*	**Same as the Project** *(Less than Significant with Mitigation)* For reasons stated under Impacts CUL-1, CUL-2, and CUL-3, the potential contribution to cumulative impacts to archaeological resources would be the same under this alternative and would remain less than significant with implementation of Mitigation Measures CUL-1, CUL-2, CUL-3, and CUL-4.
Tribal Cultural Resources	**Impact TCR-1:** Cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code § 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe. *(Less than Significant with Mitigation)*	**Same as the Project** *(Less than Significant with Mitigation)* While the footprint of components would be reduced under this alternative, shoreline protection features would generally be constructed along the same alignment (with the exception of the floodwalls south of the Ravenswood Substation and east of Meta Headquarters) and with similar construction methods as those described for the Project. Like the Project, the potential exists for archaeological resources or human remains that are considered tribal cultural resources to be uncovered during ground-disturbing activities. This impact would be mitigated through implementation of Mitigation Measures CUL-1, CUL-2, CUL-3, and CUL-4.
	Impact C-TCR-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse impacts related to tribal cultural resources. *(Less than Significant with Mitigation)*	**Same as the Project** *(Less than Significant with Mitigation)* For reasons stated under Impact TCR-1, the potential contribution to cumulative impacts to tribal cultural resources would be the same under this alternative and would remain less than significant with implementation of Mitigation Measures CUL-1, CUL-2, CUL-3, and CUL-4.
Energy	**Impact ENE-1:** Result in a potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during Project construction or operation or conflict with or obstruct a state or local plan for renewable energy or energy efficiency. *(Less than Significant)*	**Same as the Project** *(Less than Significant)* This alternative would require less energy use during operations than the Project due to not requiring a new pump station. Like the Project, construction and operation of the Modified Footprint Alternative would not result in the inefficient, wasteful or unnecessary consumption of energy nor conflict with applicable plans related to renewable energy or energy efficiency, and the impact would remain less than significant.
	Impact C-ENE-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse impacts related to energy. *(Less than Significant)*	**Same as the Project** *(Less than Significant)* For reasons stated under Impact ENE-1, the potential contribution to cumulative impacts related to energy use would be the same under this alternative and would be less than significant.
Geology, Soils, and Paleontology	**Impact GEO-1:** Cause potential substantial adverse effects involving rupture of a known earthquake fault, strong seismic ground shaking, seismic-related ground failure including liquefaction, and/or landslides. *(Less than Significant)*	**Same as the Project** *(Less than Significant)* While the footprint of components would be reduced under this alternative, shoreline protection features would generally be constructed along the same alignment (with the exception of the floodwalls south of the Ravenswood Substation and east of Meta Headquarters) and with similar construction methods as those described for the Project. The existing conditions related to being in a liquefaction hazard zone would remain, and the same design criteria and requirements would be applicable to this alternative. The impact would remain less than significant.
	Impact GEO-2: Result in substantial soil erosion or the loss of topsoil. *(Less than Significant)*	**Same as the Project** *(Less than Significant)* While the footprint of components would be reduced under this alternative, ground-disturbing construction activities would still total more than 1 acre and could increase erosion risk or sediment transport. Like the Project, implementation of the alternative would require preparation of a Stormwater Pollution Prevention Plan to control run-on and runoff from construction sites, resulting in less-than-significant impacts related to soil erosion and loss of topsoil.
	Impact GEO-3: Be located on a geologic unit or soil that is unstable, or that would become unstable because of the Project. *(Less than Significant)*	**Same as the Project** *(Less than Significant)* While the footprint of components would be reduced under this alternative, shoreline protection features would be generally constructed along the same alignment (with the exception of the floodwalls south of the Ravenswood Substation and east of Meta Headquarters) and within the same geologic units as the Project. The same design criteria and requirements would apply to this alternative and the impact would remain less than significant.
	Impact GEO-4: Be located on expansive soil. *(Less than Significant)*	**Same as the Project** *(Less than Significant)* While the footprint of components would be reduced under this alternative, shoreline protection features would be constructed along the same alignment and within soils with high expansion potential. The same design criteria and requirements would apply to this alternative and the impact would remain less than significant.
	Impact C-GEO-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse impacts related to geology and soils. *(Less than Significant)*	**Same as the Project** *(Less than Significant)* For reasons stated under Impacts GEO-1 through GEO-3, the potential contribution to cumulative impacts to geology and soils would be the same under this alternative and would remain less than significant.

Environmental Resource	SAFER Bay Project	Alternative[14]
Greenhouse Gas Emissions	**Impact GHG-1:** Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment. *(Less than Significant)*	**Same as the Project** *(Less than Significant)* Because construction-related and operational activities for this alternative would be similar to those of the Project, the impact related to generation of GHG emissions is expected to remain less than significant.
	Impact GHG-2: Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases. *(No Impact)*	**Same as the Project** *(No Impact)* Because construction-related and operational activities for this alternative would be similar to those of the Project, this alternative would not conflict with any plan or policy adopted to reduce GHG emissions, and there would remain no impact.
	Impact C-GHG-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse impacts related to greenhouse gas emissions. *(Less than Significant)*	**Same as the Project** *(Less than Significant)* For reasons stated under Impacts GHG-1 and GHG-2, the potential contribution to cumulative impacts related to GHG emissions would be the same under this alternative (less than significant).
Hazards and Hazardous Materials	**Impact HAZ-1:** Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials, or reasonably foreseeable upset or accident conditions involving the release of hazardous materials into the environment. *(Less than Significant with Mitigation)*	**Same as the Project** *(Less than Significant with Mitigation)* Construction and operation under this alternative would involve use of the same equipment and hazardous materials as described for the Project. Under this alternative contractors would be required to comply with the same hazardous materials regulations, including preparation of a Hazardous Materials Business Plan and Stormwater Pollution Prevention Plan. In addition to compliance with adopted regulations, the impact related to creating a significant hazard to the public or environment through the routine transport, use, disposal, or accidental release of hazardous materials would be mitigated to a less-than-significant level through implementation of Mitigation Measures HAZ-1, HAZ-2, and HYD-1b and other adopted site-specific risk management plans.
	Impact HAZ-2: Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school. *(Less than Significant)*	**Same as the Project** *(Less than Significant)* The shoreline protection features would generally follow the same alignment (with the exception of the floodwalls south of the Ravenswood Substation and east of Meta Headquarters) and would be the same distance from East Palo Alto Charter School as the Project. Additionally, no changes are proposed to the design of the South of Bay Road Reach (the closest to the school) under this alternative, so impact would remain less than significant.
	Impact HAZ-3: Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code § 65962.5 and, as a result, would it create a significant hazard to the public or the environment. *(Less than Significant with Mitigation)*	**Same as the Project** *(Less than Significant with Mitigation)* Because the shoreline protection features would generally follow the same alignment and have similar construction methods as the Project, they would be within or directly adjacent to the same hazardous materials sites and would be required to implement the same adopted plans described in Table 3.10-1. As shown on Figure 3.10-1, the floodwalls south of the Ravenswood Substation and east of Meta Headquarters are not within hazardous materials sites. In addition to compliance with adopted plans (including site-specific risk management plans), the impact related to being located on a hazardous materials site and creating a significant hazard to the public or environment would be mitigated to a less-than-significant level through implementation of Mitigation Measures HAZ-1, HAZ-2, and HYD-1b.
	Impact HAZ-4: For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, result in a safety hazard or excessive noise for people residing or working in the Project area. *(Less than Significant)*	**Same as the Project** *(Less than Significant)* The shoreline protection features would generally follow the same alignment (with the exception of the floodwalls south of the Ravenswood Substation and east of Meta Headquarters) and would be the same distance from Palo Alto Airport as the Project. Additionally, no changes are proposed to the design of the South of Bay Road Reach (the closest reach to the airport) under this alternative, so impact would remain less than significant.
	Impact HAZ-5: Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plans. *(Less than Significant with Mitigation)*	**Same as the Project** *(Less than Significant with Mitigation)* Construction of the shoreline protection features under this alternative would use the same access routes as described for the Project. Like the Project, construction truck traffic could contribute to conditions that would impair emergency access. With implementation of Mitigation Measure TRA-1, this impact would be less than significant.
	Impact HAZ-6: Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires. *(Less than Significant)*	**Same as the Project** *(Less than Significant)* Like the Project, while there is the potential for fire associated with construction or maintenance, the Alternative location is not in a high fire zone and the SFCJPA would comply with applicable hazardous materials storage and fire protection regulations. The impact would remain less than significant.
	Impact C-HAZ-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse impacts related to hazards and hazardous materials. *(Less than Significant with Mitigation)*	**Same as the Project** *(Less than Significant with Mitigation)* For reasons stated under Impacts HAZ-1 through HAZ-5, the potential contribution to cumulative impacts to hazards, hazardous materials, and wildfire would be the same under this alternative, and the impact would be reduced to a less-than-significant level with implementation of Mitigation Measures HAZ-1, HAZ-2, and HYD-1b.

Environmental Resource	SAFER Bay Project	Alternative[14]
Hydrology and Water Quality	**Impact HYD-1:** Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality. *(Less than Significant with Mitigation)*	**Same as the Project** *(Less than Significant with Mitigation)* Construction would occur in the same locations as the proposed Project with the exception of the additional floodwall at the Ravenswood Substation and a floodwall along Ravenswood Slough east of Meta Headquarters. The Modified Footprint Alternative would involve the same types of construction activities as the Project. Less fill for levee construction may be required, however the fill could introduce contaminants, like the Project, and dewatering would still be required which could degrade water quality. These impacts would be required to a less-than-significant level with implementation of Mitigation Measures HYD-1a and HYD-1b. Operations of this alternative would be the same as the proposed Project and impacts would be less than significant.
	Impact HYD-2: Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would result in substantial erosion or siltation. *(Less than Significant)*	**Same as the Project** *(Less than Significant)* This alternative would still result in breaching Ponds R1 and R2. The amount of levee-top trail impervious area would be reduced compared with the Project. The proposed modifications to existing drainage features would be the same except that a new pump station to convey the outfall from Ravenswood Pump Station would not be needed and a floodwall would block runoff from the north frontage road of SR 84 from entering the Ravenswood Substation. The floodwall along Ravenswood Substation would alter drainage patterns but would not result in substantial erosion or siltation because the area where runoff is directed (frontage road) is paved.
	Impact HYD-3: Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or impede or redirect flood flows. *(Less than Significant with Mitigation)*	**Less than the Project** *(Less than Significant with Mitigation)* The proposed modifications to existing drainage features would be the same except that a new pump station to convey the outfall from Ravenswood Pump Station would not be needed and a floodwall would block runoff from the north frontage road of SR 84 from entering the Ravenswood Substation. The floodwall would reduce the potential for worsened flooding within the Ravenswood Substation and runoff from the frontage road would flow to existing or replaced stormwater drainage infrastructure (Caltrans Frontage Road Pump Station). Therefore, this alternative would result in reduced impacts compared to the Project. This impact would be less than significant with implementation of Mitigation Measures HYD-2a and HYD-2c (to address impacts at the South of Bay Road and Marsh Road reaches).
	Impact HYD-4: In a flood hazard, tsunami, or seiche zone, risk release of pollutants due to project inundation. *(Less than Significant)*	**Same as the Project** *(Less than Significant)* Construction would occur in the same locations as the Project with the exception of the additional floodwall at the Ravenswood Substation and a floodwall along Ravenswood Slough east of Meta Headquarters. The Modified Footprint Alternative would involve the same types of construction activities as the Project. Maintenance activities would be carried out in the same locations as the Project.
	Impact HYD-5: Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan. *(Less than Significant with Mitigation)*	**Same as the Project** *(Less than Significant with Mitigation)* Construction would occur in the same locations as the Project with the exception of the additional floodwall at the Ravenswood Substation and a floodwall along Ravenswood Slough east of Meta Headquarters. The Modified Footprint Alternative would involve the same types of construction activities as the Project. Operations of this alternative would be the same as the proposed Project and less than significant with implementation of Mitigation Measures HYD-1a, HYD-1b, and BIO-10.
	Impact C-HYD-1: The Project, in combination with past, present, and probable future projects in the Project area, would result in significant adverse impacts related to hydrology and water quality. *(Less than Significant with Mitigation)*	**Less than the Project** *(Less than Significant with Mitigation)* For reasons stated under Impacts HYD-1 through HYD-5, the potential contribution to cumulative impacts related to hydrology and water quality would be incrementally less under this alternative and less than significant with implementation of Mitigation Measures HYD-1a, HYD-1b, and BIO-10.
Land Use	**Impact LU-1:** Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect. *(Less than Significant)*	**Same as the Project** *(Less than Significant)* This alternative is considered consistent with the general plans of the cities of East Palo Alto, Menlo Park, and Redwood City because it provides the same functions and in a similar manner as the proposed Project, and any potential policy inconsistencies with city policies and regulations would be resolved through the cities' approval processes.
	Impact C-LU-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse impacts related to land use. *(No Impact)*	**Same as the Project** *(No Impact)* Because this is an evaluation of plan and policy consistency, there is no residual contribution to a cumulative impact on the physical environmental impact associated with it.
Noise and Vibration	**Impact NOI-1:** Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies. *(Significant and Unavoidable Despite Mitigation)*	**Greater than the Project** *(Significant and Unavoidable Despite Mitigation)* The Modified Footprint Alternative involves construction of more levee/floodwall hybrid and floodwall shoreline protection (refer to Figure 4-1). While typical levees do not require sheet pile driving, construction of floodwalls and levee/floodwall hybrids require pile driving to install both temporary and permanent sheet piles. Since pile drivers would likely be considered the loudest piece of equipment at the construction site, the use of pile drivers at each reach would increase construction noise levels compared to those analyzed for the proposed Project. Due to the distance from receptors, construction noise would be louder under this alternative. Due to the proximity of receptors within the North of Bay Road Reach (90 feet), use of a pile driver would likely result in an increase of more than 10 dBA over existing daytime ambient levels at nearby sensitive receptors, resulting in a significant and unavoidable impact for this reach. Impacts would also remain significant and unavoidable within the South of Bay Road, Tech Campus, Bedwell Bayfront Park, and Marsh Road reaches, even with implementation of Mitigation Measure NOI-1.
	Impact NOI-2: Generation of excessive ground borne vibration or ground borne noise levels. *(Less than Significant)*	**Greater than the Project.** *(Less than Significant)* For the reasons described for Impact NOI-1, impacts related to ground borne vibration or noise during construction are anticipated to be incrementally greater under this alternative due to the increased use of pile drivers along segments of reaches adjacent to residences, especially within the North of Bay Road Reach. However, given the distances between floodwall construction and nearby structures this impact is still anticipated to be less than significant.
	Impact NOI-3: For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels. *(Less than Significant)*	**Same as the Project** *(Less than Significant)* The shoreline protection features would generally follow the same alignment (with the exception of the floodwalls south of the Ravenswood Substation and east of Meta Headquarters) and would be the same distance from Palo Alto Airport as the Project. Additionally, no changes are proposed to the design of the South of Bay Road Reach (the closest reach to the airport) under this alternative, so impact would remain the same and less than significant.
	Impact C-NOI-1: The Project, in combination with past, present, and probable future projects in the Project area, would result in significant adverse impacts related to noise and vibration. *(Significant and Unavoidable Despite Mitigation)*	**Greater than the Project** *(Significant and Unavoidable Despite Mitigation)* For reasons stated under Impacts NOI-1, NOI-2, and NOI-3, the potential contribution to cumulative impacts to noise and vibration would be greater under this alternative and would be significant and unavoidable even with implementation of Mitigation Measure NOI-1.

Environmental Resource	SAFER Bay Project	Alternative[14]
Population and Housing	**Impact POP-1:** Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure). *(No Impact)*	**Same as the Project** *(No Impact)* The function and purpose of the shoreline protection features under this alternative would remain the same as the proposed Project. Construction and operation of the alternative would not directly or indirectly induce substantial unplanned population growth, and there would remain no impact.
	Impact C-POP-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse impacts related to population and housing. *(No Impact)*	**Same as the Project** *(No Impact)* For reasons stated under Impact POP-1, the potential contribution to cumulative impacts to population and housing would be the same under this alternative and there would be no impact.
Recreation	**Impact REC-1:** 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. *(Less than Significant)*	**Similar to the Project** *(Less than Significant)* The alignment for the Modified Footprint Alternative would generally be the same as the proposed Project with the exception of the floodwalls south of the Ravenswood Substation and east of Meta Headquarters. The levee and levee/floodwall hybrid designs can accommodate a trail; the floodwall design cannot. Improvements to existing trails (2.69 miles) would be the same as for the proposed Project. Both the proposed Project and the Modified Footprint Alternative would include the decommissioning of a 1.8-mile segment of the Ravenswood Pond Trail. The floodwall within the Tech Campus Reach under the Modified Footprint Alternative would likely require the decommissioning of about 0.4 mile of existing trail. The Modified Footprint Alternative includes creating new trail in the same locations as the proposed Project (totaling about 2.11 miles) as well as around the Ravenswood Substation (about 1 mile of new trail). Consequently, this alternative would construct about 0.6 mile more trail than the proposed Project. Like the Project, construction would temporarily disrupt access to existing recreational facilities which would cause trail users to visit other recreational facilities. Like the Project this temporary shift would be unlikely to cause substantial physical deterioration given the progression of reach construction, duration of trail closures, and number and variety of existing facilities in the surrounding areas. The alternative's beneficial contribution to recreational facilities during operations would be incrementally less than the Project's (and not significantly adverse) due to the floodwall within the Tech Campus Reach.
	Impact C-REC-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse impacts related to recreational resources. *(Less than Significant)*	**Similar to the Project** *(Less than Significant)* As described for the proposed Project, although cumulative projects could also temporarily disrupt access to existing recreational facilities, they would be unlikely to result in substantial physical deterioration of existing recreational facilities. The impact would remain similar to the Project and would be less than significant.
Transportation	**Impact TRA-1:** Conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities. *(Less than Significant with Mitigation)*	**Similar to the Project** *(Less than Significant with Mitigation)* While the type of shoreline protection features would change in some reaches under this alternative, construction and operations activities would be similar as those described for the proposed Project. Like the Project, construction truck traffic could contribute to conditions that would conflict with existing plans and policies related to roadway safety, accommodating all modes of travel, and maintaining emergency response access. With implementation of Mitigation Measure TRA-1, this impact would be less than significant.
	Impact TRA-2: Conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b). *(Less than Significant)*	**Similar to the Project** *(Less than Significant)* Like the proposed Project, this alternative would generate low levels of intermittent vehicular traffic during operation and maintenance and would not generate a substantial increase in long-term VMT. Like the proposed Project, this alternative is neither a land use nor transportation development for the purposes of CEQA Guidelines section 15064.3(b), Therefore, impacts related to a potential conflict with CEQA Guidelines section 15064.3(b) would be less than significant.
	Impact TRA-3: Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment). *(Less than Significant with Mitigation)*	**Similar to the Project** *(Less than Significant with Mitigation)* Similar levels of construction traffic would use the same roadways to access the alignment as the proposed Project, which would include residential streets that could experience excessive road wear. This impact would be less than significant with implementation of Mitigation Measures TRA-1 and TRA-2.
	Impact TRA-4: Result in inadequate emergency access. *(Less than Significant with Mitigation)*	**Similar to the Project** *(Less than Significant with Mitigation)* Truck traffic could impair access by emergency vehicles. The number of large, slow-moving vehicles (trucks) would be similar to the Project and the vehicle routes would be the same as the Project. This impact would be reduced to a less-than-significant level with implementation of Mitigation Measure TRA-1.
	Impact C-TRA-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse impacts related to transportation. *(Less than Significant with mitigation)*	**Similar to the Project** *(Less than Significant with Mitigation)* Like the Project, this alternative, in combination with cumulative projects, could increase road wear on residential streets. For reasons stated under Impacts TRA-1 through TRA-4, the potential contribution to cumulative impacts to transportation would be similar under this alternative, and the impact would be reduced to a less-than-significant level with implementation of Mitigation Measure TRA-1 and TRA-2.

Environmental Resource	SAFER Bay Project	Alternative[14]
Utilities, Service Systems, and Public Services	**Impact USP-1:** Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects. *(Less than Significant)*	**Similar to the Project** *(Less than Significant)* Like the Project, this alternative would not directly or indirectly induce significant population or housing growth, and because the alignment is in the same location, similar modifications to utilities would be required. The impact would remain similar to the Project and would be less than significant.
	Impact USP-2: Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years. *(Less than Significant)*	**Similar to the Project** *(Less than Significant)* While the type of shoreline protection features would change in some reaches under this alternative, construction and operations activities would be similar as those described for the proposed Project, and water use is anticipated to be similar as under the proposed Project. The alternative would have sufficient water supplies available to serve the Project and reasonably foreseeable future development during normal, dry and multiple dry years. The impact would remain similar to the Project and would be less than significant.
	Impact USP-3: Generate solid waste in excess of state or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals. *(Less than Significant)*	**Similar to the Project** *(Less than Significant)* The quantity of demolition materials from existing infrastructure and removal of existing berm spoils is anticipated to be similar to or less than the proposed Project due to the modified footprint and construction of several floodwalls and levee/floodwall hybrids instead of typical levees. Therefore, this alternative would not generate solid waste exceeding state or local standards, or exceeding the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals. The impact would remain similar to the Project and would be less than significant.
	Impact USP-4: Fail to comply with federal, state, and local management and reduction statutes and regulations related to solid waste. *(Less than Significant)*	**Same as the Project** *(Less than Significant)* The solid waste from construction activities would be disposed of in accordance with regulations as described for the proposed Project. Additionally, for the reasons stated under Impact USP-1, this alternative would comply with federal, state, and local management and reduction statutes and regulations related to solid waste, and the impact would be less than significant.
	Impact USP-5: Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for fire protection, police protection, schools, parks, or other public facilities. *(Less than Significant)*	**Same as the Project** *(Less than Significant)* The construction workforce for this alternative would be similar to that described for the proposed Project and would likely come from within San Mateo County or commute from other locations in the San Francisco Bay Area and are thus already being served by existing services provided by the counties and individual cities and towns. The potential for any incremental increase in demand for public services during construction would be the same as for the proposed Project, would be temporary, and would be accommodated by existing local public service providers. This alternative would not require construction of new or physically altered facilities to maintain service, and the impact would be less than significant.
	Impact C-USP-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse impacts related to utilities, service systems, and public services. *(Less than Significant)*	**Similar to the Project** *(Less than Significant)* For reasons stated under Impacts USP-1 through USP-5, the potential contribution to cumulative impacts to utilities, service systems, and public services would be similar under this alternative and would be less than significant.

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TABLE 4-4
SUMMARY OF ABILITY OF PROJECT AND ALTERNATIVES TO MEET PROJECT OBJECTIVES

Objectives	SAFER Bay Project	No Project	Modified Footprint Alternative[a]
	Would the Project or alternative meet the objective?		
Reduce the risk of flooding within the cities of East Palo Alto and Menlo Park from San Francisco Bay waters, including up to 3.5 feet of future sea level rise, and support the communities' objective to be removed from the Federal Emergency Management Agency (FEMA) floodplain.	Yes	No	Yes
Enable adaptation to our changing climate by implementing flood protection in ways that sustain and restore marsh habitat, support sensitive tidal marsh species, and enhance and protect habitat for western snowy plover, consistent with the South Bay Salt Ponds Restoration Project and other restoration efforts.	Yes	No	Yes (-)
Expand opportunities for recreation and community connectivity in collaboration with the Bay Trail Program and efforts to enhance local trails.	Yes	No	Yes
Minimize future maintenance requirements.	Yes	No	Yes (-)
Partner with agencies and organizations pursuing similar goals and objectives and with assets to be protected by the Project.	Yes	No	Yes

NOTES:

a. Negative sign (-) indicates alternative meets the objective to a lesser extent than the proposed Project.

4.5 Comparison of Alternatives

4.5.1 Comparison of Alternatives' Impacts

Sections 4.3.1 and 4.3.2 describe the changes in environmental impacts under the No Project Alternative and the Modified Footprint Alternative. Compared to the proposed Project, none of the impacts associated with construction and operation would occur under the No Project Alternative. There would be an increased likelihood of flooding in East Palo Alto and Menlo Park, which could create adverse effects on the environment where it occurred but the location, timing, and nature of such repairs cannot be foreseen. In addition, the effects of flooding would be exacerbated over time with sea level rise, and repairs to existing flood protection infrastructure could cause adverse effects on the environment.

The primary differences between the impacts of the proposed Project and the Modified Footprint Alternative include the following:

- ***Aesthetic Resources***. Views of Ravenswood Slough and from the SR 84 view corridor would be adversely affected to a greater degree with the Modified Footprint Alternative because of the floodwall between SR 84 and Meta Headquarters. The floodwall would have higher visual contrast with surrounding scenery than a landscaped levee. This would exacerbate a long-term, significant and unavoidable impact associated with the Project; Mitigation Measure AES-1 would help reduce the severity of this impact. The Modified Footprint Alternative would also create more viewing

opportunities for recreationists with inclusion of a trail atop the levee around the Ravenswood Substation.

- ***Biological Resources***. The Modified Footprint Alternative would result in approximately 19.5 fewer acres of permanent impacts on wetland and aquatic habitats. The additional floodwalls and levee/floodwall hybrids associated with this alternative would interfere with the movement of terrestrial wildlife to a greater degree than the proposed Project (a less-than-significant impact).

- ***Hydrology and Water Quality***. The floodwall west of the Ravenswood Substation would eliminate the need for a new pump station to convey the outfall from the existing Ravenswood Pump Station and would reduce runoff flowing into the substation, reducing potential flooding at the substation exacerbated by the proposed Project levee.

- ***Noise and Vibration***. Construction of more floodwalls and levee/floodwall hybrids would increase sheet pile driving and introduce sheet pile driving in more sections of the alignment, exposing more receptors and structures to significant and unavoidable noise impacts. These impacts would be short term.

4.5.2 Environmentally Superior Alternative

The CEQA Guidelines require the identification of an environmentally superior alternative among the alternatives (CEQA Guidelines section 15126.6[e]). If it is determined that the "no project" alternative would be the environmentally superior alternative, then the EIR shall also identify an environmentally superior alternative among the other project alternatives (CEQA Guidelines section 15126.6[e][2]).

On the basis of comparing the extent to which the alternatives reduce or avoid significant impacts of the Project, the No Project Alternative would be the environmentally superior alternative in the short term because it would avoid the Project's significant and unavoidable impacts and other significant impacts of the Project related to aesthetics, air quality, biological resources, cultural resources, tribal cultural resources, hazards and hazardous materials, hydrology and water quality, noise, and transportation. However, the No Project Alternative would allow flood risks to persist and to worsen with sea level rise, leading to potentially severe environmental and community consequences. The effects associated with increased coastal flooding include damage to properties within the flood plain; release of contaminants into floodwaters and the environment; disruption of public services, utilities, transportation and recreational facilities; potential environmental impacts associated with repairs and reconstruction to resources damaged by flooding; a reduction in habitat quality compared to the proposed Project; and adverse impacts to snowy plover breeding habitat.

The magnitude of permanent impacts to wetland and aquatic habitats under the Modified Footprint Alternative would be less than the Project, although short-term significant and unavoidable aesthetic and noise impacts would be incrementally exacerbated. Between the alternatives studied, the Modified Footprint Alternative is considered the environmentally superior alternative.

4.6 Alternatives Considered but Eliminated from Further Analysis

4.6.1 Feasibility Study Alternatives

As indicated in Section 4.2.1, alternatives screened out in the Feasibility Study were reconsidered during the alternatives screening process for this EIR. The alternatives and reasons for rejection are described briefly below and shown in figures in Appendix ALT.

Low Cost Alternative

Description

The cost of each reach option in the 2016 Feasibility Study was qualitatively considered. The "Low Cost" Alternative was formulated to combine those options that present the lowest overall cost. The alignment of the Low Cost Alternative is similar to the proposed Project's, with differences at the Dumbarton Approach, Substation and Marsh Restoration, and Marsh Road reaches (reaches 1 and 5 in the 2016 Feasibility Study). Within the Dumbarton Approach the alignment follows the San Francisco Public Utilities Commission (SFPUC) right-of-way and University Avenue. The Citizens Committee to Complete the Refuge suggested that a levee alignment along University Avenue be considered as an alternative to the proposed alignment through Pond SF2 to reduce the potential to "cause extensive temporary and permanent impact on the wildlife that require this habitat." The RWQCB requested that the SFCJPA consider aligning shoreline protection landward in areas of low-density land uses and parking (which this candidate alternative could do in the Dumbarton Approach Reach).

Reasons for Rejection[15]

This alternative was eliminated from further consideration in this EIR due to insufficient ability to satisfy Project objectives and inability to reduce significant environmental impacts. This alternative does not provide shoreline protection for all of Menlo Park (the area of Menlo Park west of Marsh Road and north of US 101 would not have flood protection). This alternative is inconsistent with the Project's objective to "enhance and protect habitat for western snowy plover" because it does not include the Project's proposed shoreline protection for USFWS-designated western snowy plover critical habitat or the proposed western snowy plover habitat in Pond SF2. With tidal marsh restoration in Ponds R1 and R2 and lack of protection of critical habitat in Pond SF2, this alternative would have significant impacts on western snowy plovers, and mitigation habitat would need to be enhanced and managed elsewhere in the estuary. A levee alignment around the western perimeter of Pond SF2 would also have substantially greater impacts to aquatic habitat as compared to the relatively shorter proposed alignment.

[15] In in the Feasibility Report this alternative was screened against Evaluation Factors (the primary selection criteria) and Consideration Scoring Metrics (specific elements that were assessed and scored based on quantitative and qualitative evaluations). Evaluation Factors included Construction Cost and Constructability, Operation and Maintenance, Restoration, and Recreation. The Lowest Cost Alternative received the lowest ranking of all alternatives considered in the 2016 Feasibility Report for potential acreage of enhanced tidal marsh habitat, interagency coordination, potential impacts/mitigation requirements, and interpretive viewing opportunities.

Restoration Alternative

Description

Reach options in the Feasibility Study were considered for greater opportunities for tidal wetland habitat restoration, and options with the higher/highest potential for restoration (or lowest wetland habitat impact) were identified. The "Restoration Alternative" was formulated to combine those options that maximize restoration opportunities, which resulted in an alignment very similar to the proposed Project's, with differences near the Marsh Road, Substation and Marsh Restoration, and Dumbarton Approach reaches (reaches 1 and 5 in the 2016 Feasibility Study). However, the Restoration Alternative assumed that tidal restoration would occur in Pond R3 and included construction of wider transition zone habitat, requiring substantial import of fill material along the bayward side of proposed levees near the South of Bay Road, North of Bay Road, Dumbarton Approach, and Substation and Marsh Restoration reaches (see Figures 26, 28 and 30 in the Feasibility Report).

Reasons for Rejection

Most of this alternative's alignment is the same as the proposed Project's; differences reflect changes resulting from in-depth investigations of siting and design constraints (e.g., the presence of existing structures and facilities within the SFPUC right-of-way) that occurred after the Feasibility Report was completed and integration with planned flood protection in Redwood City (described in Section 3.1, Overview). Note that the Restoration Alternative's alignment east of Meta Headquarters is part of the Modified Footprint Alternative. The remaining differences between the Restoration Alternative and the proposed Project are related to restoration within Pond R3 and the width of transition zones. When the Feasibility Study was prepared, restoration specialists involved in preparing the report understood that tidal restoration was planned within Pond R3. Subsequent discussions with the SBSPRP indicated that tidal restoration was not planned for Pond R3, and that the pond would be managed to support western snowy plover instead. Consistent with this, and based on discussions with the SBSPRP and regulators, the wider transition zones were eliminated in areas where high quality marsh is already present to limit adverse impacts on waters of the U.S. and state and habitat for special-status species. Consequently, these aspects of the Restoration Alternative were determined to have greater environmental impacts than the proposed Project, and the Restoration Alternative was therefore eliminated from further consideration.[16]

Recreation Alternative

Description

Reach options in the 2016 Feasibility Study were considered for greater opportunities to maintain or improve Bay Trail recreational opportunities, and options with the higher/highest recreation potential were identified. The "Recreation Alternative" was formulated to combine those options that maximize recreational opportunities. The alignment is identical to the Restoration Alternative described above and very similar to the Proposed Project. The primary differences between the proposed Project and the

[16] In the Feasibility Report this alternative was screened against Evaluation Factors (the primary selection criteria) and Consideration Scoring Metrics (specific elements that were assessed and scored based on quantitative and qualitative evaluations). Evaluation Factors included Construction Cost and Constructability, Operation and Maintenance, Restoration, and Recreation. The Restoration Alternative was tied with the Recreation Alternative for the lowest rankings related to construction cost, lifecycle cost, construction schedule, operation and maintenance cost, debris and sediment management, and flood fighting accessibility (i.e., ease of inspection, access, evaluation, and flood fighting during a major flood event).

Recreation Alternative are that the latter included an extension of the Bay Trail in two areas: across Pond SF2 in the Dumbarton Approach Reach and parallel to the Bayfront Canal in the Marsh Road Reach.

Reasons for Rejection

Refer to the discussion under the Restoration Alternative regarding the disposition of the alignment associated with the Recreation Alternative with respect to Pond R3. Inclusion of a trail atop the proposed levee through Pond SF2 was considered and rejected due to incompatibility with proposed habitat restoration within Pond SF2 (increased human disturbance to western snowy plovers that would reduce the quality of habitat).[17] Consequently, these aspects of the Recreation Alternative were determined to have greater impacts on western snowy plover and eliminated from further consideration. As discussed in Section 3.15, Recreation, no recreation improvements are proposed under the Project for the Marsh Road Reach, which is on private property, although the proposed levee design could accommodate one and the Project does not preclude a trail. The Metropolitan Transportation Commission has identified a proposed trail between Bedwell Bayfront Park (in Menlo Park) and Seaport Boulevard in Redwood City, a segment of which is generally aligned with the Marsh Road Reach levee alignment. Note also that the Modified Footprint Alternative includes a trail around the Ravenswood Substation.

4.6.2 Dumbarton Bridge Western Approach Alternatives

As indicated in Section 4.2.1, the long-term alternatives from the DBWA Study were considered during the alternatives screening process for this EIR. The long-term alternatives (including two options for Alternative 3) are described below, all of which would provide an equivalent level of flood protection as the SAFER Bay Project.[18] (Refer to Appendix ALT for figures of these alternatives.)

DBWA Alternative 2: Protect in Place

Description

The levee under this alternative generally follows the same alignment as the North of Bay Road, Dumbarton Approach, Substation and Marsh Restoration, and Tech Campus reaches for the SAFER Bay Project. This alternative includes the following:

- **Shoreline Protection:** While specific details about levee design are not included in the DWBA Study, for purpose of analysis, the levee is assumed to be a traditional levee with a 3:1 slope on each side. This alternative would involve construction of levees along both sides of SR 84, south to Bay Road and west to Meta Headquarters; SR 84 would be maintained at its present elevation and alignment. This alternative also includes a sub-alternative levee alignment between Pond R1 and Pond R2 in place of a levee around the substation.
- **Restoration:** Restoration under this alternative does not include habitat improvements in the former salt ponds but allows "for flexibility in long-term restoration and management plans by providing the

[17] In the Feasibility Report this alternative was screened against Evaluation Factors and Consideration Scoring Metrics. Evaluation Factors included Construction Cost and Constructability, Operation and Maintenance, Restoration, and Recreation. The Recreation Alternative was tied with the Restoration Alternative for the lowest rankings related to construction cost, lifecycle cost, construction schedule, operation and maintenance cost, debris and sediment management, and flood fighting accessibility (i.e., ease of inspection, access, evaluation, and flood fighting during a major flood event).

[18] Alternative 1 in the DBWA Study involved near-term changes related to interim flood protection and restoration preparation, does not address the purpose of the SAFER Bay Project, and therefore was not considered as a potential alternative.

option for tidal restoration of Ponds R1 and R2, the eastern portion of Pond SF2, and currently diked bayfront areas (such as the SFPUC property)". Areas bayward of the levees could be restored to tidal marsh "if it is deemed appropriate based on monitoring and adaptive management decisions in the future. Restoration would occur by removing alongshore barriers to connectivity, such as the railroad berm and decommissioned above-ground Hetch Hetchy pipeline, and breaching or removing the redundant bayfront levee."

- **Recreation:** New or rehabilitated existing trails would be constructed atop levees.

The rough order of magnitude for annual operating and maintenance costs were determined to be "high" for this alternative in the DBWA Study.

Reasons for Rejection

The basic DBWA Alternative 2 levee alignments are essentially the same as the North of Bay Road, Dumbarton Approach, Substation and Marsh Restoration, and Tech Campus reach alignments for the proposed Project except near Meta Headquarters, where the levee alignment is the same as the Modified Footprint Alternative. As an option this approach would provide a levee around Pond R2 instead of adjacent to the Ravenswood Substation in the Substation and Marsh Restoration Reach which, unlike the Project, would not be consistent with recommendations from the South Bay Salt Ponds Restoration Project. This alternative was eliminated from further consideration because it lacks distinct environmental advantages relative to the proposed Project or the Modified Footprint Alternative with respect to the North of Bay Road, Dumbarton Approach, Substation and Marsh Restoration, and Tech Campus reaches. Compared to the proposed Project, the traditional levee under this alternative would be wider around Meta Headquarters (Tech Campus Reach) and in the segments of the Dumbarton Approach Reach that parallel east- and westbound SR 84, all of which include a levee/floodwall hybrid design under the proposed Project. A wider levee footprint increases impacts on habitat compared to the proposed Project. However, the levee in the Substation and Marsh Restoration Reach may be narrower than that included in the proposed Project (which has a 10:1 ratio around the Ravenswood Substation), reducing impacts on habitat at that location.

DBWA Alternative 3: Raise the Road (Option 1)

Description

This alternative includes the following:

- **SR 84 Raise:** SR 84 would be raised within the study area and placed on a causeway (an elevated structure) to protect the highway from sea level rise and flooding, reduce the length of levee required (compared to Alternative 2), and allowing for hydrologic and ecologic connectivity between Mosley Tract (to the north of SR 84) and the eastern portion of Pond SF2 (to the south of SR 84). This alternative includes a temporary causeway that would be constructed south of SR 84 and would pass over the eastern and middle cells of Pond SF2. This option of the permanent raised causeway would extend past the eastern cell of Pond SF2 and touch down at approximately the eastern edge of the Ravenswood Substation, effectively relocating the touchdown point of the bridge farther inland. This description is conceptual; there is no information on the extent to which there would be permanent impacts to jurisdictional waters from the structures that would support the causeway.

- **Shoreline Protection:** While specific details about levee design are not included in the DWBA Study, for purpose of analysis, the levee is assumed to be a traditional levee with a 3:1 slope on each side. This alternative includes construction of flood protection levees along the north side of SR 84, south to Bay Road, and west to the Meta Headquarters. At the touchdown point of the causeway, the levees on either side of SR 84 would abut against the touchdown structure, forming a continuous line of protection. This alternative would initially provide an equivalent level of flood protection as the SAFER Bay Project and could provide additional flood protection. This alternative also includes a sub-alternative levee alignment between Ponds R1 and Pond R2 in place of a levee around the Ravenswood Substation.
- **Restoration:** Restoration under this alternative does not include habitat improvements in the former salt ponds but would restore "the hydrological connection between the eastern cell of Pond SF2 and Moseley Tract (and potentially farther north and east to either Pond R1 and/or R2 if and when they are restored)." Areas bayward of the levees could be restored to tidal marsh "if it is deemed appropriate based on monitoring and adaptive management decisions in the future. Restoration would occur by removing alongshore barriers to connectivity, such as the railroad berm and decommissioned above ground Hetch Hetchy pipeline and breaching or removing the redundant bayfront levee. Once the existing roadway becomes decommissioned after construction of the causeway, it would be removed which would allow for the hydrological connection between the eastern cell of Pond SF2 and Moseley Tract (and potentially farther north and east to either Pond R1 and/or R2 if, and when, they are restored). In the interim prior to long-term restoration, these areas (such as managed Pond SF2) would continue to be operated and maintained according to their existing management plans."
- **Recreation:** New or rehabilitated existing trails would be constructed atop levees.

Both the rough order of magnitude for annual operating and maintenance costs and the capital cost ($500 million to $1 billion) were determined to be "high" in the DBWA Study.

Reasons for Rejection

A lead agency may conclude that an alternative is remote or speculative if substantial changes in governmental policy or legislation are necessary to carry it out, and an EIR need not consider an alternative whose implementation is speculative.[19] Caltrans, a state agency, is not a member agency of SFCJPA and elevating the SR 84 roadway would not clearly be within the powers granted to the SFCJPA. Thus, in this case, substantial changes to the powers granted to the SFCJPA would be necessary for the SFCJPA to carry out this alternative, making the alternative speculative. In addition, temporary and permanent impacts would occur from construction activities and the footprint of the temporary and permanent causeway structures; there is uncertainty as to whether this alternative would reduce the severity or magnitude of impacts attributable to the Project. Therefore, the SFCJPA has eliminated this alternative from further consideration. As indicated in Section S.6 in Chapter S, *Summary*, and Section 2.4.1 in Chapter 2, *Project Description*, Caltrans will ultimately decide on the design for providing flood protection for SR 84, which may include elevating the approach to the Dumbarton Bridge. Caltrans would

[19] CEQA Guidelines section 15126.6(f)(3).

serve as Lead Agency for that project's CEQA compliance and may elect to use information in this EIR for purposes of considering alternatives.

DBWA Alternative 3: Raise the Road (Option 2)

Description

This alternative includes the following:

- **SR 84 Raise:** SR 84 would be raised within the study area and placed on a causeway to protect the highway from sea level rise and flooding, reduce the length of levee required (compared to Alternative 2), and allowing for hydrologic and ecologic connectivity between Mosley Tract (to the north of SR 84) and the eastern portion of Pond SF2 (to the south of SR 84). This alternative includes a temporary causeway that would be constructed south of SR 84 and pass over all cells of Pond SF2 to join SR 84 at the University Avenue intersection. This option of the permanent raised causeway would extend past the middle cell of Pond SF2 and touch down prior to University Ave, effectively relocating the touchdown point of the bridge farther inland. This description is conceptual; there is no information for the extent to which there would be permanent impacts to jurisdictional waters from the structures that would support the causeway.
- **Relocate Ravenswood Substation:** Relocate the Ravenswood Substation and Menlo Park Fire District training facility (new location to be determined).
- **Shoreline Protection:** While specific details about levee design are not included in the DWBA Study, for purpose of analysis, the levee is assumed to be a traditional levee with a 3:1 slope on each side. This alternative includes construction of flood protection levees along the north side of SR 84, south to Bay Road (on the west side of Pond SF2), and west to the Meta Headquarters. This option of Alternative 3 does not include a levee around the Ravenswood Substation and would require the non-engineered berm between the middle and eastern cells of Pond SF2 to be raised and new water control structures to be installed in order manage water levels and maintain operation of the middle cell as a managed pond. At the touchdown point of the causeway, the levees on either side of SR 84 would abut against the touchdown structure, forming a continuous line of protection.
- **Restoration:** same as Option 1.
- **Recreation:** New or rehabilitated existing trails would be constructed atop levees.

Both the rough order of magnitude for annual operating and maintenance costs and the capital cost (greater than $1 billion) were determined to be "very high" in the DBWA Study.

Reasons for Rejection

The SFCJPA has eliminated this alternative from further consideration due to infeasibility (for reasons described above for DBWA Alternative 3: Raise the Road Option 1). This alternative also includes relocating the Ravenswood Substation and Menlo Park Fire District training facility. While the new location was not determined, the DBWA Study noted that a potential location for the relocated substation could be adjacent to the existing SFPUC Hetch Hetchy facilities south of Pond SF2. However, relocating the PG&E substation to SFPUC's property, which contains water supply infrastructure, would not clearly be within the powers granted to the SFCJPA. Additionally, the potential location for the relocated

substation could adversely affect several acres of jurisdictional waters (non-tidal saline pond and saline seasonal wetland).

4.6.3 Other Alternatives

Floodwall Only Alternative

Description

This alternative would implement floodwalls for the entire length of the SAFER Bay Project to substantially reduce impacts to waters of the U.S., waters of the state, and habitat for special-status species present in sensitive habitat within and near the Project site.

Reasons for Rejection

This alternative was eliminated from further consideration due to inability to meet the following Project objectives:

- Enable adaptation to our changing climate by implementing flood protection in ways that sustain and restore marsh habitat and enhance and protect habitat for western snowy plover, consistent with the SBSPRP and other restoration efforts.
- Expand opportunities for recreation and community connectivity in collaboration with the Bay Trail Program and efforts to enhance local trails.
- Minimize future maintenance requirements.

Floodwalls located next to existing and proposed restored tidal salt marshes would lack a salt marsh-upland transition zone with suitable high-tide refugia to support sensitive salt marsh species during high tides when they are vulnerable to predation. Instead, such floodwalls would serve as barriers to movement by small mammals such as the salt marsh harvest mouse, increasing predation risk considerably during king tides. Floodwalls adjacent to existing and proposed restored tidal marshes would provide abundant perches from which avian predators may hunt sensitive salt marsh species. Additionally, this alternative would not meet the objective related to recreation and community connectivity as well as the proposed Project because existing trails atop berms would be eliminated and the floodwalls could not accommodate trails on top of the structures (trails could be constructed on the landward side of the floodwalls but would not provide views of nor community connectivity with the baylands). Lastly, floodwalls typically include steel construction, which is susceptible to corrosion and can ultimately require wholesale replacement whereas earthen levees, with proper annual maintenance and augmented with additional material as needed, can persist without need of wholesale replacement.

Minimize Impacts to Public Use of the Bay Trail

Description

The California State Lands Commission suggested that the Project consider “alternatives to construction methods, materials, and access... that minimize impacts to public use of the Bay Trail.”

Reasons for Rejection

As indicated in Section 3.15, Recreation, the Project would not have significant impacts on recreational resources. The reduction in construction-phase impacts to public use of the Bay Trail would occur through implementation of Mitigation Measure TRA-1 (in Section 3.16, Transportation). Mitigation Measure TRA-1 requires preparation of a traffic control plan(s) to reduce potential construction-phase safety hazards for trail users. Among other things, Mitigation Measure TRA-1 requires preparation of "Circulation and detour plans that include the use of signage, flagging, fences, barriers, lights, and/or guards as necessary to guide vehicles, pedestrians, and cyclists through or around the construction zone and any temporary traffic control devices." While the proposed Project would disrupt trail use during construction it includes improvements to existing trails and the construction of new trails (refer to Table 3.15-4 in Section 3.15, Recreation).

Restore Ravenswood Triangle

Description

The Midpeninsula Open Space District requested that the Project include restoration of the "Ravenswood Triangle" area and retain the Ravenswood Bay Trail. The Ravenswood Triangle area is south of State Route 84 and between Willow Road and University Avenue. The proposed SAFER Bay alignment is outside of and not contiguous with the Ravenswood Triangle; restoration proposed as part of the Project is within the Ravenswood Pond Complex area within the Don Edwards National Wildlife Refuge as well as within and near the proposed construction corridor. Caltrans owns most of the Ravenswood Triangle property.

Reasons for Rejection

This alternative would not reduce a significant impact of the proposed Project. As discussed in Impact BIO-2 in Section 3.4, Biological Resources, the Project incorporates restoration of 576 acres of tidal marsh habitat as well as restoration and enhancement of 456 acres of western snowy plover breeding habitat, which is more than sufficient to compensate for the 62.87 acres of total combined permanent impacts on wetland and aquatic habitats. Additional tidal wetland restoration would be beneficial but is not required to reduce the proposed Project's wetland impacts. The Ravenswood Triangle is inland of the proposed SAFER Bay alignment. Restoration of full tidal action to this area would necessitate additional levee construction around the sides of the wetland to meet Project objectives (e.g., coastal flood protection), thus incrementally increasing other impacts associated with levee construction (air pollutant emissions and noise, among others). In addition, the Ravenswood Pump Station and most of the Ravenswood Triangle are owned by Caltrans and used to manage stormwater from SR 84; Caltrans is not a member agency of SFCJPA and implementation of this alternative by the SFCJPA would be speculative. Therefore, this alternative concept was eliminated from further consideration.

Regarding the Ravenswood Trail, as indicated in Section 2.4.1 in Chapter 2, the two tidal restoration breaches shown in Figure 2-3 would remove access to a 1.8-mile segment of the Ravenswood Trail. The decommissioned segment would provide near-term wind-wave protection to allow sufficient time for vegetated tidal salt marsh to establish within Pond R1, and the berm would naturally erode over time. As indicated in Section 3.15, Recreation, the Project would not have significant impacts on recreational resources, and the Project would improve about 2.7 miles of existing trail and create about 2.1 miles of

new trail. Consequently, an alternative fully retaining the Ravenswood Trail would not reduce a significant impact attributable to the Project but *would* impair tidal salt marsh restoration.

South of Bay Road Reach: Landward Alignment

Description

The Citizens Committee to Complete the Refuge suggested that the South of Bay Road Reach be located along a more landward alignment.

Reasons for Rejection

This alternative is not considered feasible due to the following factors:

- Limited space between the proposed alignment to the east and existing development and utilities to the west;
- The presence of land use controls due to soil and groundwater contamination and the systems in place to contain and treat that contamination; and
- Engineering constraints associated with design and implementation of shoreline protection.

During Project development, design engineers worked with wetland scientists, wildlife biologists, and hydrologists to avoid or reduce impacts to Faber and Laumeister marshes and sensitive habitats elsewhere. As a result, the proposed design for the South of Bay Road Reach incorporates a levee/floodwall hybrid with a relatively narrow 3:1 transition slope on the bayward side and includes relocation of a sanitary sewer. As indicated on Figure 2-7 in Chapter 2, *Project Description*, in addition to the sanitary sewer, there are stormwater management facilities (the Runnymede storm drain ditch and Bayshore Pond), and power transmission towers between the marshes and developed areas of East Palo Alto. Figures 2-7 and 2-8 (in Chapter 2) show the proposed alignment on aerial photo base map and present sections of the proposed design for the South of Bay Road Reach. As indicated in these figures sections of the transition slope incorporate the bayward slope of an existing levee (refer to the upper half of Figure 2-8), reducing encroachment into Faber and Laumeister marshes while providing high quality upland high-tide refugia compared to other shoreline protection design options. The exception to this, where the alignment extends farther into the marshes (refer to Figure 2-7), is due to the presence of PG&E transmission towers and extensive contamination (primarily associated with 1990 Bay Road) and the systems in place to contain and treat that contamination between Runnymede Street and Bay Road.

South of Bay Road Reach: Hybrid Levee with Steeper Slopes – 1990 Bay Road

Description

This alternative, suggested by the proponents of a development at 1990 Bay Road (Harvest Properties), would incorporate a hybrid levee with sections of 3:1 and steeper (2:1) slopes at 1990 Bay Road to allow for more development.

Reasons for Rejection

As shown on Figures 2-7 and 2-8, the proposed Project incorporates aspects of this suggested concept because the full length of the shoreline protection in this area would have a 3:1 slope on the bayward side

of the levee and a 2:1 slope on the landward side of the levee. This is possible because the proposed shoreline protection along the South of Bay Road Reach combines a levee and floodwall. A steeper slope on the bayward side, to further reduce the levee footprint, is not feasible because it would be inconsistent with USACE guidance for levee design.

North of Bay Road Reach: Landward Alignment

Description

Several individuals who reviewed Figure 1 in the NOP requested that the SFCJPA implement the landward alignment. The SFCJPA has included the landward alignment for the North of Bay Road Reach except for a segment immediately north of Bay Road, where the NOP alignment was west of 2091 Bay Road, the Infinity Auto Salvage property. The RWQCB requested that the SFCJPA consider aligning shoreline protection landward in areas of low-density land uses and parking.

Reasons for Rejection

The alignment segment west of the privately owned Infinity Auto Salvage property was rejected due to potential groundwater and soil contamination concerns, engineering considerations regarding the alignment of shoreline protection, and land and space constraints. As shown in Figure 4-1, the Modified Alternative includes two alignment segments with the levee/floodwall hybrid design to reduce impacts on the marsh. The proposed levee between those segments appears to be adjacent to open space; a more westerly alignment was not incorporated into the Project or an alternative because of the presence of contamination and to avoid encroaching into containment systems (refer to description under Impact HAZ-3 in Section 3.10, Hazards, Hazardous Materials, and Wildfire and Impact HYD-1 in Section 3.11, Hydrology and Water Quality). As shown on Figures 3.4-2c, 3.4-2d, and 3.4-2e in Section 3.4, Biological Resources, this segment of the proposed alignment is in upland areas so a more landward alignment would not reduce impacts to the marsh.

North of Bay Road Reach: Bayward Alignment

Description

The Ravenswood Shores Business District requested that “Where ecotone levees are being considered, a design that pushes into the wetland areas of the project should be considered. The ecological benefit of ecotone levees should not be at the sole expense of inbound land.”

Reasons for Rejection

This alternative was rejected because it would worsen impacts to sensitive biological resources and would be inconsistent with the Project’s objective related to restoration (refer to Table 4-4).

North of Bay Road Reach: Loop Road

Description

The City of East Palo Alto’s Ravenswood Business District / 4 Corners (RBD) Specific Plan previously incorporated a loop road around the north and east parts of University Village to connect University Avenue to Demeter Street. The loop road would have been within the northern part of the North of Bay Road Reach between Purdue Avenue and Fordham Street and would have required the levee to be substantially wider than proposed (approximately 80 or more feet).

Reasons for Rejection

This alternative was eliminated from further consideration due to incompatibility with policies governing land use within the Don Edwards National Wildlife Refuge, and exacerbation of impacts on sensitive species and habitat within the Refuge. As observed by the SBSPRP in its comments on the NOP, "while it may be acceptable to build a levee through part of the Refuge to manage floodwaters or establish separation between different types of wildlife habitats, a levee-top roadway intended for use as a thoroughfare for private vehicles is not a compatible or appropriate use of the Refuge's congressionally mandated purpose or the mission of the National Wildlife Refuge System." The RBD Specific Plan now includes incorporation of a Loop Trail to connect pedestrians and bicycles around the eastern perimeter of University from University Avenue to Demeter Street.

Tech Campus Reach

Description

This alternative, suggested by the Sierra Club, would locate the levee farther inland of Ravenswood Slough on or toward Hacker Way to minimize loss of habitat and impacts on wildlife. The RWQCB requested that the SFCJPA consider aligning shoreline protection landward in areas of low-density land uses and parking (which an alignment along the privately owned Hacker Way would do).

Reasons for Rejection

This alternative was eliminated from further consideration due to the inability of the SFCJPA to reasonably acquire, control, or have access to the site and lack of environmental advantages compared to the Modified Footprint Alternative. The SFCJPA considered two options for this candidate alternative. The first would align the levee along Hacker Way, meaning that the levee would be inboard of the buildings in the northwestern corner of Meta Headquarters (shown on Figure 2-20 in Chapter 2). The second option would follow Hacker Way but would extend the levee bayward at the northwestern corner to provide flood protection to those buildings. In the option that includes the northwestern corner extension, approximately one quarter of the levee alignment in the Tech Campus Reach would be the same as the Project. Shifting the remaining levee approximately 40 feet landward along portions of the Tech Campus Reach could reduce impacts on marsh habitat, although the exact dimensions of the levee footprint in this area are conceptual and therefore the amount of habitat reduction is uncertain (as shown on Figure 2-11, the width of the levee/floodwall combination proposed at the Tech Campus Reach varies depending on the existing grade, and the existing grade at Hacker Way is low – approximately 7 to 8 feet NAVD88 – thereby potentially necessitating a wide levee footprint). The design changes incorporated into the Modified Footprint Alternative would more clearly reduce habitat impacts compared to this candidate alternative.

CHAPTER 5
Other CEQA Issues

This chapter identifies the significant environmental impacts that cannot be avoided if the Project is implemented, describes significant irreversible impacts, identifies areas of controversy and issues to be resolved, and discusses the Project's growth inducement potential.

5.1 Significant Unavoidable Impacts

In accordance with the California Environmental Quality Act (CEQA), the purpose of this section is to identify Project-related environmental impacts that could not be eliminated or reduced to a less-than-significant level with implementation of mitigation measures identified in Chapter 3, *Environmental Setting, Impacts, and Mitigation Measures*. With the exceptions described below, all Project impacts would either be less than significant or reduced to a less-than-significant level with implementation of the identified mitigation measures:

- **Impact AES-1.** Public viewing opportunities toward Faber Marsh and the East Bay Hills (e.g., from Beech, Cypress, and Garden streets in East Palo Alto, South of Bay Road Reach) and toward Ponds R1, R2, R3, SF2, and Ravenswood Slough (Dumbarton Approach, Substation and Marsh Restoration, Tech Campus, and Bayfront Expressway reaches) would be interrupted by proposed shoreline protection and recreational features (refer to Figures 3.2-5 and 3.2-6 in Section 3.2). Implementation of Mitigation Measure AES-1 (Floodwall Design and Landscaping Treatments) would reduce visual contrast for the affected views but would not eliminate view obstruction; consequently, this impact would be significant and unavoidable despite mitigation.
- **Impacts NOI-1 and C-NOI-1.** Construction activities in the South of Bay Road, North of Bay Road, Tech Campus, Bedwell Bayfront Park, and Marsh Road reaches would expose nearby sensitive receptors to noise levels that would either exceed the Federal Transit Authority's daytime criterion of 90 A-weighted decibels (dBA) L_{eq}[1] for residential uses or represent an increase of more than 10 dBA over existing daytime ambient levels at the receptors. Implementation of Mitigation Measure NOI-1 (Construction Noise Control Measures) would attenuate construction noise; however, existing daytime ambient levels could still be exceeded by more than 10 dBA. Construction traffic would temporarily increase noise levels by more than 3 dBA at sensitive receptors in the North of Bay Road Reach despite implementation of Mitigation Measure NOI-1. Therefore, impacts within these reaches would remain significant and unavoidable even with implementation of Mitigation Measure NOI-1. In addition, the construction of other projects near the Project site (listed in Table 3.1-2 in Section 3.1,

[1] L_{eq} is the equivalent sound level, which describes noise over a specified period, typically 1 hour, in terms of a single numerical value. The L_{eq} is the constant sound level, that would contain the same acoustic energy as the varying sound level during the same period (i.e., the average noise exposure level for the given period).

Overview) could overlap with the proposed Project, further exacerbating significant noise levels. (Impacts NOI-1 and C-NOI-1).

5.2 Significant Irreversible Environmental Changes

In accordance with CEQA, the purpose of this section is to identify significant irreversible environmental changes that would be caused by the Project. Construction and operational impacts associated with Project implementation would result in an irretrievable and irreversible commitment of natural resources, including fossil fuels and construction materials. Energy resources, such as gasoline, diesel, and oil, would be required to fuel and maintain construction equipment during the construction period. Project construction would commit resources, such as concrete and steel, to be used for the proposed facilities and related improvements. Operation and maintenance of Project facilities (e.g., pump stations, landscaped areas) would result in irreversible changes associated with increased energy demand due to energy usage and greenhouse gas emissions (from anthropogenic, carbon-based sources).

5.3 Growth-Inducing Impacts

CEQA requires that EIRs include a discussion of the ways in which a project could foster economic or population growth, or the construction of additional housing, either directly or indirectly (e.g., through a major public service expansion).[2] Growth is not necessarily assumed to be beneficial, detrimental, or of little significance to the environment; however, population increases could tax existing community service facilities, requiring construction of new facilities that could cause significant environmental impacts.

Section 3.14, Population and Housing, describes the existing environmental and regulatory setting related to population and housing resources in the Project area and evaluates the Project's potential to induce substantial unplanned population growth. As described in Section 3.14, construction workers would likely be drawn primarily from the local and regional construction workforce rather than relocating from more distant cities or towns; and the Project would not result in the creation of new permanent jobs not does it include the development of new homes or businesses. The areas that would receive improved protection against flooding have already been accounted for in local and regional planning documents. The secondary effects on the physical environment associated with redevelopment, including those associated with the construction of new community service facilities, have been evaluated in CEQA documents prepared for the East Palo Alto and Menlo Park general plans and for individual development proposals within these cities. Consequently, Project implementation would not induce unplanned growth and is not considered growth-inducing. Refer to Section 3.14 for additional information.

[2] CEQA Guidelines section 15126.2(e)

CHAPTER 6
Report Preparers

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Stephanie Villegas – *Project Coordinator; Aesthetic Resources; Land Use, Agriculture, and Forestry Resources*
Anaya Ward – *Noise and Vibration*
Chris Dugan – *Noise and Vibration*

Chris Sanchez – *Noise and Vibration*
Dave Davis – *Aesthetic Resources*
Fred Marquez – *GIS and Graphics*
Heidi Koenig – *Cultural Resources; Tribal Cultural Resources*
Jonathan Teofilo – *Transportation*
Joneil Manansala – *Air Quality; Greenhouse Gas Emissions; Energy*
Juliana Medan – *Transportation*
Jyothi Iyer - *Air Quality; Greenhouse Gas Emissions; Energy*
Karen Divita – *Hydrology and Water Quality*
Matt Brennan – *Hydrology and Water Quality*
Nick Reynoso – *Noise and Vibration*
Ron Teitel – *Graphics*
Summer Forsman – *Technical Editing*
Vince Molina – *Population and Housing; Utilities, Service Systems, and Public Services*
Zac Martin – *Geology, Soils, and Paleontology*

HT Harvey and Associates

Max Busnardo – *Biological Resources*
Steve Rottenborn, PhD – *Biological Resources*
Benjamin Pearl – *Biological Resources*
Kate Drake – *Biological Resources*

Appendix APN

Assessor Parcel Numbers Associated with the SAFER Bay Project

TABLE APN-1
PARCELS POTENTIALLY AFFECTED BY THE SAFER BAY PROJECT

054-310-060	054-310-160	055-170-310	055-400-421
055-400-423	055-400-450	055-400-460	055-400-490
055-400-520	055-400-530	055-400-570	055-400-580
055-400-610	055-400-620	055-400-630	055-400-640
055-400-999	055-411-060	055-411-070	055-411-150
055-411-999	060-411-070	063-050-050	063-122-030
063-240-420	063-271-070	063-271-480	063-271-490
063-272-080	063-381-190	063-383-999	063-390-030
063-580-040	063-580-090	063-580-100	063-590-040
063-590-060	093-590-050	093-590-060	093-600-010
096-220-180	096-220-200	096-220-230	096-220-270

Appendix SCOP
CEQA Scoping Report

STRATEGY TO ADVANCE FLOOD PROTECTION, ECOSYSTEMS AND RECREATION ALONG SAN FRANCISCO (SAFER) BAY

CEQA Scoping Report

Prepared for
San Francisquito Creek Joint Powers Authority

October 2022



STRATEGY TO ADVANCE FLOOD PROTECTION, ECOSYSTEMS AND RECREATION ALONG SAN FRANCISCO (SAFER) BAY

CEQA Scoping Report

Prepared for
San Francisquito Creek Joint Powers Authority

October 2022

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SAFER BAY PROJECT
CEQA Scoping Report

CEQA Scoping Process

In accordance with the provisions of the California Environmental Quality Act (CEQA) and the CEQA Guidelines, the San Francisquito Creek Joint Powers Authority (SFCJPA), as CEQA Lead Agency, is preparing an environmental impact report (EIR) for the proposed Strategy to Advance Flood Protection, Ecosystems and Recreation along San Francisco (SAFER) Bay Project (SAFER Bay Project or Project), which consists of engineered and natural flood protection features, habitat restoration, and recreation improvements. The overall purpose of the Project is to protect people, property and infrastructure from current tidal flooding and projected sea level rise through engineered and natural features that enhance shoreline ecosystems and improve recreational opportunities. The SAFER Bay Project would provide resiliency to coastal flooding and sea level rise in East Palo Alto and Menlo Park as well as habitat and recreation improvements. The multi-benefit Project includes more than 550 acres of potential habitat restoration or improvements and 1 to 2.5 miles of new or improved trails.

The SFCJPA initiated an outreach process, generally referred to as scoping, to notify the responsible and trustee agencies, interested parties, and the public of the Project in compliance with CEQA section 15082. The purpose of scoping is to determine the appropriate scope and content of the environmental review. The scoping period ran from April 25 to June 15, 2022. This memo provides an overview of the scoping process. Scoping documents and comments received during the scoping process are included as attachments to this memo.

Notice of Preparation

The SFCJPA has prepared this Notice of Preparation (NOP) of an EIR in connection with the Project to inform the public, responsible and trustee agencies, and interested parties about the Project and the intent to prepare an EIR and initiate the scoping process. The NOP was circulated for agency and public review from April 25, 2022 to June 15, 2022 (**Attachment A**). The NOP was submitted to the Governor's Office of Planning and Research CEQA State Clearinghouse (SCH Number 2020090171). The NOP identified the date, time, and participation information for a public scoping meeting held on May 19, 2022.

Public Meeting

The SFCJPA hosted a virtual scoping meeting by web-based video and teleconference on May 19, 2022, with simultaneous Spanish language interpretation. The meeting began with an introduction to the format of the meeting, a description of the proposed Project, and information on the EIR process, followed by public comments. Oral and written comments were provided by agency staff and members of the public during the meeting. The meeting was attended by 55 people. The recorded meeting and presentation slides were subsequently posted on the SFCJPA website at: https://youtu.be/SJmmnZtWY4M. The meeting presentation is included in **Attachment B**.

Additional public outreach occurred during this time by the SFCJPA and community-based outreach partners at Climate Resilient Communities and Nuestra Casa. The SAFER Bay Project is using the Bay Adapt Platform to guide Project activities.

Scoping Period Comments

The SFCJPA received 16 written submittals (letters and emails) from 15 different entities in addition to comments received at the public meeting. **Table 1** provides a list of comment submittals received and **Table 2** lists those who submitted comments during the public meeting. Copies of letters and emails received, as well as a summary of the comments and responses during the public meeting are presented in **Attachment C**. Numerous commenters suggested alternatives that should be considered or eliminated from consideration for the Project, expressed concerns regarding Project development, or raised questions about the Project development process. Accordingly, the SFCJPA has prepared a global response to provide more information on these topics, presented below. **Tables 3 through 18**, presented after the global response, provide summaries of the written comments received during the scoping period as well as summary responses indicating (for example) whether a topic will be addressed in the EIR.

Global Response on Project Development and Alternatives Screening

Numerous comments on the Notice of Preparation (NOP) raise questions or concerns regarding Project development and/or suggest alternatives that should be considered or eliminated from consideration. This global response addresses these comments, providing background information on the interrelated steps of developing the Project and screening alternatives.

Project Development

The proposed Project design is currently in development. During the next 12 months, the SFCJPA will engage in several activities to better define and develop the proposed Project to be evaluated in the EIR, including the following:

TABLE 1
AGENCIES AND ORGANIZATIONS SUBMITTING WRITTEN COMMENTS

Agencies
California State Coastal Conservancy, South Bay Salt Pond Restoration Project
California Department of Fish and Wildlife
California Department of Transportation
Native American Heritage Commission
California State Lands Commission
San Francisco Bay Conservation and Development Commission
San Francisco Regional Water Quality Control Board
City of East Palo Alto
City of Palo Alto
San Francisco Public Utilities Commission
Midpeninsula Regional Open Space District
Organizations
Citizen's Committee to Complete the Refuge
Sierra Club
Harvest Properties
Ravenwood Shores Business District

TABLE 2
COMMENTERS AT THE PUBLIC SCOPING MEETING

Commenter
David Halsing, South Bay Salt Ponds Restoration Project
Kevin Lewis, City of East Palo Alto
Eileen McLaughlin, Citizen's Committee to Complete the Refuge
Sheila Brady
Davena Gentry
Pam D. Jones
Scott Marshall
Grace Popple
Virginia Portillo
Marlene Santoyo
Anonymous

- **Field investigations and desktop studies**. Examples include performing geotechnical drilling investigations, biotic habitat and special-status species assessments and wetland delineation, obtaining accurate property boundary information; obtaining mitigation plans for areas of contamination; collecting available utility information; review of applicable plans, policies and regulations governing construction of the flood protection features and actions within specific jurisdictions/areas (e.g., the Don Edwards National Wildlife Refuge, East Palo

Alto and Menlo Park, and the San Francisco Public Utilities Commission right-of-way), as well as performing desktop studies such as internal drainage analysis, geomorphic marsh evolution, projections and coastal hydraulics analysis.[1]

- **Develop design criteria**. The design criteria will be refined to establish the design level to which the Project will be evaluated and designed. Design criteria parameters include the establishing the final design water surface elevation and other loading conditions.

- **Consultation with Stakeholders.** Implementation of the Project will require numerous discretionary permits and other approvals from regulatory agencies (refer to NOP page 11). Consequently, the SFCJPA will continue to consult with regulatory agencies as the Project is refined to ensure that the Project that is developed can be permitted and approved. The primary means of engaging with regulatory agencies will be through meetings with the San Francisco Bay Restoration Regulatory Integration Team (BRRIT); the South Bay Salt Pond Restoration Project Management Team and Don Edwards National Wildlife Refuge operators; and the cities of East Palo Alto and Menlo Park. The SFCJPA and member cities will also be entering into memorandums of understanding (MOUs) with some stakeholders, and will continue to meet with landowners, representatives from neighboring communities through the Community Advisory Committee, and Native American tribes.

- **Alternatives suggested by commenters on the NOP.** In developing the proposed Project, the SFCJPA will consider alternatives suggested in comments on the NOP.

Inputs from fieldwork, desktop investigations, engineering analyses, and consultation with stakeholders will lead to refinements in the proposed Project and preparation of 30% design for the reaches/Project elements to be evaluated at a project-level of detail in the EIR. In addition, the SFCJPA will develop assumptions regarding construction for use in the EIR impact evaluations. Those reaches/aspects of the Project to be evaluated at a program level of detail will be defined in less detail.

The outcomes of the Project Development process will be 30% design drawings and documentation, construction assumptions, and the EIR Project Description (which will be based on the design and construction information). The SFCJPA also will document aspects of the Project development process and any alternatives that were considered but eliminated from evaluation in the EIR. The EIR Project Description will be made available for public review in August 2023; information on Project Development and alternatives screening will be included in the public draft EIR, expected to be available in early 2024. The discussion of consistency with plans and policies, as well as any unresolved issues, also will be presented in the Draft EIR.

Alternatives Screening

The Project development processes described above are guided by environmental laws and regulations pertaining to alternatives screening, and inevitably some alignment/design options

[1] The SFCJPA will consider consistency with plans and policies in refining the proposed Project and in the evaluations presented in the EIR consistent with CEQA requirements. Examples include SBSPRP planned improvements, San Francisco Bay Plan, 2020 Dumbarton Bridge West Approach + Adjacent Communities Resilience Study, East Palko Alto and Menlo Park general plans, and Ravenswood Specific Plan.

will be eliminated from detailed evaluation in the EIR in favor of others. The two key sets of environmental regulations that guide alternatives screening are described below.

Clean Water Act Section 404(b)(1)

An evaluation of alternatives is required for the Project under the Clean Water Act Section 404(b)(1) Guidelines, contained in 40 Code of Federal Regulations [CFR] 230.5. The Guidelines prohibit discharges of dredged or fill material into waters of the United States if there is a practicable alternative to the proposed discharge that meets the Project's purpose and would avoid, minimize or have less adverse impacts on the aquatic ecosystem, provided that the alternative does not have other significant adverse environmental consequences (40 CFR section 230.10(a)). The Guidelines require that the applicant prepare an alternatives analysis report that provides the rationale as to why the preferred project alternative is the least environmentally damaging practicable alternative that meets the project purpose. Under the Guidelines, an alternative is considered "practicable" if it is "available and capable of being done after taking into consideration cost, existing technology, and logistics in light of the project purpose" (40 CFR 230.10(a)(2)).

California Environmental Quality Act

The CEQA *Guidelines*, Section 15126.6(a), state that an EIR must describe and evaluate a reasonable range of alternatives to a project that would feasibly attain most of the project's basic objectives but would avoid or substantially lessen any identified significant adverse environmental effects of the project. Specifically, the CEQA *Guidelines* (Section 15126.6) set forth the following criteria for selecting and evaluating alternatives:

- **Purpose**. Because an EIR must identify ways to mitigate or avoid the significant effects that the proposed project may have on the environment, the discussion of alternatives must focus on alternatives to the project or its location which are capable of avoiding or substantially lessening any significant effects of the project, even if these alternatives would impede to some degree the attainment of the project's objectives, or would be more costly.

- **Identifying Alternatives.** The selection of alternatives is limited to those that would avoid or substantially lessen any of the significant environmental effects of the project, are feasible, and would attain most of the basic objectives of the project. Factors that may be considered when addressing the feasibility of an alternative include:

  - Site suitability
  - Availability of infrastructure
  - General plan consistency
  - Other plans or regulatory limitations
  - Jurisdictional boundaries
  - Economic viability
  - Whether the proponent can reasonably acquire, control, or otherwise have access to an alternative site.

- An EIR need not consider an alternative whose impact cannot be reasonably ascertained and whose implementation is remote and speculative. The specific alternative of "no project" must also be evaluated.

- **Range of Alternatives.** An EIR need not consider every conceivable alternative, but must consider and discuss a reasonable range of feasible alternatives in a manner that will foster informed decision-making and public participation. The "rule of reason" governs the selection and consideration of EIR alternatives, requiring that an EIR set forth only those alternatives necessary to permit a reasoned choice. As the lead agency, the SFCJPA is responsible for selecting a range of project alternatives to be examined and for disclosing its reasons for the selection of the alternatives.

- **Evaluation of Alternatives.** EIRs are required to include sufficient information about each alternative to allow meaningful evaluation, analysis, and comparison with the Project. Matrices may be used to display the major characteristics and the potential environmental effects of each alternative. If an alternative would cause one or more significant effects that would not result from the project as proposed, the significant effects of the alternative must be discussed, but in less detail than the significant effects of the project.

Consistent with CEQA, all alternatives will be screened for their ability to foster informed decision making and public participation. While CEQA guidance will be considered during Project development (i.e., the SFCJPA will consider feasibility and ability of an alternative to meet most of the basic objectives of the Project), because the *purpose* of EIR alternatives is to find ways to mitigate or avoid significant effects associated with the proposed Project, EIR alternatives cannot be confirmed until the SFCJPA has completed the evaluations of environmental impacts for the EIR, at which point candidate alternatives will be screened for their ability to feasibly reduce one or more significant impacts attributable to the proposed Project while still attaining most of the basic objectives of the Project.

Candidate Alternatives

As indicated in the NOP (page 8), candidate alternatives to be considered for evaluation in the EIR include other Project alignments and design options identified in the Feasibility Report, and any alternatives that were suggested in comments on the NOP. Investigations during Project Development may lead to the identification of other alternatives as well. Final consideration of alternatives to be presented in the Draft EIR (either as alternatives retained for evaluation or alternatives considered but eliminated) will occur once the impact evaluations for the Project are complete and significant impacts confirmed. The SFCJPA has committed to releasing a draft Project Description on its website for public review prior to release of the DEIR.

Alternatives Considered but Eliminated

Any alternatives that are considered but eliminated from evaluation in the EIR (e.g., due to infeasibility, inability to meet most of the basic Project objectives, or inability to reduce one or more significant environmental impacts) will be briefly described along with the reasons for their elimination.

TABLE 3
SUMMARY COMMENTS AND RESPONSES ON SAFER BAY NOTICE OF PREPARATION:
SOUTH BAY SALT POND RESTORATION PROJECT

Summary of Comment	Summary Response
1. As we have discussed in multiple meetings, the collaborating entities behind the South Bay Salt Pond Restoration Project (SBSPRP)- most notably the U.S. Fish and Wildlife Service's (USFWS) Don Edwards San Francisco Bay National Wildlife Refuge (Refuge), which is the landowner of the Ravenswood pond complex portion of the SBSPRP- are supportive of the SFCJPA's overall mission and goals for the SAFER Bay Project, portions of which would take place on Refuge lands. However, there are several points and details in the text and figure in the Notice of Preparation - and that were discussed in the May 19 Scoping Meeting - that we wanted to be sure were clarified and addressed in the Draft Environmental Impact Report (EIR). Our comments on those matters are listed below; please include these considerations in the analysis of the feasibility and environmental impacts of different alternatives in the EIR.	The SBSPRP's support for the SFCJPA's overall mission and goals is acknowledged.
2. Any portion of the SAFER Bay Project that occurs on Refuge lands must comport with federal law and policy about the mission of the National Wildlife Refuge System. The priority public uses of a National Wildlife Refuge include wildlife observation, interpretation, photography, environmental education, hunting and fishing. Any recreational activities considered on engineered levees in or through the Refuge should be appropriate, wildlife-compatible uses such as pedestrian and bicycle trails for public wildlife viewing and interpretation, where appropriate.	The need for the Project to comport with federal law and policy about the mission of the National Wildlife Refuge System is acknowledged. The EIR will include discussions of consistency with applicable plans and policies.
3. Any public uses, structures, and/or facilities in the Refuge and associated with the SAFER Bay Project would need to be evaluated and approved under a Compatibility Determination supported by a NEPA-compliant project. We realize that the SAFER Bay Project's NEPA coverage will be provided in a subsequent permitting process, and so the timing of these steps is important to consider now.	The need for a Compatibility Determination supported by a NEPA-compliant project is acknowledged. The SFCJPA has eliminated a potential loop road through SF2 as non-compatible and is evaluating a potential loop road that connects to University Avenue.
4. Construction-related short-term impacts are a major source of potential adverse impacts to the Refuge and its surroundings. The Draft EIR should describe best management practices, avoidance and minimization measures, and mitigation measures that can be taken to reduce these impacts. Construction activities would need to be planned and timed to cause the least disturbance to Refuge operations, wildlife and habitats.	The DEIR will describe best management practices, avoidance and minimization measures, and mitigation measures to reduce construction-related impacts. The SFCJPA will continue to consult with the SBSPRP regarding implementation of the Project and its effects on Refuge operations and resources.
5. The anticipated impacts of each alternative under consideration should be listed in tables and quantified wherever possible.	The impacts of alternatives retained for evaluation in the EIR will be described in table format and quantified where possible and consistent with CEQA requirements.
6. The Draft EIR should contain and identify a Preferred Alternative that is appropriate to implement on Refuge lands.	The SFCJPA intends to continue close collaboration with Refuge and SBSPRP staff on development of the preferred alternative. Prior to the release of the Draft EIR, a Draft Project Description will be made available for review that will identify the SFCJPA's proposed Project.
7. Any engineered levee or other feature on Refuge lands would need a Right-of-Way permit issued by the USFWS.	The DEIR will include the need for a Right-of-Way permit from the USFWS.

Summary of Comment	Summary Response
8. One of the points of discussion at the scoping meeting included use of Refuge lands for the construction of a "loop road" or other built feature for establishing a roadway for private vehicle use through or within the Refuge. While it may be acceptable to build a levee through part of the Refuge to manage flood waters or establish separation between different types of wildlife habitats, a levee-top roadway intended for use as a thoroughfare for private vehicles is not a compatible or appropriate use of the Refuge's congressionally mandated purpose or the mission of the National Wildlife Refuge System. As discussed in several meetings, alternatives that include establishing a transportation corridor for private vehicles will not be appropriate or compatible with the purpose of the National Wildlife Refuge.	The SFCJPA acknowledges the SBSPRP's statement that the loop road is not a compatible or appropriate use for the Refuge.
9. Figure l in the NOP as well as the discussion in the text and in the scoping meeting consistently describe Ravenswood Ponds R1 and R2 as being restored to tidal marsh. That is certainly a possibility, but it is only one of the possible futures for these two ponds under the SBSPRP's multi-phase implementation plan and the guiding documents and programmatic permits for our project. Under our Adaptive Management Plan, we have to weigh the needs of a range of different endangered, threatened, and other special-status species as each phase of the project is implemented and strike a balance between tidal marsh restoration and various types of managed pond enhancements that will bring benefits and impacts to these different species. We have not yet reached a point where we can evaluate what to do with Ponds R l and R2. They may indeed be restored to tidal marsh, but they may instead be retained and enhanced as ponds for other species. We strongly encourage the SAFER Bay Project team to include every combination of these different habitat outcomes for these ponds in the EIR, so that the alternative selected and advanced is consistent with the decisions and needs of the SBSPRP and the Refuge.	As indicated in the NOP, "The restoration scenarios include tidal marsh or a combination of tidal marsh and managed ponds." The SFCJPA will continue to work with the SBSPRP and Refuge regarding restoration scenarios within Ponds R1 and R2. The SFCJPA understands that SAFER Bay's Project Description will need to retain flexibility for the types of habitat targets of future restoration/management in Ponds R1 and R2.
10. Figure l includes a habitat transition zone in Pond R2. We are not necessarily opposed to including this feature at this location, but it may not be necessary or desirable if that pond is kept as a managed pond. And even in the tidal marsh restoration scenario, it may not provide much additional habitat value in that location. We encourage you to consider alternatives both with and without that feature.	The SFCJPA agrees that a habitat transition zone may not be constructed or located as shown in Figure 1, but at another mutually agreeable location(s) that optimizes ecological lift. The SFCJPA will continue to work with the SBSPRP and Refuge on optimum combinations of restored and/or enhanced target habitats and associated transition zone habitats in Ponds R1 and R2. The SAFER Bay Project team's habitat restoration ecologists/hydrologists will collaborate with the SBSPRP and Refuge to develop conceptual options for various restored high tide refugia features, in addition to horizontal levee type T-zones (e.g., intermarsh islands/mounds, elevated berms along historic slough channels).
11. The SBSPRP's Phase 2 construction is underway at Ravenswood Ponds R3, R4, R, and S5, near the western end of the SAFER Bay Project. If construction is completed in 2022 as planned (or even shortly thereafter), the three different habitat types, flood management systems, and public access features will be in place and operational early in 2023. The landscape will be radically different than it is in the existing aerial photos and maps. It is important that the EIR not make any inferences or conduct any description of the existing conditions based on images or data that exist of the current configuration. We are happy to work with your project team to review and clarify what will soon be the existing condition as these locations.	The SFCJPA will continue to work with the SBSPRP to understand and to accurately represent updated baseline conditions in this area.

TABLE 4
SUMMARY COMMENTS AND RESPONSES ON SAFER BAY NOTICE OF PREPARATION:
CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

Summary of Comment	Summary Response
1. The DEIR should include clear descriptions of the methods that will be used to construct flood walls as well as equipment required. Construction could cause injury or mortality to aquatic species. The EIR should include a hydroacoustic impact discussion. The Fisheries Hydroacoustic Working Group's Agreement in Principle for Interim Criteria for Injury to Fish from Pile Driving Activities specifies hydroacoustic levels that can cause injury and/or mortality to fish.	The DEIR will include clear descriptions of construction methods and will evaluate the potential for adverse effects on aquatic species, taking into consideration hydroacoustic levels in the referenced document.
2. The EIR should discuss locations in which flood risk reduction structures and pump stations are present, whether existing intakes are screened, and whether flood protection elements pose impacts to special-status fish species. Intake structures could cause entrainment or impingement; flood gates could trap fish in areas without unsuitable habitat. Water intake structures should be screened to meet CDFW and NMFS criteria [included an attachment].	The DEIR will include an assessment of impacts to special-status fish species. This will include an assessment of potential impacts due to entrainment and/or impingement. The engineering team will design intake structures to meet CDFW and NMFS criteria for screening.
3. The DEIR should discuss potential impacts of visitor use along trails to nearby shorebirds including special status species. The project may cause nest abandonment and other impacts.	The DEIR will assess potential impacts to shorebirds (including special-status species) from human use of trails constructed or modified by the Project.
4. The DEIR should include an updated habitat assessment for shorebirds; information may be available from DENWR.	The DEIR will include an assessment of habitat for shorebirds in potential impact areas and will utilize any available information from DENWR and other sources.
5. Suggested mitigation measure: a CDFW- and USFWS-approved biologist should conduct protocol-level surveys of California Ridgway's Rail.	The DEIR will include an assessment of impacts on the California Ridgway's rail. Protocol-level surveys in areas providing suitable habitat, but where the species is not already presumed to be breeding, may be included in the mitigation measures if appropriate.
6. The DEIR should describe how recreation improvements will avoid and minimize impacts to shorebirds. Consideration should be given to facility alignments/locations, use of seasonal trail closures and vegetative screening.	The DEIR will assess impacts of recreation improvements on shorebirds; such impacts will be considered during the design process with the intent of avoiding and minimizing such impacts.
7. The EIR should discuss impacts to existing tidal marsh and associated terrestrial and aquatic species from placement of transition zone habitat.	The DEIR will assess the Project's impacts to all regulated, sensitive habitats (e.g., tidal marsh, non-tidal ponds), including impacts due to construction of transition zone habitat. The design team will select locations and geometric configurations for transition zone habitat that avoid or minimize impacts to existing tidal marsh, and result in a net, long-term ecological lift.
8. The DEIR should consider the ability of the project to set back levees in areas of high-quality tidal marsh habitat. Clearly describe any constraints to the feasibility of setting back levees, and how the project is minimizing impacts to existing high quality habitat and associated species.	The Project will evaluate the maximum feasibility to set back levees onto private brownfield redevelopment areas. The SFCJPA does not own the land and must balance multiple priorities- including the location and nature of existing contamination and utilities, and what the City of East Palo Alto would like as community benefits.

9. The DEIR should provide an assessment of the need for upland refugia habitat and whether alternative options (e.g., marsh mounds) may be appropriate in certain locations.	The SFCJPA intends for the Project's restoration ecologists and restoration hydrologists to conduct a study of existing high tide refugial habitat quality and the estimated degree of marsh resilience to sea level rise along the primary bayshore marshes in the project-level reaches (I.e., Faber, Laumeister, and Cooley Marshes). This study will be used to assess potential locations for various types of created high tide refugia/transition zone habitat (e.g., marsh mounds, horizontal levees).
10. The EIR should thoroughly analyze the ecological costs and benefits of construction of transition zone habitat on existing marsh habitat.	Agreed. See above responses.
11. The DEIR should discuss whether any submerged habitats are being proposed.	No subtidal habitats are being proposed at this time.
12. Several special-status fish and wildlife species and important commercial/recreational fisheries and their habitat could be adversely affected by equipment, workers, and temporary dewatering.	The DEIR will assess potential impacts to all special-status fish and wildlife species, fisheries, and other sensitive species, as well as their habitats.
13. The EIR should include the results of a habitat assessment to determine the location and quality of suitable habitat for special-status species.	The DEIR's assessment of impacts to special-status species will be based on a current assessment of the distribution and quality of existing habitats.
14. Focused, protocol surveys for special-status species should be conducted. If project activities will take place during avian nesting season, an additional pre-project survey for active nests should be conducted.	The DEIR's assessment of impacts to special-status species will occur based on focused surveys and/or habitat assessments. Surveys may also be included in mitigation measures for some species.
15. The EIR should include species-appropriate work windows and buffers for special-status species and nesting birds.	Agreed. The DEIR will include species appropriate work windows and buffers for nesting birds and special-status species.
16. Use non-mechanized hand tools for vegetation removal in salt-marsh harvest mouse habitat.	Comment acknowledged; this will be considered for incorporation into DEIR mitigation measures.
17. Avoid in-water work to the extent practicable. If it cannot be avoided, conduct in-water work and place material at low tide to reduce risk of take of special-status fish species.	Comment acknowledged; this will be considered for incorporation into DEIR mitigation measures.
18. If avoidance of state-listed wildlife species is unavoidable, apply for an Incidental Take Permit.	An Incidental Take Permit will be obtained if take of any state-listed species will occur.
19. The project could adversely affect special-status plants. Conduct protocol-level surveys. Avoid impacts to special-status plants. If avoidance is not possible, collect seeds and plant at an approved off-site location or provide to seed bank facility.	The DEIR's assessment of impacts to special-status species will occur based on focused surveys and/or habitat assessments. Surveys and other measures suggested by the comment may also be included in mitigation measures for some species.
20. The DEIR should show specific cross-section figure numbers in an overview figure to ensure they can be easily cross-referenced. Each cross-section should include enough detail to clearly describe its location within the project.	The Project Description in the DEIR will include cross-sections indexed to locations on overview maps.
21. Please report any special-status species and natural communities detected during surveys to the CNDDB.	Any special-status species and natural communities detected during Project surveys will be submitted to the California Natural Diversity Database.
22. Payment of environmental document filing fee is required.	The SFCJPA will pay the CDFW fee as required.
23. Agreement in Principle for Interim Criteria for Injury to Fish from Pile Driving	Thank you for providing this as an attachment; it will be used during the DEIR's assessment of impacts on fish as appropriate.

TABLE 5
SUMMARY COMMENTS AND RESPONSES ON SAFER BAY NOTICE OF PREPARATION:
CALIFORNIA DEPARTMENT OF TRANSPORTATION

Summary of Comment	Summary Response
1. Sea level rise must be addressed through studies conducted in coordination with Caltrans	The SFCJPA is currently consulting with and will continue to consult with Caltrans during preparation of design studies with respect to sea level rise.
2. Analyze Sea level rise of 3.5 feet	The Project is being designed to satisfy current FEMA coastal flood protection requirements and is including an additional 3.5 feet of freeboard to account for anticipated sea level rise.
3. Address how the project may conflict with drainage facilities in coordination with Caltrans	The SFCJPA will evaluate potential conflicts with the existing utilities and work with utility operators on the best design path forward.
4. Address how the project will be maintained, maintenance resources allocated.	Maintenance procedures and funding will be determined in consultation with Caltrans
5. The County of San Mateo is responsible for mitigation. including any needed improvements to the State Transportation Network.	The EIR will indicate the entity responsible for implementing each mitigation measure.
6. If Caltrans facilities impacted, project must meet ADA standards and must maintain bicycle and pedestrian access during construction.	The Project will comply with applicable ADA requirements if Caltrans facilities are impacted. Alternative routes for bicycle and pedestrian access will be posted.
7. Project requires an encroachment permit from Caltrans.	EIR will identify need for encroachment permit from Caltrans.

TABLE 6
SUMMARY COMMENTS AND RESPONSES ON SAFER BAY NOTICE OF PREPARATION:
NATIVE AMERICAN HERITAGE COMMISSION

Summary of Comment	Summary Response
1. Recommends consultation with California Native American tribes that are traditionally and culturally affiliated with the geographic area of project as early as possible and summarizes tools for outreach and consultation.	The SFCJPA submitted a Tribal Consultation List and Sacred Lands request to the NAHC on April 11, 2022 and received a list of tribal contacts and that the Project was positive for sacred lands on May 5, 2022. The SFCJPA contacted each of the listed contacts via email on June 17, 2022 and mailed letters via USPS Priority Mail on June 24, 2022. The SFCJPA has heard from one tribe and will continue outreach to keep learning about sacred lands in the Project area and to consult with tribes affiliated with the Project area.
2. Describes the AB52 and SB18 CEQA requirements for tribal cultural resources and urges the SFCJPA to request Native American Tribal Contact lists and Sacred Lands File searches from the NAHC.	The SFCJPA has contacted the NAHC for this information.
3. Recommends that SFCJPA contact the appropriate research center for an archaeological records search and conduct an archaeological inventory if required.	The SFCJPA will contact the Northwest Information Center for a records search. Results will be shared confidentially with tribal representatives as part of the consulting process under AB 52.
4. Lead agencies should include in their mitigation monitoring reporting program provisions for the identification and evaluation of inadvertently discovered archaeological resources, cultural items, and Native American remains. A certified archaeologist and culturally affiliated Native American should monitor ground disturbing activities in areas of archaeological sensitivity.	Mitigation measures identified in the DEIR will include the requested information.

TABLE 7
SUMMARY COMMENTS AND RESPONSES ON SAFER BAY NOTICE OF PREPARATION: CALIFORNIA STATE LANDS COMMISSION

Summary of Comment	Summary Response
1. The State Lands Commission (SLC) is a trustee agency and a responsible agency and requests that the SFCJPA consult with us on preparation of the DEIR	SFCJPA will consult with SLC regarding their areas of jurisdiction over the Project.
2. Portions of the Project area include land under SLC jurisdiction, which are subject the protections of the Common Law Public Trust. Public trust purposes include but are not limited to waterborne commerce, navigation, fisheries, water-related recreation, habitat preservation, and open space. A lease will be required; contact George Asimakopoulos for further information.	Acknowledged. SFCJPA will contact George Asimakopoulos for further information.
3. The DEIR should include a thorough, complete, and precise Project Description to facilitate SLC's determination of the extent and locations of its leasing jurisdiction.	The DEIR Project Description will be prepared consistent with CEQA requirements for thoroughness, level of detail and precision to facilitate SLC determination of its jurisdiction over the Project.
4. Please update the Permits and Approvals table to state that a lease will be required from the SLC.	The referenced table will be updated for the DEIR.
5. The DEIR should disclose and analyze all potentially significant effects on sensitive species and habitats, identify feasible mitigation measures, conduct queries of the CNDDB and USFWS database, and include a discussion of consultation with CDFW, USFWS, and NMFS, including any recommended mitigation measures and potentially required permits identified by these agencies.	The DEIR will include the requested information.
6. The DEIR should evaluate noise and vibration impacts on fish and birds. Mitigation measures could include work windows as defined by CDFW, USFWS, and NMFS.	The DEIR will evaluate noise and vibration effects on fish and birds.
7. The DEIR should mention that the title to all cultural resources on or in the tide and submerged lands of California is vested in the State and under the jurisdiction of the SLC. staff requests that the SFCJPA consult with Jamie Garrett should any cultural resources on state lands be discovered. Staff requests that the following statement be included in the DEIR's Mitigation and Monitoring Plan: "The final disposition of archaeological, historical, and paleontological resources recovered on State sovereign land under the jurisdiction of the California State Lands Commission must be approved by the Commission."	The DEIR will include the requested information.

Summary of Comment	Summary Response
8. Provide detail regarding the Project's surface hydrology features and characteristics, groundwater characteristics, history of flood events and any known land uses and structures subject to flood hazards, and any flood zone designations for the Project area. In addition to Federal Emergency Management Agency standards for sea level rise with flood protection structures, identify all coastal adaptation plans applicable to the Project area and describe how the Project will implement the sea level rise goals and objectives of these plans. Describe how proposed construction activities will be designed to withstand future projections of sea level rise and elevated groundwater levels and enhance resiliency to restored tidal areas. Describe proposed monitoring programs and adaptive management measures to achieve restoration and flood protection goals. Describe how flood protection structures will be designed for compatibility with existing tidal restoration and habitat management goals for the Project region and will avoid adverse impacts to adjacent properties.	The DEIR will evaluate existing and future with-Project hydrology, including flood events. These assessments and the design will include adaptation for sea level rise.
9. Provide a comprehensive description of existing recreational uses and public access to the Bay Trail and San Francisco Bay. Describe how proposed improvements to the Bay Trail will enhance public access to the Bay and uses with the trail, including protection from coastal flooding. Describe any restrictions or limitations on public access to the Project area during construction, and methods to provide notice and accommodations to the public prior to construction.	The DEIR will describe existing recreational uses, proposed changes to trails, trail closures during construction, and actions related to trail closures.

TABLE 8
SUMMARY COMMENTS AND RESPONSES ON SAFER BAY NOTICE OF PREPARATION:
SAN FRANCISCO BAY CONSERVATION AND DEVELOPMENT COMMISSION

Summary of Comment	Summary Response
1. Portions of the project are within BCDC jurisdiction. DEIR should provide a detailed project description, clarify where the project is within BCDC jurisdiction, and identify BCDC's, federal government's permitting role.	The DEIR will identify discretionary approvals required by the Project including BCDC, federal agencies.
2. The DEIR should discuss those areas of the project site designated as "Wildlife Refuge Priority Use Area, consistency of proposed uses with this designation, and plans to resolve any inconsistencies.	The requested information will be presented in the DEIR.
3. The DEIR should indicate the amount of fill that would be placed and extracted in BCDC jurisdiction and uses associated with the proposed new fill by specific area. BCDC may require fill removal or habitat restoration elsewhere.	Requested information will be presented in the DEIR. SFCJPA will acquire and comply with terms of BCDC permit.
4. The DEIR should describe existing and proposed public access, type, number of new users and their impacts, adequacy of proposed access, and conformity with BCDC policies.	The DEIR will describe existing and proposed public access, evaluate impacts associated with the Project, and discuss conformity with BCDC policies in accordance with CEQA.
5. The Project may require review by BCDC's design review board.	SFCJPA will consult with BCDC to confirm requirements.
6. Project should be designed to minimize impacts to existing public access areas, some of which are BCDC-required, and include phased access detours or closures where necessary. BCDC staff can help identify BCDC-required access, existing permits, and can review detour routes/closure plans.	SFCJPA will request BCDC input regarding these issues. Further, the SFCJPA have been and will continue to actively consult with BCDC staff via the Bay Restoration Regulatory Integration Team (BRRIT)
7. Describe proposed trails, design for accessibility and connectivity with other trails, parking, public transportation. Bay Trail should be designed to current standards; coordinated with BCDC, MTC.	The Project will evaluate building trails on levee tops. These trails are envisioned to be part of new or connect to existing Bay Trail. The SFCJPA will use the 2016 Bay Trail design guidelines as well as Baylands Design Criteria. Some trails in East Palo Alto will be built on brownfield redevelopment lands and will be coordinated to connect with different proposed developments. The DEIR Project Description will describe proposed trail improvements and design standards.
8. Describe sensitive wildlife and habitat, how public access would avoid or minimize impacts to same. Coordinate with appropriate agencies.	SFCJPA will continue to coordinate with regulatory agencies, South Bay Salt Ponds authority. DEIR Biological Resources section will describe and evaluate impacts to habitat and identify measures to avoid or mitigate impacts.
9. Describe how construction and maintenance of public access improvements would be funded.	The DEIR will include a description of construction and maintenance responsibilities for the Project.
10. The DEIR should describe how project would maximize views of Bay. Proposed structures should be designed to avoid or minimize visual barriers to the Bay. Project should mitigate significant unavoidable impacts to Bay views through alternative enhancements to public access and/or views. DEIR should discuss significant impacts to Bay views from road near Infinity Auto Salvage and options to mitigate for these impacts.	The DEIR will evaluate potential adverse effects on aesthetic resources consistent with CEQA requirements, including evaluation of effects on views from existing public roadways.
11. Describe whether habitat protection fencing would be proposed between trails and transition zones or other habitat areas.	Habitat protection fencing will likely be proposed during levee construction near sensitive habitats as the design progresses.

Summary of Comment	Summary Response
12. The DEIR should describe and analyze alternatives for the compensatory mitigation restoration program being considered, taking into account Bay Plan policies, and describe rationale for preferred ratio. BCDC may require additional mitigation.	The DEIR will include consideration of alternative(s) that would reduce impacts on biological resources and will evaluate Project consistency with Bay Plan policies. Compensatory mitigation, if needed, will be determined in consultation with resource agencies. The Project will comply with BCDC permit requirements.
13. The DEIR should address how the project would meet Bay Plan policies related to fish, other aquatic organisms, and wildlife.	The DEIR will evaluate Project consistency with Bay Plan policies consistent with CEQA requirements.
14. The SFCJPA should continue coordinating with wildlife resource agencies.	The SFCJPA will continue to coordinate with resource agencies regarding the Project.
15. The DEIR should discuss any filling or other activities in tidal marshes or tidal flats; adverse effects on these habitats, and impact avoidance and minimization for the proposed project and alternatives. Fill in habitat should minimize near-term impacts, maximize long-term benefits to Bay habitats and native species.	The biological resources section of the DEIR will describe impacts on, and avoidance and minimization measures for tidal habitats.
16. The DEIR should address how construction and use of the project would be designed to control stormwater runoff and pollution into the Bay, and the role of the State and Regional Water Boards in approving the project.	The DEIR's hydrology and water quality section will describe stormwater runoff requirements and roles.
17. The DEIR should identify whether any portions of the project site have hazardous substances, effects associated with such contaminants including with sea level rise, how these risks would be addressed, and the role of agencies.	The DEIR's hazards and hazardous materials section will identify known areas of contamination and evaluate potential impacts associated with contaminants, including sea level rise.
18. The DEIR should describe existing and proposed shoreline protection features, analyze their potential to adversely impact natural resources and public access, indicate how impacts will be avoided.	The DEIR will describe the Project and evaluate its impacts on the environment consistent with CEQA requirements.
19. The DEIR should identify where the use of vegetation in favor of hard scape would be appropriate and feasible.	Vegetation is preferred over hardscape where possible and appropriate. The DEIR will evaluate whether there is a CEQA-compliant alternative that increases the use of vegetation instead of hardscape compared to the Project.
20. The SFCJPA should conduct, and the DEIR and permit application materials should describe meaningful community engagement throughout project planning, design and permitting	The Project will have a sustained stakeholder process as described in the February 2022 Draft Community Outreach Plan, consistent with the Bay Adapt Platform that was adopted for the SAFER Bay Project in December 2021. Local community groups, Nuestra Casa and Climate Resilient Communities, will lead outreach, including the formation of a Citizen's Advisory Group, with the initial meeting planned for November 2022. The DEIR and BCDC permit application will describe community engagement conducted for the Project.
21. The DEIR should identify the mean higher high water, the 100-year flood, mid-and end-of-century rise in sea level, storm surge effects, and a preliminary assessment of vulnerability to future flooding and sea level rise.	While the DEIR will not contain an assessment of the *vulnerability* of the Project to future flooding and sea level rise (the role of the DEIR is to evaluate the adverse effects of a project on the environment), the Project Description presented in the DEIR will describe the basis for the proposed design with respect to flood hazards and anticipated sea level rise.

22. The DEIR should describe how the project has been designed for adapting to sea level rise and shoreline flooding to ensure the project is resilient to mid-century sea level rise projections, and how it can adapt (e.g., raise levees and flood walls) to end of century projections.	The DEIR will describe the design and design standards for the Project. The Project design criteria will satisfy: • Current FEMA coastal flood protection requirements, which is the existing 100-year event (that has a 1% annual chance of occurring in any given year) with required freeboard for FEMA accreditation; and • An additional three and a half feet of tidal elevation to account for anticipated sea level rise.
23. The DEIR should address how groundwater is expected to impact levees and floodwalls during construction and with future sea level rise, and how risks from groundwater rise would be addressed.	The DEIR will evaluate impacts associated with groundwater considering Project design criteria including 3.5 feet of sea level rise.
24. The project may need to go before BCDC's Engineering Criteria Review Board.	The SFCJPA will consult with BCDC to confirm the need for review by Engineering Criteria Review Board.
25. The DEIR should describe all existing and proposed shoreline protection features, including an analysis of their potential to adversely impact natural resources and public access, and how impacts will be avoided or mitigated.	The DEIR will include the requested information.

TABLE 9
SUMMARY COMMENTS AND RESPONSES ON SAFER BAY NOTICE OF PREPARATION: SAN FRANCISCO BAY REGIONAL WATER QUALITY CONTROL BOARD

Summary of Comment	Summary Response
1. Before issuing water quality certification for the Project, we need to be able to find that the Project has avoided and minimized impacts to the maximum extent practicable as described in the Procedures and Basin Plan Section 4.23.4. The EIR should evaluate a range of potential alternatives under reasonably foreseeable climate change conditions and assess the short-term vs. long-term impacts and benefits to identify the circumstances under which proposed dredge or fill discharges appropriately avoid, minimize, or compensate for impacts to waters of the State. The alternatives should also discuss existing constraints to explain whether various flood protection alignments can shift landward to further avoid impacts to waters of the State. Fr example, has the project evaluated shifting alignments landward by modifying/raising Highway 84 to serve as the landward floor barrier; identifying a more suitable long-term location for PG&E's substation; and in areas where land uses include low density buildings and surface parking? Climate adaptation measures should be designed to provide flood protection in the near-term while allowing for a range of future actions to address uncertainty. As such, actions that provide flood protection as far landward as practicable are preferable.	The DEIR will evaluate a range of alternatives that meets CEQA requirements. The DEIR will describe the feasibility of alternatives capable of avoiding, minimizing, or compensating for impacts to waters of the State including opportunities and constraints of landward shifts in levee alignments. Foreseeable climate change conditions relative to the Project will be discussed. Climate change effects will be evaluated in accordance with the July 2022 Basin Plan Amendment and the State Water Board's April 2021 Implementation Guidance for the State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State.
2. Natural and nature-based infrastructure are preferable to traditional infrastructure (e.g., levees, seawalls, riprap) to support beneficial uses. Since nature-based approaches rely on natural processes to adapt to climate change, their location and design must be tailored to site-specific conditions and desired functions. Ecotone levees should be built as far landward as practicable to minimize settling and impacts to aquatic resources and to maximize habitat restoration. Where practicable, different nature-based measures can be combined to provide enhanced shoreline protection and beneficial uses. For example, beaches can be combined with wetland restoration to further dissipate wave energy, naturally armor shorelines from erosion, and provide valuable habitat. Where nature-based infrastructure is not practicable, hybrid approaches combining traditional ' and nature-based measures are preferable to alternatives that only include traditional infrastructure. For example, engineered features should incorporate habitat enhancements as much as practicable, such as living seawalls or construction of habitat mounds to provide high tide refugia.	The primary purpose of SAFER Bay is to reduce risk of tidal flooding to vulnerable communities with flood risk mitigation features that are able to be accredited by FEMA. To complement flood protection design criteria, the SFCJPA agrees that nature-based solutions are preferable to levees, seawalls and riprap where possible. To the extent practicable, the Project will incorporate green or hybrid infrastructure that is thoughtfully tailored to the unique physical and ecological conditions of the various Bayshore reaches.
3. For additional information related to climate change and adaptation relevant to Water Board permitting of dredge or fill activities, please refer to the proposed Climate Change Basin Plan Amendment.	The referenced document will be consulted in associated with permitting.
4. To facilitate evaluation of potential impacts to waters of the State, the EIR should include sufficient information on the Project's impacts by distinguishing between temporary impacts, permanent impacts, conversion of waters to uplands, and conversion from one aquatic habitat (type conversion).	The DEIR will distinguish between temporary and permanent impacts and describe conversion of waters to uplands, and habitat type conversion.

5. We support the Project's coordination with the South Bay Salt Ponds Restoration Project to restore either tidal marsh or a mix of tidal marsh and enhanced managed pond habitat in Ponds R1 and R2. The NOP also notes the potential for tidal marsh restoration of the bayward portion of Pond SF2 and the adjacent diked marsh between Pond SF2 and the Cooley Marsh, and western snowy plover breeding habitat enhancement in Pond R3.	The Regional Board's support is acknowledged.
6. The EIR should include information on how the Project will meet the California Wetland Conservation Policy, the primary goal of which is to ensure no overall net loss and to achieve a long-term net gain in the quantity, quality, and permanence of wetland acreage and functions. In doing so, it is important to distinguish between different types of mitigation such as creation, restoration, and enhancement. Fill placed in waters of the State that converts wetlands to uplands will require mitigation through wetland creation (i.e., wetlands created/restored in current uplands), thereby resulting in no net loss or a net gain in waters of the State. Impacts from Project activities that convert one aquatic habitat type to another aquatic habitat type (type conversion) may be offset by the enhanced beneficial uses and overall long-term environment net benefit resulting from the type conversion. We recognize that nature-based features such as ecotone levees can result in near-term impacts to the acreage, functions, and values of waters of the State, but in the context of climate change can have less impacts and more benefits over the long term. For climate adaptation projects where fill placed in waters of the State converts wetlands to uplands in the near-term. mitigation is not required if these areas are inundated within 30 years and are converted back to waters of the State again. Please refer to the Ocean Protection Council's guidance and evaluate the medium-high risk aversion scenario to estimate the extent of fill placement that will be inundated within 30 years.	Comment acknowledged. The SFCJPA looks forward to ongoing collaboration and early consultation with RWQCB staff via the BRRIT, to arrive at a wetland mitigation approach that meets the RWQCB requirements. The Ocean Protection Council's guidance has and will continue to be consulted to estimate the extent of fill placement.
7. Project construction will require importing a considerable amount of fill material. The Project should develop a quality assurance project plan (QAPP) that establishes a process for evaluating the quality of fill material to ensure that imported fill is suitable for placement and is protective of aquatic habitat. The QAPP should detail how fill material will be screened, screening levels for contaminants including laboratory testing methods, and transport and placement procedures.	The SFCJPA used the South Bay Salt Pond Restoration Project's quality assurance project plan (QAPP) standards in the completed Reach 1 Project and anticipates using them again for imported fill for the SAFER Bay Project on the bay side. On the land side, there is existing contamination and different standards for fill that must be adhered to as part of Site Management Plans.
8. The EIR should describe measures that will be implemented to avoid and minimize impacts to water quality from runoff. For impervious surfaces associated with trails, runoff can be directed to adjacent vegetated areas, to non-erodible permeable areas, or towards the outboard side of levees. If runoff is directed to adjacent vegetated areas, a 2: 1 or lesser ratio of impervious to pervious surface (or a vegetated area that is at least half the width of the trail) is preferred.	The DEIR will consider runoff for with-Project conditions, and to the extent possible, consider mitigating measures to avoid and minimize impacts to water quality. The Project will work with cities on stormwater recommendations.

TABLE 10
SUMMARY COMMENTS AND RESPONSES ON SAFER BAY NOTICE OF PREPARATION:
CITY OF EAST PALO ALTO

Summary of Comment	Summary Response
1. The Project levees and improvements are proposed within the RBD Specific Plan (Specific Plan) area. As identified in the General Plan, the RBD is high priority for the City for future redevelopment. The General Plan and Specific Plan recognize the value of the Bay, specifically the Ravenswood Open Space Preserve and the Palo Alto Baylands Natural Preserve. The City's policies place great importance on the connected public open spaces within this area and making sure that new development is compatible and provides benefits to the community. The City has concerns about the impact of the proposed levee on future development and the ability to implement the Specific Plan goals. The parks and trails provide space for active and passive recreation and enhance the visual appearance of the City. The levee may limit the ability to realize these goals. The General Plan also values community involvement. Policy 1. 7 encourages public involvement in every aspect of park and open space acquisition, design, construction and programming. The City requests that the SFCJPA work with East Palo Alto to design a levee system that will not limit the ability to implement the City's goals and policies regarding the RBD. The City would appreciate greater coordination to ensure that both the SFCJPA and City's goals are met, including presentations to the City Council regarding how the City's concerns are being addressed, not less than quarterly. The coordination should also include greater public involvement.	Please refer to the global response on Project Development and Alternatives Screening. The SFCJPA will coordinate closely with the City of East Palo Alto and its Ravenswood Specific Plan Update. The SFCJPA meets regularly with the Ravenswood Shores Business District as well as individual developers. The SFCJPA Board adopted the Bay Adapt Platform in December 2021 to recognize the importance of community involvement in the process. The SFCJPA's draft community outreach plan specifies sustained community involvement from design through implementation. The SFCJPA has engaged two local entities, Nuestra Casa and Climate Resilience Communities, to convene a Citizen's Advisory Group, which will began meeting in the fall of 2022. The DEIR will evaluate Project consistency with East Palo Alto plans and policies.
2. As part of the planning application process, the City will require, as a condition of approval, certain landowners to dedicate construction, maintenance, and public access easements for the levee and Bay Trail. The location of the easements will consider recreational uses and shoreline access improvements in the one hundred feet shoreline band proposed by the landowners. The City is concerned that the proposed levee alignment will be inconsistent with the landowner-provided easements.	Please refer to the global response on Project Development and Alternatives Screening. If the City establishes easement requirements before the Project has been evaluated under CEQA and approved by the SFCJPA and agencies with discretionary authority over the Project, there may be inconsistencies between the Project as approved and these easement requirements. Note that the San Francisco Bay Conservation and Development Commission established shoreline bands with regard to its authority.
3. The Specific Plan includes the Loop Road that connects to University Avenue to Bay Road. A proposed levee alignment shows the Loop Road, Bay Trail, and levee in a narrow corridor between the University Village subdivision and the railroad right-of-way. The City is concerned that the proposed improvements will not fit within the narrow corridor.	Please refer to the global response on Project Development and Alternatives Screening. Refer also to comments from the South Bay Salt Ponds Restoration Project-California State Coastal Conservancy indicating that the loop road "is not a compatible or appropriate use of the Refuge's congressionally mandated purpose or the mission of the National Wildlife Refuge System."
4. A levee alignment in the North of Bay Road reach shows the Bay Trail relocated onto the 2020 Bay Road property, EPA Waterfront property, and Infinity Auto Salvage property. The City is concerned that high-speed bicycles on the relocated Bay Trail may be inconsistent with the pedestrian areas proposed as part of the recreational uses and shoreline access improvements on the properties.	The SFCJPA will use 2016 Bay Trail Design guidelines for trail design and incorporate any more recent suggestions for safety with both electric bicycles, electric scooters and the like that may form safety hazards on trails.

5. The existing Bay Trail and its adjacent open spaces along the City's perimeter are critical public park resources for the community today. It is important for the levee improvement project to identify the trailheads and access points planned for the Bay Trail and to maximize the number of access points between the community and the new Bay Trail.	Trailheads and access points planned for the Bay Trail will be identified for all project-level components and may be identified for reaches that will be evaluated at a program-level of detail.
6. In addition, the open spaces and shoreline band areas identified in the RBD Specific Plan and Martin Luther King, Jr. Park Master Plan are critical future opportunities to meet the community's park needs today and in the future. The planned improvements at Martin Luther King, Jr. Park include expansion to the west towards the Bay. The City is concerned that the Project will not consider the future park improvements.	The SFCJPA will include the City's planned Martin Luther King Park improvements and planned upgrades at the stormwater system at O'Connor and Runnymede streets in our evaluations. Continued close coordination with City will occur as part of the design process. Please refer to the global response on Project Development and Alternatives Screening. The DEIR will evaluate cumulative impacts related to and Project consistency with East Palo Alto plans.
7. Throughout many phases of community engagement efforts for the future of East Palo Alto's shoreline, a common theme has included the opportunity to expand public access as part of the redevelopment and infrastructure improvements. The design of the 3-to-1 levee slopes along the City-facing perimeter should include opportunities for adjacent properties to back-fill and meet the new Bay Trail grade, creating an accessible, gradual slope that maximizes the area available for usable public access and recreation. Those areas could also be designed to provide more open space and recreational uses.	The City will want to maintain access to operate, monitor, and maintain the levee for long-term flood protection. However, a goal of the SAFER Bay Project is to also to create opportunities for improved recreation and restoration within the flood control alignment. There are opportunities for the SFCJPA and the City to collaborate and identify such opportunities that can be implemented now or in the future with additional partnering agencies.
8. The levee is critical to support the City's planned resiliency and adaptation to sea level rise. The City is concerned about how the SFCJPA will implement the levee to ensure critical infrastructure is fully protected from sea level rise and mitigates anticipated impacts into the future. The levee design shall adhere to the 'City's Climate Action Plan, <https://www.cityofepa.org/econdev/page/climate-action-plan> concurrently under public review. Design standards shall ensure guidance provided by the California Ocean Protection Council (OPC) and San Mateo County's Sea-Level Rise Vulnerability Assessment are followed. <http://seachangesmc.org/vulnerability-assessment/>	The DEIR will evaluate Project consistency with and cumulative impacts of East Palo Alto, State, and county sea level rise adaptation plans.
9. Design considerations of the planned levee shall result in infrastructure which equates to resiliency across all sea level rise risks including increased wave action, rising groundwater tables and saltwater intrusion, increased erosion (i.e., landward shoreline· retreat) and changes in sediment supply in lands pertaining to the proposed project.	The Project will be designed for resilience in response to secondary effects from sea level rise, including wave action, erosion, rising groundwater, saltwater intrusion, and changes in sediment supply.
10. Vehicle access points to the top of the levee should be provided for maintenance vehicles, police vehicles, fire vehicles/equipment, and ambulances. The City is concerned that the levee may not be sufficiently wide to allow vehicles to safely drive on the levee due to the steep embankment. The City is concerned that the levee/Bay Trail may not be sufficiently wide to allow for vehicles, pedestrians, and cyclists to pass moving and/or parked vehicles. The City also is concerned that the levee may have an inadequate number of access points for vehicles, that the levee pavement section may not be designed for vehicle traffic, and that the geometric design of the Bay Trail may not accommodate vehicles, especially near the PG&E poles and towers and the existing Bay Trail alignment near Runnymede Street.	Operation and maintenance are key factors for FEMA-accredited flood control systems and the SFCJPA will continue to coordinate with the City during Project development.

11. Along the Bay shoreline, BCDC's land use authority relates primarily to public access. The Commission bases the approval of a project primarily on whether the development provides maximum feasible public access, consistent with the project. The City shares the BCDC's goal regarding providing maximum feasible access to the shoreline. The City's priorities regarding public access are identified in the 2007 East Palo Alto Bay Access Master Plan. The City is concerned that the maximum feasible public access to the Bay shoreline is provided.	The City's concerns are acknowledged. Please refer to the global response on Project Development and Alternatives Screening.
12. Existing access points to the Bay Trail are located at Daphne Way, O'Connor Street, Cypress Street, Garden Street, Runnymede Street, Weeks Street, Bay Road, and Martin Luther King, Jr. Park, etc. The Project should maintain existing access points to the Bay Train, and these should be reconstructed by the Project. The landowners in the RBD development plan to significantly increase the shoreline access on their properties. New and feasible access points to the Bay Trail should be considered at Beech Street, Stevens Avenue, Fordham Street, Rutgers Street, and Tulane Avenue which terminate near the existing or relocated Bay Trail. The City is concerned that new access points may not be considered near the existing or relocated Bay Trail.	The City's preferences regarding access to the Bay Trail are acknowledged and will be taken into consideration as Project planning and design progress. Please refer to the global response on Project Development and Alternatives Screening.
13. The City is concerned that ADA compliant access to the Bay Trail will not be provided.	ADA guidance for trails will be used during the planning of design of on/off ramp access to the Bay Trail.
14. Contaminated soil and groundwater are well-known and documented issues in areas from the Weeks Street terminus, north along East Palo Alto's shoreline to Fordham Street. Additionally, imported topsoil in northern properties of the City from Demeter Street to Fordham Street have been documented to include PCBs and other constituents of concern. The City recommends that the following Permitting agencies shall be included in design review for these areas to ensure appropriate remediation: California Department of Toxic Substances Control, the Environmental Protection Agency, and the Bay Area Air Quality Control Board.	The SFCJPA submitted the Notice of Preparation to the California Department of Toxic Substances Control and BAAQMD, will coordinate with regulators with jurisdiction over contaminated sites during Project design, and will comply with any requirements from such agencies regarding Project development.
15. A levee alignment crosses the Infinity Auto Salvage property, as well as other properties that may have contaminated soil and/or ground water. If the Project acquires any property in fee and the eventual property owner is the City, the City is concerned about the City's liability associated with the contaminated soil and/or groundwater on the properties.	Contaminated soil and groundwater are important issues that will be considered in the EIR. The SFCJPA will work with land owners to understand remediation activities. Site owners must continue to manage remediation activities in accordance with their Site Management Plans and/or Site Orders/permits. The
16. An overlook can provide a place for cyclists and pedestrians to stop and clear the Bay Trail, view the marshes, sit at a bench, and rest, and read educational and information signage. The City is concerned that the Project will not provide overlooks for people to clear the trail, rest, and enjoy various amenities.	The Project team will consider potential opportunities for overlooks to allow for an improved recreational experience. These could be paired with emergency vehicle access turnouts and/or on/off ramps to the Bay Trail.
17. As part of the City's public outreach effort for the City's Park Master Plan, residents identified adding lighting to increase visibility at night as the most important and best means to address public safety concerns at parks. Lighting on the Bay Trail will help address residents' safety concerns and increase utilization of the Bay Trail in the City. Lighting would also benefit the cyclist safety as many commute to work via the Bay Trail before and after dark.	The Project team will consider the types of lighting that might be able to be incorporated into the Bay Trail during design, as well as measures to reduce impacts of lighting on sensitive biological resources. However, lighting can result in direct and indirect impacts on threatened and endangered species present immediately adjacent to the Bay Trail, so some restrictions on lighting are expected to be required.

18. Storm drain facilities, including drainage pipes, outfalls, ditches, swales, retention basins, pump stations, and overland sheet flows convey storm water from the City to Bay. The City is concerned that the Project may obstruct storm water or reduce the capacity of the facilities.	The Project design is incorporating consideration of the function of existing storm water facilities.
19. Impacts to residents, business, and infrastructure during the construction of the Project.is of concern. Parking within the City is limited. The Project should provide on-site parking for all construction personnel, construction offices/trailers, and staging areas for materials and equipment. The City may implement a Resident Parking Permit program that would limit parking on streets to residents.	Construction staging areas will be identified to help manage impacts to nearby residents and business. This will be a substantial construction project in a densely populated area with limited roadway accessibility. The SFCJPA and the City of East Palo Alto will continue to work collaboratively to identify appropriate construction staging and access to the Project sites.
20. Damage to city streets and impacts to traffic due to trucking and hauling, especially hauling of embankment material is a major concern. Project shall adhere to the requirements of Municipal Code Section 8.28 including allowable haul routes determined by the Public Works Director.	The Project will comply with the referenced code as determined in consultation between the SFCJPA and the Public Works Director. Before and after videos of street condition will be used to evaluate re-pavement needs.
21. Staging or lining up trucks before loading or offloading materials should take place on-site or on private property as a contract requirement. No staging of trucks will be permitted on City streets.	The City's concerns regarding staging and truck queuing in City streets is acknowledged. The SFCJPA and the City of East Palo Alto will work collaboratively to identify the most appropriate construction staging and access to/from the Project site.
22. Minimizing the construction noise disturbing residents is a priority. Hours of construction activity shall be limited to hours described in Municipal Code Section 15.04.125 unless further limited by the Public Works Director. For example, installing sheet piles may be limited to hours 1 2.2. from 9 am to 4 pm. Any deviations from the allowable hours of construction activity shall be approved by the Public Works Director.	The Project will comply with the referenced code as determined in consultation between the SFCJPA and the Public Works Director.
23. Settlement of nearby structures due to construction activities needs to be avoided. The Project should implement a settlement monitoring program to address settlement concerns, complaints, and claims.	Settlement of levee fill is anticipated and is planned for as part of the design. The design team is aware that underground utilities exist and will need to be evaluated whether they are structurally capable of withstanding fill being place on top or if those utilities may need to be relocated.
24. Well planned Bay Trail detours will improve cyclists' experience during construction. The City is concerned that the design of detours may not be included in the construction contracts. The detour design should include creating Class II bikeways where Class II bikeways are not feasible.	Design of detours for both the Bay Trail and affected street traffic will be included on the construction contracts.
25. Public Notices including door hangers, social meetings postings, or websites are essential to informing the public about changes to their daily life. The Project should develop a comprehensive public outreach plan for construction activities.	Agreed. The SFCJPA has initiated sustained stakeholder outreach in accordance with the draft Public Outreach Plan and the Bay Adapt Platform. We are working with our partners Nuestra Casa and Climate Resilient Communities and will have a Citizen's Advisory Group to obtain meaningful public outreach through planning, design, and construction phases of the Project.
26. The Project should consider phasing construction within a reach as opposed to closing an entire reach for the duration of construction. As construction windows may be limited for environmental reasons, the construction contract should ensure the Bay Trail is useable when no construction is permitted due to environmental restrictions to the greatest extent feasible.	Construction phasing will be determined by many factors. The construction contract will include a condition that the Bay Trail is useable when no construction is permitted due to environmental restrictions to the greatest extent feasible.
27. Stormwater pollution generated by the Project is a concern of the City. The construction contract should require daily sweeping of City streets, including haul routes, inlet protection, and site watering to minimize airborne dust.	The Project will obtain a Construction General Permit as required by the California State Water Resources Control Board, and will implement best management practices, including sweeping, as specified in the Storm Water Pollution Prevention Plan.

28. The City is concerned about the Contractor importing contaminated soil for construction. An independent lab should be hired by the SFCJPA to test material, as opposed to the Contractor sampling and testing the material.	All imported soil must meet both geotechnical and environmental criteria for reuse. Analytical chemistry of imported soil will be determined by a laboratory that is part of California's Environmental Laboratory Accreditation Program (ELAP) for the specified parameters and required detection limits. Imported soil will require contaminant testing to document that soil imported to the Baylands for construction of levees and ecotones is protective of human health and the environment. Refer also to Comment #7 in Table 9, above.
29. The Project will require City Permits, which may include the following: 1. Encroachment Permit(s). (Municipal Code Sections 13.06.200 and 13.06.280) 2. Hauling /Oversize Load Transportation Permit(s) (Municipal Code Sections 8.28 and 10.36) 3. Grading Permit(s) (Municipal Code Section 15.48) 4. Tree Removal Permit(s) (Municipal Code Section 18.28)	The SFCJPA will obtain all applicable City permits prior to the start of construction.
30. The proposed levee is near the cul-de-sacs on Weeks Street, Runnymede Street, Garden Street, Cypress Street, Beech Street, and O'Connor Street. The cul-de-sacs are essential for allowing vehicles, especially fire vehicles/equipment, to turn around. The city is concerned that the levee may adversely impact existing cul-de-sacs. Any modifications to the City streets shall comply with the City's design and construction standards, as well as the City's adopted Green Infrastructure Plan. Green Infrastructure I City of East Palo Alto (cityofepa.org) https://www.cUyofepa.org/publicworks/page/green-infrastructure	The SFCJPA will work collaboratively with the City of East Palo on the Project design and potential impacts. The SFCJPA agrees that emergency access to the neighborhood must be maintained.
31. The City will improve the Storm Water Pump Station (Pump Station) near O'Connor Street. The improvements will include (a) installing a new above ground diesel fuel storage tank on the north side of pump station at the elevation of the existing Bay Trail; and (b) removing the existing underground fuel storage tanks on the east side of the Pump Station. The City is concerned that the Project will not consider the future improvements at the Pump Station.	The DEIR will evaluate the potential for other projects, in conjunction with the proposed Project, to contribute to significant cumulative impacts.
32. The portions of the existing Bay Trail within the City are maintained by the City, City of Palo Alto, and Mid-Peninsula Regional Open Space District. The City is concerned about any increase in human resources and/or financial resources that would be necessary for the post- construction maintenance of the Bay Trail and Tidal Marsh Transition Zones by the City.	The City accepted maintenance for the new levees as a condition of the HMGP grant acceptance and award. It is acknowledged that levees may be on lands owned by the City of Palo Alto. The City's Joint Use Permit with the City of Palo Alto may need to be updated as a result of SAFER Bay Project.
33. The proposed 3:1 levee embankment side-slopes will be difficult for workers to safely maintain due to the steepness. Embankment side-slopes not steeper than 4:1 is industry standard (See Caltrans Highway Design Manual). If 3:1 side-slopes are required by the Project, the City is concerned that low to no maintenance plantings will not be installed on the side-slopes to minimize maintenance of the embankment slopes.	Levee side slopes will be designed based upon industry guidance, such as FEMA's Chapter 44 Code of Federal Regulations Section 65.10 as well as the USACE EM 1110-2-1913. The design of the embankment slopes considers ease of construction, maintenance, seepage, and slope protection criteria.

34. Sea level rise may require an increase to top of levee elevation. Increasing the top of levee requires increasing the width of the levee embankment footprint. The City wishes to avoid filling the tidal marsh transition zone if the top of levee elevation must be increased. Permitting and construction of a project within the tidal marsh transition zones is more difficult than compared to a project on the landward side of the levee. The City is concerned that adequate space on the landward side of the levee will not be provided for the additional embankment width required to increase the top of levee elevation, if required.	Please refer to the global response on Project Development and Alternatives Screening. The SFCJPA agrees with this comment.
35. The levee will pass over Bay Road and the Union Pacific Railroad tracks near University Avenue. The City is concerned about how the SFCJPA will implement the levee at Bay Road and the Railroad Crossing crossings including effectiveness and impact to the roads and railroads when deployed and not deployed.	A type of flood gate will be required at all transportation crossings. There are many different types of gates available, some require manual deployment; others deploy automatically. SFCJPA will work collaboratively with the City of East Palo on the Project design.

TABLE 11
SUMMARY COMMENTS AND RESPONSES ON SAFER BAY NOTICE OF PREPARATION:
CITY OF PALO ALTO

Summary of Comment	Summary Response
1. For reaches that are proposed to be evaluated at a Project level, the EIR must provide figures that clearly show the trail alignment. The figures and text should clearly indicate the width of the proposed trail. Per California Manual on Uniform Traffic Control Device standards, shared use paths are at least eight feet wide, preferably 10 feet.	The DEIR will provide figures showing trail alignment for project-level reaches. Trails are anticipated to be 18-20 feet wide.
2. Indicate the proposed surface material for the Bay Trail. All portions of the Bay Trail that are currently paved must be replaced in kind. Because this is an important regional bicycle trail connection, the city supports improving the Bay Trail with paving where feasible.	The Bay Trail design standards will be applied in the design and reconstruction of the Trail along the new levee.
3. The EIR should discuss long term maintenance of the trail, especially where surface improvements are planned. The EIR should clearly identify the responsible parties for the long-term maintenance of the trail pavement and any associated accessories (i.e., benches, bollards, trash bins, etc.) that are to be placed on the trail.	The City of East Palo Alto has accepted long term maintenance of the levees in East Palo Alto; however, it is recognized that much of the current Bay Trail south of Bay Road is on land that is owned by the City of Palo Alto. The SFCJPA can facilitate a discussion between its partner cities and codify roles and responsibilities in an updated Joint Use Agreement.
4. The EIR should discuss what type of vegetation is proposed adjacent the trail. The City recommends that the SFCJPA consider an integrated design approach to weed management. Specifically, the design should consider proposing dense, native plants along the trail. Select native plant species that can outcompete-the invasive species and require less maintenance (i.e., won't require mowing or grow into the trail). If the project involves planting plants right up to the edge of the trail (within 3') the design should consider proposing dense, native low-growing plants (e.g. Frankenia, marsh heather, salt grass, etc.)	The SFCJPA's restoration ecologists and landscape architects agree with and will incorporate these recommendations into the Project's landscape plans. The DEIR will be based upon a conceptual plan and Project Description. Detailed landscape design, will occur following the DEIR.
5. Clarify whether there is proposed irrigation to establish the plants and, if so, the source of the irrigation. Identify the proposed maintenance period to ensure vegetation is established as well as who will be responsible for maintaining the vegetation post-planting and long-term.	The Project's restoration/revegetation ecologists and landscape architects will develop irrigation and vegetation maintenance plans to facilitate establishment of target vegetation on levee slopes. The DEIR will be based upon a conceptual plan and Project Description. Detailed landscape design will occur following the DEIR.
6. Would the proposed levee within the South of Bay Road be a horizontal levee, ecotone levee, earthen levee, or flood wall? It is unclear from the figures in the NOP what is proposed for this reach. The EIR must describe in detail who will be responsible for long-term maintenance of any proposed structure or irrigation system. A conceptual maintenance agreement should be required prior to finalizing the project design.	. The proposed flood control system may include all types shown in the NOP, or combinations thereof. Existing constraints, such as available space, will determine the preferred configuration. The City of East Palo Alto has accepted long-term maintenance of the levees in East Palo Alto – see response #3 above.
7. The City recommends that the proposed Bay Trail designed in a manner that helps to prevent issues with ground burrowing rodents by using an integrated pest management approach in its design.	The potential for burrowing rodents to impact the levee/Bay Trail, potential rodent management solutions, and potential impacts of those solutions on sensitive biological resources will be considered during design and CEQA review of the Project. Additionally, the long-term operations and maintenance plan will include guidance on how to monitor and prevent ground burrowing rodents within the levee prism.
8. If Archeological or Tribal Cultural Resources are uncovered during construction on property owned by the City of Palo Alto, the City shall be notified of the discovery. Any proposed mitigation for the South of Bay Road reach, which is partially proposed on land owned by the City, should specify this requirement.	The DEIR will incorporate into mitigation measures the requirement that City staff, and other entities as needed, will be notified of accidental discoveries of cultural resources.

Summary of Comment	Summary Response
9. The City requests that the SFCJPA continue to coordinate with the City of Palo Alto throughout the SAFER Bay EIR process as this project could affect the analysis and conclusions of the City's Sea Level Rise Adaptation Plan project.	The SFCJPA will continue to coordinate with the City, US Army Corps of Engineers, and Valley Water regarding the Sea Level Rise Adaptation projects, the Palo Alto Airport and other contemplated projects that could affect design, construction and long-term O&M of the SAFER Bay Project.
10. Because the project is not located within the City of Palo Alto's jurisdiction, it is not anticipated that permits from the City would be required. However, Council approval would be required for any proposed easements to construct and maintain flood infrastructure on the City's property. Additionally, the City recommends coordinating with its airport department regarding permits that may be required from the FAA for work within the vicinity of the Palo Alto Airport.	The SFCJPA will obtain needed easements from the City and will notify the City and obtain any required permits. The SFCJPA will obtain the needed permits via FAA 7460 permit from the FAA.

TABLE 12
SUMMARY COMMENTS AND RESPONSES ON SAFER BAY NOTICE OF PREPARATION:
SAN FRANCISCO PUBLIC UTILITIES COMMISSION

Summary of Comment	Summary Response
1. Any use of SFPUC lands will require prior written agreement and payment of a use fee. The SFPUC has policies that limit third-party uses on San Francisco property, including the Interim Water Pipeline ROW Use Policy and Integrated Vegetation	The SFCJPA acknowledges that any use of SFPUC lands for implementation of the SAFER Bay Project would require SFPUC approval and compliance with its procedures.
2. In the DEIR please identify the SFPUC's Ravenswood site, clarify project boundaries, and clearly indicate improvements and/or alterations on SFPUC property and how they might affect SFPUC infrastructure and operations.	The DEIR Project Description will clearly identify the SFPUC's Ravenswood site, which is part of the Dumbarton Approach Reach. The DEIR will present proposed actions within the SFPUC's Ravenswood site to the extent such actions have been defined. Design of shoreline protection, restoration and recreation improvements for this Reach will not progress sufficiently to permit project-level evaluation in the DEIR. The Dumbarton Approach Reach is being evaluated at a program level of detail in the DEIR.
3. Please add the SFPUC on behalf of the City and County of San Francisco to the list of permits and approvals and identify the SFPUC as a responsible agency.	The SFCJPA confirms the SFPUC's status as a responsible agency and will describe its authority if the SAFER Bay Project alignment is on lands owned by or affects infrastructure controlled by the SFPUC.
4. The marshy area at the SFPUC's Ravenswood site might be a mitigation site for an SFPUC project. If so, the SFPUC will provide comments on the Draft EIR on the implications of this for the SAFER Bay Project.	If this site is ultimately part of the SAFER Bay alignment, the SFCJPA will reach out to SFPUC prior to the DEIR.
5. Projects on San Francisco property must undergo a Project Review Process.	Acknowledged. Note that the SFCJPA submitted a project review form for the SAFER Bay Project August 24, 2021, and SF Water determined that a Project Review was not needed. The SFCJPA will engage SFPUC using their preferred methods and means.

TABLE 13
SUMMARY COMMENTS AND RESPONSES ON SAFER BAY NOTICE OF PREPARATION:
MIDPENINSULA REGIONAL OPEN SPACE DISTRICT

Summary of Comment	Summary Response
1. Midpen is focused on how the SAFER Bay Project improvements in Reaches 5, 7 and 8 would impact Ravenswood Open Space Preserve, Cooley Landing Park, and the Bay Trail at Ravenswood. Midpen agrees with the SFCJPA's determination that an EIR is the appropriate level of environmental review and that all environment factors listed under the CEQA Guideline Appendix G should be evaluated in the EIR.	Comment acknowledged.
2. Biological Resources. Midpen's Ravenswood Preserve and the City's Cooley Landing Park contain highly sensitive and regulated resources. As such, Midpen should be included in discussions with the SFCJPA, the City, and appropriate regulatory agencies related to proposed Project improvements within Midpen lands.	The SFCJPA will continue to consult with the Midpeninsula Open Space District (Midpen) regarding proposed Project improvements within Midpen lands
3. The EIR should include analysis of the impacts to the adjacent sensitive wetlands, tidal marsh lands, and protected species to ensure that the site's sensitive resources and wildlife movement along the shoreline are fully protected from the implementation of flood protection measures for the built environment.	The DEIR will analyze impacts to the referenced resources.
4. In general, use broad sloped or ecotone levees wherever possible versus standard levees with more abrupt slopes or floodwalls as they provide enhanced ecological benefits in support of sensitive habitats, special status species (Ridgway's rail, salt marsh harvest mouse, tidal marsh plants) and flood protection.	The SFCJPA's design team includes design experts across the relevant disciplines (e.g., flood control engineering, hydrology, and restoration ecology/revegetation design). The Project design team intends to integrate multiple benefits into the planned flood protection, including high tide refugia/marsh transgression space, to the extent practicable. The team will evaluate the pros and cons of various transition zone/high tide refugia design options along the bayshore and customize those to the existing tidal marsh habitat conditions, to avoid and minimize impacts and generate longer term ecological benefits.
5. Ponds R1 and R2 currently provide substantial seasonal breeding habitat for the federally threatened western snowy plover. Restoration of these ponds should include alternative options to mitigate the loss of the existing habitat. These alternatives should include enhancements to R3 and SF2 to ensure these sites are productive/viable as plover habitat or consider leaving some select areas of RI and R2 that could provide flat, elevated, bare ground appropriate for breeding habitat. Specifically, retaining nesting islands in SF2 should be analyzed for the feasibility of providing habitat for plovers and terns in the short-term, and Ridgeway's rail and salt marsh harvest mouse in the long-term, if the islands become vegetated.	Agreed. The SFCJPA and its multi-disciplinary design team will closely coordinate and collaborate with the SBSPRP team and the Refuge to develop and assess the pros and cons of habitat restoration/pond management options that leverage SAFER's coastal flood protection improvements to further the purpose of the SBSPRP and mission of the Refuge.
6. Analyze and consider the need for measures to avoid conflicts between recreation and native species. Project implementation may result in plovers and other shorebirds nesting on recreational trails, especially adjacent to lost habitat. Consider and analyze alternatives to reduce these conflicts.	Agreed. The Project team's designers and ecologists will collaborate to plan the Project's recreation improvements to avoid and minimize impacts to sensitive/special-status wildlife species.
7. Coordinate with researchers (USGS, USFWS, others) that are studying Pond SF2 to understand the potential for impacts to SF2 from the implementation of a proposed transition zone habitat east of SF2.	Agreed. See above response regarding active collaboration with the SBSPRP and Refuge. This will include other experts, including USGS, as appropriate.
8. The EIR should consider the potential of the future improved tidal marsh when developing appropriate and compatible Project alternatives for Reach 5 and 7.	Agreed.

Summary of Comment	Summary Response
9. The EIR should include an analysis of potential water quality impacts resulting from contamination discharge related to soil disturbance as part of the Project implementation.	The DEIR will evaluate the potential for water quality impacts from disturbance of contaminated soil
10. For Project implementation, clean soils are critical to prevent water quality degradation and the introduction of invasive species and pathogens. If imported soil will be required, develop, and analyze soil quality standards for identifying and sourcing appropriate clean, weed-free imported soils.	The SFCJPA anticipates using the South Bay Salt Pond Restoration Project's quality assurance project plan (QAPP) standards for imported fill for the SAFER Bay Project on the bay side (refer to Comment #7 from the San Francisco Bay Regional Water Quality Control Board, Table 9).
11. The Project design and environmental review should consider and analyze upland stormwater flows and appropriate water discharge and holding, if necessary.	FEMA accreditation of levee systems requires consideration of 'interior drainage'. Design and environmental review will consider the potential for the Project to affect stormwater management.
12. The DEIR should include analysis of the proposed Project's temporary and permanent impacts to recreational uses along the Bay Trail. Outreach and coordination with Midpen and other affected land management agencies for the Bay Trail should be addressed prior to and during construction, including the coordination on any anticipated closures to nearby trails and Bay Road that leads to Ravenswood Open Space Preserve and Cooley Landing Park.	The DEIR will disclose trail closures and evaluate impacts related to recreational resources. The SFCJPA will coordinate with Midpen and other agencies responsible for managing affected trail and road closures.
13. The DEIR should include analysis and consideration of measures to mitigate the potential for conflicts between recreation and biological resources/sensitive species and habitats. Project implementation may result in plovers and other shorebirds nesting on recreational trails, especially adjacent to lost habitat. Consider and analyze alternatives to reduce these conflicts.	Agreed. Please see above response to comment 6.
14. The EIR should include analysis of the proposed Project impacts to the views of the Bay from recreational trails, adjacent parks, and surrounding neighborhoods.	The DEIR will include the referenced analysis.
15. The EIR should include analysis of the proposed Project impacts (temporary and permanent) to the existing Bay Trail and impacts to the proposed transportation improvements included in the Ravenswood Business District / 4 Corners Specific Plan.	The DEIR will evaluate impacts to existing facilities and address Project consistency with plans and policies consistent with CEQA requirements
16. Midpen recommends that the SFCJPA coordinate closely with the City to understand potential future development associated with the Ravenswood Business District (RBD) / 4 Corners Transit-Oriented Development (TOD) Specific Plan Update in order to develop appropriate flood control measures for not only current conditions, but future developments.	The SFCJPA will continue to coordinate closely with the City of East Palo Alto regarding the Ravenswood Business District.
17. We strongly recommend that the SFCJPA continue working closely with the City of East Palo Alto, the San Francisco Public Utilities Commission, Mid pen, other public stakeholders as well as private landowners to identify additional Project or segment alternatives to be considered in the EIR. while considering impacts and mitigation strategies for the whole Project.	The SFCJPA will continue to coordinate with the referenced entities regarding Project development, impacts and mitigation strategies.
18. Midpen requests that the EIR analyze Project alternatives that prioritize the implementation of broad sloped or ecotone levees wherever possible, retain the new Ravenswood Bay Trail segment, and evaluate the potential for restoration to and assess impacts on the Ravenswood triangle.	The DEIR will identify alternatives consistent with CEQA requirements. Broad sloped ecotone levees are ideal and will be used where feasible. Levee alignments will look to preserve the Ravenswood Bay Trail Segment.

Summary of Comment	Summary Response
19. Midpen requests that the SFCJPA consult with Midpen on design alternatives affecting the Ravenswood Bay Trail and Preserve prior to the initiation of an environmental analysis. Once the Draft EIR is available for public review and comments, please send notification to Planning Manager Jane Mark at jmark@openspace,org and Senior Planner Gretchen Laustsen at glaustsen@openspace.org. We appreciated the opportunity to review and submit comments on the NOP.	The SFCJPA will consult with Midpen regarding design alternatives affecting the Ravenswood Bay Trail and Preserve. The SFCJPA will include Jane Mark and Gretchen Laustsen on the DEIR distribution list.

TABLE 14
SUMMARY COMMENTS AND RESPONSES ON SAFER BAY NOTICE OF PREPARATION:
CITIZENS COMMITTEE TO COMPLETE REFUGE

Summary of Comment	Summary Response
1. The Refuge was established to protect special status species and other fish and wildlife, and all actions undertaken must be compatible with protection of those resources.	Comment acknowledged.
2. The EIR needs to (1) include the Refuge's Comprehensive Conservation Plan as a planning resource, (2) add the USFWS/Refuge to its list of Permits and Approvals for permitted access to Refuge lands and (3) consult with Refuge management on any Project needs involving Refuge lands inclusive of the Faber and Laumeister marshes.	The DEIR will include review of Project consistency with the Refuge's Comprehensive Conservation Plan. Consistent with CEQA requirements, the DEIR will identify discretionary permits and approvals needed for the Project including those needed from USFWS and the Refuge. The SFCJPA will continue to coordinate with Refuge management.
3. The DEIR must ensure that sufficient information is included on Project design and environmental impacts for a "meaningful response", for the reaches that will be analyzed at the project level in the EIR and sufficient information regarding potential direct and indirect impacts that may arise in future phases to enable the agencies and public to provide substantive comments.	The DEIR will include sufficient detail to facilitate review by responsible and trustee agencies and members of the public.
4. What is considered supplemental CEQA? Would reaches being considered at the program level be subject to a full EIR or would a Negative Declaration be used? Will the level of subsequent CEQA analysis be different for each Project reach?	Supplemental CEQA for reaches evaluated programmatically in the DEIR cannot be determined at this time and would be determined by the lead agency (which may or may not be the SFCJPA). Options besides a full EIR and a Negative Declaration include a supplemental or subsequent EIR and addendum.
5. The Project Description and/or the EIR should outline how the supplemental CEQA process will unfold and opportunities for agency and public review and comment. It is particularly important to inform agencies and the public whether or not there will be opportunities to review and provide comment on future phases, as those phases move forward or whether the programmatic DEIR will be the only opportunity for public review and comment.	The Introduction to the DEIR will describe the CEQA process including the process for supplemental CEQA and will indicate public comment opportunities (which vary by the type of tiered CEQA document being prepared).
6. The NOP indicates that the project "will construct" restoration in Ponds R1/R2 but neither the SFJPA nor the Refuge has any agreements for such actions. In the EIR, statements of proposed actions must be accurate to the status of that action. The EIR should be able to cite a completed agreement of the parties for the action.	The SFCJPA and the Refuge have initiated a memorandum of understanding regarding that SAFER Bay Project. Statements in the DEIR will be accurate. While there is no requirement that an EIR disclose such agreements, the DEIR will, as required by CEQA, identify any issues to be resolved prior to implementation (e.g., the need to execute property rights agreements with landowners).

7. Decisions on future tidal marsh restoration of R1 and R2 may be dependent on habitat decisions for SF2, and vice-versa, especially with respect to ensuring the retention of adequate breeding habitat, or enhancement of habitat, for endangered western snowy plovers. While Ponds R1 and R2 are in a reach that will be analyzed at the project level of detail in the EIR, Pond SF2 will not undergo a detailed project-level analysis until some future time. Since decisions on future habitat designations for Ponds R1, R2 and SF2 cannot be made in isolation, it may be appropriate for the Project, in consultation with the SBSPRP and the Refuge, to consider conducting a project-level analysis for SF2 at this time as well; specifically, to obtain the required Refuge and SBSPRP determination as to whether or where placement of any SAFER levees within these ponds will be appropriate for habitat restoration or enhancement.	The decision to evaluate reaches at a project- or program-level of detail is based on many factors, including the level of design and available funding. While there is no plan to evaluate Project actions within Pond SF2 at a project level at this time, the SFCJPA will continue to coordinate with the SBSPRP, the Refuge, and other stakeholders regarding restoration planning within Ponds R1, R2 and SF2.
8. It would be inappropriate to assume ponds R1 and R2 will be converted to tidal wetlands. When considering the overall habitat mosaic in the South Bay, and the critical acres needed for specific Bay wildlife species, the SBSPRP and Refuge may conclude that the best ecologically based decision is to leave Ponds R1, R2 and SF2 entirely as managed ponds. What effect would this have on the Project's ability to mitigate for Project impacts to jurisdictional wetlands and aquatic habitats? In order to address the possibility that the number of acres available for Project habitat restoration may not be adequate for mitigation, the EIR must include details on the location, functional value, and acreage of existing jurisdictional wetlands and aquatic sites that could be directly and indirectly impacted by Project actions, and provide mitigation strategies that do not require the use of lands that may already be encumbered by restriction in use.	This is a key question that the SFCJPA's Project team has been carefully assessing in collaboration with the SBSPRP and Refuge during the feasibility stage of the Project. The SFCJPA will continue consult closely with the SBSPRP and the Refuge throughout Project planning and design regarding the disposition of Ponds R1, R2 and SF2. The DEIR will quantify the Project's wetland and aquatic habitat impacts and identify the acreage and type of habitat mitigation necessary to reduce those impacts to a less than significant level. The DEIR will also identify feasible wetland/aquatic habitat mitigation options.
9. As subsequent comments in this letter will demonstrate, the two levee design graphics were not sufficient information, particularly for project-level discussions. Along the ~7 miles of Project shoreline, the variations in siting, of differing inboard and outboard conditions and the common obstacles of ordinary infrastructure all lead to the conclusion that there must be many variations of levee footprint, height, slope/partial slope/no slope and more in levee design. While we made attempts to answer questions by building charts, it was clear more information was needed and may be very pertinent to, say, someone whose home would be near the future levee. The EIR needs to provide in-depth levee information in plain language The EIR needs to provide in-depth levee information in plain language but with the appropriate level of detail so the public and agencies may better understand the changes ahead. The Project Description of the EIR must include discussion, charts, and images suitable for every project-level action and sufficient to make program-level consideration informative.	The CEQA Guidelines (section 15082(a)(1)) set minimum requirements for the information to be presented in a Notice of Preparation (NOP); the NOP for the Project exceeded these requirements. The DEIR Project Description will include detailed descriptions of proposed flood protection, restoration and recreation features in reaches being evaluated at a project level of detail, consistent with the requirements of CEQA Guidelines section 15124. The level of detail for Project elements being evaluated at a program level of detail will reflect the state of planning and design.
10. Marsh Road. Since the Feasibility Report was issued in 2016, the Bayfront Canal & Atherton Channel Flood Protection and Ecosystem Restoration Project has been completed. The new infrastructure components of this flood control project must be reflected in the existing conditions section of the EIR. Additionally, The Bayfront Canal is directly adjacent to the Cargill salt ponds which are all in the Congressionally authorized expansion boundary for the Refuge. Should these adjacent Cargill ponds become available for acquisition and restoration to tidal marsh in the future, this levee could provide high marsh habitat and room for marsh migration with sea level rise. The EIR should explore a design alternative for the levee on this reach that could accommodate (or at least not preclude) a possible future addition of an extended 30:1 slope on the bayside of the SAFER levee.	The DEIR Project Description and evaluations will reflect conditions generally as they existed at the time of publication of the NOP or conditions expected when the Project is implemented (if supported by substantial evidence), which include the referenced flood control features. The suggested alternative will be considered for inclusion in the DEIR and screened using CEQA criteria.

11. Bedwell Bayfront Park. The Draft Project Description should provide a sufficient level of detail for agencies and the public to understand how the Project will increase flood protection in this reach within the constraints of existing water control structures, the roadway into the park, the adjacent Flood Slough waters and wetlands and Refuge Pond S5.	The function of flood protection features proposed within this reach, to be evaluated at a program level of detail, will be described in the DEIR. The City of Menlo Park would be responsible for developing project-level CEQA documentation for this area in the future.
12. Bayfront Expressway. The NOP doesn't reflect the existing conditions on Refuge lands in this area that will be impacted by proposed Project levees shown in NOP Figure 1 and Figure 2. (Although Figure 2 is labeled as Bedwell Bayfront Park, it appears to apply to the Bayfront Expressway reach.) As part of its Phase 2 implementation, the SBSPRP has installed a water control structure between Pond R5 and R4 and is expected to complete construction of a habitat transition zone along the perimeter of Pond R4 by the end of 2022. To what extent, if any, would the Project's Proposed Transition Zone Habitat section within Pond 4 (as depicted in NOP Figure 1) be needed?	The DEIR Project Description and evaluations will reflect conditions generally as they existed at the time of publication of the NOP or conditions expected when the Project becomes operational (if supported by substantial evidence). The SFCJPA is aware of the SBSPRP's Phase 2 construction of transition zone (T-zone) habitat in Pond R4. The intent of the proposed T-zone in Pond R4 would be to increase the surface area of upper elevation T-zone habitat between the SPSPRP's constructed upper T-zone extent and the top of SAFER's levee. However, the Project team will continue to assess the need for additional T-zone habitat at this location during Project planning and in consultation with the SBSPRP and Refuge. The City of Menlo Park would be responsible for developing project-level CEQA documentation for this area in the future.
13. Other than the levee cross section provided for the small area with transition zone habitat in R4, the NOP includes no information on the dimensions or footprint for the remaining levee sections between Pond 3 and S5/R6 and along Bayfront Expressway. The SBSPRP Phase 2 plans currently being implemented call for Pond R3 to remain a managed pond for endangered western snowy plover breeding habitat; therefore, levees for this reach should be designed to have a smaller footprint in order to have the least amount of fill placed inside Refuge Ponds R3. The EIR must provide details on the number of acres in Refuge ponds that would be permanently impacted from fill, identify, and analyze direct and indirect impacts to the Refuge and special status species and also describe how impacts to Refuge lands and wildlife during and after levee construction will be minimized or mitigated.	As part of Project planning, the SFCJPA will continue to consult with the SBSPRP and the Refuge to ensure that improvements planned as part of the Project are consistent with restoration planning. The SFCJPA will evaluate direct and indirect impacts to habitat within and outside of the Refuge and identify measures to avoid or mitigate those impacts.

14. Tech Campus. The Tech Campus Levee has the potential to significantly impact jurisdictional wetlands and waters. In addition, the levee sections to the west and north of the tech campus could potentially affect the Refuge's levee on the opposite side of Ravenswood Slough that protects Pond R3 habitat for shorebirds, including the federally threatened western snowy plover. The Feasibility Report states that Ravenswood Slough in the Tech Campus area, " ... is not currently high-quality tidal marsh." The Feasibility Report and NOP provide no criteria or assessment for reaching this conclusion. This description implies that Ravenswood Slough does not provide valuable wildlife habitat. Ravenswood Slough has been documented to support the federal and state listed endangered and state fully protected Ridgway's rail (RIRA). In the 2020 Invasive Spartina Project RIRA survey results noted the detection of 14 RIRA. The Project determination that Ravenswood Slough in this reach is not high quality is also inconsistent with our recent observations. This area of Ravenswood Slough west of the tech campus is currently being used by Killdeer and Black-necked Stilts, and their young. Photos taken June 6, 2022. Black-necked Stilt populations have experienced precipitous declines in the south San Francisco Bay, so any habitat suitable for this species to use for breeding is important and should be considered worth protecting. The Feasibility Report description that this is not a high-quality salt marsh could lead the public to assume it is not suitable habitat for the federally endangered salt marsh harvest mouse. We now know the mouse occupies a diversity of vegetation in addition to pickleweed and can inhabit muted tidal marshes. The Feasibility Report's unsubstantiated characterization of Ravenswood Slough salt marsh in this area could influence agency and public comments with respect to the scope and content of the EIR. The EIR must include accurate documentation of the extent and ecological value of existing Biological Resources in this reach, including listed species, and provide alternatives that avoid, minimize, or mitigate impacts to habitat and wildlife.	The SFCJPA agrees that Ravenswood Slough provides functional tidal salt marsh habitat in the existing condition. The DEIR will accurately characterize existing biological resources in the Project area, including the potential presence of listed species. The DEIR will identify alternatives that avoid, minimize, or mitigate significant impacts, including impacts to sensitive habitats and wildlife.
15. Information Needed on the Extent of Tidal Habitat Loss. The NOP does not provide information on potential Project impacts to the salt marsh habitat in this section of Ravenswood Slough; however, using the figures provided in the NOP (Figures 1,3 and 4) it is clear that there is a potential for loss of salt marsh along 1.25 miles of Ravenswood Slough from the proposed Project levee. Additionally, the NOP provides no information on the design and footprint for the levee section along Bayfront Expressway, and therefore the potential for impacts to tidal marsh habitat in this area is unknown. For each alternative considered in the EIR for this reach, even at the program level, there must be specific locations and acreage provided for any wetlands and waters that could be temporarily, permanently, directly, and indirectly impacted from the Project. The types of impacts and acreages of impacts should be provided in a table (e.g., temporary, permanent, direct, indirect, habitat type, acreage).	The content of the NOP for the Project exceeds CEQA requirements. The DEIR will include a quantitative and qualitative characterization of existing tidal marsh habitat conditions within the Project area, including both the project level and program level reaches which includes the tidal salt marsh within Ravenswood Slough. The DEIR will overlay the proposed Project onto these existing conditions and quantify the temporary and permanent impacts on wetlands and waters. The impact quantities will be presented in table format.
16. Potential Impacts to the Levee Protecting R3. Converging shorelines increase tidal amplitude towards the landward end of enclosed estuaries. Without knowing the extent to which a proposed levee may encroach into Ravenswood Slough, thereby increasing the convergence of the shorelines, it is not possible to determine what impact increased tidal amplitude may have on the structural integrity of the Pond R3 levee across the slough (even without sea level rise) that protects habitat for shorebirds and breeding western snowy plover from inundation. The EIR should include an analysis of the potential hydrological changes in Ravenswood Slough (including changes in tidal amplitude) from the Tech Campus levee, and how those changes could impact the levee protecting the shorebird habitat in the Refuge's Pond R3.	The coastal hydraulics analysis will include an assessment of the potential changes in tidal water levels within and adjacent to the Project area.

17. The SBSPRP plan for Pond R3, currently being implemented, is to enhance this managed pond for shorebirds and western snowy plover nesting habitat, and not restoration to tidal marsh. This decision was published in the South Bay Salt Pond Restoration Final Environmental Impact Statement/Report, Phase 2 Executive Summary in April 2016. On Page 7 of the NOP, there is a statement that the Project would provide habitat enhancement for nesting plovers in Pond R3; however, the NOP included updated figures for this reach (Figures 3 and 4) with the same 2016 Feasibility Report levee designs for possible restoration to tidal marsh. These designs are for a levee with a large footprint and "transition zone habitat" extending well into Ravenswood Slough. There appears to be no reason at this point to have a larger levee with a transition zone surrounding the tech campus. In order to avoid or minimize impacts to the Ravenswood Slough wetlands and endangered species, the Project should reconsider the Feasibility Report's Reach 4, Option 1 levee, or another levee design that eliminates any permanent fill in Ravenswood Slough.	These comments regarding impacts to Ravenswood Slough wetlands and endangered species and the suggested alternative will be taken into consideration during Project development and alternatives screening.
18. Substation and Marsh Restoration. The EIR for this reach may need to analyze a range of options for levee placement and design, and for enhancing wildlife habitat in these ponds. Following consultation with the SBSPRP and the Refuge to obtain options consistent with their goals, the Project should include an appropriate number of alternatives to analyze. Additionally, migratory shorebirds and breeding Western Snowy Plovers utilize these ponds; therefore, the EIR should identify potential impacts to wildlife from levee construction and provide corresponding mitigation measures.	Please refer to the global response on Project Development and Alternatives Screening.
19. Dumbarton West Approach, Levee Expressway Crossing and SF2 Alignment. Even though this part of the Project is program-level, it is a concern that the map's suggestions omit mention of various options developed in the 2020 Dumbarton Bridge West Approach + Adjacent Communities Resilience Study7 (DBWA Study). Those options can affect best placement of the Project's levees. By the time actions described under program-level planning commence, Caltrans may have adopted DBWA options that may alter locations for a levee crossing of the Expressway and the route of the levee within or around Pond SF2.	Please refer to the global response on Project Development and Alternatives Screening.
20. Present the six options shown in the Conclusions of the DBWA Study with discussion about how they each might affect the Project's levee locations, levee connections and the best site for the Expressway crossing. For instance, in options that include a longer or shorter elevated roadway, where are sites that are optimal for the Expressway crossing? Pending Caltrans decision on length of an elevated roadway, how does the landing location of the roadway affect levee alignments on the roadside or with SF2?	Please refer to the global response on Project Development and Alternatives Screening.
21. As Program-level guidance, set the standard that project level planning includes in-depth biological resource assessments (BRA) as required under Menlo Park's Connect Menlo, identifying impacts unique to alignment-habitat combinations. For example, the BRA findings of a levee next to Ravenswood Slough would differ from a levee next to the western snowy plover habitat in SF2. Analysis would occur for impacts along both sides of the expressway. from the Mosely Tract through Ravenswood Slough and similarly along SF2. Additionally, the BRA analysis would need to include how the planned levee type impacted habitat and consider if an alternate form of levee could avoid or minimize impacts.	The DEIR will analyze impacts at a project level for some levee segments, and for others, will both programmatically evaluate impacts and describe the process by which project-level impact and mitigation considerations will be applied for those segments. The Biological Resource Assessment (BRA) approach, derived from Menlo Park's ConnectMenlo EIR, is not necessary. The SAFER Bay Project does not tier off the ConnectMenlo EIR and is not required to prepare a BRA. Nevertheless, the general approach to future evaluation of impacts and mitigation measures for levee segments that are analyzed programmatically in the DEIR will be similar to that of the BRA process recommended here.

22. Figure 1 suggests three possible levee alignments in SF2. It is of significance that these Refuge lands are required under Refuge priorities and the National Wildlife Refuge System Administrative Act8 to dedicate the highest priority to wildlife and the habitat they require. Any levee crossing, new or increased in size can cause extensive temporary and permanent impact on the wildlife that require this habitat, multiplied by the number of levee alignments built. The greatest impact would occur for levees bisecting and disrupting habitat such as the alignment shown near the Bay or that of the existing berm separating the migratory bird island pond and snowy plover habitat. For these reasons we recommend that the EIR consider a University Avenue levee only.	A levee alignment along University Avenue will be considered for inclusion in the DEIR. Please refer to the global response on Project Development and Alternatives Screening.
23. For any alignment within or adjoining SF2, the EIR needs to set the program-level standard that project-level planning (supplemental CEQA action) will report the existence of a completed formal agreement with the Refuge for the action proposed.	The SFCJPA and the Refuge have initiated a memorandum of understanding. Please refer to the global response on Project Development and Alternatives Screening.
24. The Loop Road would vastly escalate impacts on the species of SF2. That very issue is likely why Congress, through the NWRSAA, expressly limited public use on Refuges to passive recreation and environmental education if/when/where it is compatible with adjoining habitats. The NWRSAA neither describes or authorizes any other public use, not roads nor any other construct serving only humans. The EIR discussion of alternatives needs to list the Loop Road proposal as having been considered and rejected.	These comments pertaining to the Loop Road are acknowledged. The DEIR will screen any alternative containing the Loop Road against CEQA criteria. Please refer to the global response on Project Development and Alternatives Screening.
25. The East Palo Alto shoreline has a nature based SLR asset that is unique among Bay cities: its entire length features thriving tidal marshes. An objective then is to protect by avoidance and, where needed, enhance existing marshes to be paired with inboard levees. Here is a place where SLR adaptation needs no manmade introduction, just encouragement and protection. If there is any location with the possibility of inland marsh migration, it should be considered as well.	The commenter's observations and suggestion that locations within the possibility of inland marsh migration are acknowledged. Please refer to the global response on Project Development and Alternatives Screening.
26. The Project, in NOP Figure 1, presents two alternative alignments, one following the existing Bay Trail berm as it cuts through marsh as a border of the Ravenswood Open Space Preserve (ROSP). The other sits on high ground adjoining edges of Eastern Slough and the marsh edge. The first would require substantial fill in wetlands in order to build a stable levee and presents engineering challenges to avoid interference with the flow of Eastern Slough, risking long-term impact on the hydrology of the inner marsh area. It was reassuring to hear (Tess Byler, personal communication with Eileen McLaughlin) that the SFCJPA had told the Bay Integrated Restoration Regulatory Team (BIRRT) that the Project would put no fill in the Bay. If that is the Project's intent and as fill and construction disruption would have significant impacts to wildlife, habitat, and hydrology, then in the EIR the Bay Trail alternative should be rejected and excluded from consideration even as a program-level option in the EIR.	Please refer to the global response on Project Development and Alternatives Screening.

27. We recommend that the Project retain the high ground levee alternative with EIR consideration with discussion of the reasons for doing so. As this alignment appears to avoid Bay fill, it simultaneously preserves the deepest, most flood protective reach of tidal marsh on the East Palo Alto shoreline. The EIR should analyze issues and impacts including Project right-of-way on privately-owned lands, realignment of the Bay Trail and presence of hazardous materials. The land nearest Bay Road is well documented as an EPA Superfund site (aka Romie site) and the existing auto salvage business is both a levee obstacle and hazardous waste concern. Infinity Salvage has been in business at this site for decades and, to public knowledge, has never had its soils tested for hydrocarbon and other hazards that may have accumulated, possibly seeping beyond its boundary including toward Eastern Slough. The high ground alignment would also need to use land that the 2013 RBDSP set aside for a possible "Loop Road." At this time and from our participation in RBDSP Update planning, there is no indication that East Palo Alto will build that road.	Please refer to the global response on Project Development and Alternatives Screening. The DEIR will describe the alternatives screening process and evaluate the potential for the proposed Project to adversely affect the physical environment, including the potential for hazardous materials at contaminated sites to pose a health risk.
28. Given that increasing the depth of marsh (distance from mudflat edge to shore) also increases its SLR and sea surge protection, it is in the best interest of East Palo Alto to use the opportunity to enhance this slough and marsh and improve protection of the North of Bay Road Shoreline.	This suggestion, that the Project enhance marsh habitat at Eastern Slough, is acknowledged. Please refer to the global response on Project Development and Alternatives Screening.
29. Provide a comprehensive discussion of potential levee types, varied by location and relationship to exposure to wave dynamics, rising seas and utilization of existing marshes as nature-based SLR adaptation or situations that offer potential to enhance or establish nature-based wave mitigation.	The DEIR will describe proposed flood protection features for this reach in plan view and cross-section. The proposed design will consider the factors mentioned in this comment.
30. Include examples of levees requiring a narrower footprint on the Bay side, for example where it is sufficient that vegetated slope starts midway on a sea wall.	Please refer to the global response on Project Development and Alternatives Screening.
31. Analyze how the presence and extent of marsh may or may not mitigate the wave reflective impact of a flood wall, inclusive of shoreline erosion potential. If such a wall is needed, discuss how impacts will be mitigated.	With-Project wave conditions will be predicted and incorporated in the design of erosion protection (if needed) and to assess the potential for impacts.
32. As the Project designs predict settlement of the levee, the EIR should discuss and identify locations where settlement and instability may produce maintenance issues.	Some settlement of the levee is anticipated during the first-year post-construction. The long-term operations and maintenance plan will also include guidance to maintain the levee to its design configuration.
33. Provide levee information in graphics and charts to allow residents or business owners to know what type of levee they will be seeing day to day and how it might change their neighborhood. Please see charts on following pages that may be examples of their function as an information tool.	The DEIR will describe proposed flood protection features for this reach in plan view and cross-section.
34. A critically important Project objective should be to preserve the habitat that exist as part of the flood protection solution. Endangered Ridgway's rail and salt marsh harvest mice use the marshes, and it is expected that California black rail and salt marsh wandering shrew are present. The following figure shows the result of a Ridgway's rail survey in Faber Marsh that provides a sense of the importance of this habitat to wildlife, as well as the broad extent for natural productivity and carbon sequestration.	Thank you for providing the information from the Ridgeway's rail survey in Faber Tract. The Project objectives are presented on NOP page 4 and include the following objective that relates to the protection of habitat: *Enable adaptation to our changing climate by using tidal marsh areas for flood protection in ways that sustain marsh habitat and facilitate marsh restoration associated with the South Bay Salt Ponds Restoration Project (SBSPRP) and other restoration efforts*.
35. Because of the importance of Laumeister Marsh and its relatively good position in relation to future accretion, there should be no, or an absolute minimum of bay fill in the Levee South of Bay Road. The NOP raises a concern that extending the levee into the Bay is still considered as an option for this segment.	Please refer to the global response on Project Development and Alternatives Screening.

36. Charts on this page and the next might be useful in presenting levee information in the EIR.	Tables will be used to describe features of Project-level reaches.
37. Starting at the south end of the Trail and working north, the space between the current trail edge and constraining features diminishes. Initially, there appears to be room for the trail-on-top levee at the south, and farther north conditions are likely to require the Flood Wall option. There are exceptions where none of the designs fit and other options should be considered.	This comment is acknowledged. Please refer to the global response on Project Development and Alternatives Screening.
38. A walking tour of the South of Bay Road segment with an eye on planning for the Ravenswood Business District identified a variety of conditions and infrastructure that may require specialized levee adaptation such as: right of way on private property and on high ground, the bend and narrow point in the Bay Trail near Runnymede, stormwater outflows, drainage ditches that parallel the alignment, the O'Connor Pump House, public access at multiple locations, previously unknown locations of contaminated soil and power towers. The EIR needs to discuss how the Project will resolve each of these situations (and others perhaps) and what impacts are incurred and how they will be mitigated.	This comment is acknowledged. Please refer to the global response on Project Development and Alternatives Screening. The EIR will identify impacts based on established significance thresholds and mitigation measures for significant impacts.
39. Impact Analysis of the Levees South of Bay Road. The intent of the Project options described for South of Bay Road on pages 20 and 21 is to preserve the existing refugia slope from the edge of the current trail to the wetlands. For any exceptions that require Bay fill the EIR must describe and evaluate every feasible flood protection design to avoid fill. If mitigation is required for any levee impacts in this segment, the EIR must consider and select enhancement options within or for Laumeister and Faber Marshes. Some construction impact seems unavoidable to the transition/refugia slope and adjacent wetlands. The EIR must describe those impacts and recommend mitigation on site. For example, if there are impacts to the existing transition zone, it may be possible to do invasive plant control there and add native perennials while creating the transition slope. The EIR must consider options, such as the ones described above, to fit a SAFER levee into a smaller horizontal space when necessary to avoid wetland fill.	Please refer to the global response on Project Development and Alternatives Screening. The SFCJPA is seeking to identify the least environmentally damaging practicable alternative.
40. No matter which of the bayside slopes is designed there may be the potential for additional transition habitat to be created along the higher levee. The DEIR should identify and provide details regarding the success criteria that will be utilized for the project, describe what ongoing resource management is required and how it will be funded.	The DEIR will provide success criteria for mitigation measures involving compensatory mitigation. Details regarding ongoing management of any such mitigation will be included in mitigation and monitoring plans that describe such mitigation in greater detail. Any management that is part of the Project will be described in the Project Description, and the impacts of such management on sensitive resources will be included in the impact assessment.
41. The EIR must consider the direct and indirect cumulative effects of the proposed developments in East Palo Alto and interactive effects between those and the SAFER Projects. Examples of some of the possible effects are settlement, groundwater distribution, stormwater distribution and pumping, night lighting, increase in human impacts and litter on the bay habitats. The EIR should provide a description of mitigation measures that will be implemented at each segment that will address impacts to biological and hydrological resources, hazards, etc.	The DEIR will evaluate the potential for significant cumulative impacts to occur in association with the Project, proposed development, and other projects. Mitigation measures will be identified if the Project's contribution to a significant cumulative impact is determined to be cumulatively considerable. The topics raised in this comment will be considered in the cumulative analysis.
42. Describe the effects of improved Bay Trail facilities and access on increasing human use and impacts. Describe ongoing litter control and removal programs required to mitigate the effects. Describe how human disturbance to wetland habitat and wildlife will be addressed. Define who will be responsible for monitoring and addressing issues that might arise.	The DEIR will evaluate the potential for recreation improvements proposed as part of the Project to adversely wildlife, habitat, and other features of the physical environment. The DEIR Project Description will identify responsible parties for operations and maintenance of proposed facilities.

43. The SAFER Project must obtain agreements with local jurisdictions to prohibit night lighting and light trespass on the levee, Bay Trail, and bay habitats.	The DEIR will evaluate the potential for nighttime lighting, if proposed, to adversely affect the natural environment, and measures needed to avoid or mitigate such impacts. The SFCJPA will comply with all requirements from permits and other agreements obtained for the Project.
44. The EIR must consider how the inner side of the levee and new overpass access ramps can help preserve the drainage ditch and stormwater capacity and its usefulness for fresh to brackish water habitat.	Please refer to the global response on Project Development and Alternatives Screening. As part of continued Project refinements, the SFCPA will evaluate potential conflicts with stormwater drainage facilities and the improvements needed to resolve such conflicts.
45. Not only is Nature of service to humans for flood control, but Nature must be preserved for its inherent values. The EIR must provide integrated assessment, consideration and planning for the wetlands and bay habitats adjacent to the SAFER levee in this segment and that will involve partnership with the USFWS and agreements when necessary.	Please refer to the global response on Project Development and Alternatives Screening. The SFCJPA will continue to consult with the SFSPRP and the Refuge regarding planning.
46. The EIR must describe the special value and nature of prehistoric, never-diked wetlands such as Laumeister Marsh, and precautions that are appropriate to preserve those areas.	Agreed. The Project's ecological consultants understand the unique ecosystem functions and values of Laumeister Marsh, having worked along this portion of the bayshore for decades. Laumeister Marsh is one of the few historic tidal salt marsh areas that was never diked or filled. As noted above, the Project's Biotic Resource Study will characterize existing habitat conditions, including those in Laumeister Marsh, and every effort will be made, within the constraints of the Project purpose, to avoid and minimize impacts to this marsh.
47. Analysis must be completed for Tidal Channels (3: 1 slope levee) (Ravenswood Slough, Eastern Slough, site-specific small sloughs): - Potential impacts of wave reflection on opposite earthen banks - Potential marsh erosion at the base of floodwalls following high-water wave action or storm surge - For a levee extending into a channel, potential alteration of channel flow with possible increased erosive action on the far bank Flood walls (vertical structures) - Wave force reflection when directly facing the incoming waves - Wave force reflection at a 90-degree angle to incoming waves - Erosion impacts of soils at base of floodwall, direct or angled Major storm events or series of moderate storm events	The issues referenced in the comment will be considered during Project development and addressed in the DEIR. With-Project water velocity and wave conditions will be predicted and incorporated in the design of erosion protection (if needed) and to assess the potential for impacts.
48. In a sudden, major storm event, water can accumulate rapidly inboard of a levee wall. The EIR must analyze, by location, vulnerability issues and how they could be mitigated. In East Palo Alto consider conditions described in a LAFCO Municipal Services Report. In the EIR, analysis should identify impacted nodes in the vicinity the levee and plan mitigation comparable to risks such as the depth of potential flooding.	The referenced municipal services report will be consulted and used to evaluate potential conflicts with stormwater drainage facilities and the improvements needed to resolve such conflicts.
49. At the program-level the EIR needs to set a framework for development actions that can adapt and survive these climate changes and to preserve the effectiveness of the levee system planned. The EIR needs to assess: How might rising groundwater affect the stability and structural integrity of a levee? An important reference to consult is a report prepared by the San Francisco Estuary Institute for the City of Sunnyvale: Sea-level rise impacts on shallow groundwater in Moffett Park.	Please refer to the global response on Project Development and Alternatives Screening. Rising groundwater will be considered in continued Project development. The referenced report will be consulted.

50. One recommendation that we made in earlier discussion was the recommendation to have a qualified biologist perform a Biological Resource Assessment (BRA). BRAs are required by Menlo Park which has a detailed description of BRA actions. We hope the Project agrees that it would make good sense to use that analysis tool for the entire Project and for identification of the Project's Biological impacts and mitigations.	Please refer to the response to comment 21.
51. Bayland landscape settings (non-tidal baylands, uplands, high tide line position, and tidal marsh) should provide a framework for design and impact assessment. All plan view figures showing alignment of levee and transition zone habitat designs, and impact analysis should be clearly framed in relation to their position within bayland landscape (landform and habitat) settings. Drawings and designs should clearly display the degree to which new levees and constructed transition zone (ecotone) slopes are set back landward of the high tide line or encroach into existing tidal marsh.	The SFCJPA agrees with the commentors recommendations.
52. Substrate specifications used to construct habitat transition zones, especially the root zone (upper soil profile) are essential for assessment of project feasibility and environmental effects. They are as essential to project description as elevations.	The SFCJPA agrees. During the detailed design phase, the Project's restoration designers intend to incorporate soil preparation methods into the design to facilitate establishment of the target transition zone habitats.
53. Phasing for incremental construction of habitat transition zones over time, in pace with sea level rise. Just as the NOP indicates the potential need to phase construction for logistical project needs, environmental impact minimization needs also justify evaluation of alternatives that include incremental "thin-layer" lifts of sediment for gradual construction of habitat transition zones, within the range of (non-destructive) burial tolerance of transition zone vegetation.	The thin lift method was developed for T-zones in existing marsh to minimize impact. The design team will consider this potential transition zone construction method as appropriate.
54. High tide refuge design and assessment should include the entire tidal marsh-upland gradient, not just the high tide line. We support the NOP to assess the entire distribution of high tide refuge habitat across the tidal marsh landscape, and plan for long-term integrated co-management of high tide refuge habitat both within constructed transition zones, and in the related tidal salt marsh platform.	Landscape evaluation may be considered as part of adaptive management, in coordination with land managers.
55. In addition, we recommend explicit focus on project impacts on non-native plant species invasions (spread of wildland upland and wetland weeds), and mitigation measures based on integrated weed management during all project stages, including pre-construction management and imported fill selection, stockpiling, and handling.	The DEIR will evaluate the potential for the Project to introduce invasive plant species and identify measures to mitigate significant impacts.
56. Recreational trail alignments and vegetation designs should be integrated to minimize behavioral impacts of trail uses on wildlife in tidal marshes and transition zones.	The Project will be designed to minimize impacts of recreational activities on sensitive species and habitats, and such impacts will be analyzed in the DEIR.

TABLE 15
SUMMARY COMMENTS AND RESPONSES ON SAFER BAY NOTICE OF PREPARATION:
SIERRA CLUB

Summary of Comment	Summary Response
1. Construction of a new levee requires significant fill and reduces wetland habitat throughout the area and negatively impacts wildlife. We acknowledge that this may be necessary in some areas to achieve the goals of the project. However, wherever possible, new levees should be located upland of existing wetlands, on land, to minimize Bay fill and the associated loss of wetland habitat and impact on wildlife. This is consistent with East Palo Alto's Ravenswood Business District Specific Plan Policy LU-9.4	Project design development includes consideration of minimizing impacts to wetland habitat and wildlife.
2. The SAFER project plans show ponds as they exist today and do not reflect the future plans for ponds in the Don Edwards San Francisco Bay National Wildlife Refuge as described in South Bay Salt Pond Restoration Project's multi-phase implementation plan. Existing plans for future pond operation in the Refuge must be reflected in the environmental impact analysis for the project. Similarly, we would like to see the DEIR include Meta's Willow Village project and East Palo Alto's Ravenswood Business District Specific Plan Update in a cumulative impact analysis.	The DEIR will consider the South Bay Salt Pond Restoration Project's future plans, as well as the plans of other nearby projects.
3. We urge you to drop construction of a roadway for vehicle traffic between SF2 ponds in the Don Edwards San Francisco Bay National Wildlife Refuge from the project alternatives to be considered in the DEIR. Use of the refuge as a roadway is in direct conflict with the purpose of the refuge which is to preserve and enhance wildlife habitat. A roadway would have a significant negative impact on wildlife using the SF2 ponds, both during construction and under normal use. It would also require additional Bay fill to be used between the SF2 ponds, resulting in a permanent loss of habitat potential. We are similarly concerned about the extension of that roadway into East Palo Alto. In our May 16, 2022, scoping letter regarding East Palo Alto's Ravenswood Business District Specific Plan Update (attached), we expressed significant concern about encroachment from new development and associated infrastructure constraining width and alignment options for the SAFER Levee and reducing flexibility for future heightening of the levee. We maintain that the best and highest use of the lands proposed for the Loop Road in East Palo Alto is a flood protection levee that can be raised over time to protect the University Village area.	The comments regarding impacts associated with the loop road are acknowledged. Please refer to comments from South Bay Salt Pond Restoration Project presented in Table 3.
4. We are concerned about the location of the segment of the SAFER Levee between Ravenswood Slough and Hacker Way. The new higher levee should be located inland of the Ravenswood Slough toward Hacker Way. It is critical to site this new higher levee upland of the Ravenswood Slough toward Meta Headquarters parking area to minimize the loss of habitat and the impacts on wildlife.	The SFCJPA Project team is aware of the existing structure and function of tidal salt marsh habitat in Ravenswood Slough in this Project reach. The comments regarding impacts to Ravenswood Slough associated with the Tech Campus reach will be taken into consideration as the SFCJPA evaluates alignments for this reach at a programmatic level. The City of Menlo Park would be responsible for developing project-level CEQA documentation for this area in the future.
5. We are concerned about the plans for the North of Bay Road segment of the SAFER Levee in that it includes only a floodwall, inboard of the Bay Trail, and no obvious plans to raise or relocate the Bay Trail. A new higher levee and Bay Trail should be constructed upland of wetlands on land similar to plans for the SAFER Levee segment South of Bay Road. Plans to assure the continued viability of this section of the Bay Trail should not be delayed as a future continuous Bay Trail should be a goal of the project.	The current Bay Trail North of Bay Road is located on a separate berm east of the slough channel. There are multiple flood control alignments and configurations being considered for this Project segment. The selection of the preferred alignment and configuration will depend on many considerations.

Summary of Comment	Summary Response
6. We are concerned about construction impacts on sensitive Bay ecosystems in the project area. We recommend a baseline Biological Resource Assessment (BRA) be performed as part of the environmental analysis for this project and established as a standard methodology for subsequent project level environmental review. BRAs should be undertaken for each reach and bio-niches within the reach.	The SAFER Bay Project's ecological consultant will prepare a Biological Resource Study that meets CEQA EIR requirements, and that will be incorporated into the Project's EIR. The study area will encompass all geographic areas that could be impacted by the SAFER Bay Project. The study will include a characterization of the existing conditions of biotic resources within the study area, including a wetland delineation, and will quantify the Project's permanent and temporary impacts, and propose feasible mitigation approaches. The design team will utilize the study's characterization and mapping of existing biotic resources as one of the tools for developing a preferred Project that avoids and minimizes environmental impacts to the maximum practicable extent while meeting the Project's flood control objectives. The DEIR will also describe the process by which levee segments that are analyzed only programmatically in the DEIR will be analyzed at the project level in the future so that mitigation measures can be implemented as appropriate.
7. We appreciate the opportunity to participate in this project's development and request that you include alternatives in your environmental impact report that include no roadway between SF2 ponds, location of the SAFER levee segment north of Bay Road in East Palo Alto upland of any marshland and location of the SAFER levee segment around Meta Headquarters completely upland of the Ravenswood Slough.	The SFCJPA will consider the suggested alternatives in the DEIR. The City of Menlo Park would be responsible for developing project-level CEQA documentation for this area in the future.

TABLE 16
SUMMARY COMMENTS AND RESPONSES ON SAFER BAY NOTICE OF PREPARATION: HARVEST PROPERTIES

Summary of Comment	Summary Response
1. We have identified the impacts that 7:1 levee slope would have on Harvest's The Landing project. Specifically, it would eliminate the recreational and open space amenities that the community expressed as critical for East Palo Alto's waterfront. In the spirit of partnership, and with a shared goal of providing resiliency to coastal flooding and sea level rise, as well as maximizing habitat and recreation improvements and benefits to the community, Harvest has identified and now proposes a hybrid slope operation for the SFCJPA's consideration, which we have mapped and included as an attachment to this letter. There are certain constraints that are unavoidable and will necessitate a more traditional levee with a 2:1 slope in limited areas. However, for the majority of our property's waterfront, Harvest is open to the possibility of including a 3:1 slope, and in some locations, a 7:1 slope. We therefore request that this hybrid slope option is evaluated in the forthcoming Safer Bay Project Environmental Impact Report and as part of the ultimate alignment. The following includes additional detail.	The SFCJPA has been working with designers on modifications that are workable. The SFCJPA understands the constraints in the area and will continue to work with residents in East Palo Alto, Harvest, and environmental regulatory permitters on a flood protection design that benefits the community.
2. The SFCJPA will also be required to follow the rules and procedures of the Risk Management Plan for Harvest's properties. In particular, to preserve water quality within Laumeister Marsh, the levee slope and core should be designed to retain the integrity of the previously remediated soils, now and in the future. The levee design should minimize contact with remediated soils during construction and should avoid and minimize future exposure of tidal surface and ground water to remediated soils as sea level rises.	The SFCJPA will follow the rules and procedures of the Risk Management Plan for Harvest's properties. During Project development, the SFCJPA will evaluate ways to minimize disturbance of remediated soils.
3. Finally, as the SFCJPA is aware, PG&E's Cooley Landing Substation is located at the northern end of our property, and its high voltage towers and lines are situated along the entire extent of the waterfront. Harvest is currently working collaboratively with PG&E to ensure that The Landing's design is accommodating the needs and constraints of PG&E's infrastructure. Any future SAFER Bay levee design and construction will also need to pay close attention to the existing Substation as well as the towers and overhead lines' location and alignment.	The SFCJPA agrees with this comment.
4. While it is typical for a levee to create a berm, with a slope down to lower, existing inland ground, as part of The Landing, Harvest has proposed that the entire site be raised by approximately 5 feet to match the grade of the Bay Trail and the levee. This has a number of positive community benefits and comes at a significant cost. It creates a seamless transition from the Bay Trail and levee to all the inland recreational amenities, and it also provides unobstructed views of the waterfront as the top of levee is at the same elevation as The Landing's amenities.	The SFCJPA will continue to work collaboratively with Harvest to advance flood protection while allowing for improved recreation and restoration opportunities.

5. It was not until the NOP for the SAFER Bay project was recently released that we were made aware that SFCJPA was now contemplating a different conceptual Cross-Section, indicating a range of 3:1 to 7:1 for its Transition Zone. As mentioned above, this creates significant problems for our current site plan, and will prevent the community's goals of maximizing recreational and open space amenities from being realized. It may also continue a troubling pattern of poorer communities and communities with largely non-white populations bearing the brunt of environmental impacts, including infrastructure meant to address environmental harms that also serves to protect wealthier, whiter communities. The NOP presents two (2) "Conceptual Cross-sections of Integrated Floodwall and Transition Zone, Habitat Creation," for the area south of Bay Road (Exhibit 6: Figure 8 & Figure 9). The Cross-Sections depicted are in the same location of The Landing project, as our properties extend south of Bay Road to south of Weeks Street. A slope of 3:1 (min) to 7:1 Transition Zone Habitat Creation is presented in these Cross-Sections, with a reference to Note 3 on the same page, which states: "Transition Zone will vary based upon location along the Flood Control Alignment and Existing Constraints."	The cross sections presented in the NOP are conceptual and are subject to change as the SFCJPA continues to collect additional data and community input and advances the Project through permitting and design.
6. While we can appreciate the goal of maximizing this Transition Zone, it is critical to note that for portions of our site, anything greater than a 3:1 slope (and in some locations 2:1 slope) would eliminate the recreational and open space amenities that the community has expressed as critical for EPA's waterfront. Please see Exhibit 7: Levee with 7:1: Transition Zone. As can be seen in this diagram, a 7:1 slope would extend inland into our property, by nearly 50 feet. If a transition zone of 7:1 were constructed along our property's frontage, this would eliminate the possibility of the construction of the community's children's playground, ½ court basketball court, fitness area, picnic benches, BBQ areas, outdoor seating, and the viability of future retail along that frontage. There would simply not be adequate room to construct these amenities. Additionally, the emergency vehicle access road that curves down from the end of the Weeks Street cul-de-sac would also would not be able to be constructed, which would create severe fire and emergency vehicle access problems. Others of The Landing's amenities would also be drastically reduced in size, such as the project's public plazas, and grassy amphitheater lawns, and waterfront seating areas.	The SFCJPA will continue to work on levee designs that accommodate community benefits.
7. Additionally, as was mentioned above, PG&E's Cooley Landing Substation is located at the northern end of our property, and its high voltage towers and lines are situated along the entire extent of the waterfront. As can be seen in Exhibit 7 above, with a 7:1 sloped levee, there would be several conflicts that would need to be addressed by SFCJPA in adapting and working around the existing Substation and high voltage towers and lines.	The SFCJPA agrees with this comment.
8. Harvest believes this "experimental" method of addressing flood risk management and sea level rise ecotone levees may come at too high an economic and social cost, including losing sight of the needs and desires of the community and City of East Palo Alto, and providing the community with the open space and recreational amenities that they desire.	The SFCJPA will continue to coordinate with stakeholders and will consider community benefits in levee design.
9. It is critical that Harvest and the SFCJPA work together on the design, engineering, and eventual construction of the levee, as we are neighbors, and it will take close coordination and partnership to plan for and execute the development of The Landing and the SAFER Bay project.	The SFCJPA will continue to consider community benefits in levee design.

10. In the spirit of this partnership, and with a shared goal of providing resiliency to coastal flooding and sea level rise as well as maximizing habitat and recreation improvements and benefits to the community, we have revisited our site plan to explore the possibility of incorporating more gentle ecotone slopes into our proposed plans. As Note 3 in the NOP's Cross-Sections acknowledges, there are certain "constraints" that are unavoidable, and will necessitate a more traditional levee with a 2:1 slope in limited areas. However, for the majority of our property's waterfront, we are open to the possibility of including a 3:1 slope, and in some locations, a 7:1 slope. Please see attached *Exhibit 8: Hybrid Levee Option.*	Thank you for this information as well as additional updated designs that were submitted to the City of East Palo Alto.
11. We are proposing a 2:1 slope for two particular site-constrained areas of the site: 1) PG&E Cooley Landing substation pinch point (to the north); 2) Community Park with emergency vehicle access to the Bay Trail (to the south). This area includes the children's playground, fitness areas, ½ court basketball court, seating areas. For these locations, a 2:1 sloped levee will allow both flood and sea level rise protection as well as the protection of critical infrastructure and community benefits. It is important to note that there is a single-family residence just south of our proposed community park area that would also be negatively impacted by a gentler Transition Zone; a 2:1 sloped levee is likely the best and only alternative for this property.	Levee side slopes will be designed based upon industry guidance, such as FEMA's Chapter 44 Code of Federal Regulations Section 65.10 as well as the US Army Corps of Engineers EM 1110-2-1913. The design of the embankment slopes considers ease of construction, maintenance, seepage, and slope protection criteria.
12. As previously mentioned, up until one month ago, under the direction and guidance of the SFCJPA, our prior design was based upon a 2:1 levee slope. The Cross-Sections presented in the NOP present a number of challenges for our current site plan. In the spirit of partnership, Harvest has worked with its engineering and design team to create the hybrid levee option. This hybrid levee option appropriately and reasonably balances our property interests, community expectations for amenities and flooding, sea level rise and habitat preservation. It is important to note that Harvest will not be able to make any other adjustments to this revised site plan, as it already represents significant changes to our site plan. Additionally, we feel the SFCJPA will be pleased with this option's creation of additional wetland areas on Harvest's property (i.e., additional square footage of wetland areas) that do not currently exist along the shoreline.	Levee side slopes will be designed based upon industry guidance, such as FEMA's Chapter 44 Code of Federal Regulations Section 65.10 as well as the US Army Corps of Engineers EM 1110-2-1913. The design of the embankment slopes considers ease of construction, maintenance, seepage, and slope protection criteria.
13. One point that we would like to raise is that in the course of recent conversations regarding the potential levee alignments, we have heard no discussion of how or whether SFCJPA intends to seek fee purchase or permanent easements over the property, which would be necessary for the ultimate levee alignment, and which would only have higher costs in the event a more gentle 7:1 slope is selected for a larger area. Similarly, we have not heard whether such actions will be accomplished through condemnation (and whether SFCJPA is authorized by its Joint Powers Agreement to take such action) or negotiated agreements. Further, how will the significant costs of doing so be funded? We urge SFCJPA to consider and disclose these factors as part of the consideration of potential alignments.	The SFCJPA has been working with the Ravenswood Shores Business District on this non-CEQA issue.

TABLE 17
SUMMARY COMMENTS AND RESPONSES ON SAFER BAY NOTICE OF PREPARATION:
RAVENSWOOD SHORES BUSINESS DISTRICT (FIRST SUBMITTAL)

Summary of Comment	Summary Response
1. Project Objectives - Given the soil contamination levels in several of the sites both South of Bay Road and North of Bay Road, project objectives should include the enhancement of the environmental remediation requirements of these sites and ensuring that SAFER Bay Project implementation does not expose additional contamination. Any levee development should comply with the current remediation orders by Regional Water Quality Control Board, the Environmental Protection Agency, and the California Department of Toxic Substances.	Consistent with CEQA, the Project objectives reflect the underlying purpose of the Project, which does not include remediating contaminated soils. Nonetheless, any soil remediation undertaken as part of Project construction would be done in consultation with regulatory agencies and would comply with all applicable environmental regulations.
2. Shoreline Protection -. Several Areas along both the South of Bay Road and North of Bay Road segments, will benefit from the proposed filling of the inboard areas to raise the overall site to elevations 16' feet. As such, the inboard area is not at any risk of "levee" failures. Consideration should be given in these areas for only minor additional enhancements of the outboard segments of the shoreline protection. An example of this is best outlined in Figures 3, 6 and 7, where there is only "fill" and no levee base excavation required.	Additional considerations need to be evaluated during the design phase to determine the added benefits of the proposed filling of inboard areas. These may include the extent of the infill, infill materials proposed, long-term operations and maintenance plan, flood fighting plan, and an evaluation of the interior stormwater drainage system.
3. Recreation - East Palo Alto, as an economically disadvantaged community, has limited access to park and other recreation spaces. While the implementation of the SAFER Bay Project, may in some locations enhance San Francisco Bay access, in other areas, the proposed levee may encroach on planned development of open space and other City amenities.	The DEIR will evaluate recreation impacts, consistency with plans and policies, and cumulative impacts. The SFCJPA is preparing a separate evaluation of environmental justice issues. Please refer to the global response on Project Development and Alternatives Screening.
4. Impacts on University Village Neighborhood - The alignment of the levee in this area will have significant impacts on the residences that may about the levee and storm water drainage. The need for adequate storm drainage collection and storage must be considered as the University Village has the potential to become a "bathtub."	The DEIR will evaluate the potential for the Project to adversely affect the capacity to inhibit storm water drainage from the landward side of the levees. The Project will assess interior drainage and emergent groundwater such that the Project design can preserve the capacity for stormwater drainage. Levee system accreditation by FEMA requires that interior drainage issues be addressed.
5. Ecotone Levees - Where ecotone levees are being considered, a design that pushes into the wetland areas of the project should be considered. The ecological benefit of ecotone levees should not be at the sole expense of inbound land.	Please refer to the global response on Project Development and Alternatives Screening.
6. It is critical in evaluation of the SAFER Bay Project, that the multiple needs and concerns of the community, the residents, the landowners, the employees in the City of East Palo Alto are given appropriate consideration. There are complicated issues of environmental contamination, storm water drainage, recreational access, development community benefits that must be equitably considered in the development of this project specific and programmatic project Environmental Impact Report.	The SFCJPA will have a sustained stakeholder process. Please refer to the global response on Project Development and Alternatives Screening.

TABLE 18
SUMMARY COMMENTS AND RESPONSES ON SAFER BAY NOTICE OF PREPARATION:
RAVENSWOOD SHORES BUSINESS DISTRICT (SECOND SUBMITTAL)

Summary of Comment	Summary Response
1. North of Bay Storm Drainage. The University Village area as well as some of the sites on Demeter, Pulgas and Tara are at low elevation. This storm drainage, which already needs experiences some flooding at storm events and king tides, needs to be coordinated with the levee alignment and potential stormwater collection. We want to avoid necessitating pump stations at each of these storm drainage outflows, which in turn require redundancy at a very high cost.	An assessment of the interior drainage and emergent groundwater will be included such that the Project design can preserve the capacity for stormwater drainage.
2. Utility Easements. The current utility easements are within the areas where levees may be developed. Relocating any of the high voltage electrical towers is prohibitively expensive. Making sure we can accommodate effectively the EPASD sewer line which currently runs adjacent to the Bay Trail needs to be a high priority.	Impacts to both electric and sanitary sewer utilities are being considered as part of the decision-making process to select and refine the preferred alignment.

Attachment A
Notice of Preparation

ESA

SAN FRANCISQUITO CREEK
JOINT POWERS AUTHORITY

sfcjpa.org

NOTICE OF PREPARATION

Strategy to Advance Flood Protection, Ecosystems and Recreation along San Francisco Bay Project Environmental Impact Report

Introduction

In accordance with the provisions of the California Environmental Quality Act (CEQA) and the CEQA *Guidelines*, the San Francisquito Creek Joint Powers Authority (SFCJPA), as CEQA Lead Agency, is preparing an environmental impact report (EIR) for the proposed Strategy to Advance Flood Protection, Ecosystems and Recreation along San Francisco (SAFER) Bay Project (SAFER Bay Project or Project), which consists of engineered and natural flood protection features, habitat restoration, and recreation improvements.

The SFCJPA has prepared this Notice of Preparation (NOP) of an EIR in connection with the Project to inform the public, responsible and trustee agencies, and interested parties about the Project and the intent to prepare an EIR. The purpose of an NOP is to provide sufficient information describing the Project and the potential environmental effects to enable the responsible agencies to make a meaningful response related to the scope and content of the EIR (CEQA *Guidelines* Section 15082). The purpose of the EIR is to provide information about potential significant physical environmental effects of the Project, to identify possible ways to minimize the significant effects, and to describe and analyze possible alternatives to the Projects.

The SFCJPA is seeking your views regarding the scope and content of the EIR in connection with the Project.

Project Background

San Francisquito Creek Joint Powers Authority

The SFCJPA is a regional government agency composed of the cities of East Palo Alto, Menlo Park, and Palo Alto, the San Mateo County Flood and Sea Level Rise Resiliency District and Santa Clara Valley Water District. The SFCJPA plans, designs and implements multi-benefit projects across jurisdictional boundaries to protect communities from flooding, including flooding from high creek flows, coastal flooding, and sea level rise, that enhance and restore ecosystems and improve trails in Project areas.

SAFER Bay Project Feasibility Report

In 2016 the SFCJPA released a public draft Feasibility Study that evaluated options to address current tidal flooding and projected sea level rise, known as the Strategy to Advance Flood Protection, Ecosystems and Recreation along San Francisco Bay – East Palo Alto and Menlo Park Public Draft Feasibility Study (Feasibility Report).[1] The overall purpose of the Feasibility Report was to evaluate flood protection alternatives along the San Francisco Bay shoreline. The Feasibility Report was provided to stakeholders and agencies and the SFCJPA conducted six public engagement events. The proposed Project described in this NOP has been updated from the 2016 Feasibility Report based on stakeholder input and studies in the area prepared by others, including the June *2020 Dumbarton Bridge West Approach + Adjacent Communities Resilience Study*, 2019 *San Francisco Bay Shoreline Adaptation Atlas*, and the 2017 Resilient by Design challenge.[2]

Project Description

Project Location

The SAFER Bay Project site is located immediately west of San Francisco Bay along approximately 7 miles of the shoreline from the Menlo Park/Redwood city border south along East Palo Alto to East Palo Alto/Palo Alto border. The Project connects to and is consistent with design criteria for the SFCJPA's completed San Francisquito Creek flood protection and ecosystem restoration project (Figure 1, at the end of this document). The project has been divided into 8 segments as described below from the Redwood City border to City of Palo Alto border, shown on Figure 1.

- Marsh Road (Marsh Rd)
- Bedwell Bayfront Park (Bedwell)
- Bayfront Expressway (Bayfront)
- Tech Campus (Tech)
- Substation and Marsh Restoration (R1/R2)
- Dumbarton Approach (Dumbarton)
- North of Bay Road--East Palo Alto (EPA North)
- South of By Road--East Palo Alto (EPA South)

The Project site is within the cities of Menlo Park and East Palo Alto, on both public and privately owned property. The Project includes actions within the Don Edwards National Wildlife Refuge (Refuge), including Refuge-managed land in Laumeister and Faber Tract Marshes (owned by City of Palo Alto) and Ravenswood Open Space Preserve (owned by Midpeninsula Open Space District). The Project also includes actions within land owned by the San Francisco Public Utilities Commission, the Cargill Corporation, and many others; and within the Caltrans State Route 84 right-of-way at the western approach to the Dumbarton Bridge. Appendix NOP-1 lists the Assessor Parcel Numbers of properties that are wholly within, partially within, or within 100 feet of the footprint of the Project site (excluding easements).

1 SFCJPA, 2016. *Strategy to Advance Flood Protection, Ecosystems and Recreation along San Francisco Bay – East Palo Alto and Menlo Park Public Draft Feasibility Study*.

2 The *Dumbarton Bridge West Approach + Adjacent Communities Resilience Study* can be found at: https://mtc.ca.gov/sites/default/files/documents/2021-05/Dumbarton-Bridge-West-Approach-Adjacent-Communities-Resilience-Study-Final-Report.pdf. The San Francisco Bay Shoreline Adaptation Atlas can be found at: https://www.sfei.org/adaptationatlas. The Resilient by Design challenge website can be found at: http://www.resilientbayarea.org/.

Project Overview

The SAFER Bay Project will provide resiliency to coastal flooding and sea level rise in East Palo Alto and Menlo Park as well as habitat and recreation improvements. Guidance from the Ocean Protection Council recommends projects now in development should include 3.5 feet of sea level rise resilience.[3] The Project will connect to adaptation actions under consideration in Redwood City and unincorporated San Mateo County to the north and in the City of Palo Alto to the south. The multi-benefit Project includes more than 550 acres of habitat restoration and 1 to 2.5 miles of new or improved trails.

The SFCJPA is collaborating with the South Bay Salt Ponds Restoration Project to restore former salt production ponds, Pond R1 and Pond R2, located in the Ravenswood Complex, as part of the SAFER Bay Project. The restoration scenarios include tidal marsh or a combination of tidal marsh and managed ponds. The Project will construct levees, floodwalls and other flood protection features necessary to enable the restoration of tidal action to these ponds and includes design and construction of the pond restoration itself in order to mitigate for the Project's impacts to jurisdictional wetlands and aquatic habitats. The Project also proposes to increase the diversity of habitat by building tidal salt marsh-upland transition zone habitat (transition zone habitat) on the bayward slope of appropriate segments of levee adjacent to existing and/or restored tidal salt marsh. In addition, the Project proposes to enhance recreational access to the shoreline by creating new sections of the Bay Trail and by placing existing sections of the Bay Trail atop new levees where they will be less susceptible to flooding.

Consistent with CEQA, the SAFER Bay Project EIR will contain both project-level and program-level evaluations.[4] Those Project components with sufficient design and construction information will be evaluated at a project level of detail and those lacking sufficient detail will be evaluated programmatically, in accordance with CEQA Guidelines Sections 15161 and 15168. Consistent with CEQA Guidelines Section 15168, the SAFER Bay Project EIR will provide a comprehensive review of the overall nature and magnitude of potential environmental impacts so that the SFCJPA and its member agencies can make informed decisions for the Project while considering impacts and mitigation strategies for the whole Project. Figure 1 indicates those Project components that will be evaluated at a project level of detail and those to be evaluated at a program level of detail.

Project Need, Purpose and Objectives

Need for the Project

Currently, the communities of East Palo Alto and Menlo Park are exposed to coastal flooding from San Francisco Bay, and this situation is expected to worsen with sea level rise. These areas are within the existing 1-percent annual chance (commonly referred to as the *100-year flood event*)[5]

3 Sea-Level Rise Leadership Team, January 2022. *State Agency Sea-Level Rise Action Plan for California*.

4 CEQA Guidelines Section 15168 provides for the programmatic environmental review of a plan or program with multiple components (projects or actions) that are related either: geographically, as logical parts in the chain of contemplated actions, in connection with the issuance of rules, regulations, plans, or other general criteria to govern the conduct of a continuing program, or as individual activities carried out under the same authorizing statutory or regulatory authority and having generally similar environmental effects that can be mitigated in similar ways.

5 These are areas subject to flooding by the flood event with a 1 percent chance of occurring in any individual year.

flood hazard area as mapped by the Federal Emergency Management Agency (FEMA). With respect to habitat, the San Francisco Bay has lost 95% of historical tidal marsh habitat,[6] and with that has been a loss of the ecosystem services that tidal marsh habitat provides, including nesting and foraging habitat and upland refugia for threatened and endangered species such as California Ridgeways rail, western snowy plover, and salt marsh harvest mouse. The SAFER Bay project provides an opportunity to restore critical habitat. In some areas of the Project site, tidal salt marsh habitat cannot be restored until adequate flood protection for landward uses is in place.

Project Purpose and Objectives

The overall purpose of the Project is to protect people, property and infrastructure from current tidal flooding and projected sea level rise through engineered and natural features that enhance shoreline ecosystems and improve recreational opportunities. The specific objectives of the Project include:

- Reduce the risk of flooding within the cities of East Palo Alto and Menlo Park from San Francisco Bay waters, including consideration of up to 3.5 feet of future sea level rise, and support the communities' objective to be removed from the Federal Emergency Management Agency (FEMA) floodplain;
- Enable adaptation to our changing climate by using tidal marsh areas for flood protection in ways that sustain marsh habitat and facilitate marsh restoration associated with the South Bay Salt Ponds Restoration Project (SBSPRP) and other restoration efforts;
- Expand opportunities for recreation and community connectivity in collaboration with the Bay Trail Program and efforts to enhance local trails;
- Minimize future maintenance requirements; and
- Partner with agencies and organizations pursuing similar goals and objectives and with assets to be protected by the Project.

Design Criteria

The Project is being designed to satisfy current FEMA coastal flood protection requirements (i.e., the existing 100-year event with required freeboard for FEMA accreditation) and an additional 3.5 feet of tidal elevation to account for anticipated sea level rise as well as other applicable FEMA design criteria (e.g., for the evaluation of settlement and structural stability).[7]

Proposed Shoreline Protection, Restoration and Recreation

Proposed integrated shoreline protection, restoration, and recreation features, which vary by reach depending on existing site characteristics, are described below. (A reach is a section or length of bank or waterway.) As shown on Figure 1, the Project is divided into reaches based on local

6 Goals Project, 1999. *Baylands Ecosystem Habitat Goals*. Prepared by the San Francisco Bay Area Wetlands Ecosystem Goals Project, U.S. Environmental Protection Agency, San Francisco, Calif./S.F. Bay Regional Water Quality Control Board.

7 The SFCJPA is using the Ocean Protection Council's 2018 and 2020 *Sea Level Rise Guidance* to guide Project design.

geography.[8] The precise routes within some reaches have not been finalized and could depend on funding, land acquisition, and other factors. For example, multiple alignment options are under consideration for the Dumbarton Approach segment (see Figure 1). The SFCJPA will identify a preferred alignment in consultation with regulatory agencies and stakeholders and continuing investigation of engineering, environmental, and regulatory constraints.

Shoreline Protection

The Project includes the following features to provide protection from coastal flooding to parts of Menlo Park and East Palo Alto:

- ***Levees***. A typical levee, composed of engineered fill with geogrid reinforcement, will have 3:1 (horizontal to vertical) side slopes, a final levee crest height of 16 to 17 feet North American Vertical Datum of 1988 (NAVD 88)[9], and a base width of about 60 to 100 feet. Habitat transition zones, described in the next section, will be integrated on the water-side of some levee segments. In some cases, levees might be constructed and raised in stages given the long-term impacts of sea level rise and budget limitations. An assessment of high tide refugial habitat functions in the face of sea level rise will be performed in existing high-quality marshes. This assessment will be utilized in collaboration with resource agencies to determine if and where the project would propose construction of transition zone or other types of high tide refugial habitats in existing high-quality marshes. (The issue of emergent groundwater on the landward side of levees will be investigated in the EIR.)

- ***Floodwalls***. Where existing spatial or other constraints do not allow for the construction of a levee, concrete or steel floodwalls could be constructed. Habitat transition zones, described in the next section, will be integrated on the water-side of some floodwalls.

- ***Flood Risk Reduction Structures***. There are several existing roadways and drainage ditches that cross the Project site. Where it is impractical to raise roadways to an elevation sufficient to provide flood protection, a passive flood risk reduction structure[10] such as a flood gate could be constructed. Additional improvements to infrastructure (e.g., pump stations) in association with the flood risk reduction structures are proposed.

Figures 2 through 5 (at the end of this document) present representative cross-sections of proposed shoreline protection features in combination with habitat restoration.

Habitat Restoration, Creation and Enhancement

Tidal Salt Marsh Restoration

The South Bay Salt Pond Restoration Project's (SBSPRP's) programmatic environmental impact statement/report (EIS/R) calls for large scale restoration of tidal salt marsh habitat in the vicinity of the SAFER Bay Project site.[11] The SBSPRP is currently using an adaptive management process to guide restoration activities and the SFCJPA is coordinating closely to ensure consistency with

8 The Feasibility Report divided the Project site into 9 reaches. The reaches have been refined and consolidated since the Feasibility Report was completed and the nomenclature has been updated with input from local stakeholders.

9 The North American Vertical Datum of 1988 is the official vertical datum of the United States.

10 A passive structure is defined as a feature that can be closed at beginning of a storm event and left alone without any additional management except to reopen at the end of the storm event.

11 U. S. Fish and Wildlife Service, et al, 2007. *South Bay Salt Pond Restoration Project Programmatic Environmental Impact Statement/Report*.

SBSPRP goals and objectives. The SBSPRP EIS/R's Alternative B-Managed Pond Emphasis includes the restoration of tidal salt marsh in Ponds R1 and R2, which are located in SAFER Bay's Substation and Marsh Restoration Reaches.

The Project will construct the necessary flood protection to allow tidal restoration of Ponds R1 and R2. That said, some portion of managed pond habitat may be retained to provide shorebird habitat (for western snowy plover in particular) pending further ecological assessment of the appropriate balance of restored marsh to managed pond in collaboration with the SBSPRP's project management team. The project will implement tidal marsh restoration (and potentially some proportion of managed pond enhancement) at Ponds R1 and R2 early in the construction sequence to reduce the temporal loss of tidal marsh habitat from levee fill in marshes. A later phase of the project may include tidal marsh restoration of the bayward portion of Pond SF2 and the adjacent diked marsh between SF2 and the Cooley Marsh (located in the Ravenswood Open Space Preserve). This action would substantially improve tidal marsh habitat connectivity for wildlife movement along the bayshore.

Tidal Marsh-Upland Transition Zone Habitat

The Project includes the creation of broad, gently sloped tidal marsh-upland transition zones (also referred to as horizontal levees), the ecological benefits of which include:

- ✓ Provision of high-tide refugia for the endangered salt marsh harvest mouse and California Ridgway's rail, considered essential for the survival and recovery of these species;[12]
- ✓ Provision of essential habitat for endangered marsh plants (e.g., salt marsh bird's beak and California sea blight) and promotion of high plant and animal community diversity;[13]
- ✓ Increased habitat diversity and biodiversity; and
- ✓ Accommodation of landward movement of tidal marsh with sea level rise.

As Project design progresses, the SFCJPA will consider the following factors, in consultation with stakeholders including the SBSPRP, to determine optimal locations and footprints of transition zone habitats:

- Minimizing fill within tidal marshes;
- Set-backs and site constraints;
- Quality and proximity of existing tidal habitats;

[12] U. S. Fish and Wildlife Service, 1984. *Salt Marsh Harvest Mouse and California Clapper Rail Recovery Plan*. Shellhammer, H., 2012. *Small Mammals. Ecology, Conservation, and Restoration of Tidal Marshes, the San Francisco Estuary*. San Francisco Bay Area Wetlands Ecosystem Goals Project, 2015. *The Baylands and Climate Change: What We Can Do. Baylands Ecosystem Habitat Goals Science Update*. U. S. Fish and Wildlife Service, 2013. *Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California*.

[13] U. S. Fish and Wildlife Service, 2013. *Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California*. San Francisco Bay Area Wetlands Ecosystem Goals Project, 1999. *Baylands Ecosystem Habitat Goals*.

- Relative importance of existing tidal habitats for endangered wildlife species; and
- Projected inundation associated with sea level rise and sedimentation and the resulting sustainability of existing tidal marshes.

Tidal marsh habitat or a mix of tidal marsh and managed pond habitats will be restored in Ponds R1/ R2. Transition zone habitat will be restored in Ponds R1/R2 and R4, as described below. The relative amount of restored tidal marsh, managed pond and transition zone habitats will be evaluated in collaboration with the SBSPRP.

- ***Tidal Marsh-Upland Transition Zone Habitat at Pond R1/R2***. The Project will construct a broad, gently sloped habitat transition zone that will increase the surface area and vertical extent of transition zone habitat adjacent to the footprint of restored tidal salt marsh. High tide refugia could also be created within portions of Pond R1 to provide escape cover within the restored marsh. The locations of transition zone habitat will depend upon the footprint of restored tidal habitat versus enhanced managed pond habitat (to be determined in collaboration with the SBSPRP project management team).

- ***Tidal marsh-upland transition zone habitat construction at Pond R4.*** Similar to Pond R2, the Project will construct a broad, gently sloped habitat transition zone that will increase the surface area and vertical extent of transition zone habitat relative to the amount of transition zone habitat restored in Pond R4 by the SBSPRP. The design will be developed in collaboration with the SBSPRP project management team.

Western Snowy Plover Breeding Habitat Enhancement

The western snowy plover is known to breed in Pond R3.[14] The Project could enhance snowy plover breeding habitat in Pond R3 by placing oyster shell or similar material within a portion of Pond R3. The precise locations of enhancement work will be determined in collaboration with the SBSPRP project management team.

Recreation

The Project overlaps with segments of the San Francisco Bay Trail and other trails. The Project includes proposed improvements to existing recreational access to the shoreline. Figures 2 through 7 present representative conceptual designs for trails to be constructed as part of the Project. By elevating these shoreline trails, the Project will reduce the trails' exposure to flooding, thereby increasing public access and trail longevity. Other options include new trails that connect to existing Bay Trail.

14 Pearl, B. and A. Chen, 2018. *Western Snowy Plover Monitoring in the San Francisco Bay. Annual Report 2017.* Prepared by the San Francisco Bay Bird Observatory for the Don Edwards San Francisco Bay National Wildlife Refuge and the California Department of Fish and Wildlife. Pearl, B., A. Chen, and Y. Wang, 2019. *Western Snowy Plover Monitoring in the San Francisco Bay, Annual Report 2018*. Prepared by the San Francisco Bay Bird Observatory for the Don Edwards San Francisco Bay National Wildlife Refuge and the California Department of Fish and Wildlife.

Construction, Operations, and Maintenance

Construction of the Project will occur in phases. Improvements within the Substation and Marsh Restoration and South of Bay Road--East Palo Alto reaches, which will be evaluated at a project level of detail in the EIR, will be constructed as part of the first phase, assumed to begin in 2025 (subject to the availability of funding). Supplemental CEQA for those aspects of the Project evaluated in the SAFER Bay EIR at a program level of detail will occur before construction of those elements. For purposes of analysis, construction of the entire Project is assumed to be completed by 2030. Following construction, monitoring of tidal marsh restoration, transition zone creation, and managed pond enhancement will occur in accordance with applicable permit requirements. Levees, floodwalls, and flood risk reduction structures will be visually inspected periodically and any damage will be repaired as needed.

Alternatives

Pursuant to CEQA Guidelines Section 15126.6, the EIR will consider alternatives to the proposed Project, including the No Project Alternative. [15] Preliminary options to be considered for evaluation in the EIR include other Project alignment and design options identified in the Feasibility Report. Reviewers are encouraged to identify additional alternatives to be considered for potential inclusion in the EIR when commenting on this NOP.

Possible Environmental Impacts and Need for an EIR

Because of the potential for significant impacts to the environment, the SFCJPA has determined that an EIR is appropriate under CEQA. The purpose of an EIR is to inform decision-makers and the general public of the environmental effects of a proposed Project. The EIR process is intended to provide information sufficient to evaluate a project and its potential to cause significant impacts on the environment; examine methods of reducing adverse environmental impacts; and identify and evaluate alternatives to the proposed project. The following environmental resources will be evaluated in the EIR:

- Aesthetics
- Agriculture and Forestry Resources
- Air Quality
- Biological Resources
- Cultural Resources and Tribal Cultural Resources
- Energy
- Geology, Soils and Minerals
- Greenhouse Gas Emissions
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Land Use and Planning
- Mineral Resources
- Noise and Vibration
- Population and Housing
- Public Services
- Recreation
- Traffic and Transportation
- Utilities and Public Services
- Wildfire

[15] Managed retreat is the movement and transition of people and ecosystems away from vulnerable coastal areas. Georgetown Climate Center Managed Retreat Tool Kit web site: https://www.georgetownclimate.org/adaptation/toolkits/managed-retreat-toolkit/introduction.html. Accessed April 1, 2022.

The Draft EIR will analyze potentially significant impacts to the physical environment and propose measures to mitigate (avoid, reduce, or compensate for) impacts that are determined to be significant.

As several community tracts in the Project vicinity meet the criteria to be designated as disadvantaged communities, the SFCJPA will also be considering social and economic equity issues during preparation of the Draft EIR.

EIR Scoping Process

This NOP initiates the CEQA scoping process through which the SFCJPA will refine the range of issues and alternatives to be addressed in the Draft EIR. The public is invited to comment on this proposal to prepare the EIR and on the scope of issues to be included in it. The SFCJPA will host a Scoping Meeting:

May 19, 2022 at 6:00 p.m.
You must register in advance for this webinar:

https://us02web.zoom.us/webinar/register/WN_UlRvFu4eRwiOXlC-qiBf2Q

After registering, you will receive a confirmation email containing information about joining the webinar.

Virtual meetings are planned to reach the greatest number of stakeholders as possible. Spanish and Tongan translation will be available during the meeting. RSVPs are encouraged, but not required. In addition, the SFCJPA is happy to meet in person with individuals or groups or provide a tour or the project areas.

The May 11 and May 19 meetings are part of the EIR scoping process during which the general public, public agencies, and private sector entities can provide input on specific topics that they believe should be addressed in the environmental analysis.

Due to the size and complexity of the Project, the SFCJPA and project partners at Nuestra Casa and Climate Resilient Communities will implement a sustained stakeholder engagement process throughout planning, design and construction, consistent with the SAFER Bay Community Outreach Plan.

Requests for in-person meetings, or tour of the Project area or any questions are welcome. Written comments on the NOP are **due by June 15, 2022** and may be sent to:

Tess Byler, Senior Project Manager
San Francisquito Creek Joint Powers Authority
2100 Geng Road
Palo Alto CA 94303
tbyler@sfcjpa.org

The SFCJPA Board adopted Resolution 21-12-16B for the Bay Adapt Platform guiding principles and priority actions to foster local and regional consensus on the actions necessary to protect people and the natural and built environment from rising sea levels. This transparent and collaborative process lays out regional strategies that focus on overcoming barriers and identifying factors for successful sea level rise adaptation outcomes. Use of this platform, and the ideas in it, will create a Project that is informed by local input with regional coordination using the best available science.

Public Participation in EIR Review

All interested persons and organizations wishing to be notified when the Draft EIR is available for review should respond to this notice and provide a current address. You may do so by emailing Tess Byler at tbyler@sfcjpa.org, or telephone (650) 484-0859, or by completing an interest form at the SFCJPA website, Connect With Us — San Francisquito Creek Joint Powers Authority (sfcjpa.org).

The SFCJPA will add you to our list of interested parties and will provide notice when the Draft EIR is available. In anticipation of community and stakeholder interest in the Project, the SFCJPA is extending the normal review period for the Notice of Preparation to 45 days with comments to be submitted by Monday June 6, 2022.

Information about availability of the Draft EIR will also be posted on the SFCJPA's website (http://sfcjpa.org).

Permits and Approvals

The Projects may require discretionary permits and other approvals from the agencies listed below.

Agency or Organization	Action Potentially Requiring Permit or Consultation
Federal	
U.S. Army Corps of Engineers	Impacts to wetlands and waters of the U.S.
U.S. Fish and Wildlife Service	Impacts to federal listed threatened and endangered species
National Oceanic and Atmospheric Administration: National Marine Fisheries Service	Impacts to federal listed threatened and endangered species
State	
State Historic Preservation Office	Construction in or near cultural resources
State Lands Commission	Need for an approval action to be confirmed
California Department of Fish and Wildlife	Effects on state-listed species
Regional Water Quality Control Board	Impacts to waters of the state and potential for surface water quality impairment from pollutant discharge
Bay Conservation and Development Commission	Impacts to lands within BCDC jurisdiction
Local	
City of East Palo Alto	Various
City of Menlo Park	Various
City of Palo Alto	Various

Related Planning and Projects

Dumbarton Bridge West Approach and Adjacent Communities Resilience Study

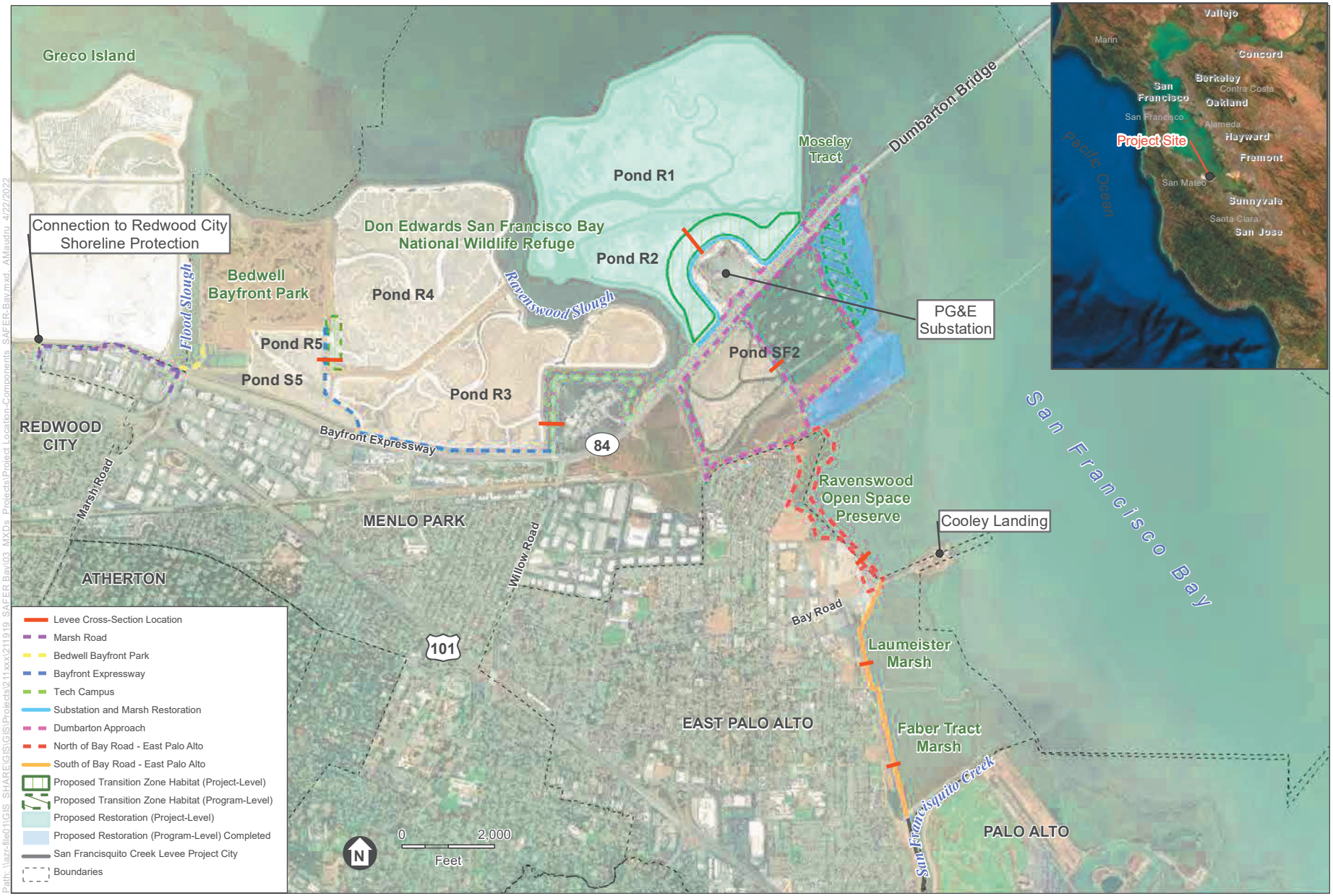
The *Dumbarton Bridge West Approach and Adjacent Communities Resilience Study*[16] is a separate, complimentary planning effort to the SAFER Bay Project. The Metropolitan Transportation Commission (MTC) completed this study of the Dumbarton Bridge/Highway 84 Corridor in 2020, which was funded by the California Department of Transportation (Caltrans), the MTC, and the Bay Area Toll Authority. The purpose of the study was to develop a strategy for sea level rise adaptation for the western approach of the bridge and adjacent communities. The SAFER Bay

16 AECOM, San Francisco Estuary Institute, and Skeo, 2020. *Dumbarton Bridge West Approach and Adjacent Communities Resilience Study Technical Report*. Prepared for the Metropolitan Transportation Commission.

Project includes Caltrans as a partner and incorporates the most recent evaluation of potential actions in the Dumbarton corridor.

South Bay Salt Ponds Project

The South Bay Salt Pond Restoration Project (SBSP Project) is the largest tidal wetland restoration project on the West Coast. The SBSP Project encompasses approximately 15,000 acres of former industrial salt ponds located in the South San Francisco Bay, including the 1,600-acre Ravenswood Pond Complex that overlaps with some of the Project Area. This complex is part of the Don Edwards San Francisco Bay National Wildlife Refuge, owned and managed by the U.S. Fish and Wildlife Service (USFWS). Parts of the SAFER Bay Project site are within the Ravenswood Pond Complex. As indicated in the preceding text, in coordination with the SBSP Project, the SFCJPA proposes to restore habitat within Ponds R1, R2 and R5.



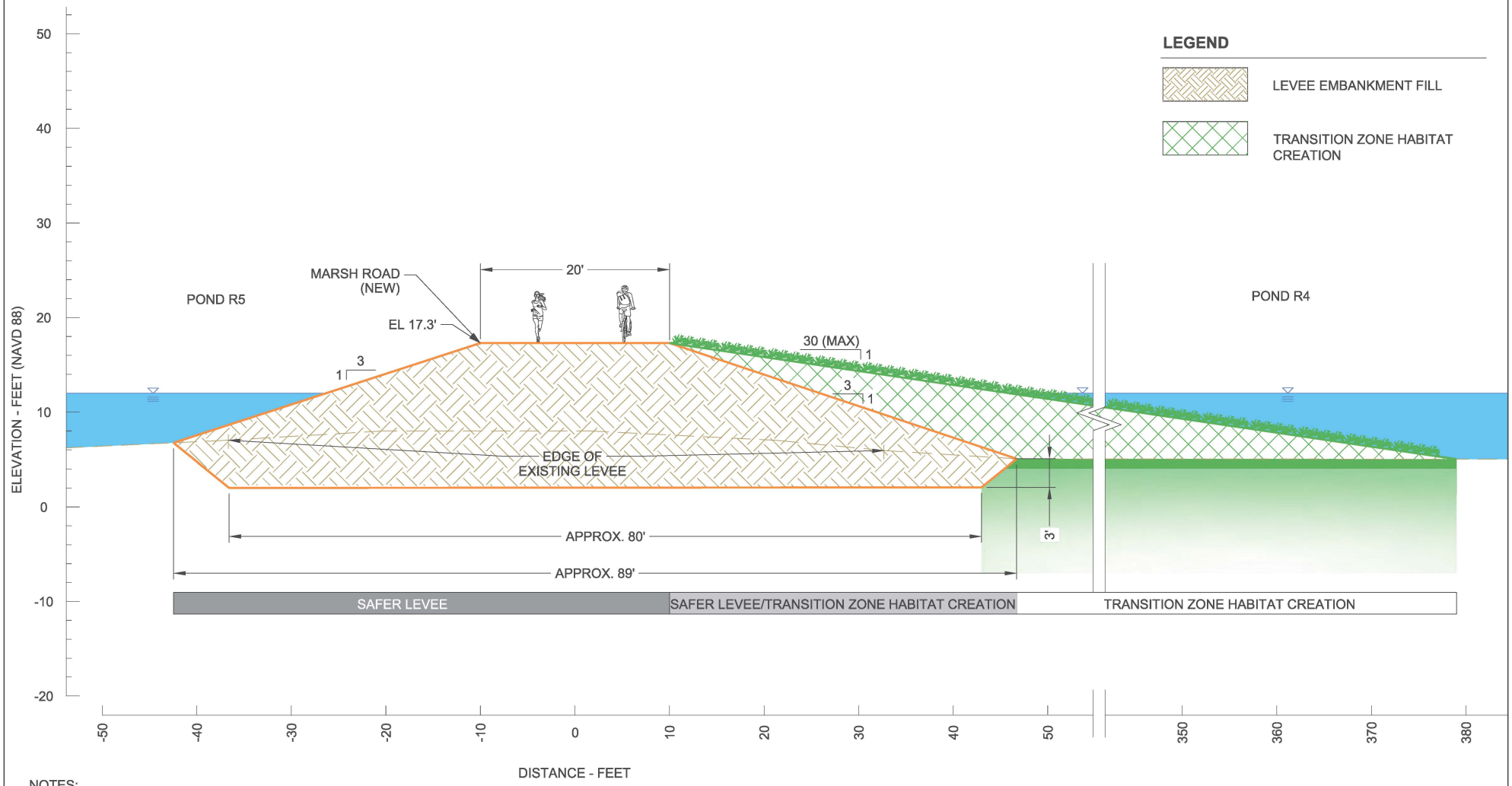
SOURCES: ESA, 2021; HDR, 2021; HT Harvey & Associates, 2021; ESRI World Imagery, 2021

NOTES: 1. Reaches to be evaluated at a project-level of detail are shown in solid lines; reaches to be evaluated at a program-level of detail are shown as dashed lines.
2. While program-level transition zones are indicated, additional areas that are not yet determined will be evaluated in the EIR. This figure does not reflect proposed improvements to western snowy plover habitat in Pond R3.
3. Water control structures will affect ecotone levee arrangement. Water control structures are/will be located between Ponds R5 and S5 and S5 and R3.
4. SAFER Bay Project will not conflict with Dumbarton Rail corridor or efforts to place it back in service.

SAFER Bay Project

Figure 1
Project Location and Components

ESA



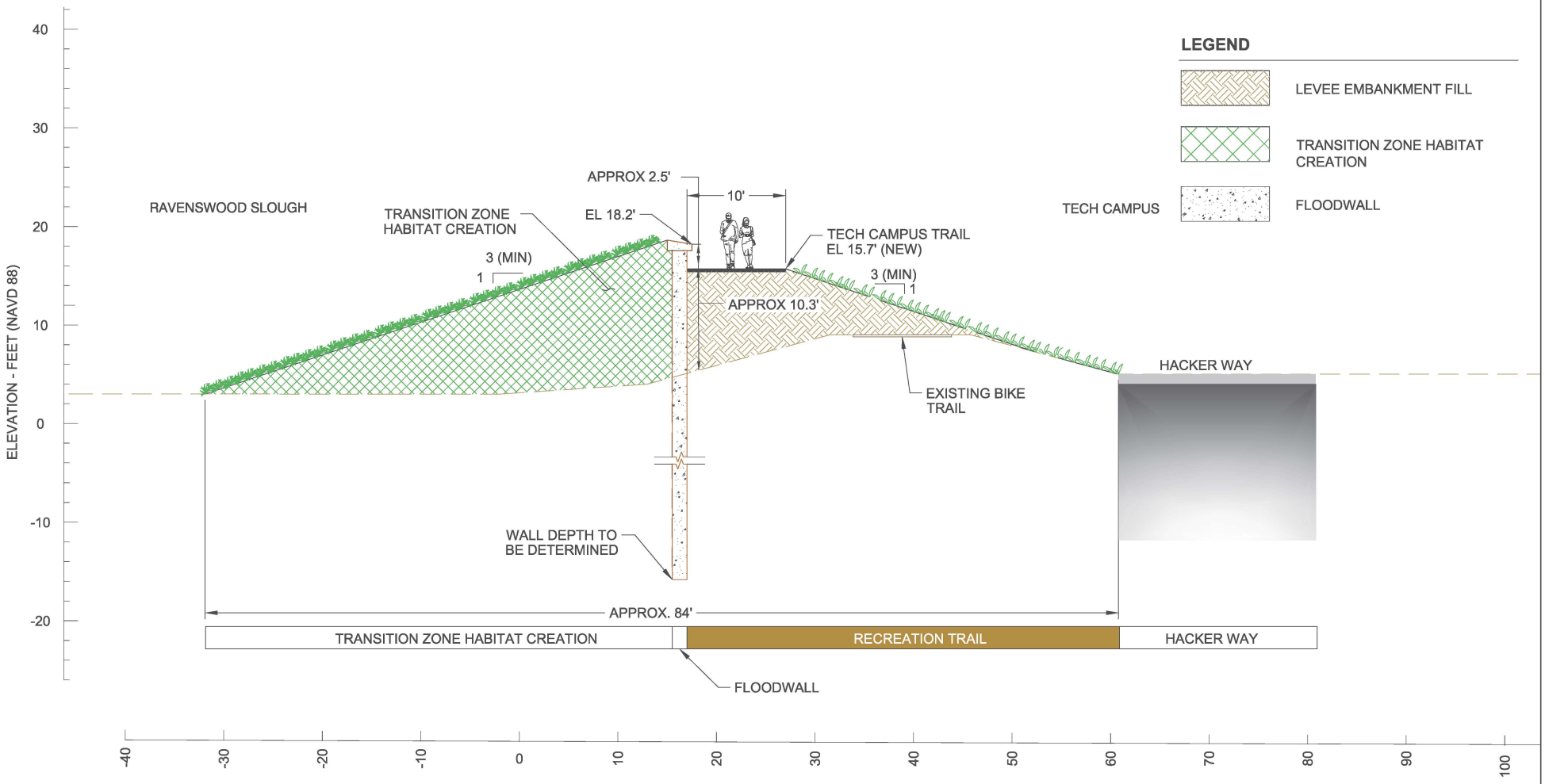
NOTES:
1. CROSS SECTION LOOKS NORTHWARD
2. ALL MEASUREMENTS ARE IN FEET
3. LEVEE HEIGHT ASSUMES 1 FT OF POST-CONSTRUCTION SETTLEMENT
4. TRANSITION ZONE DESIGNED TO BE INTEGRATED WITH AND EXPANDED UPON SBSPRP TRANSITION ZONE IMPROVEMENTS
4. EXISTING GROUND BASED ON DATA FROM USGS 2016 AND TOWILL LIDAR SURVEY 2019

CONCEPTUAL CROSS-SECTION OF LEVEE WITH TRANSITION ZONE HABITAT
(BEDWELL BAYFRONT PARK)

SAFER BAY PROJECT

Date
MAY 2022

Figure
2



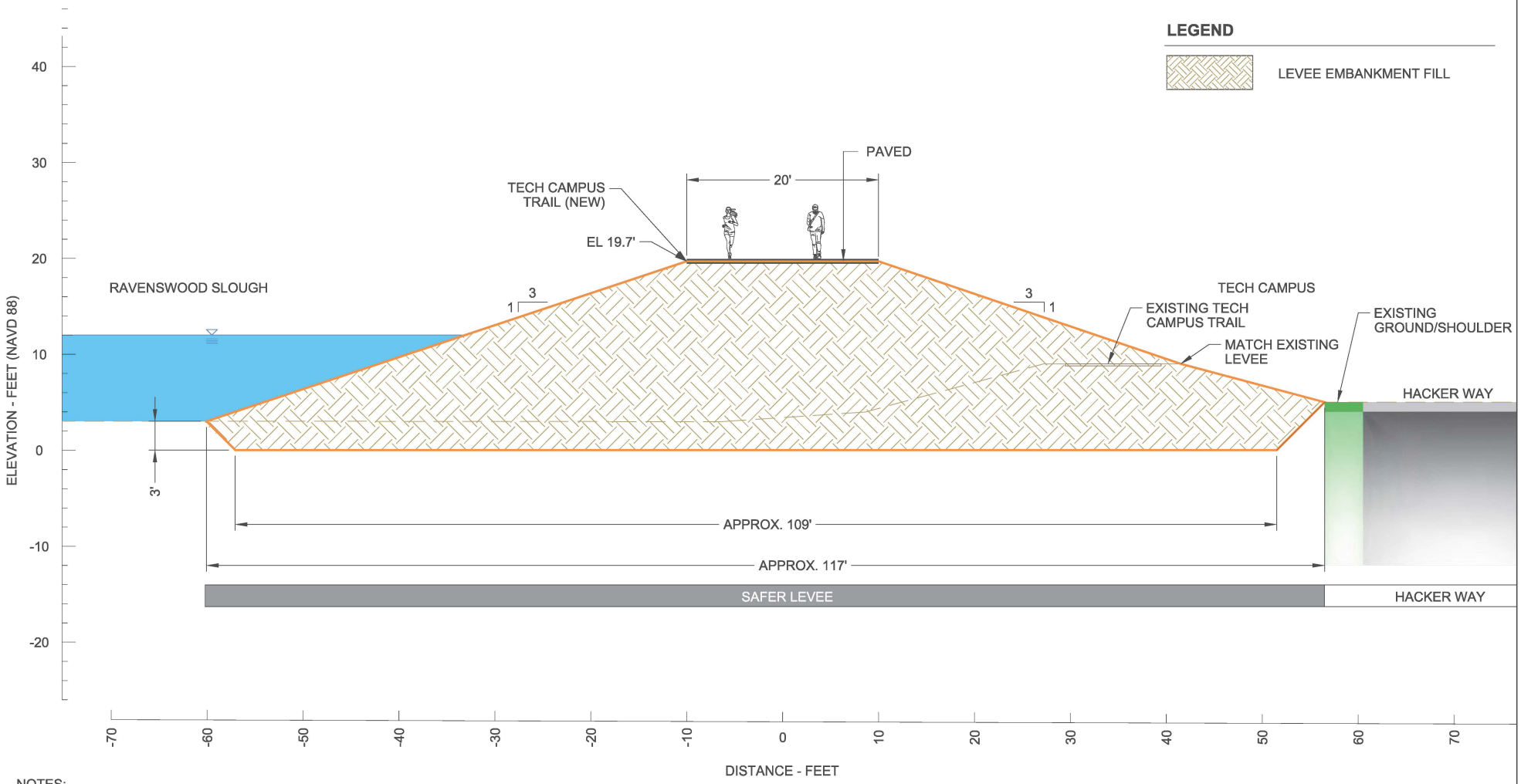
NOTES:
1. CROSS SECTION LOOKS NORTHWARD
2. ALL MEASUREMENTS ARE IN FEET
3. TRANSITION ZONE DESIGNED TO BE INTEGRATED WITH AND EXPANDED UPON SBSPRP TRANSITION ZONE IMPROVEMENTS
4. EXISTING GROUND BASED ON DATA FROM USGS 2016 AND TOWILL LIDAR SURVEY 2019
5. HORIZONTAL DISTANCE BASED OFF CENTER OF LEVEE PRISM NOT CENTER OF CUTOFF WALL.

CONCEPTUAL CROSS-SECTION OF INTEGRATED FLOOD WALL AND TRANSITION ZONE HABITAT CREATION
(TECH CAMPUS)

SAFER BAY PROJECT

Date
MAY 2022

Figure
3



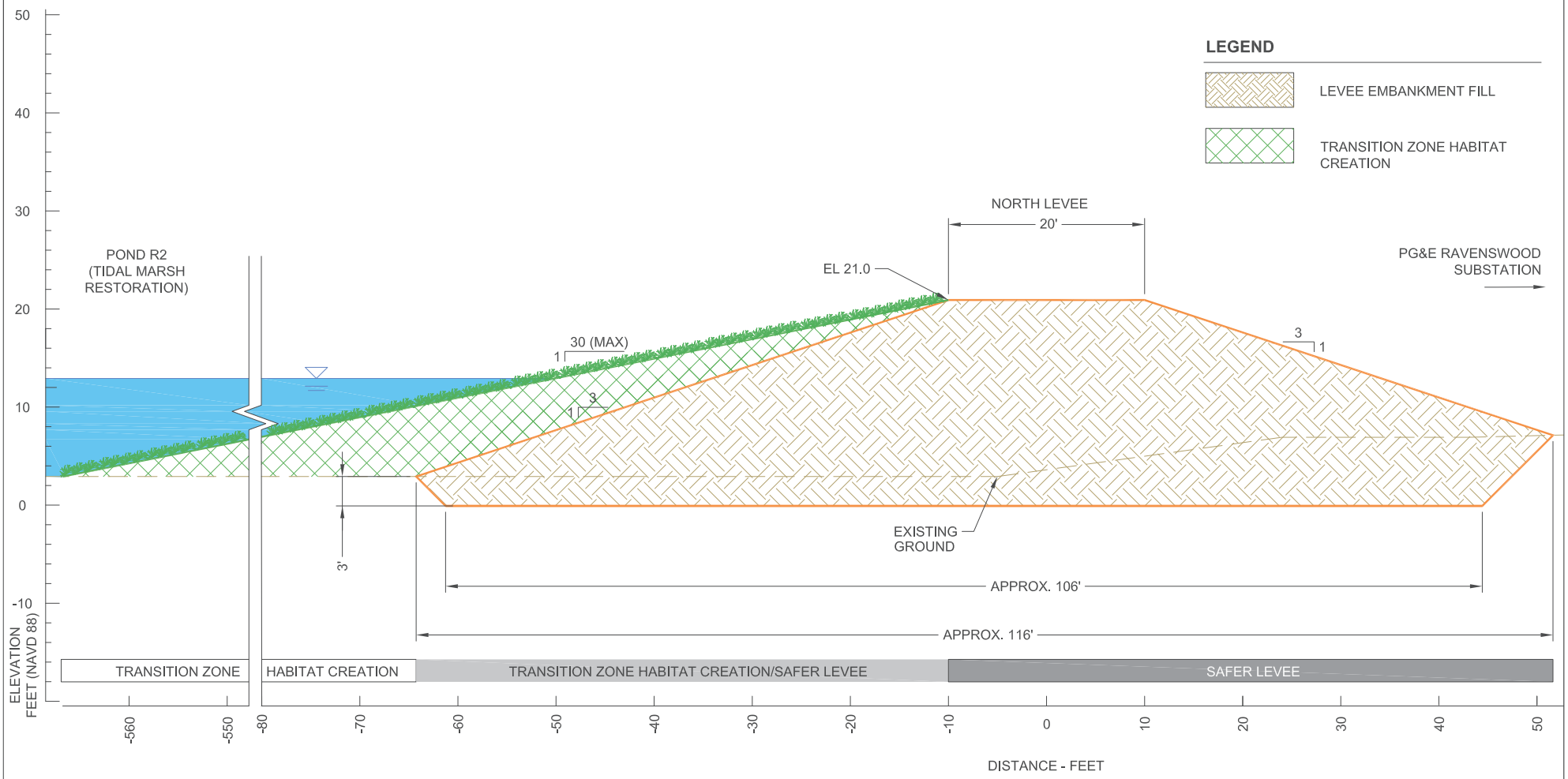
NOTES:
1. CROSS SECTION LOOKS NORTHWARD
2. ALL MEASUREMENTS ARE IN FEET
3. LEVEE HEIGHT ASSUMES 1.5 FT OF POST CONSTRUCTION SETTLEMENT
4. EXISTING GROUND BASED ON DATA FROM USGS 2016 AND TOWILL LIDAR SURVEY 2019

CROSS-SECTION LEVEE
(TECH CAMPUS)

SAFER BAY PROJECT

Date
APR 2022

Figure
4



NOTES:

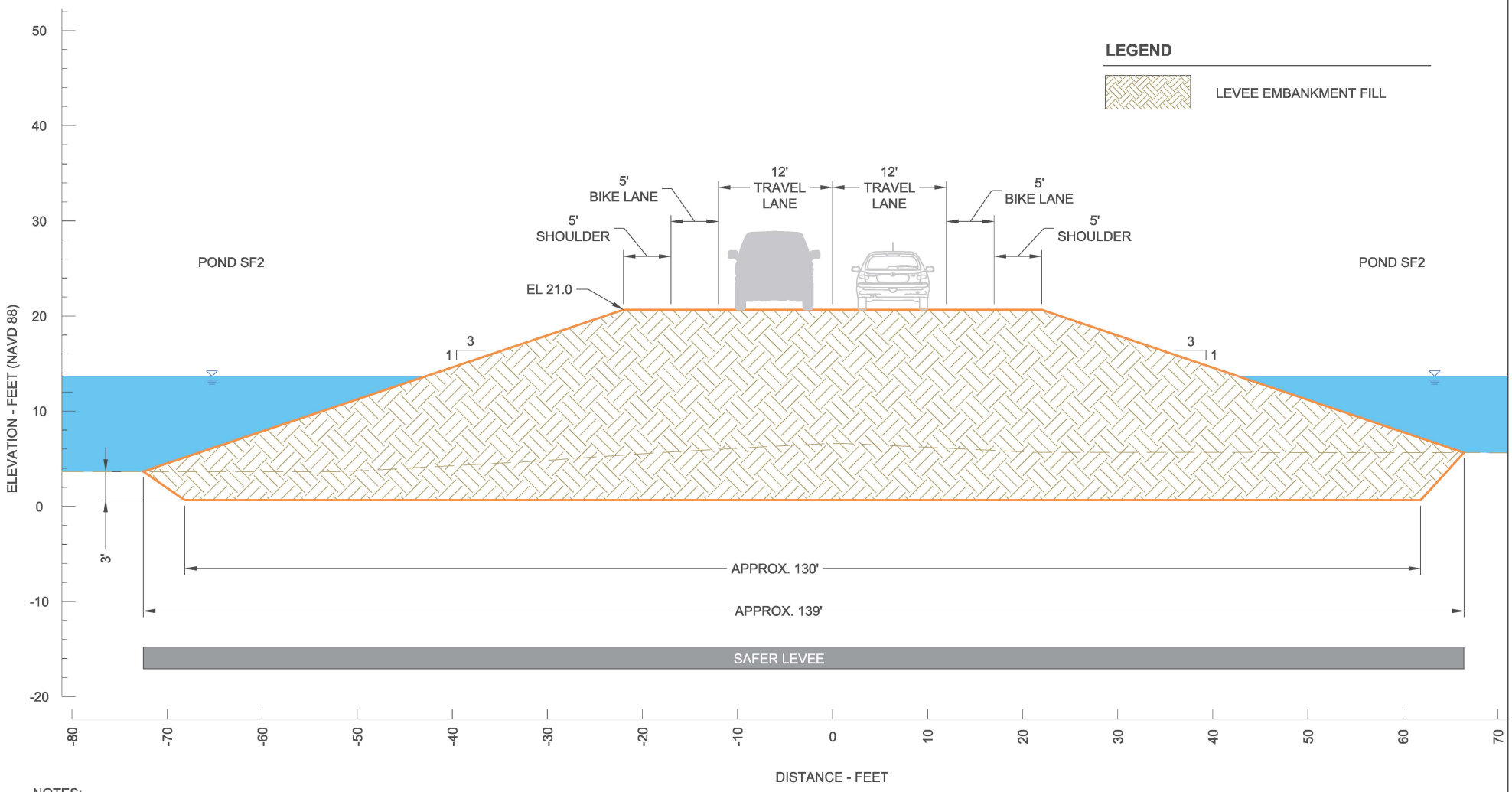
1. CROSS SECTION LOOKS EASTWARD
2. ALL MEASUREMENTS ARE IN FEET
3. REACH 5 LEVEE IS BUILT FOR 2.5FT OF POST-CONSTRUCTION SETTLEMENT
4. TRANSITION ZONE DESIGNED TO BE INTEGRATED WITH AND EXPANDED UPON SBSPRP TRANSITION ZONE IMPROVEMENTS
5. EXISTING GROUND BASED ON DATA FROM USGS 2016 AND TOWILL LIDAR SURVEY 2019

CONCEPTUAL CROSS-SECTION OF LEVEE WITH TRANSITION ZONE HABITAT CREATION
(SUBSTATION AND MARSH RESTORATION)

SAFER BAY PROJECT

Date
MAY 2022

Figure
5



NOTES:

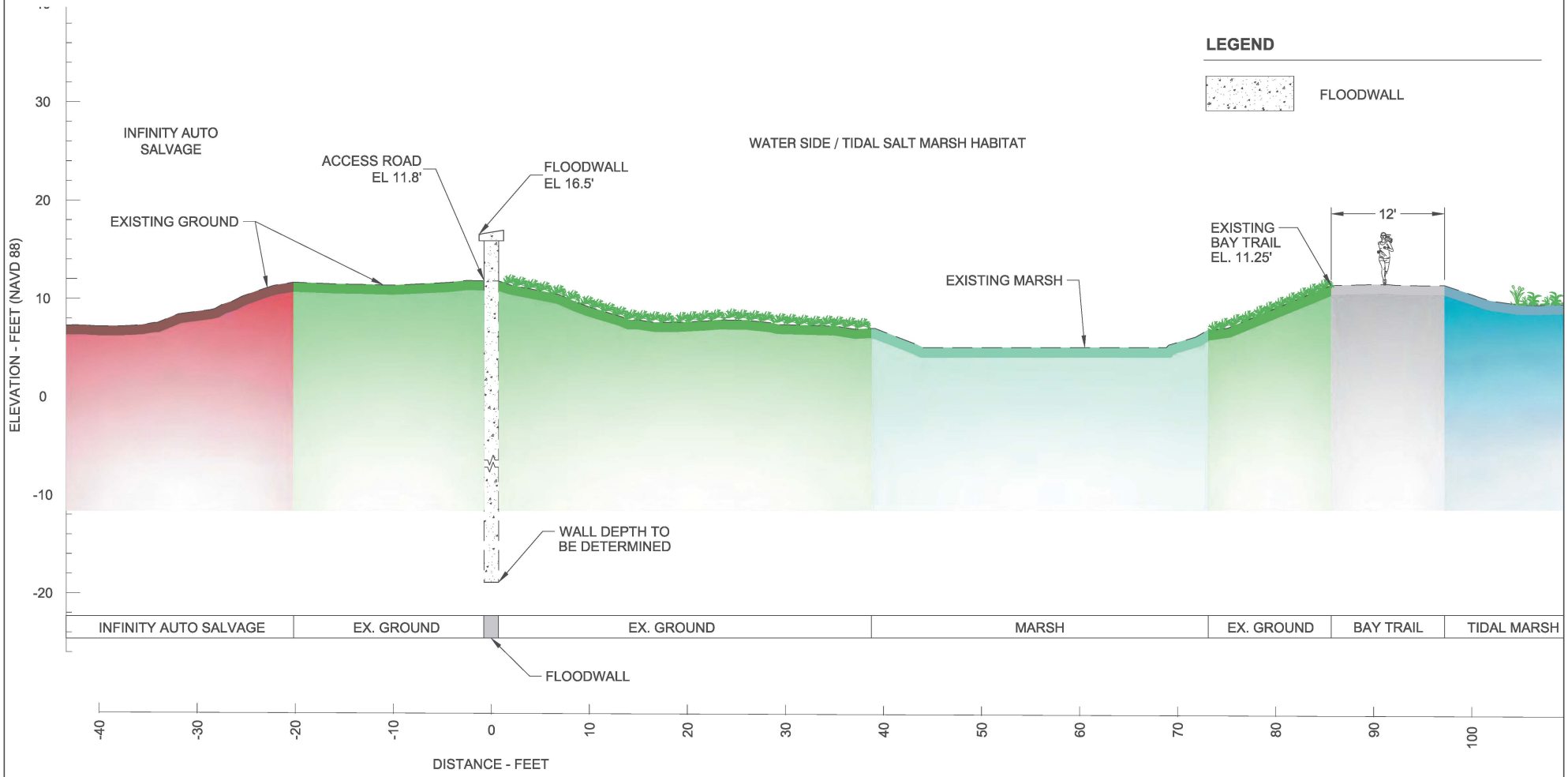
1. CROSS SECTION LOOKS EASTWARD
2. ALL MEASUREMENTS ARE IN FEET
3. LEVEE HEIGHT ASSUMES 2.5 FT OF POST-CONSTRUCTION SETTLEMENT
4. EXISTING GROUND BASED ON DATA FROM USGS 2016 AND TOWILL LIDAR SURVEY 2019
5. THERE ARE MANY ENGINEERING AND ENVIRONMENTAL CHALLENGES ASSOCIATED WITH THE CONSTRUCTION OF A LEVEE THROUGH POND SF2 THAT HAVE NOT YET BEEN FULLY EVALUATED. THIS IS ONLY A CONCEPTUAL CROSS-SECTION SHOWING A ROADWAY TO CONNECT PORTIONS OF EAST PALO ALTO TO THE DUMBARTON APPROACH. THIS CONCEPTUAL CROSS-SECTION WOULD REQUIRE FURTHER AGENCY COORDINATION AND EVALUATION TO DETERMINE IF FEASIBLE

CONCEPTUAL CROSS-SECTION LEVEE
(DUMBARTON APPROACH)

SAFER BAY PROJECT

Date
MAY 2022

Figure
6



NOTES:

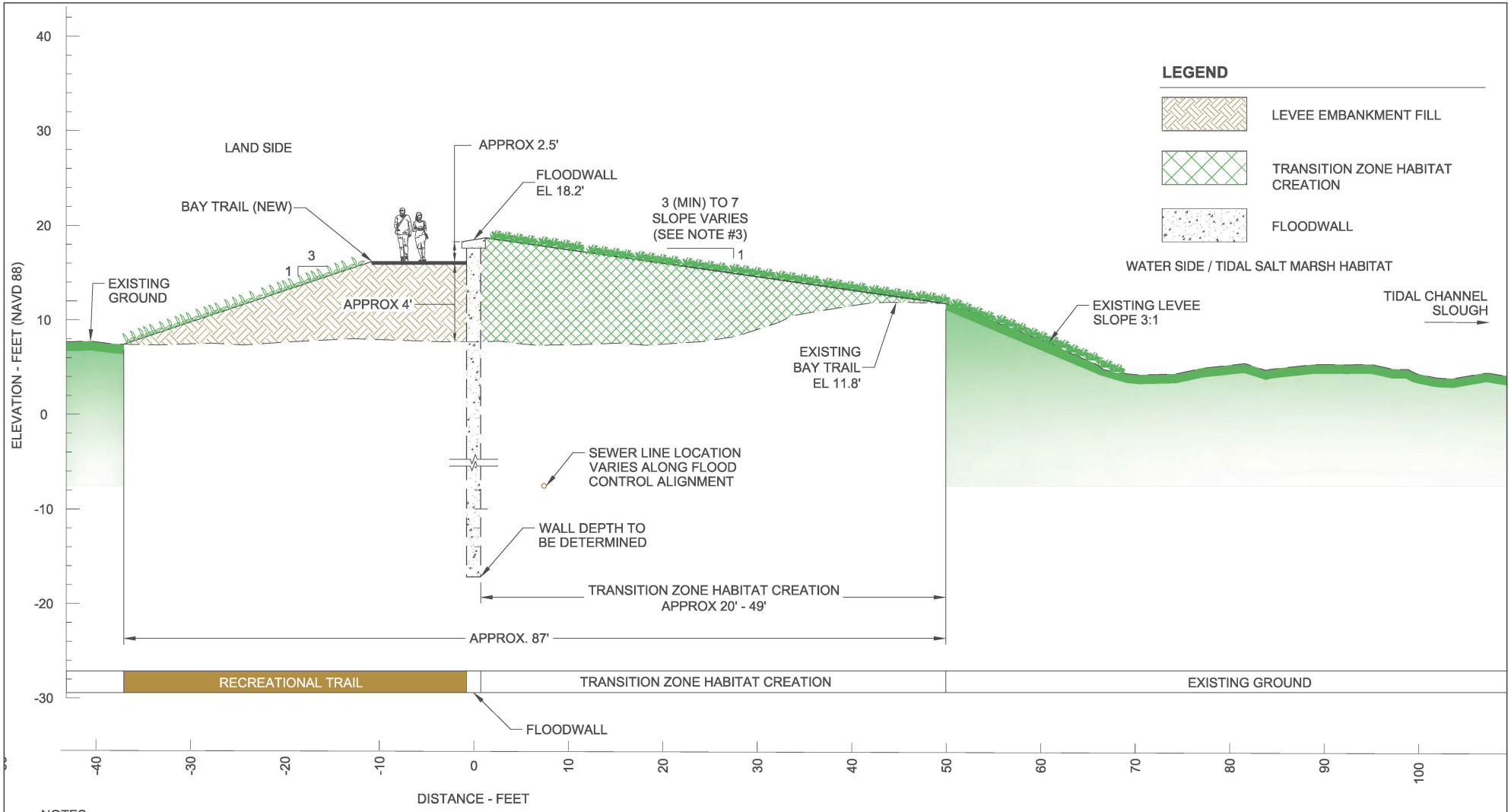
1. CROSS SECTION LOOKS NORTHWARD
2. ALL MEASUREMENTS ARE IN FEET
3. EXISTING GROUND BASED ON DATA FROM USGS 2016 AND TOWILL LIDAR SURVEY 2019
4. THERE ARE MULTIPLE FLOOD CONTROL ALIGNMENTS AND TYPES (LEVEE AND FLOODWALL) CURRENTLY BEING EVALUTED. THE SELECTED LEVEE AND/OR FLOODWALL MAY ALSO BE PAIRED WITH A TRANSITION ZONE HABITAT CREATION SLOPE

CONCEPTUAL CROSS-SECTION OF FLOODWALL AND ADJACENT MARSH
(NORTH OF BAY ROAD, EAST PALO ALTO)

SAFER BAY PROJECT

Date
MAY 2022

Figure
7



NOTES:

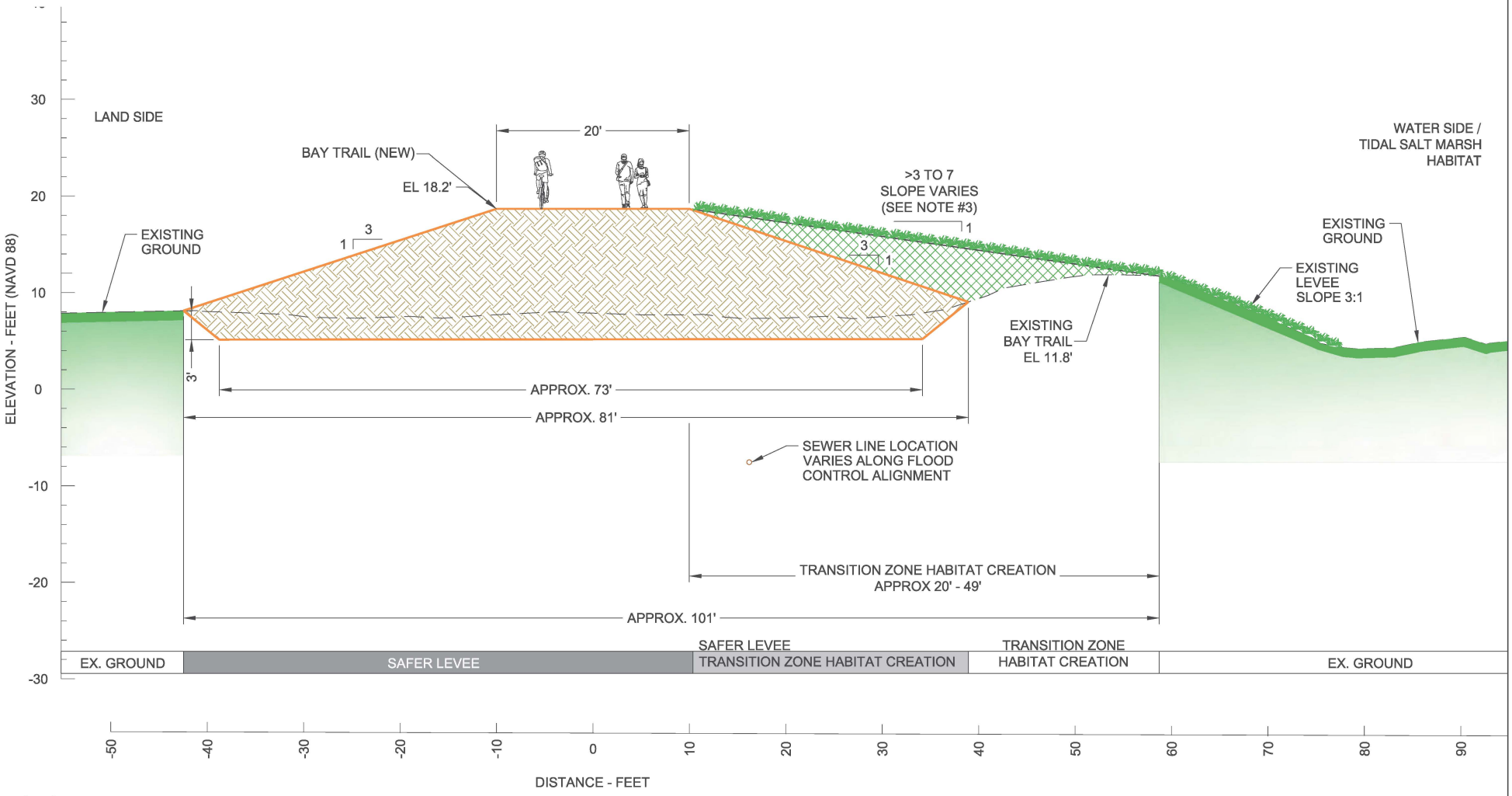
1. CROSS SECTION LOOKS NORTHWARD
2. ALL MEASUREMENTS ARE IN FEET
3. TRANSITION ZONE SLOPE WILL VARY BASED UPON LOCATION ALONG THE FLOOD CONTROL ALIGNMENT AND EXISTING CONSTRAINTS
4. EXISTING GROUND BASED ON DATA FROM USGS 2016 AND TOWILL LIDAR SURVEY 2019

CONCEPTUAL CROSS-SECTION OF INTEGRATED FLOODWALL AND TRANSITION ZONE HABITAT CREATION
(SOUTH OF BAY ROAD, EAST PALO ALTO)

SAFER BAY PROJECT

Date
MAY 2022

Figure
8



NOTES:
1. CROSS SECTION LOOKS NORTHWARD
2. ALL MEASUREMENTS ARE IN FEET
3. TRANSITION ZONE SLOPE WILL VARY BASED UPON LOCATION ALONG THE FLOOD CONTROL ALIGNMENT AND EXISTING CONSTRAINTS
4. EXISTING GROUND BASED ON DATA FROM USGS 2016 AND TOWILL LIDAR SURVEY 2019

CONCEPTUAL CROSS-SECTION OF LEVEE WITH TRANSITION ZONE HABITAT CREATION
(SOUTH OF BAY ROAD, EAST PALO ALTO)

SAFER BAY PROJECT

Date
MAY 2022

Figure
9

APPENDIX NOP-1

Assessor Parcel Numbers Associated with the Strategy to Advance Flood Protection, Ecosystems and Recreation along San Francisco Bay Project

This appendix lists the Assessor Parcel Numbers of properties that are wholly within, partially within, or within 100 feet of the footprint of the proposed Strategy to Advance Flood Protection, Ecosystems and Recreation along San Francisco (SAFER) Bay Project (Project) site excluding easements.

TABLE NOP 1-1
PARCELS POTENTIALLY AFFECTED BY THE SAFER BAY PROJECT

054-310-060	055-231-050	055-400-460	055-400-997
055-010-120	054-310-060	055-411-060	055-411-999
055-010-260	055-170-310	055-411-070	055-412-998
055-122-320	055-400-490	055-411-080	055-451-010
055-130-010	055-400-520	055-400-610	055-471-999
055-130-300	055-400-590	055-400-999	093-590-030
055-130-360	055-400-570	055-400-620	096-220-180
055-130-390	055-400-580	093-590-050	096-220-200
055-130-400	055-411-150	093-590-060	096-220-270
055-130-420	055-412-999	093-600-010	063-050-050
055-170-310	055-400-421	055-400-530	063-121-070
055-231-040	055-400-450	055-400-630	063-121-410
063-121-110	063-121-390	063-121-400	063-590-060
063-121-510	063-122-030	063-580-090	063-271-480
063-590-040	063-240-420	063-271-070	
063-272-080	063-580-100	055-400-640	

Attachment B
Public Meeting Materials

ESA

SAFER Bay Project Public Scoping Meeting



Notice of Preparation
May 19, 2022

SAN FRANCISQUITO CREEK
JOINT POWERS AUTHORITY

Esta reunión será interpretada al español.

This meeting will be interpreted into Spanish.

Language Courtesies and Interpretation Logistics

Cortesías sobre el idioma y logística de interpretación.

Logistics and Key Meeting Details

- Meeting is being recorded and will be posted on sfcjpa website
- Use Q&A for questions
- Polls

Tribal Lands Acknowledgement

The SAFER Bay Project sits on the traditional territory and unceded homeland of more than nine tribes of First Peoples – the Ohlone - who are the original inhabitants of the San Francisco Peninsula.

As the indigenous stewards of this land and in accordance with their traditions, the First Peoples have acted as caretakers of this place for millennia. We recognize the benefit of living and working in their traditional homeland.

This acknowledgement demonstrates a commitment for a process that recognizes the sovereign rights of First Peoples.

Organization

1. Welcome
2. Environmental Review Process
3. Proposed Project Overview
4. Additional public outreach
5. Comments and Questions

Welcome

Drew Combs, Menlo Park City Council, District 2 Representative and Vice Chair, SFCJPA Board

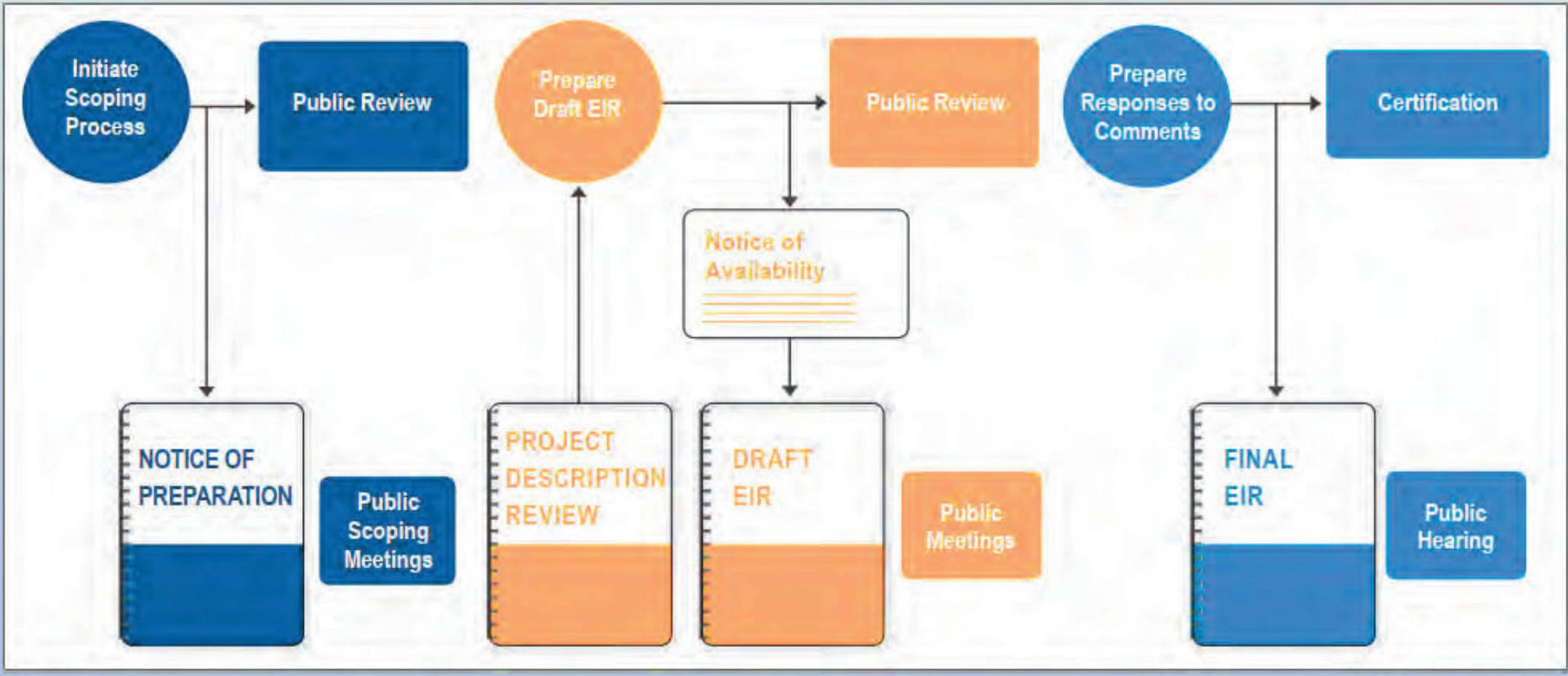


California Environmental Quality Act

- Directs agencies to:
  - Evaluate environmental impacts before considering approval of a project
  - Identify ways to reduce impacts
- Involves public in project planning
- Key document: the Environmental Impact Report

ESA

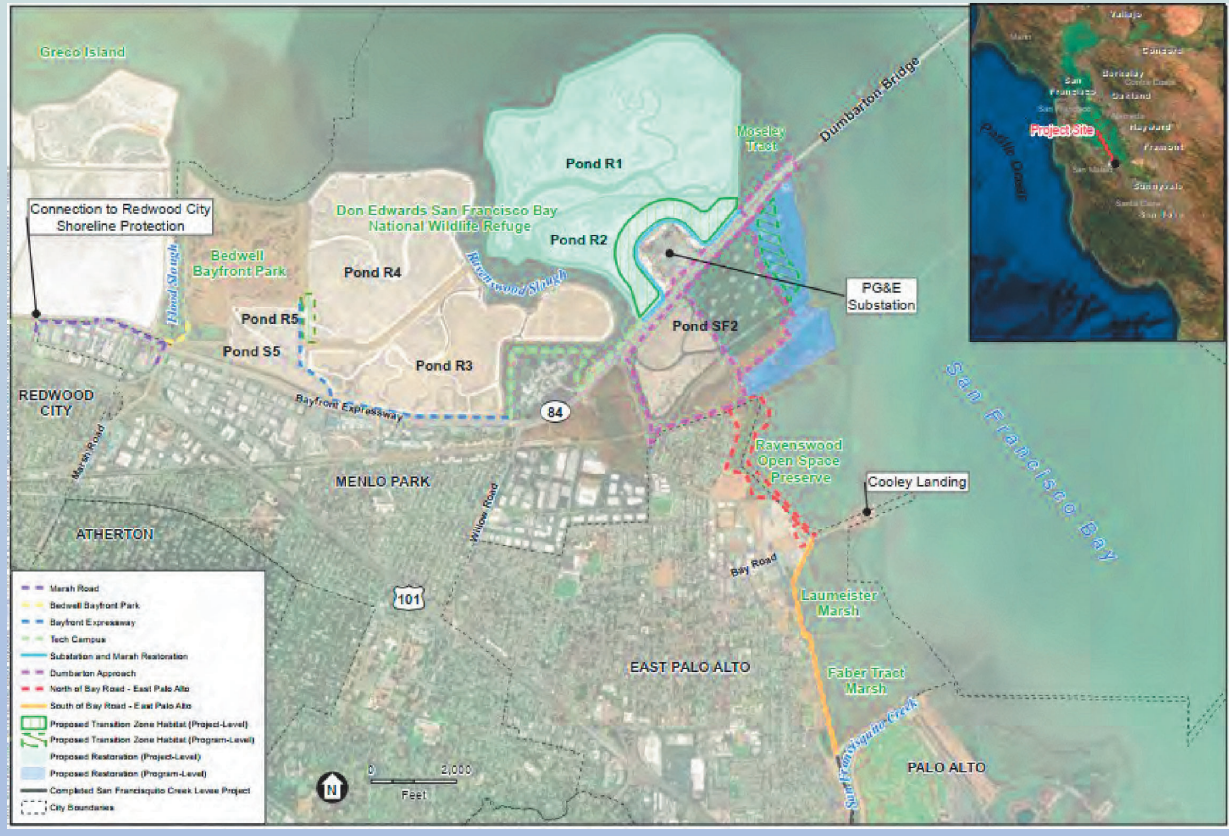
Environmental Impact Report Process



April 2022 | 2023 | Early 2024 | Late 2024

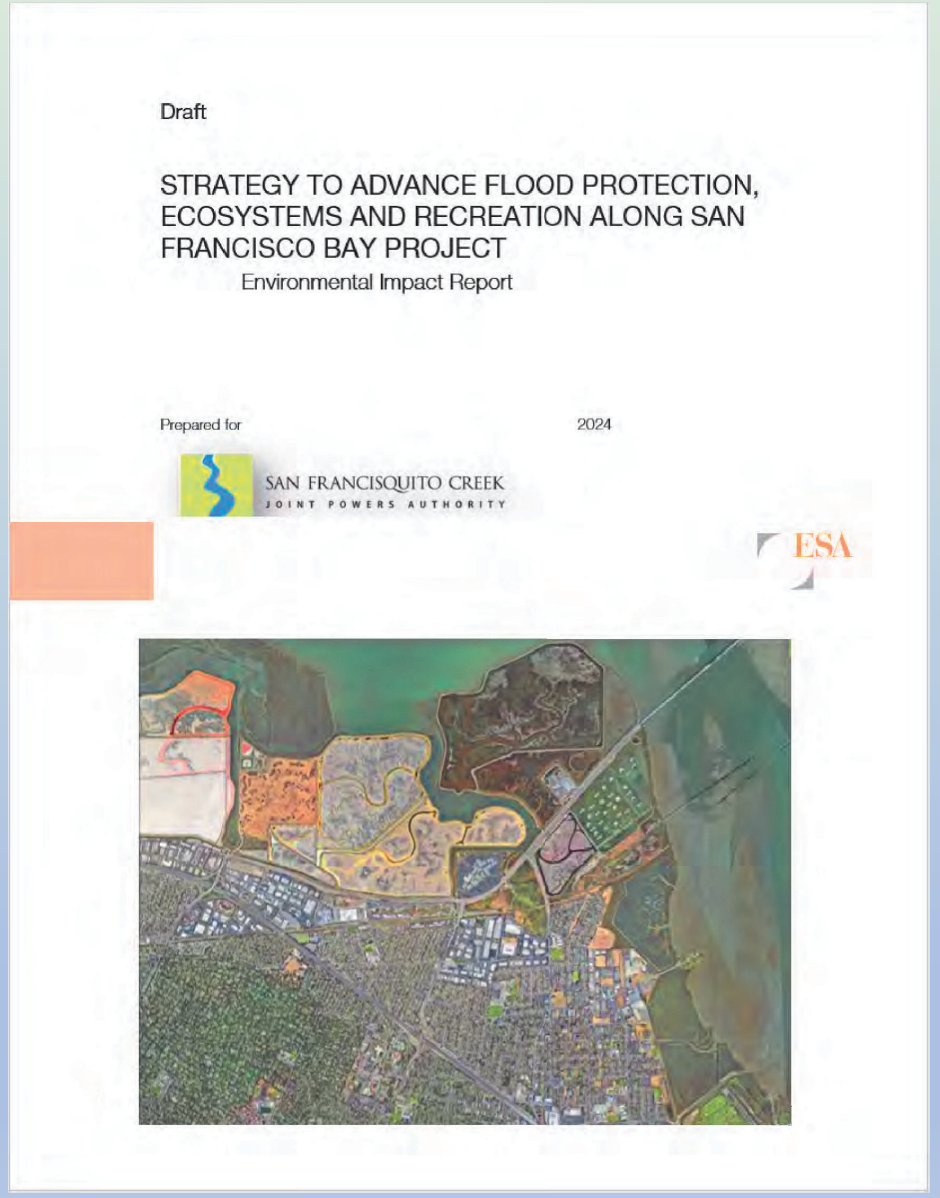
SAFER Bay EIR Level of Detail

- Project will be implemented in phases
- EIR will:
  - Evaluate Project comprehensively ("program level")
  - Include more detail for 2 reaches ("project level")



EIR Contents

- Summary
- Project Description
  - Design, construction and operations
- Environmental Setting
- Environmental Impacts
- Ways to reduce significant impacts
  - Mitigation Measures
  - Alternatives

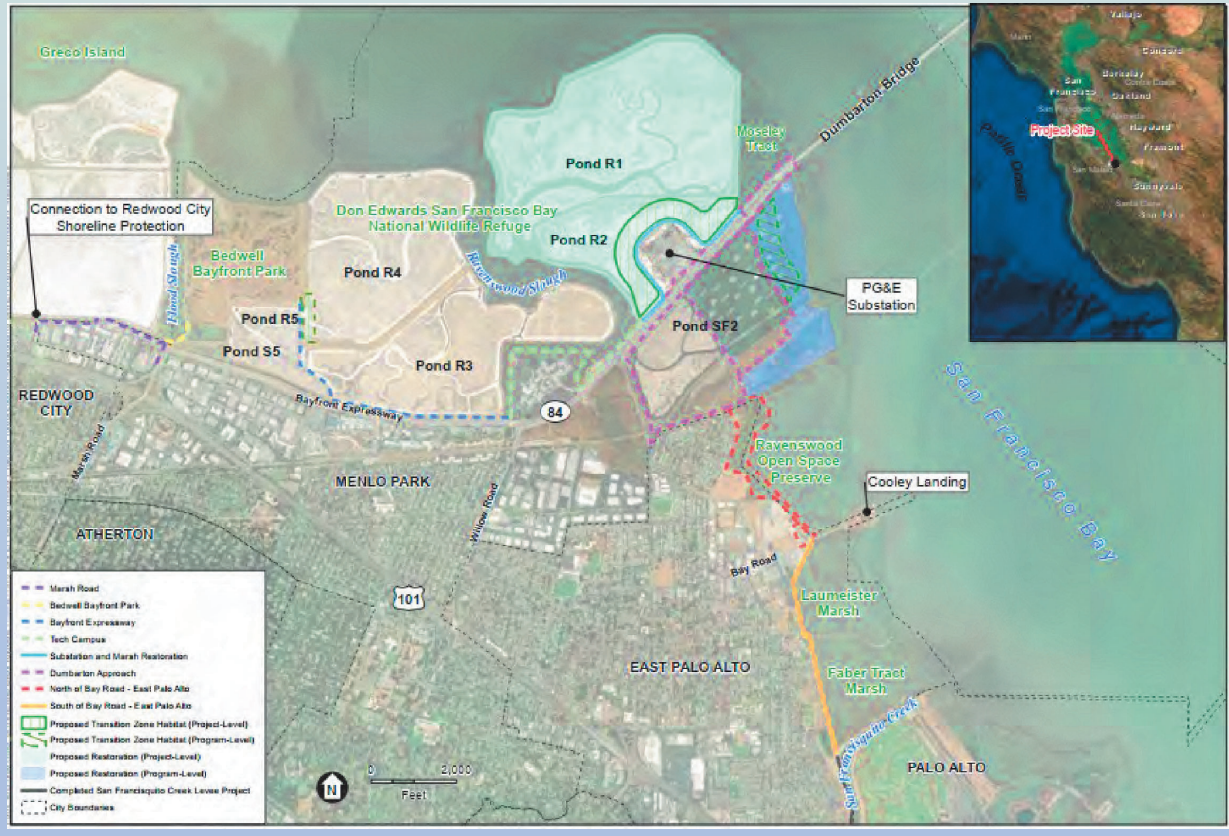


Issues to be Investigated in the EIR

- Aesthetics
- Agricultural Resources
- Air Quality
- Biological Resources
- Cultural Resources and Tribal Cultural Resources
- Energy
- Geology and Soils
- Greenhouse Gas Emissions
- Hazards, Hazardous Materials
- Hydrology and Water Quality
- Noise
- Recreation
- Traffic and Transportation
- Utilities and Public Services
- Wildfire
- Alternatives

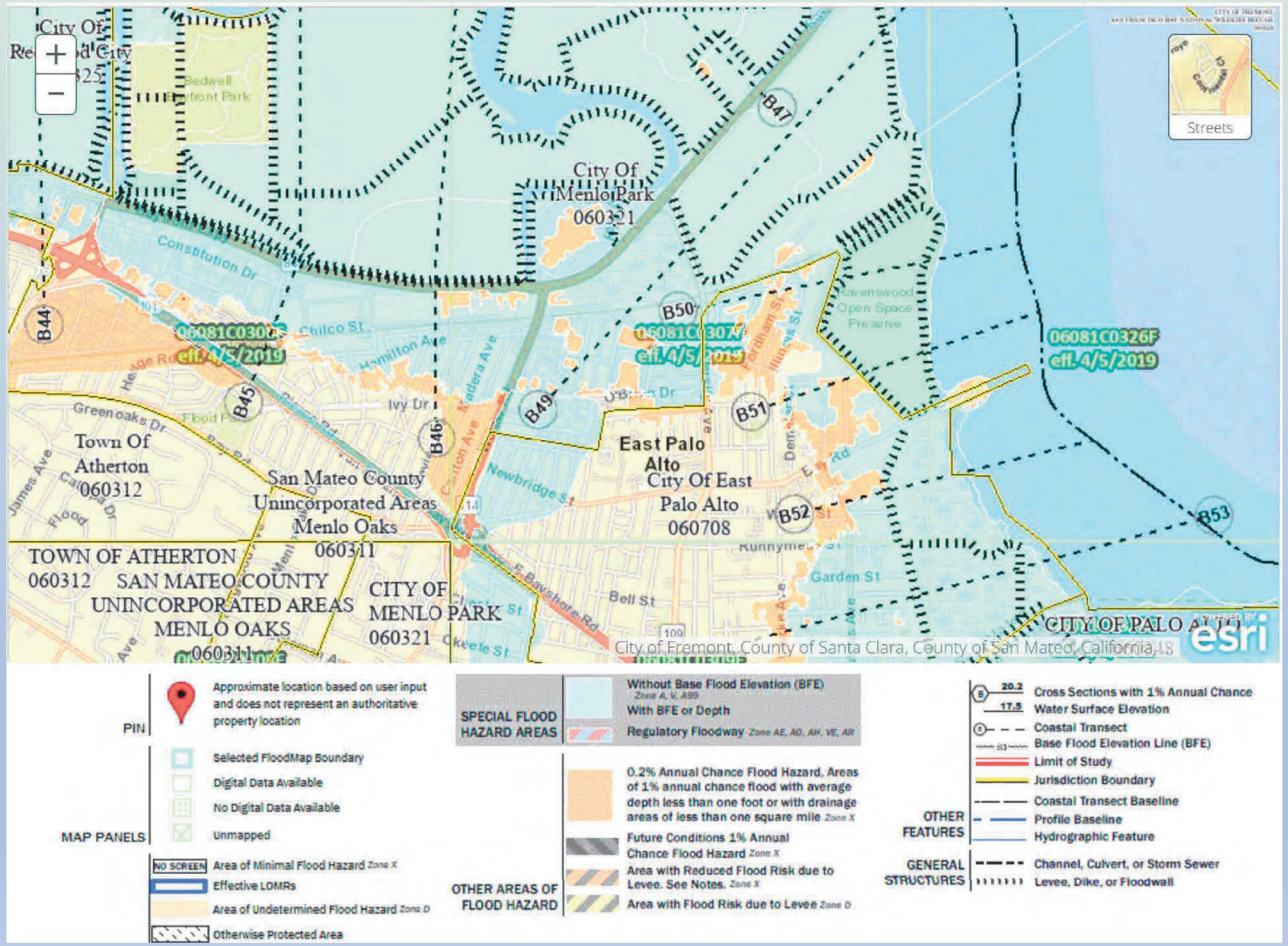
Environmental Justice

Would the Project Disproportionately Affect Disadvantaged Communities?



SAFER Bay Overview

Feasibility Study- 2016

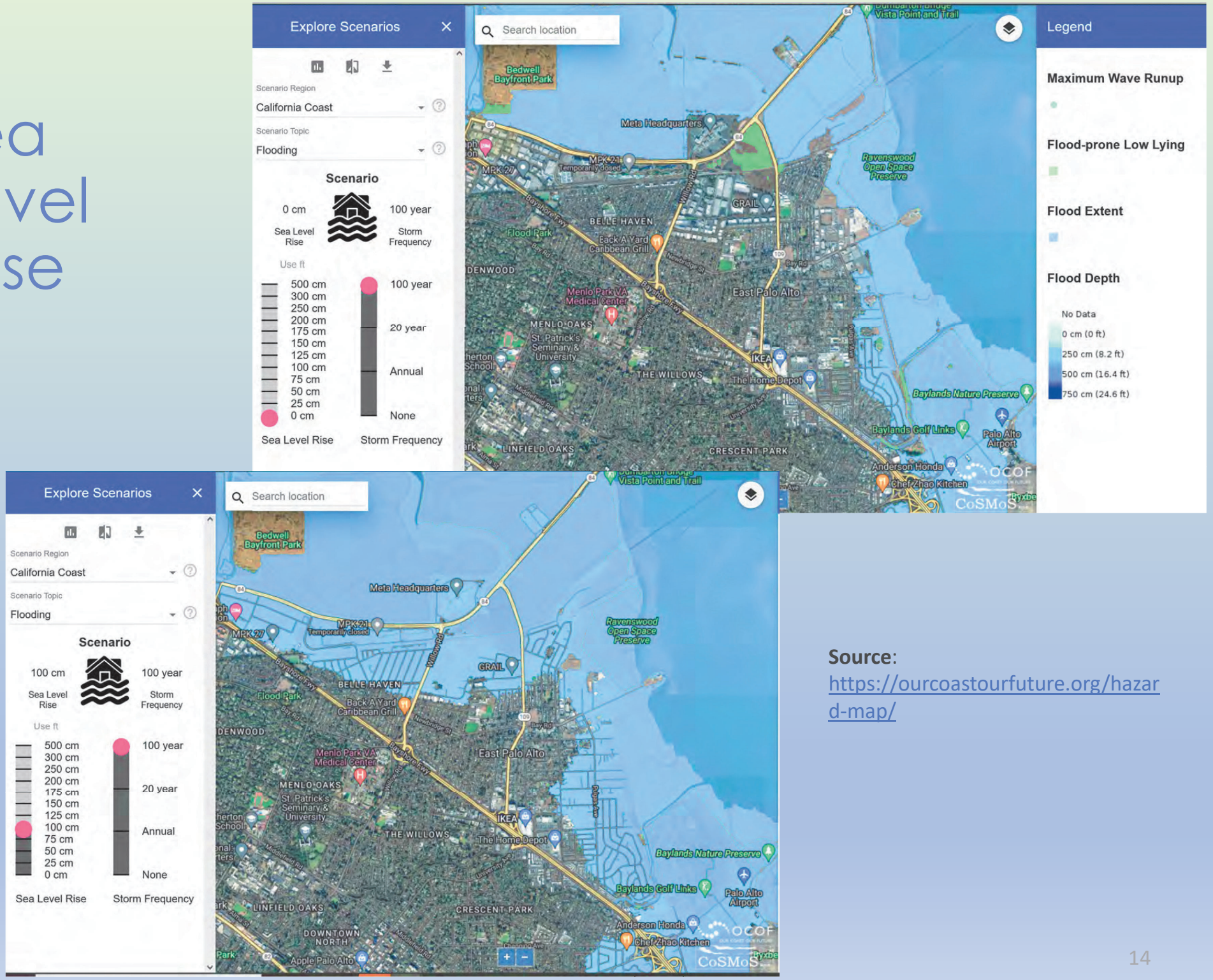


Source: FEMA Flood Map Service Center https://msc.fema.gov/portal/home

Overarching Goals:

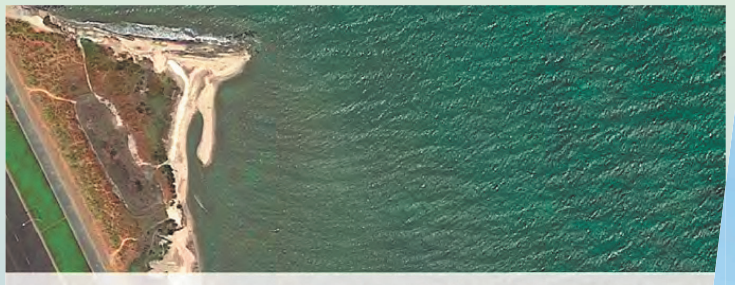
- *Nature-based flood protection and restoration of former marshes*
- *Protect properties and critical infrastructure*
- *Increase recreational opportunities*

Sea Level Rise



Source: https://ourcoastourfuture.org/hazard-map/

Multiple Studies = converging consensus on approach



SAN FRANCISCO BAY SHORELINE
Adaptation Atlas
Working with Nature to Plan for Sea Level Rise
Using Operational Landscape Units

RESILIENT BY DESIGN
BAY AREA CHALLENGE
THE FIELD OPERATIONS TEAM



DUMBARTON BRIDGE
WEST APPROACH + ADJACENT COMMUNITIES
RESILIENCE STUDY
TECHNICAL REPORT
JUNE 2020

Coastal Conservancy
METROPOLITAN TRANSPORTATION COMMISSION
Bay Area Regional Collaborative
bcdc
SAN FRANCISQUITO CREEK JOINT POWERS AUTHORITY



Public Draft Feasibility Report

SAFER Bay Project

Strategy to Advance
Flood protection, Ecosystems and
Recreation along San Francisco Bay

East Palo Alto and Menlo Park

(Task Order 1)

October 2016

SFCJPA.ORG

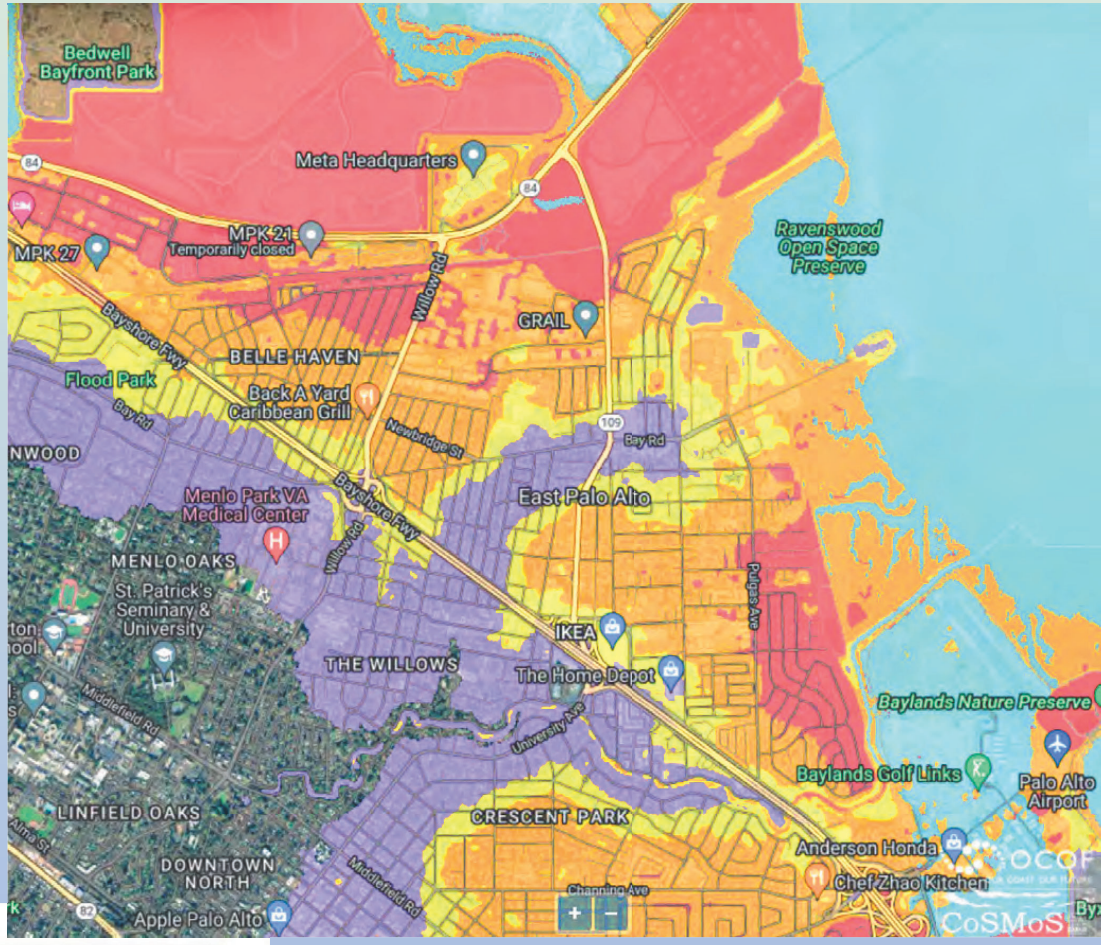
San Francisquito Creek
Joint Powers Authority
615 B Menlo Avenue
Menlo Park, CA 94025



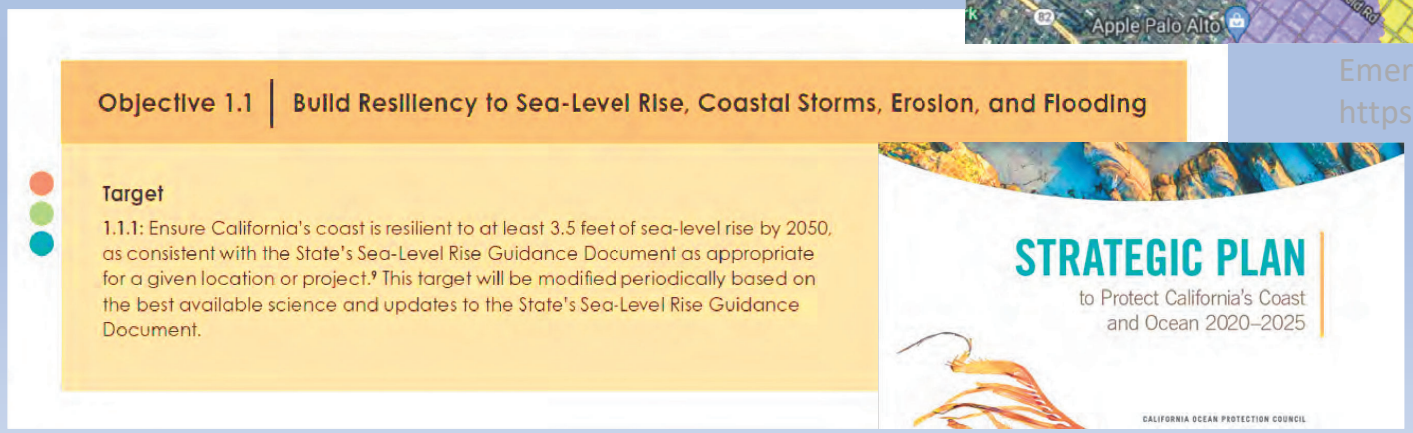
COUNTY OF SAN MATEO
SEA LEVEL RISE VULNERABILITY ASSESSMENT

Engineering Design Criteria

- Ocean Protection Council 2020 recommendation for 3.5 feet of projected sea level rise by 2050
- 100-year (1%) tide
- FEMA freeboard, settlement, wave runup, etc. for certified levees



Emergent groundwater in red. Source: https://ourcoastourfuture.org/hazard-map/



FEMA

Project Level: South of Bay Rd., East Palo Alto

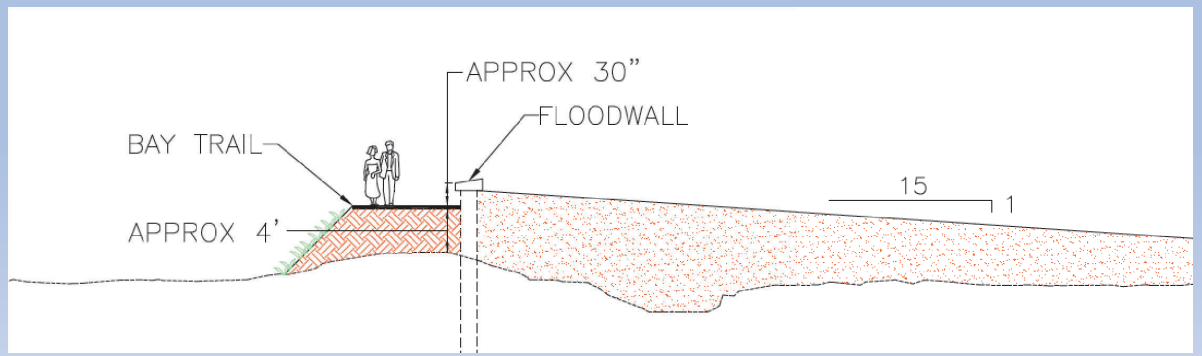


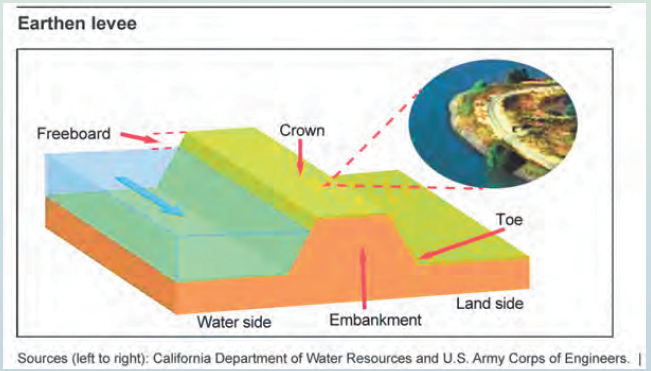
Project Level components: Menlo Park- Restoration of Ponds R1 and R2

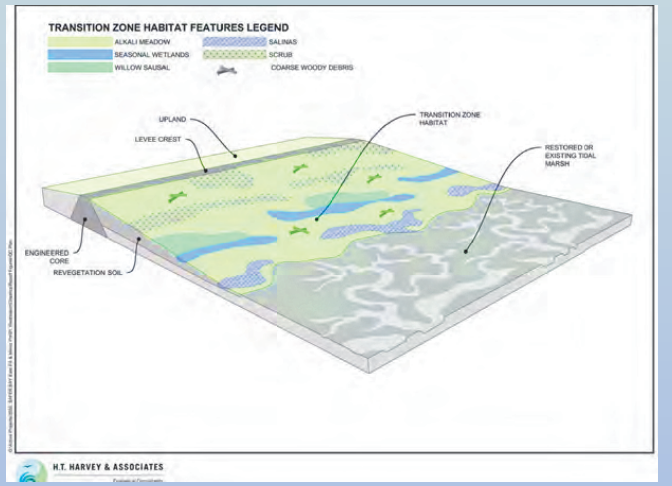


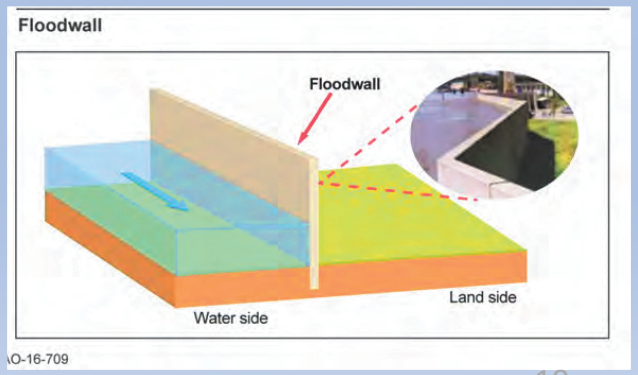
Types of Flood Protection Considering:

- Standard levee with 3:1 slopes
- Standard levee with broader slopes water side of 5:1 or 7:1
- Ecotone levee with very broad slopes of 30:1
- Conventional floodwall
- Hybrid sheetpile floodwall



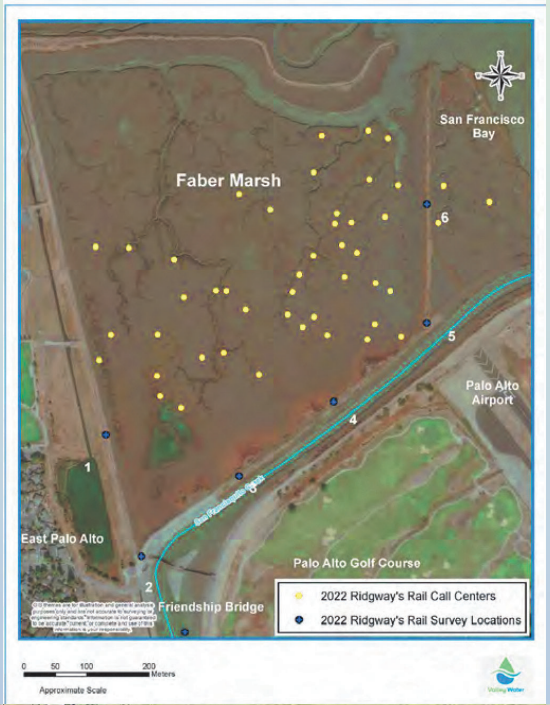


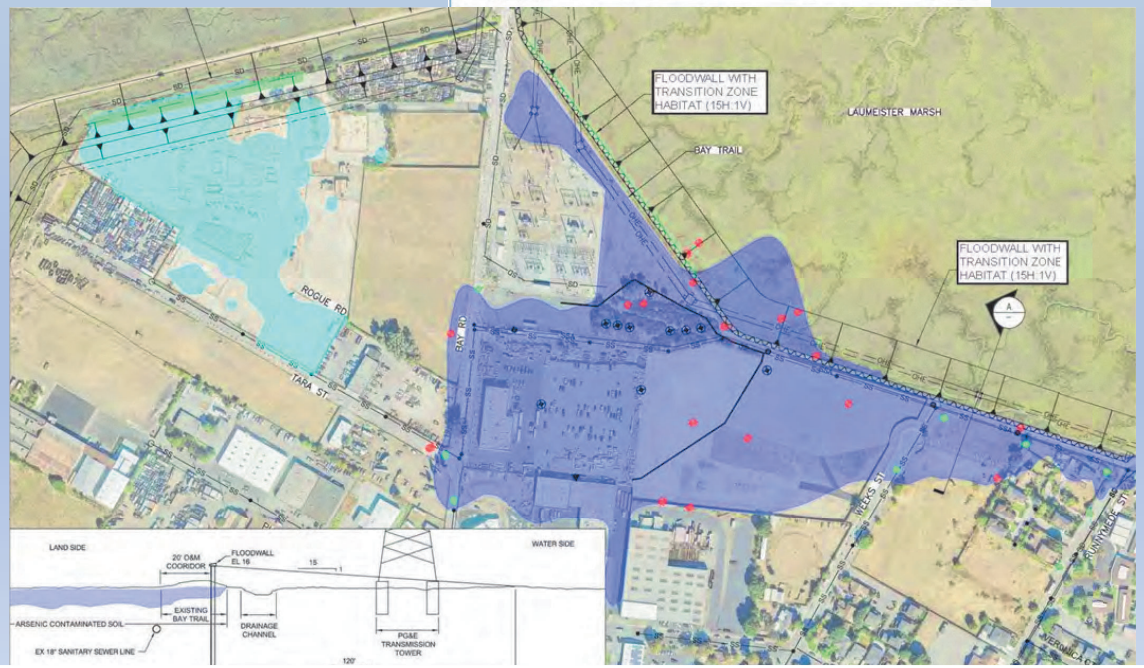




Type of Flood protection depends on site specific constraints

- Geotechnical and engineering requirements
- Location- adjacent to high value marsh and existing homes and school
- Contamination
- Available space- Cooley Landing Substation
- Underground and overhead utilities





3 Rs: Restoration, Recreational Improvements and Regional Coordination

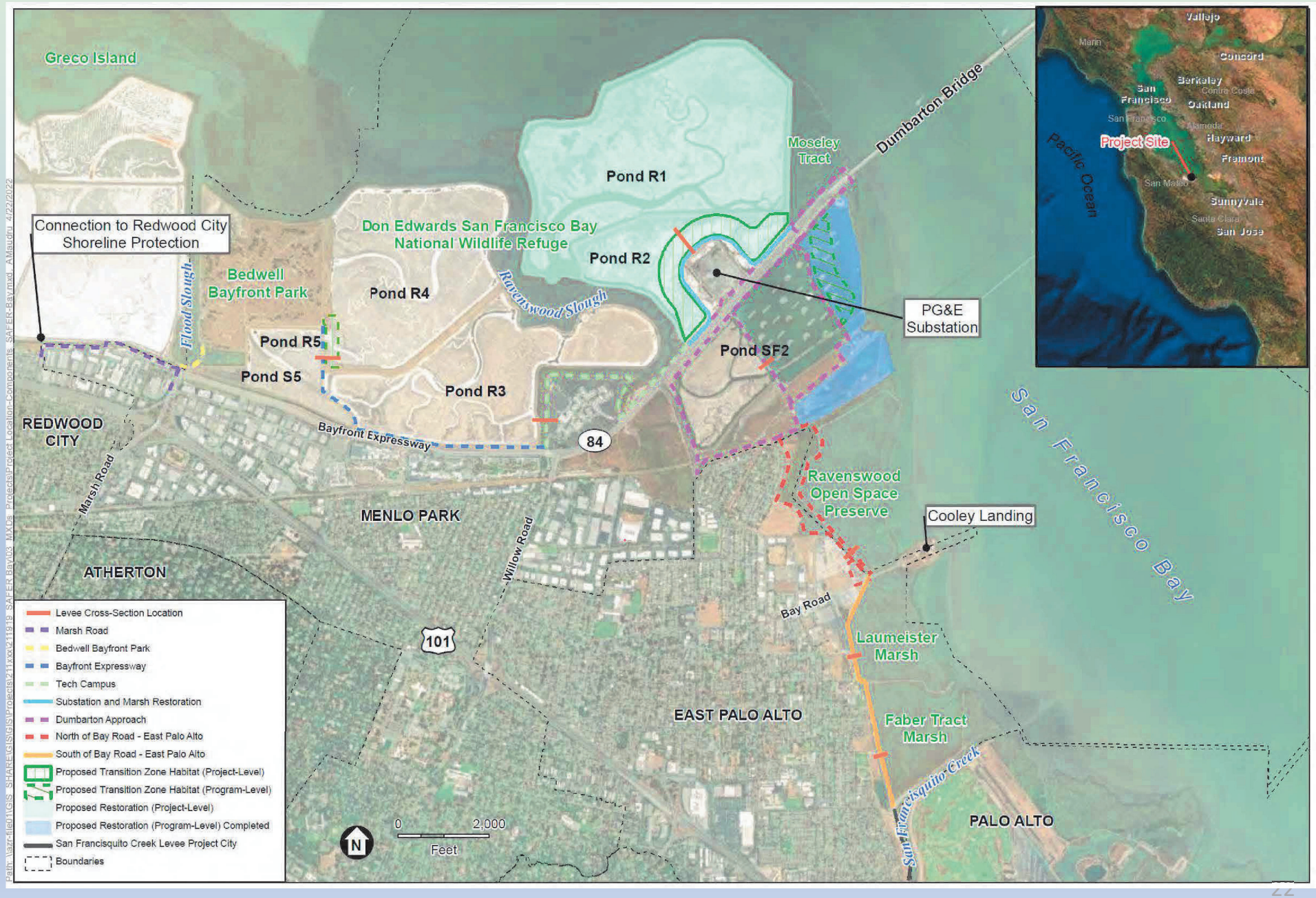
Restore former Salt Ponds R1 and R2 (~600 acres)

Recreation: Upgrade Bay Trail

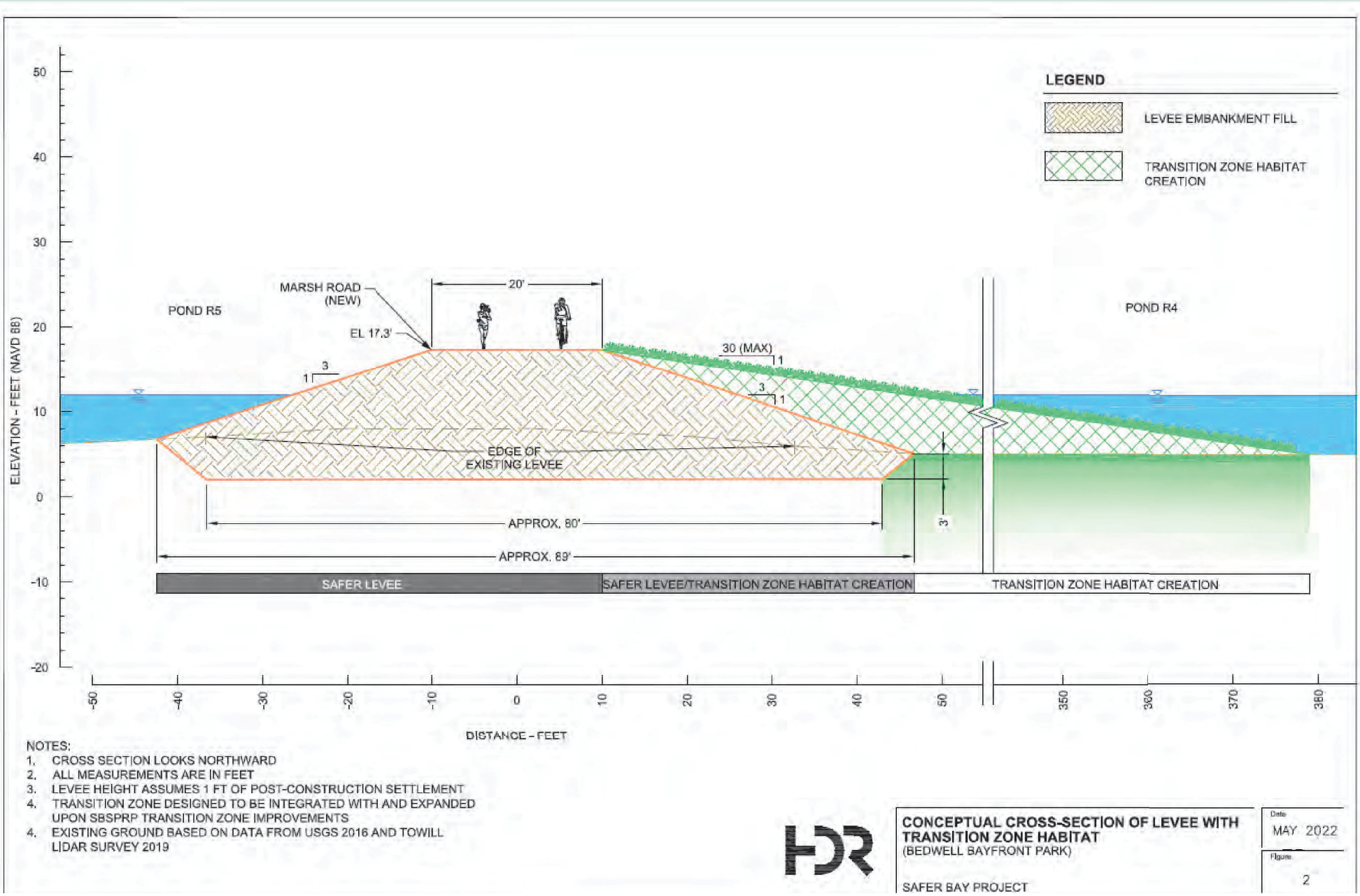
Regional and local Coordination- solution does not cause increased flooding in other areas



Example Cross Sections



Bedwell Bayfront Park



NOTES:
1. CROSS SECTION LOOKS NORTHWARD
2. ALL MEASUREMENTS ARE IN FEET
3. LEVEE HEIGHT ASSUMES 1 FT OF POST-CONSTRUCTION SETTLEMENT
4. TRANSITION ZONE DESIGNED TO BE INTEGRATED WITH AND EXPANDED UPON SBSPRP TRANSITION ZONE IMPROVEMENTS
4. EXISTING GROUND BASED ON DATA FROM USGS 2016 AND TOWILL LIDAR SURVEY 2019

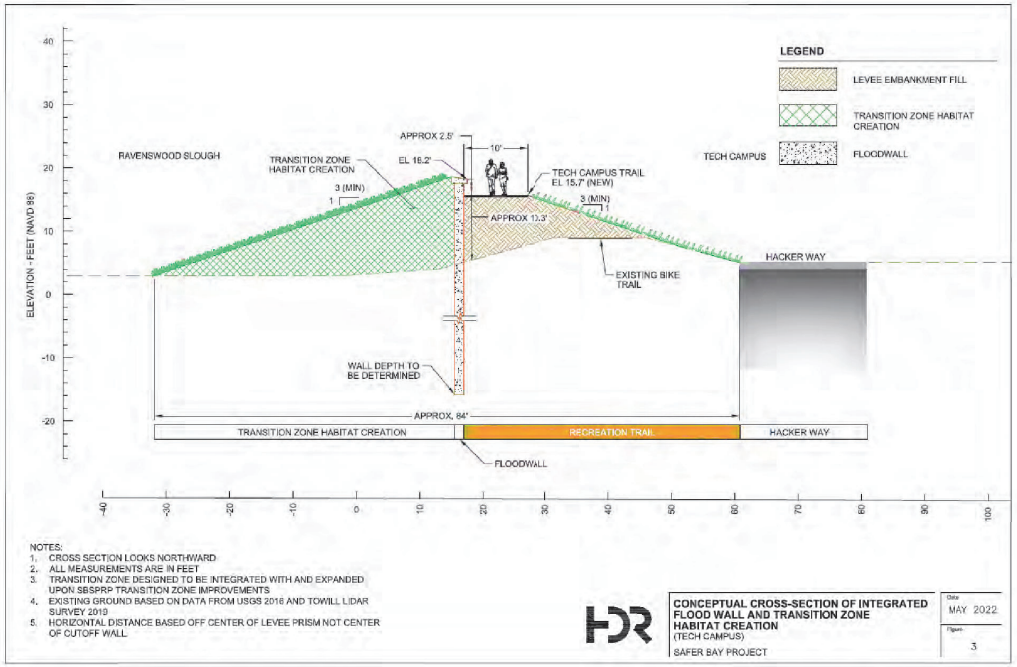
CONCEPTUAL CROSS-SECTION OF LEVEE WITH TRANSITION ZONE HABITAT
(BEDWELL BAYFRONT PARK)

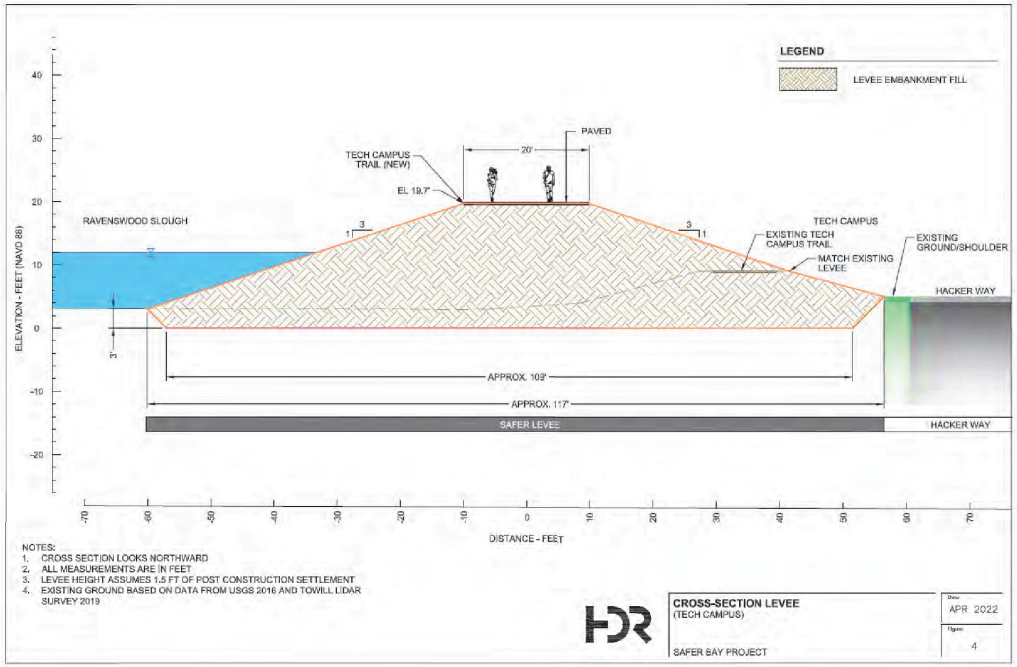
SAFER BAY PROJECT

Date: MAY 2022

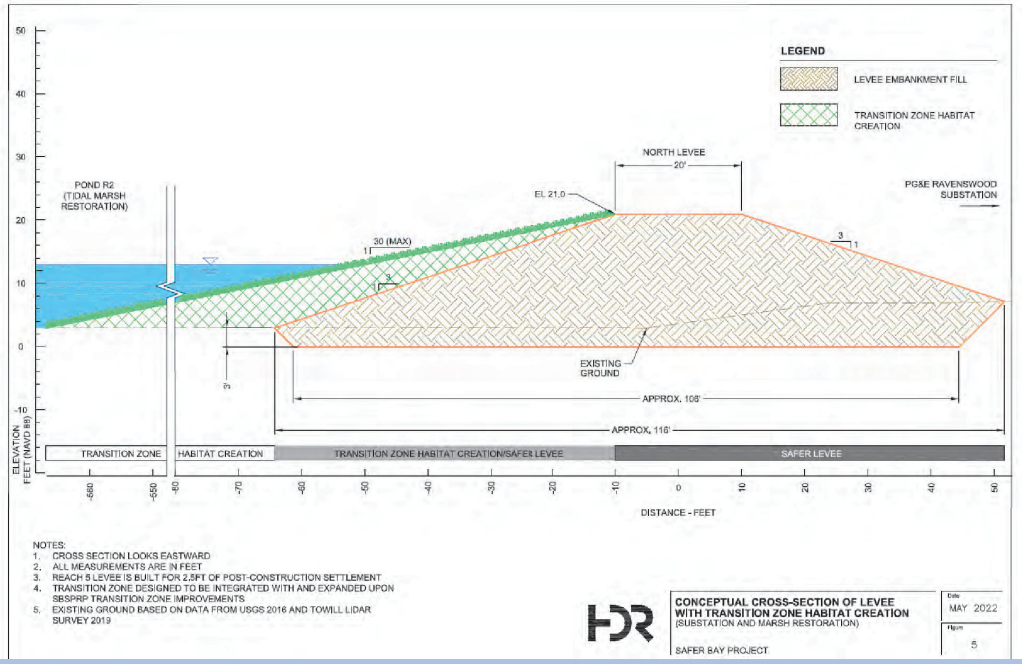
Figure: 2

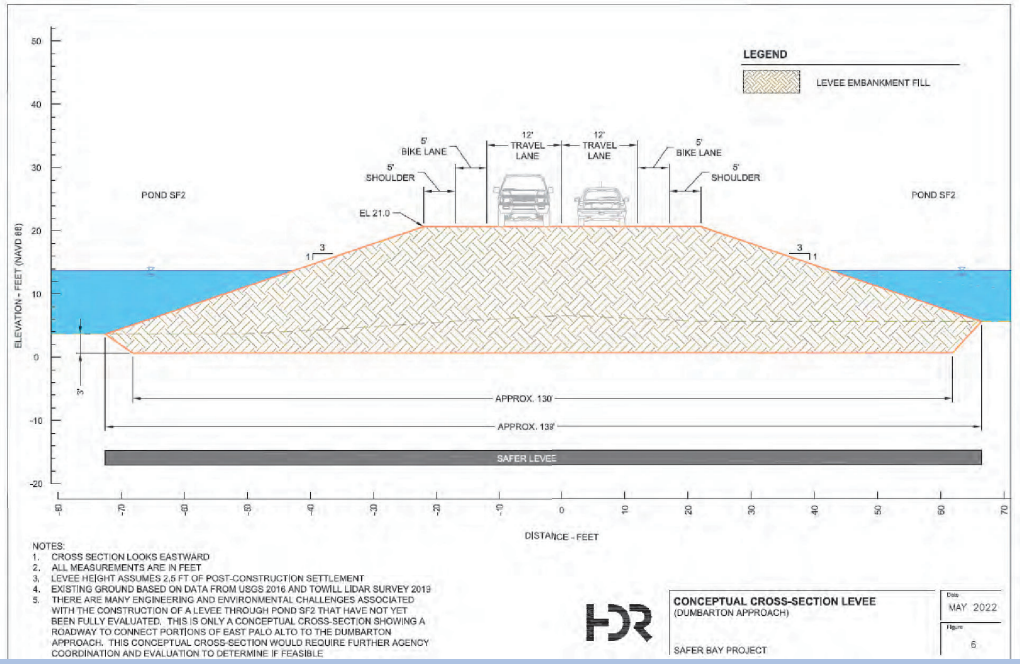
Tech Campus


LEGEND
LEVEE EMBANKMENT FILL
TRANSITION ZONE HABITAT CREATION
FLOODWALL
RAVENSWOOD SLOUGH
TRANSITION ZONE HABITAT CREATION
EL 16.2'
APPROX 2.5'
10'
TECH CAMPUS TRAIL EL 15.7' (NEW)
TECH CAMPUS
3 (MIN)
1
3 (MIN)
1
APPROX 13.3'
EXISTING BIKE TRAIL
HACKER WAY
WALL DEPTH TO BE DETERMINED
APPROX. 84'
TRANSITION ZONE HABITAT CREATION
RECREATION TRAIL
HACKER WAY
FLOODWALL
ELEVATION - FEET (NAVD 88)
NOTES:
1. CROSS SECTION LOOKS NORTHWARD
2. ALL MEASUREMENTS ARE IN FEET
3. TRANSITION ZONE DESIGNED TO BE INTEGRATED WITH AND EXPANDED UPON SBSPRP TRANSITION ZONE IMPROVEMENTS
4. EXISTING GROUND BASED ON DATA FROM USGS 2016 AND TOWILL LIDAR SURVEY 2019
5. HORIZONTAL DISTANCE BASED OFF CENTER OF LEVEE PRISM NOT CENTER OF CUTOFF WALL
CONCEPTUAL CROSS-SECTION OF INTEGRATED FLOOD WALL AND TRANSITION ZONE HABITAT CREATION
(TECH CAMPUS)
SAFER BAY PROJECT
MAY 2022
3

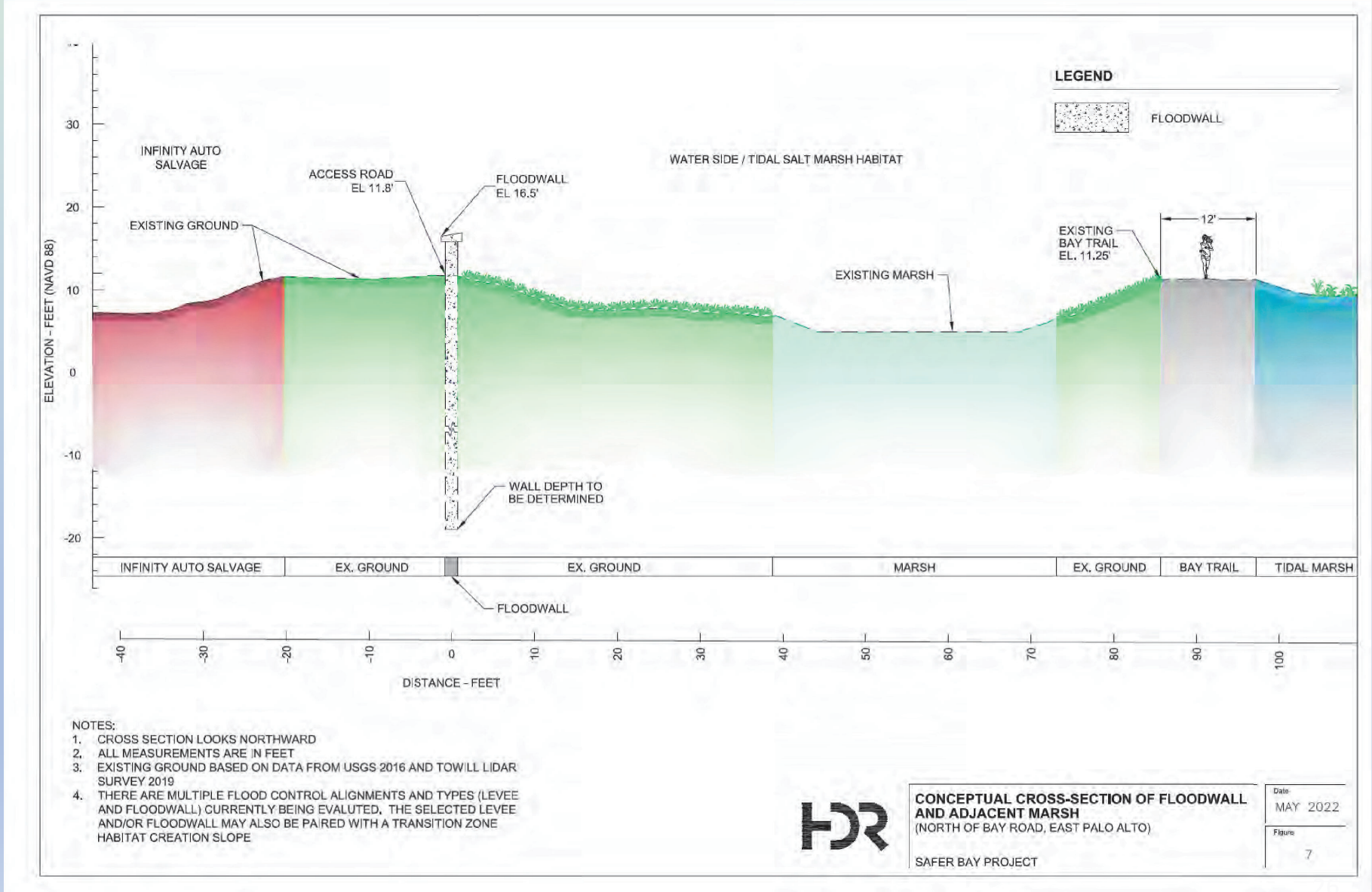

LEGEND
LEVEE EMBANKMENT FILL
PAVED
20'
TECH CAMPUS TRAIL (NEW)
EL 19.7'
RAVENSWOOD SLOUGH
3
1
3
1
TECH CAMPUS
EXISTING TECH CAMPUS TRAIL
MATCH EXISTING LEVEE
EXISTING GROUND/SHOULDER
HACKER WAY
3'
APPROX. 109'
APPROX. 117'
SAFER LEVEE
HACKER WAY
ELEVATION - FEET (NAVD 88)
DISTANCE - FEET
NOTES:
1. CROSS SECTION LOOKS NORTHWARD
2. ALL MEASUREMENTS ARE IN FEET
3. LEVEE HEIGHT ASSUMES 1.5 FT OF POST CONSTRUCTION SETTLEMENT
4. EXISTING GROUND BASED ON DATA FROM USGS 2016 AND TOWILL LIDAR SURVEY 2019
CROSS-SECTION LEVEE
(TECH CAMPUS)
SAFER BAY PROJECT
APR 2022
4

Substation and Dumbarton Approach

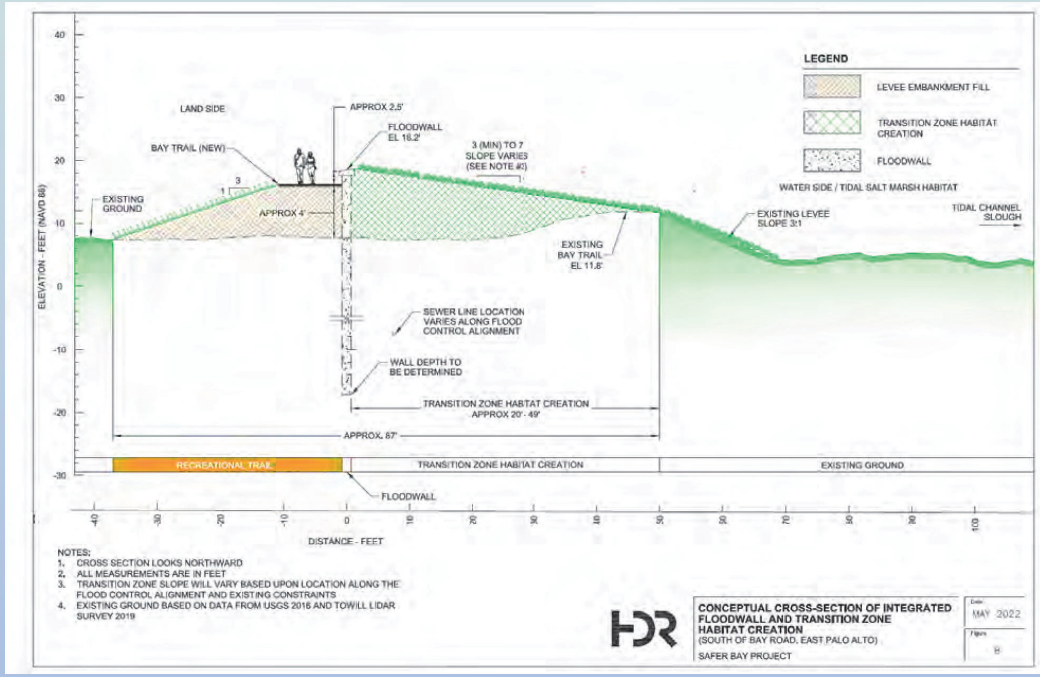


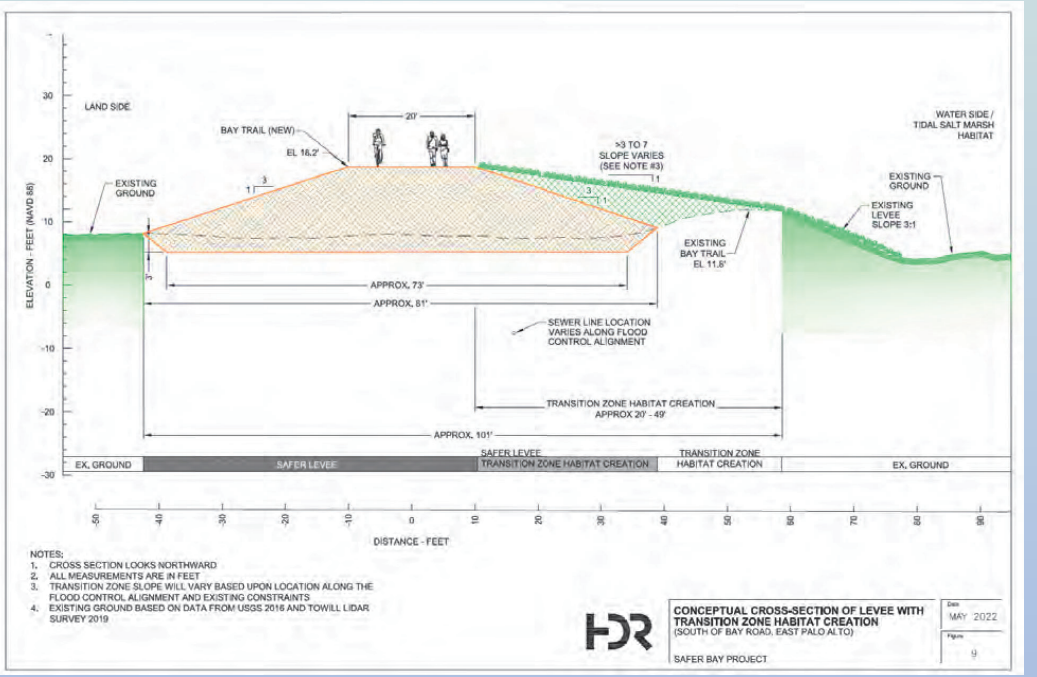


North of Bay Road, EPA



South of Bay Road, EPA





Preliminary Schedule

- Base mapping: Completed 2020
- Geotechnical Investigation: September 15, 2022 - January 31, 2023
- 30% Engineering Design- June 2023
- Draft Project Description: August 2023
- Draft Environmental Impact Report: Early 2024

Engagement Plan

SFCJPA Board Adopted – **Bay Adapt Guiding Principles**

- Support socially vulnerable communities
- Nature first whenever possible
- Support existing efforts – plan for long term
- Practice inclusive and community led governance

Goals

- Awareness
- Education
- Input
- Decision Making



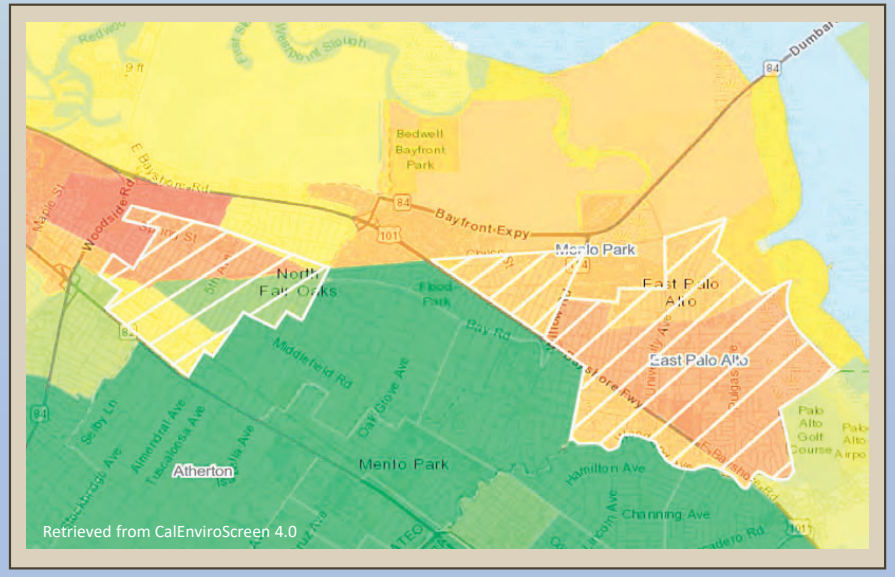






CLIMATE RESILIENT COMMUNITIES

Climate Resilient Communities is a community-based organization dedicated to serving the underrepresented through empowering community voices to implement climate solutions that bring about unity, justice, and resilience.





Community-Based Adaptation



Climate Action Education



Resilient Homes

Engagement Plan

- Advisory Group
- Climate Change Community Teams
- Partnerships with Other CBO's
- Language Justice
- Cultural Relevance
- Community Events
- Focus Groups
- Workshops







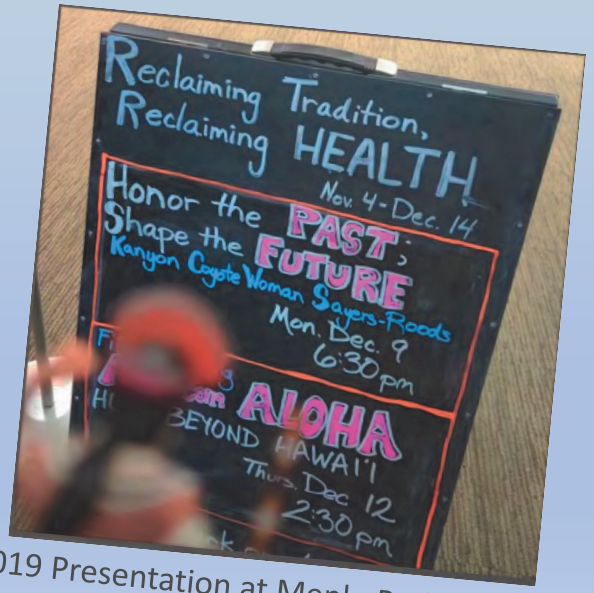


SFCJPA Tribal Engagement

Native American Heritage Commission Updated list of tribes received May 5, 2022

Sacred Lands search: positive for area

Project will have a Cultural Resource plan for pre-project testing and tribal representative onsite during earth moving activities.



Source: 2019 Presentation at Menlo Park Library, Kanyon Coyote Woman Sayers-Roods

Environmental Justice

Nuestra Casa

At Nuestra Casa, **we stand by our community's side** to help them navigate institutions, build people power, and use their voice to shape a new, more equitable community.

Our programs **build leaders** who transform our local community and are actively engaged in our local economy, school district, and civic life.

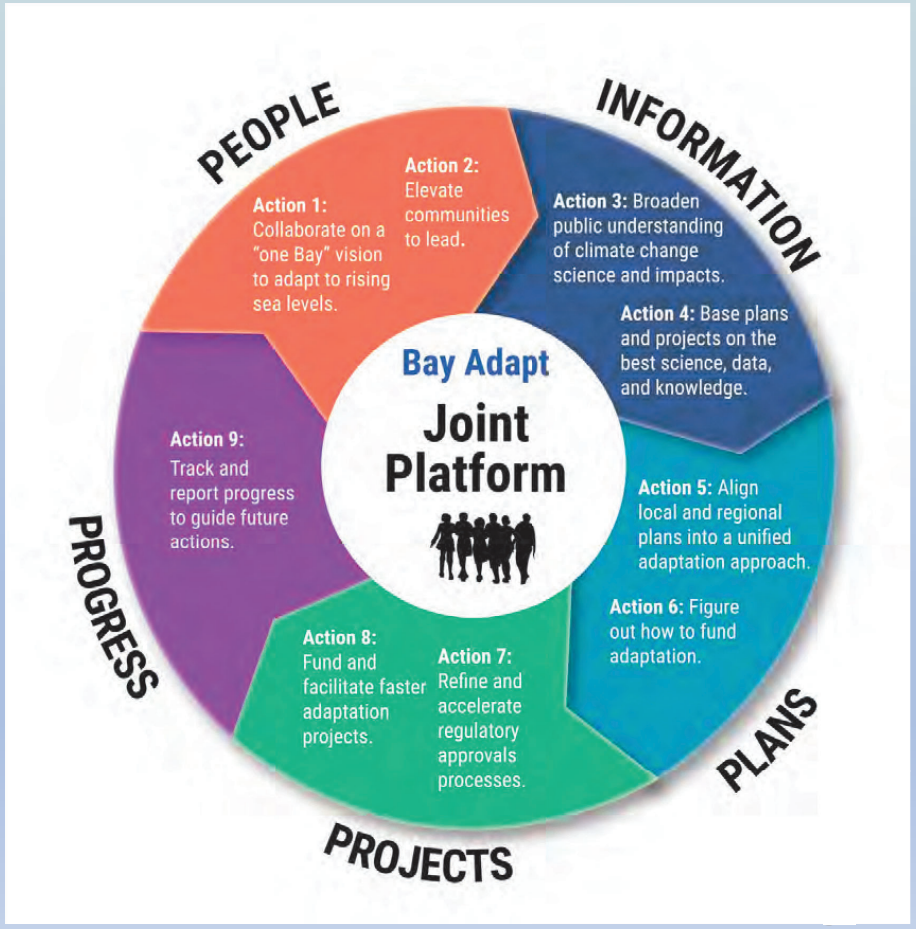
Together, we will build a community
that leaves no one behind.



Bay Adapt- Integrated Project

Nuestra Casa





Public Comments

NOP comment period ends June 15, 2022

Submit by email to:
tbyler@sfcjpa.org

by postal mail to:
SFCJPA 2100 Geng Rd. Suite 210,
Palo Alto, CA 94303
Attn: Tess Byler

Attachment C
Public Scoping Comments

ESA

South Bay Salt Pond Restoration Project

Restoring the Wild Heart of the South Bay

June 3, 2022

Tess Byler, Senior Project Manager
San Francisquito Creek Joint Powers Authority
2100 Geng Road
Palo Alto, CA, 94303
tbyler@sfcjpa.org

Dear Ms. Byler and colleagues,

Thank you for the opportunity to attend the scoping meeting and provide scoping comments on the Notice of Preparation for the San Francisquito Creek Joint Powers Authority's (SFCJPA) Strategy to Advance Flood Protection, Ecosystems and Recreation along San Francisco (SAFER) Bay Project.

As we have discussed in multiple meetings, the collaborating entities behind the South Bay Salt Pond Restoration Project (SBSPRP) – most notably the U.S. Fish and Wildlife Service's (USFWS) Don Edwards San Francisco Bay National Wildlife Refuge (Refuge), which is the landowner of the Ravenswood pond complex portion of the SBSPRP – are supportive of the SFCJPA's overall mission and goals for the SAFER Bay Project, portions of which would take place on Refuge lands.

However, there are several points and details in the text and figure in the Notice of Preparation – and that were discussed in the May 19 Scoping Meeting – that we wanted to be sure were clarified and addressed in the Draft Environmental Impact Report (EIR). Our comments on those matters are listed below; please include these considerations in the analysis of the feasibility and environmental impacts of different alternatives in the EIR.

Please note that none of these points are intended as opposition to the overall SAFER Bay Project. Rather, they are intended to inform and advance the next steps in project planning, the development and screening of project alternatives, the CEQA and NEPA processes, and the various rights-of-way and easement agreements that will need to be developed between the Refuge and the SFCJPA as those parts of the project move toward implementation.

<u>Overarching Comment</u>

Any portion of the SAFER Bay Project that occurs on Refuge lands must comport with federal law and policy about the mission of the National Wildlife Refuge System. Specifically, that mission is to "administer a national network of lands and waters for the conservation, management and, where appropriate, restoration of the fish, wildlife and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee]).

The Don Edwards San Francisco Bay National Wildlife Refuge was established by Congress on June 30, 1972, for the following purposes:

- "...for the preservation and enhancement of highly significant wildlife habitat...for the protection of migratory waterfowl and other wildlife, including species known to be threatened with extinction, and to provide an opportunity for wildlife-oriented recreation and nature study..." (86 Stat. 399, dated June 30, 1972).
- "...particular value in carrying out the national migratory bird management program" 16 U.S.C. 667b (An Act Authorizing the Transfer of Certain Real Property for Wildlife, or other purposes).
- "...to conserve (A) fish or wildlife which are listed as endangered species or threatened species....or (B) plants ..." 16 U.S.C. 1534 (Endangered Species Act of 1973).
- "...for the development, advancement, management, conservation, and protection of fish and wildlife resources ..." 16 U.S.C. 742f(a)(4) "...for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude ..." 16 U.S.C. 742f (b)(1) (Fish and Wildlife Act of 1956).

The priority public uses of a National Wildlife Refuge include wildlife observation, interpretation, photography, environmental education, hunting and fishing. Any recreational activities considered on engineered levees in or through the Refuge should be appropriate, wildlife-compatible uses such as pedestrian and bicycle trails for public wildlife viewing and interpretation, where appropriate.

Specific Comments

1. Any public uses, structures, and/or facilities in the Refuge and associated with the SAFER Bay Project would need to be evaluated and approved under a Compatibility Determination supported by a NEPA-compliant project. We realize that the SAFER Bay Project's NEPA coverage will be provided in a subsequent permitting process, and so the timing of these steps is important to consider now.
2. As part of ensuring compatibility with Refuge purposes, the following points should be considered in the Draft EIR and subsequent NEPA/permitting document:
    - Construction-related short-term impacts are a major source of potential adverse impacts to the Refuge and its surroundings. The Draft EIR should describe best management practices, avoidance and minimization measures, and mitigation measures that can be taken to reduce these impacts. Construction activities would need to be planned and timed to cause the least disturbance to Refuge operations, wildlife and habitats.
    - The anticipated impacts of each alternative under consideration should be listed in tables and quantified wherever possible.
    - The Draft EIR should contain and identify a Preferred Alternative that is appropriate to implement on Refuge lands.
3. Any engineered levee or other feature on Refuge lands would need a Right-of-Way permit issued by the USFWS.
4. One of the points of discussion at the scoping meeting included use of Refuge lands for the construction of a "loop road" or other built feature for establishing a roadway for private vehicle use through or within the Refuge. While it may be acceptable to build a levee through part of the Refuge to manage flood waters or establish separation between different types of wildlife habitats, a levee-top roadway intended for use as a thoroughfare for private vehicles is not a compatible or appropriate use of the Refuge's congressionally mandated purpose or the mission of the National Wildlife Refuge System. As discussed in several meetings, alternatives that include establishing a transportation corridor for private vehicles will not be appropriate or compatible with the purpose of the National Wildlife Refuge.

5. Figure 1 in the NOP as well as the discussion in the text and in the scoping meeting consistently describe Ravenswood Ponds R1 and R2 as being restored to tidal marsh. That is certainly a possibility, but it is only one of the possible futures for these two ponds under the SBSPRP's multi-phase implementation plan and the guiding documents and programmatic permits for our project. Under our Adaptive Management Plan, we have to weigh the needs of a range of different endangered, threatened, and other special-status species as each phase of the project is implemented and strike a balance between tidal marsh restoration and various types of managed pond enhancements that will bring benefits and impacts to these different species. We have not yet reached a point where we can evaluate what to do with Ponds R1 and R2. They may indeed be restored to tidal marsh, but they may instead be retained and enhanced as ponds for other species. We strongly encourage the SAFER Bay Project team to include every combination of these different habitat outcomes for these ponds in the EIR, so that the alternative selected and advanced is consistent with the decisions and needs of the SBSPRP and the Refuge.
6. Figure 1 includes a habitat transition zone in Pond R2. We are not necessarily opposed to including this feature at this location, but it may not be necessary or desirable if that pond is kept as a managed pond. And even in the tidal marsh restoration scenario, it may not provide much additional habitat value in that location. We encourage you to consider alternatives both with and without that feature.
7. The SBSPRP's Phase 2 construction is underway at Ravenswood Ponds R3, R4, R, and S5, near the western end of the SAFER Bay Project. If construction is completed in 2022 as planned (or even shortly thereafter), the three different habitat types, flood management systems, and public access features will be in place and operational early in 2023. The landscape will be radically different than it is in the existing aerial photos and maps. It is important that the EIR not make any inferences or conduct any description of the existing conditions based on images or data that exist of the current configuration. We are happy to work with your project team to review and clarify what will soon be the existing condition as these locations.

Again, my colleagues and I have intent and motivation to participate in and support this project's development, environmental clearance, and permitting. We look forward to the next steps in our collaboration.

Please feel free to contact me at dave.halsing@scc.ca.gov or 650-814-0588.
Most sincerely,



Dave Halsing, Executive Project Manager
South Bay Salt Pond Restoration Project
California State Coastal Conservancy
1515 Clay St., 10th Floor
Oakland, CA, 94612

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State of California – Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE
Bay Delta Region
2825 Cordelia Road, Suite 100
Fairfield, CA 94534

Marine Region
1933 Cliff Drive, Suite 9
Santa Barbara, CA 93109
www.wildlife.ca.gov

GAVIN NEWSOM, Governor
CHARLTON H. BONHAM, Director

GOVERNOR'S OFFICE OF PLANNING AND RESEARCH
Jun 08 2022
STATE OF CALIFORNIA

June 8, 2022

Tess Byler, Senior Project Manager
San Francisquito Creek Joint Powers Authority
2100 Geng Road, Suite 201
Palo Alto, CA 94303
tbyler@sfcjpa.org

Subject: Strategy to Advance Flood Protection, Ecosystems and Recreation Along San Francisco Bay, Notice of Preparation of a Draft Environmental Report, SCH No. 2022040504, San Mateo County

Dear Ms. Byler:

The California Department of Fish and Wildlife (CDFW) received a Notice of Preparation (NOP) of a Draft Environmental Report (DEIR) from the San Francisquito Creek Joint Powers Authority (SFCJPA) for the Strategy to Advance Flood Protection, Ecosystems and Recreation Along San Francisco Bay (Project) pursuant the California Environmental Quality Act (CEQA) and CEQA Guidelines.[1]

Thank you for the opportunity to provide comments and recommendations regarding those activities involved in the Project that may affect California fish and wildlife. Likewise, we appreciate the opportunity to provide comments regarding those aspects of the Project that CDFW, by law, may be required to carry out or approve through the exercise of its own regulatory authority under the Fish and Game Code.

CDFW ROLE

CDFW is California's **Trustee Agency** for fish and wildlife resources and holds those resources in trust by statute for all the people of the State. (Fish & G. Code, §§ 711.7, subd. (a) & 1802; Pub. Resources Code, § 21070; CEQA Guidelines § 15386, subd. (a)). CDFW, in its trustee capacity, has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and habitat necessary for biologically sustainable populations of those species. (*Id.*, § 1802). Similarly, for purposes of CEQA, CDFW is charged by law to provide, as available, biological expertise during public agency environmental review efforts, focusing specifically on projects and related activities that have the potential to adversely affect fish and wildlife resources.

[1] CEQA is codified in the California Public Resources Code in section 21000 et seq. The "CEQA Guidelines" are found in Title 14 of the California Code of Regulations, commencing with section 15000.

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CDFW is also responsible for marine biodiversity under the Marine Life Protection Act in coastal marine waters of California, and ensuring fisheries are sustainably managed under the Marine Life Management Act. Pursuant to our jurisdiction, CDFW has the following comments and recommendations regarding the Project.

CDFW is also submitting comments as a **Responsible Agency** under CEQA. (Pub. Resources Code, § 21069; CEQA Guidelines, § 15381). CDFW expects that it may need to exercise regulatory authority as provided by the Fish and Game Code. As proposed, for example, the Project may be subject to CDFW's lake and streambed alteration regulatory authority (Fish & G. Code, § 1600 et seq.). Likewise, to the extent implementation of the Project as proposed may result in "take" as defined by State law of any species protected under the California Endangered Species Act (CESA) (Fish & G. Code, § 2050 et seq.), the Project proponent may seek related take authorization as provided by the Fish and Game Code.

REGULATORY REQUIREMENTS

California Endangered Species Act

Please be advised that a CESA Incidental Take Permit (ITP) must be obtained if the Project has the potential to result in "take" of plants or animals listed under CESA, either during construction or over the life of the Project. Issuance of a CESA Permit is subject to CEQA documentation; the CEQA document must specify impacts, mitigation measures, and a mitigation monitoring and reporting program. If the Project will impact CESA listed species, early consultation is encouraged, as significant modification to the Project and mitigation measures may be required in order to obtain a CESA Permit.

CEQA requires a Mandatory Finding of Significance if a project is likely to substantially restrict the range or reduce the population of a threatened, rare, or endangered species. (Pub. Resources Code, §§ 21001, subd. (c), 21083; CEQA Guidelines, §§ 15380, 15064, and 15065). Impacts must be avoided or mitigated to less-than-significant levels unless the CEQA Lead Agency makes and supports Findings of Overriding Consideration (FOC). The CEQA Lead Agency's FOC does not eliminate the Project proponent's obligation to comply with Fish and Game Code section 2080.

Lake and Streambed Alteration

CDFW requires an LSA Notification, pursuant to Fish and Game Code section 1600 et. seq., for Project activities affecting lakes or streams and associated riparian habitat. Notification is required for any activity that may substantially divert or obstruct the natural flow; change or use material from the bed, channel, or bank including associated riparian or wetland resources; or deposit or dispose of material where it may pass into a river, lake, or stream. Work within ephemeral streams, washes, watercourses with a subsurface flow, and floodplains are subject to notification requirements. CDFW, as a

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Responsible Agency under CEQA, will consider the CEQA document for the Project and may issue an LSA Agreement. CDFW may not execute the final LSA Agreement (or ITP) until it has complied with CEQA as a Responsible Agency.

PROJECT DESCRIPTION SUMMARY

Proponent: SFCJPA

Objectives: The objectives of the Project are: 1) to reduce the risk of flooding within the cities of East Palo Alto and Menlo Park from San Francisco Bay waters, including consideration of up to 3.5 feet of future sea level rise, and support the communities' objective to be removed from the Federal Emergency Management Agency (FEMA) floodplain; 2) enable climate change adaptation using tidal marsh areas for flood protection, to sustain marsh habitat, and to facilitate marsh restoration associated with the South Bay Salt Ponds Restoration Project and other restoration efforts; 3) expand opportunities for recreation and community connectivity in collaboration with the Bay Trail Program and efforts to enhance local trails; 4) minimize future maintenance requirements; and 5) partner with other agencies and organizations pursuing similar goals and objectives.

Primary Project activities include shoreline protection (installation of levees, floodwalls, and other flood risk reduction structures); habitat restoration, creation, and enhancement (tidal marsh restoration, tidal marsh-upland transition zone habitat, and western snowy plover breeding habitat enhancement); and recreation (improvements to existing recreational access to the shoreline and potentially new trails).

Location: The Project is located in San Mateo County, immediately west of San Francisco Bay along approximately seven miles of the shoreline from the Menlo Park/Redwood City border south to the East Palo Alto/Palo Alto border. The Project includes actions within the Don Edwards National Wildlife Refuge (Refuge), including Refuge-managed land in Laumeister and Faber Tract Marshes (owned by the City of Palo Alto) and Ravenswood Open Space Preserve (owned by the Midpeninsula Open Space District); the San Francisco Public Utilities Commission; the Cargill Corporation, and within the Caltrans State Route 84 right-of-way approach to the Dumbarton Bridge.

Timeframe: The Project is to be constructed in phases, anticipated to begin in 2025 and to be completed by 2030. The DEIR will contain both project-level and program-level evaluations.

MARINE BIOLOGICAL SIGNIFICANCE

The San Francisco Bay-Delta is the second largest estuary in the United States and supports numerous aquatic habitats and biological communities. It encompasses 479 square miles, including shallow mudflats. This ecologically significant ecosystem

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supports both state and federally threatened and endangered species and sustains important commercial and recreational fisheries.

COMMENTS AND RECOMMENDATIONS

CDFW offers the comments and recommendations below to assist the SFCJPA in adequately identifying and/or mitigating the Project's significant, or potentially significant, direct and indirect impacts on fish and wildlife (biological) resources. Based on the potential for the Project to have a significant impact on biological resources, CDFW concludes that an EIR at the project-level and programmatic-level (depending on the phase of the project) is appropriate for the Project.

I. Project Description and Related Impact

Would the Project 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 U.S. Fish and Wildlife Service (USFWS)?

COMMENT #1 – Flood Wall and Levee Construction

Issue: The NOP discusses the proposed construction of flood walls in addition to or separate from levees within the Project area. The installation of flood walls, depending on materials and equipment used, could pose potential impacts to aquatic and terrestrial species that inhabit the ponds, adjacent sloughs, and bay habitat. The DEIR should include clear descriptions of the methods that will be used to create flood walls as well as equipment required for construction.

Specific impact: Flood wall construction activities such as pile driving in or near inundated areas could result in injury or mortality to aquatic species generated by excessive hydroacoustic pressures.

Why impact would occur: Under water sound generated from activities like pile driving have been shown to take State listed species due to a variety of factors, including behavioral modifications and both auditory and non-auditory injury or mortality. The Fisheries Hydroacoustic Working Group's *Agreement in Principle for Interim Criteria for Injury to Fish from Pile Driving Activities* (attached) specifies hydroacoustic levels that exceed 206 decibels (dB) peak pressure or accumulated sound exposure levels of 183 dB or 187 dB (depending on the size of the fish), can cause injury and/or mortality.

Evidence impact would be significant: Injury or mortality to fish resulting from activities such as pile driving may further population declines of fish species already at risk due to loss of bay habitat and exposure to pollutants.

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Recommended Potentially Feasible Mitigation Measures

Mitigation Measure #1: Hydroacoustic Impact Discussion

If flood wall construction will be in or near inundated areas, a hydroacoustic impact discussion for activities such as pile driving, should be included in the DEIR.

COMMENT #2 – Water Pumping and Flood Gates

Issue: The NOP discusses the potential for flood risk reduction structures to be incorporated into areas where it is not feasible to raise the elevation. These structures could include flood gates or improvements to pump stations. The DEIR should discuss the locations in which flood risk reduction structures and pump stations are present and whether the flood protection elements proposed could pose potential impacts to special-status fish species, such as the federal candidate and State threatened longfin smelt.

Specific impact: In areas where longfin smelt are present, water intake structures could pose potential impacts such entrainment and/or impingement. Additionally, flood gates could trap fish in areas that may not be suitable habitat during various times of the day or year.

Why impact would occur: Fish may be more susceptible to predation or could become trapped within unsuitable environmental conditions for a full tidal cycle without an option to return to unconfined habitats.

Evidence impact would be significant: Injury or mortality to fish resulting from predation or exposure to unsuitable environmental conditions may further population declines of fish species already at risk due to loss of bay habitat and exposure to pollutants.

Recommended Potentially Feasible Mitigation Measures

Mitigation Measure #1: Screening

To prevent or minimize entrainment or impinge risk, water intake structures are generally screened to meet CDFW and National Marine Fisheries Service screening criteria (attached). The DEIR should discuss whether current intake structures are screened and whether intake structure improvements will include screens that meet resource agency requirements.

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COMMENT #3 – Public Access

Issue: The NOP discusses the inclusion of 1.0-2.5 miles of new or improved trails, including creation of new sections of the Bay Trail and placement of existing sections of the Bay Trail atop new levees where they will be less susceptible to flooding. The DEIR will need to discuss potential impacts of visitor use along the trails to nearby breeding, roosting, or foraging shorebirds, including special-status species such as the federal and State endangered and State fully protected California Ridgway's rail (*Rallus obsoletus obsoletus*), the State threatened and State fully protected California black rail (*Laterallus jamaicensis coturniculus*), and the federal threatened and State species of special concern (SSC) western snowy plover (*Charadrius nivosus nivosus*).

Specific impact: Nest abandonment or reduced frequency or duration of care for young, as well as decreased time spent foraging and roosting, resulting in reduced health or vigor of all life stages may occur as a result of the Project.

Why impact would occur: Inclusion of new trails will increase the number and proximity of visitors to the Project site. In addition, placing trails on top of levees will increase the visibility of visitors, which may be perceived as threats to breeding, roosting, and foraging shorebirds. Signage and fencing associated with recreational access may provide perching opportunities to avian predators. All of these factors may reduce the time shorebirds spend performing activities associated with breeding, roosting, and foraging, in favor of increasing avoidance behaviors.

Evidence impact would be significant: Loss of emergent saline wetland habitat and upland refugia in San Francisco Bay has contributed to declines in local populations of both rail species. Increased contact with humans at coastal nesting and overwintering sites has reduced populations of western snowy plover. All three species are susceptible to both terrestrial and avian predation pressure. Project impacts, including increased conflicts associated with recreation may further population declines of these species, including cumulative impacts resulting in the restriction in the range of these species.

Recommended Potentially Feasible Mitigation Measures

Mitigation Measure #1: Shorebird Habitat Assessment

The DEIR should include an updated habitat assessment for shorebirds, including California Ridgway's rail, California black rail, and western snowy plover within and adjacent to the Project Area. Specific information on current habitat use by these species may be available by contacting staff at the Don Edwards National Wildlife Refuge.

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Mitigation Measure #2: Rail Surveys

A CDFW and USFWS-approved biologist should conduct protocol-level surveys of California Ridgway's rail in all suitable habitat adjacent to the Project using the 2015 *California Clapper Rail Survey Protocol* to determine where California Ridgway's rail are onsite in each year of construction. CDFW staff are available to work with you to incorporate calls of California black rail into the protocol to ensure that both species are sufficiently surveyed.

Mitigation Measure #3: Trail Alignment, Seating, and Signage

The DEIR should describe how the placement of additional trails, modifications of existing trails to be placed atop levees, and placement of any associated seating and signage will avoid and minimize impacts to shorebirds using adjacent habitat. Consideration should be given to placement of trail alignments away from known breeding habitat, as well as use of seasonal trail closures and/or vegetative screening where appropriate to reduce visitor disturbance to shorebirds. Interpretive signage and seating associated with recreational trails should be sized, configured, and placed appropriately to reduce predator perching opportunities.

COMMENT #4 – Transition Zone Habitat

Issue: The NOP discusses the construction of broad, gently sloped tidal salt marsh-upland transition zone habitat on the bayward slope of certain segments in association with levees, floodwalls, and hybrid features adjacent to existing and/or restored tidal salt marsh. The NOP mentions the benefits of such transition zones, such as provision of high-tide refugia for tidal marsh species and special-status marsh plants, increased habitat diversity, and sea level rise resilience. The DEIR will need to discuss the specific impacts to existing tidal marsh habitat and tidal marsh terrestrial and aquatic species that may result by placement of salt marsh-upland transition zone habitat.

Specific impact: Depending on the type of flood protection infrastructure selected, there may be placement of fill material in existing high quality salt marsh habitat (and thus, conversion of habitat type) to create transition zone habitat.

Why impact would occur: Fill and habitat conversion would reduce the amount of high-quality habitat currently available for tidal marsh species (such as California Ridgway's rail, California black rail, and the federal and State endangered and State fully protected salt-marsh harvest mouse (*Reithrodontomys raviventris*).

Evidence impact would be significant: Reduction of suitable habitat for special-status tidal marsh species may further population decline of these species already at

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risk due to historical losses of tidal marsh habitat, as well as the cumulative impacts of further restricting the range of these species.

Recommended Potentially Feasible Mitigation Measures

Mitigation Measure #1: Set Back Levees

The DEIR should consider the ability of the Project to set back levees (away from the Bay) in areas of existing high quality tidal salt marsh habitat to reduce the placement of fill material and habitat conversion. The DEIR should clearly identify and describe any constraints that would make setting back of levees infeasible, where and why placement of fill into existing high-quality habitat may be the only feasible alternative, and how the Project is minimizing impacts to existing high-quality habitat and its associated species.

Mitigation Measure #2: Upland Refugia Assessment

The DEIR should provide an assessment of the need for upland refugia habitat in existing high quality tidal marsh habitat and whether alternative upland refugia options (such as marsh mounds) may be appropriate in lieu of broad transition slopes in certain locations to minimize impacts to existing tidal marsh habitat.

Mitigation Measure #3: Ecological Cost and Benefit Assessment

The DEIR should provide a thorough analysis of the ecological costs and benefits (both short-term and long-term) of construction of transition zone habitat on existing marsh habitat to associated terrestrial and aquatic species, including whether bayward expansion of transition zone habitat can provide desired marsh transgression space and sea level rise resilience for tidal marsh species over the long-term.

Mitigation Measure #4: Habitat Transition Zone for Aquatic Species

In addition to discussing terrestrial habitat transition zones, the DEIR should discuss whether any submerged habitat zones are being proposed for fish and/or invertebrates.

II. Mitigation Measures and Impacts

Would the Project 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?

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COMMENT #5 – Special-Status Fish and Wildlife Species

Issue: Without appropriate mitigation measures, the Project could potentially have a significant impact on the following special-status fish and wildlife species (in addition to the species already mentioned in comments above), including but not limited to:

- White-tailed kite (*Elanus leucurus*; State fully protected)
- California least tern (*Sternula antillarum browni*; federal and State endangered and State fully protected)
- Brown pelican (*Pelecanus occidentalis californicus*; State fully protected)
- Salt-marsh wandering shrew (*Sorex vagrans halicoetes*; SSC)
- Northern harrier (*Circus hudsonius*; SSC)
- Saltmarsh common yellowthroat (*Geothlypis trichas sinuosa*; SSC)
- Alameda song sparrow (*Melospiza melodia pusillula*; SSC)
- Yellow rail (*Coturnicops noveboracensis*; SSC)
- Longfin smelt (*Spirinchus thaleichthys*; federal candidate and State threatened)
- Central California Coast steelhead (*Oncorhynchus mykiss*; federal threatened; Central California Coast and Central Valley Evolutionarily Significant Units)
- Green sturgeon (*Acipenser medirostris*; federal threatened; southern Distinct Population Segment)
- White Sturgeon (*A. transmontanus*; SSC)

Several species with important commercial/recreational fisheries value and habitat value for spawning and rearing could potentially be present near Project activities. These include:

- Pacific herring (*Clupea pallasii*)
- Crangon shrimp (*Crangon* spp.)
- Surfperches (*Embiotocidae*)

Specific impact: Direct mortality through crushing of adults or young or individuals within nests, loss of nests, capture, nest abandonment, loss of potential nesting habitat, loss of potential foraging habitat resulting in reduced reproductive success (loss or reduced health or vigor of eggs or young), inadvertent entrapment or

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entrainment, impingement, lack of water resulting in reduced reproductive success or desiccation of eggs.

Why impact would occur: The Project may include construction of levees and/or floodwalls, restoration or construction of trails, installation of flood gates, improvements to pump stations, and habitat restoration that may include tidal marsh and/or managed pond habitat conversion. The Project will include impacts such as noise, groundwork, and operation and movement of equipment and workers that would have the potential to disturb foraging, roosting, and nesting. Temporary water diversion structures may need to be constructed to dewater wetted areas of the Project.

Evidence impact would be significant: The species listed above are either fully protected species under California Fish and Game Code (§ 3511, § 4700 or § 5050), listed under the federal Endangered Species Act (ESA) or CESA and may also be designated as rare, threatened or endangered under §15380, subds. (c)(1) and (c)(2), or designated by CDFW as SSC and are at conservation risk and may be experiencing serious population declines or range retractions. In addition, take of nesting birds, birds in the orders Falconiformes or Strigiformes, and migratory nongame birds as designated in the Migratory Bird Treaty Act is a violation of Fish and Game Code (§ 3503, § 3503.5, and § 3513).

Recommended Potentially Feasible Mitigation Measures

Mitigation Measure #1: Habitat Assessment

The DEIR should include results of a through habitat assessment conducted by a qualified biologist to determine the locations and quality of suitable habitat for special-status species within the vicinity of the Project site.

Mitigation Measure #2: Special-Status Surveys

Focused surveys for special-status species using appropriate protocols should be conducted by qualified biologists at the Project site prior to any Project-related construction. If Project activities are to take place during the avian nesting season, an additional pre-Project activity survey for active nests should be conducted by a qualified biologist no more than seven days prior to the start of Project activity. See Mitigation Measure #2 under Comment #1 above regarding the protocol for rail surveys.

Mitigation Measure #3: Seasonal Work Windows

The DEIR should include species-appropriate seasonal work windows to avoid and minimize impacts to special-status species. The following are examples of seasonal

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work windows that may be appropriate to implement in all or portions of the Project site, depending on the suitability of the habitat and likelihood of species presence:

- In the vicinity of nesting rails, the Project should limit construction activities to September 1-January 31 to avoid the rail breeding season.

- In the vicinity of western snowy plovers, the Project should limit construction activities to September 15-February 28 to avoid the western snowy plover breeding season.

- In-water work should be limited to June 15-November 30 to minimize impacts to salmonids in the Project area.

Mitigation Measure #4: Buffers

The DEIR should include species-appropriate buffers to avoid and minimize impacts to special-status species. For example, a 700-foot no-work buffer should be implemented between construction activities and any current-year breeding rail detections if construction cannot be avoided during the rail breeding season. If establishing a 700-foot buffer around breeding rail detections is not feasible, noise reducing modifications to equipment as well as portable acoustic barriers/blankets placed near noise sources may be appropriate to reduce auditory and visual impacts to breeding rails. Note that these features may be appropriate regardless of time of year to minimize impacts to foraging rails as well.

For other species of nesting birds, CDFW recommends implementing appropriate buffers around active nests based on species, behavior of birds, ambient noise levels, type of construction activities, topography, and other site-specific factors that may affect nesting bird disturbance levels. It is advised that buffers remain in place until the breeding season has ended or until a qualified biologist has determined that the birds have fledged and are no longer reliant upon the nest or on-site parental care for survival. Variance from these buffers is possible when there is compelling biological or ecological reason to do so, such as when the Project site would be concealed from a nest site by topography. CDFW recommends that a qualified avian biologist advise and support any variance from established buffers.

Mitigation Measure #5: Non-Mechanized Hand Tools

CDFW recommends the use of non-mechanized hand tools for any necessary vegetation removal activities in habitat suitable for salt-marsh harvest mouse to the maximum extent practicable. Use of mechanized hand tools has resulted in mortality and/or injury to this and other species during vegetation removal for other projects in the Bay Area.

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Mitigation Measure #6: In-Water Work Avoidance

CDFW recommends avoiding in-water work to the extent practicable. If in-water work cannot be avoided, conducting in-water work and placing material at low tide when fish are unlikely to be present may reduce the risk of take of special-status fish species.

Mitigation Measure #7: Take Authorizations

If known or expected occurrences of State-listed wildlife species are present at a Project site or the species is identified during surveys and full avoidance of take is not feasible, the Project proponent should apply to CDFW pursuant to Fish and Game Code § 2081(b) for take authorization through issuance of an Incidental Take Permit (ITP). Fully protected species may not be taken or possessed at any time, except for necessary scientific research, including efforts for recovery. Under the CDFW's Cutting the Green Tape Program, a Restoration Management Permit (RMP) consolidates take authorizations needed for voluntary habitat restoration projects into a single streamlined permit and can include take authorization for CESA-listed and State fully protected species. CDFW staff can work with you to help determine whether a RMP may be appropriate for this Project. More information about the Cutting the Green Tape Program can be found at the following link: https://wildlife.ca.gov/Conservation/Watersheds/Cutting-Green-Tape.

COMMENT #6 – Special-Status Plant Species

Issue: Without appropriate mitigation measures, the Project could potentially have a significant impact on the following special-status plant species, including but not limited to:

- Coastal marsh milk vetch (*Astragalus pycnostachyus* var. *pycnostachyus*) – California Rare Plant Rank 1B.2
- Alkali milk vetch (*A. tener* var. *tener*) – California Rare Plant Rank 1B.2
- San Joaquin spearscale (*Atriplex joaquiniana*) – California Rare Plant Rank 1B.2
- Congdon's tarplant (*Centromadia parryi* ssp. *condonii*) – California Rare Plant Rank 1B.1
- Point Reyes salt bird's beak (*Chloropyron maritimum* ssp. *plustre*) – California Rare Plant Rank 1B.2
- California seablite (*Suaeda californica*) – Federal endangered and California Rare Plant Rank 1B.1

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- Saline clover (*Trifolium hydrophilum*) – California Rare Plant Rank 1B.2
- Hairless popcorn flower (*Plagiobothrys glaber*) – California Rare Plant Rank 1A

Specific impact: Direct mortality or inability to reproduce.

Why impact would occur: Implementation of the Project could include grading and heavy equipment use associated with the construction of floodwalls, levees, trails, and transition zone habitat, as well as with restoration/enhancement of tidal marsh and managed pond habitat. Dewatering of stream channels may also be necessary.

Evidence impact would be significant: Special-status plant species are typically narrowly distributed and often endemic species, susceptible to habitat loss and habitat fragmentation resulting from development, vehicle and foot traffic, and introduction of non-native plant species.

Recommended Potentially Feasible Mitigation Measures

Mitigation Measure #1: Special-Status Plant Focused Surveys

The Project site should be surveyed for special-status plant species by a qualified botanist following protocol-level surveys. Protocol-level surveys, which are intended to maximize detectability, may include identification of reference populations to facilitate the likelihood of field investigations occurring during the appropriate floristic period.

Mitigation Measure #2: Special-Status Plant Avoidance

Direct and indirect impacts to special-status plant species should be avoided through delineation and establishment of a no-disturbance buffer of at least 50 feet from the outer edge of the plant population or specific habitat type required by special-status plant species.

Mitigation Measure #3: Seed Collecting/Planting

If complete avoidance of impacts to special-status plants is not possible, CDFW recommends collecting seed (if appropriate) and planting at an approved off-site location or providing seed to an acceptable seed banking facility certified by the Center for Plant Conservation for long-term conservation storage.

III. Editorial Comments and/or Suggestions

Figure 1 of the NOP shows seven cross-section locations on an aerial figure of the Project site but does not label them in accordance with the figure numbers of the

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subsequent cross-sections themselves. There are eight cross-sections provided in the NOP, and it appears that two of the cross-sections (Figures 3 and 4) refer to the tech campus trail. In addition, Figure 8 (Conceptual Cross-Section of Integrated Floodwall and Transition Zone Habitat Creation) and 9 (Conceptual Cross-Section of Levee with Transition Zone Habitat Creation) are both are labeled as South of Bay Road. It is unclear whether these are two different potential scenarios for the same location, or whether Figure 8 is located adjacent to Laumeister Marsh and Figure 9 is located adjacent to Faber Tract Marsh (as both Laumeister Marsh and Faber Tract Marsh are both located south of Bay Road). The DEIR should show specific cross-section figure numbers in Figure 1 to ensure they can easily be cross-referenced to the appropriate corresponding cross-section figures. In addition, each cross-section figure should include enough detail to clearly describe its location within the Project.

ENVIRONMENTAL DATA

CEQA requires that information developed in environmental impact reports and negative declarations be incorporated into a database which may be used to make subsequent or supplemental environmental determinations. (Pub. Resources Code, § 21003, subd. (e)). Accordingly, please report any special-status species and natural communities detected during Project surveys to the California Natural Diversity Database (CNDDB). The CNNDB field survey form can be filled out and submitted online at the following link: https://wildlife.ca.gov/Data/CNDDB/Submitting-Data. The types of information reported to CNDDB can be found at the following link: https://www.wildlife.ca.gov/Data/CNDDB/Plants-and-Animals.

ENVIRONMENTAL DOCUMENT FILING FEES

The Project, as proposed, would have an impact on fish and/or wildlife, and assessment of environmental document filing fees is necessary. Fees are payable upon filing of the Notice of Determination by the Lead Agency and serve to help defray the cost of environmental review by CDFW. Payment of the environmental document filing fee is required in order for the underlying project approval to be operative, vested, and final. (Cal. Code Regs, tit. 14, § 753.5; Fish & G. Code, § 711.4; Pub. Resources Code, § 21089).

CONCLUSION

CDFW appreciates the opportunity to comment on the NOP to assist the SFCJPA in identifying and mitigating Project impacts on biological resources.

If you have any questions for staff in the Bay Delta Region, please contact Ms. Tami Schane, Senior Environmental Scientist (Specialist), at (415) 710-0711 or Tami.Schane@wildlife.ca.gov; or Ms. Brenda Blinn, Senior Environmental Scientist

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(Supervisory), at (707) 339-0334 or Brenda.Blinn@wildlife.ca.gov. For questions for staff in Marine Region, please contact Mr. Arn Aarreberg, Environmental Scientist, at (707) 791-4195 or Arn.Aarreberg@wildlife.ca.gov; or Mr. Eric Wilkins, Senior Environmental Scientist (Supervisory), at (805) 594-6172 or Eric.Wilkins@wildlife.ca.gov.

Sincerely,

DocuSigned by:
Erin Chappell
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Erin Chappell
Regional Manager
Bay Delta Region

DocuSigned by:
343995CB95354BC...
Craig Shuman
Regional Manager
Marine Region

ATTACHMENTS

1. Agreement in Principle for Interim Criteria for Injury to Fish from Pile Driving Activities

2. Department of Fish and Game Fish Screening Criteria

ec: Office of Planning and Research, State Clearinghouse, Sacramento

Tami Schane, CDFW Bay Delta Region – Tami.Schane@wildlife.ca.gov
Brenda Blinn, CDFW Bay Delta Region – Brenda.Blinn@wildlife.ca.gov
Craig Weightman, CDFW Bay Delta Region – Craig.Weightman@wildlife.ca.gov
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NOAA's Fisheries Northwest and Southwest Regions	*U.S. Fish and Wildlife Service Regions 1 & 8*	*California/Washington/ Oregon Departments of Transportation*	*California Department of Fish and Game*	*U.S. Federal Highway Administration*

MEMORANDUM

June 12, 2008

From: Fisheries Hydroacoustic Working Group

Subject: Agreement in Principle for Interim Criteria for Injury to Fish from Pile Driving Activities

To: Applicable Agency Staff

The signatory agencies, identified below, have agreed in principle to use the attached Interim Criteria for Injury to Fish from Pile Driving Activities. The agreement was concluded at a meeting in Vancouver, Washington on June 10-11, 2008 with key technical and policy staff from the Federal Highway Administration, NOAA Fisheries, U.S. Fish and Wildlife Service, the Departments of Transportation from California, Oregon, and Washington; and national experts on sound propagation activities that affect fish and wildlife species of concern. The agreed upon criteria identify sound pressure levels of 206 dB peak and 187 dB accumulated sound exposure level(SEL) for all listed fish except those that are less than 2 grams. In that case, the criteria for the accumulated SEL will be 183 dB.

These criteria will apply to all new projects beginning no later than 60 days from the date of this memorandum. During the interim 60 day period, the Transportation Agencies will work with the Services to identify projects currently in the consultation process and reach agreement on which criteria will be used to assess project effects.

The agencies agree to review the science periodically and revise the threshold and cumulative levels as needed to reflect current information. Behavioral impacts to fish and impacts to marine mammals are not addressed in this agreement. Sub-injurious effects will continue to be discussed in future meetings.

The respective agencies also agree to develop appropriate training for staff on these revised criteria, as well as a process to review and possibly refine the criteria, when appropriate.

For questions or concerns about the revised criteria, we recommend staff contact their agency environmental coordinator or agency expert on pile driving issues.

Carol G. Adkins

Federal Highway Administration*

*FHWA supports the use of these interim criteria in the states signing this agreement in principle. FHWA leaves the schedule for implementation to the discretion of the state DOTs in cooperation with their respective FHWA Division Offices and the Services.

Michael Jehan

NOAA Fisheries – NWR

Russell M Strach

NOAA Fisheries – SWR

Ken S Berg

US Fish and Wildlife Service Region 1

Richard E Rogers Jr.

US Fish and Wildlife Service Region 8

California Department of Transportation

California Department of Fish and Game

Oregon Department of Transportation

Washington State Department of Transportation

EXHIBIT A
DEPARTMENT OF FISH AND GAME
FISH SCREENING CRITERIA
June 19, 2000

1. STRUCTURE PLACEMENT

A. Streams And Rivers (flowing water): The screen face shall be parallel to the flow and adjacent bankline (water's edge), with the screen face at or streamward of a line defined by the annual low-flow water's edge.

The upstream and downstream transitions to the screen structure shall be designed and constructed to match the bankline, minimizing eddies upstream of, in front of, and downstream of, the screen.

Where feasible, this "on-stream" fish screen structure placement is preferred by the California Department of Fish and Game.

B. In Canals (flowing water): The screen structure shall be located as close to the river source as practical, in an effort to minimize the approach channel length and the fish return bypass length. This "in canal" fish screen location shall only be used where an "on-stream" screen design is not feasible. This situation is most common at existing diversion dams with headgate structures.

The National Marine Fisheries Service - Southwest Region "Fish Screening Criteria for Anadromous Salmonids, January 1997" shall be used for these types of installations.

C. Small Pumped Diversions: Small pumped diversions (less than 40 cubic-feet per second) which are screened using "manufactured, self-contained" screens shall conform to the National Marine Fisheries Service - Southwest Region "Fish Screening Criteria for Anadromous Salmonids, January 1997."

D. Non-Flowing Waters (tidal areas, lakes and reservoirs): The preferred location for the diversion intake structure shall be offshore, in deep water, to minimize fish contact with the diversion. Other configurations will be considered as exceptions to the screening criteria as described in Section 5.F. below.

2. APPROACH VELOCITY (Local velocity component perpendicular to the screen face)

A. Flow Uniformity: The design of the screen shall distribute the approach velocity uniformly across the face of the screen. Provisions shall be made in the design of the screen to allow for adjustment of flow patterns. The intent is to ensure uniform flow distribution through the entire face of the screen as it is constructed and operated.

B. Self-Cleaning Screens:[1]

The U.S. Fish and Wildlife Service has selected a 0.2 feet per second approach velocity for use in waters where the Delta smelt is found. Thus, fish screens in the Sacramento-San Joaquin Delta and San Francisco Estuary should use this criterion for design purposes. In addition:

1. Streams and Rivers (flowing waters) - exposure to the fish screen shall not exceed fifteen minutes.

[1] Approach velocities in the June 19, 2000 Fish Screening Criteria that are inapplicable if delta smelt are present are omitted.

2. In Canals (flowing waters) - a bypass entrance shall be located every one-minute of travel time along the screen face.
3. Non-Flowing Waters (tidal areas, lakes and reservoirs) - The specific screen approach velocity shall be determined for each installation, based on the delta smelt life stage being protected. Velocities which exceed those described above will require a variance to these criteria (see Section 5.F. below).

C. Screens Which Are Not Self-Cleaning: The screens shall be designed with an approach velocity one-fourth that outlined in Section B. above. The screen shall be cleaned before the approach velocity exceeds the criteria described in Section B.

D. Frequency Of Cleaning: Fish screens shall be cleaned as frequently as necessary to prevent flow impedance and violation of the approach velocity criteria. A cleaning cycle once every 5 minutes is deemed to meet this standard.

E. Screen Area Calculation: The required wetted screen area (square feet), excluding the area affected by structural components (i.e., pore space or open area), is calculated by dividing the **maximum** diverted flow (cubic-feet per second) by the allowable approach velocity (feet per second). Example:
1.0 cubic-feet per second / 0.2 feet per second = 5.0 square feet of pore space
Unless otherwise specifically agreed to, this calculation shall be done at the **minimum** stream stage.

3. SWEEPING VELOCITY (Velocity component parallel to screen face)

A. In Streams And Rivers: The sweeping velocity should be at least two times the allowable approach velocity.

B. In Canals: The sweeping velocity shall exceed the allowable approach velocity. Experience has shown that sweeping velocities of 2.0 feet per second (or greater) are preferable.

C. Design Considerations: Screen faces shall be designed flush with any adjacent screen bay piers or walls, to allow an unimpeded flow of water parallel to the screen face.

4. SCREEN OPENINGS

A. Porosity: The screen surface shall have a minimum open area of 27 percent. We recommend the maximum possible open area consistent with the availability of appropriate material, and structural design considerations.
The use of open areas less than 40 percent shall include consideration of increasing the screen surface area, to reduce slot velocities, assisting in both fish protection and screen cleaning.

B. Round Openings: Round openings in the screening shall not exceed 3.96mm (5/32in). In waters where steelhead rainbow trout fry are present, this dimension shall not exceed 2.38mm (3/32in).

C. Square Openings: Square openings in screening shall not exceed 3.96mm (5/32in) measured diagonally. In waters where steelhead rainbow trout fry are present, this dimension shall not exceed 2.38mm (3/32in) measured diagonally.

D. Slotted Openings: Slotted openings shall not exceed 2.38mm (3/32in) in width. In waters where steelhead rainbow trout fry are present, this dimension shall not exceed 1.75mm (0.0689in).

5. SCREEN CONSTRUCTION

A. Material Selection: Screens may be constructed of any rigid material, perforated, woven, or slotted that provides water passage while physically excluding fish. The largest possible screen open area which is consistent with other project requirements should be used. Reducing the screen slot velocity is desirable both to protect fish and to ease cleaning requirements. Care should be taken to avoid the use of materials with sharp edges or projections which could harm fish.

B. Corrosion and Fouling Protection: Stainless steel or other corrosion-resistant material is the screen material recommended to reduce clogging due to corrosion. The use of both active and passive corrosion protection systems should be considered. Consideration should be given to anti-fouling material choices, to reduce biological fouling problems. Care should be taken not to use materials deemed deleterious to fish and other wildlife.

C. Project Review and Approval: Plans and design calculations, which show that all the applicable screening criteria have been met, shall be provided to the Department before written approval can be granted by the Regional Manager, Bay Delta Region.

The approval shall be documented in writing to the project sponsor, with a copy to the Deputy Director, Resource Management and Policy Division. Such approval may include a requirement for post-construction evaluation, monitoring and reporting.

D. Assurances: All fish screens constructed after the effective date of these criteria shall be designed and constructed to satisfy the current criteria. Owners of existing screens, approved by the Department prior to the effective date of these criteria, shall not be required to upgrade their facilities to satisfy the current criteria unless:

1. The controlling screen components deteriorate and require replacement (i.e., change the opening size or opening orientation when the screen panels or rotary drum screen coverings need replacing),
2. Relocation, modification or reconstruction (i.e., a change of screen alignment or an increase in the intake size to satisfy diversion requirements) of the intake facilities, or
3. The owner proposes to increase the rate of diversion which would result in violation of the criteria without additional modifications.

E. Supplemental Criteria: Supplemental criteria may be issued by the Department for a project, to accommodate new fish screening technology or to address species-specific or site-specific circumstances.

F. Variances: Written variances to these criteria may be granted with the approval of the Regional Manager, Bay Delta Region and concurrence from the Deputy Director, Resource Management and Policy Division. At a minimum, the rationale for the variance must be described and justified in the request. Evaluation and monitoring may be required as a condition of any variance, to ensure that the requested variance does not result in a reduced level of protection for the aquatic resources.

EXHIBIT A
DEPARTMENT OF FISH AND GAME
FISH SCREENING CRITERIA
June 19, 2000

It is the responsibility of the project sponsor to obtain the most current version of the appropriate fish screen criteria. Project sponsors should contact the Department of Fish and Game and the U.S. Fish and Wildlife Service (for projects in anadromous and fresh waters) for guidance.

Copies of the current criteria are available from the Department of Fish and Game Bay Delta Region; 7329 Silverado Trail/P.O. Box 46, Yountville, CA 94599, (707) 944-5500.

Technical assistance can be obtained directly from the Habitat Conservation Branch; 1416 Ninth Street, Sacramento, CA 95814 - (916) 653-1070.

The National Marine Fisheries Service Southwest Region "Fish Screening Criteria for Anadromous Salmonids, January 1997" is available at: http://swr.ucsd.edu/hcd/fishscrn.htm and from their Southwest Region, 777 Sonoma Avenue, Room 325, Santa Rosa, CA 95402 - (707) 575-6050.

California Department of Transportation

DISTRICT 4
OFFICE OF TRANSIT AND COMMUNITY PLANNING
P.O. BOX 23660, MS–10D | OAKLAND, CA 94623-0660
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Governor's Office of Planning & Research

Jun 14 2022

STATE CLEARINGHOUSE

June 14, 2022

SCH #: 2022040504
GTS #: 04-SM-2022-00438
GTS ID: 26302
Co/Rt/Pm: SM/84/28.641

Tess Tyler, Senior Project Manager
San Franciscito Creek Joint Powers Authority
2100 Geng Rd., Suite 201
Palo Alto, CA 94303

Re: SAFER Bay Project, Notice of Preparation (NOP) for a Draft Environmental Impact Report (DEIR)

Dear Tess Tyler:

Thank you for including the California Department of Transportation (Caltrans) in the environmental review process for the SAFER Bay Project. We are committed to ensuring that impacts to the State's multimodal transportation system and to our natural environment are identified and mitigated to support a safe, sustainable, integrated and efficient transportation system. The following comments are based on our review of the April 2022 NOP.

Project Understanding

The Project proposes to restore former salt production ponds, Pond R1 and Pond R2, located in the Ravenswood Complex, as part of the SAFER Bay Project. The restoration scenarios include tidal marsh or a combination of tidal marsh and managed ponds. The Project will construct levees, floodwalls and other flood protection features necessary to enable the restoration of tidal action to these ponds and includes design and construction of the pond restoration itself to mitigate the Project's impacts to jurisdictional wetlands and aquatic habitats. The Project also proposes to increase the diversity of habitat by building tidal salt marsh-upland transition zone habitat (transition zone habitat) on the bayward slope of appropriate segments of levee adjacent to existing and/or restored tidal salt marsh. In addition, the Project proposes to enhance recreational access to the shoreline by creating new sections of the Bay Trail and by placing existing sections of the Bay Trail atop new levees where they will be less susceptible to flooding.

Climate Change Planning
Caltrans acknowledges that this NOP recognizes the potential impacts of sea level rise may on transportation facilities located in the project area, primarily SR-84 and the Dumbarton Bridge West Approach. Executive Order (EO) S-13-08 directs State agencies planning construction projects in areas vulnerable to sea level rise to begin planning for potential impacts by considering a range of sea level rise scenarios for years 2050 and 2100. Higher water levels may increase erosion rates, change environmental characteristics that affect material durability, lead to increased groundwater levels, and change sediment movement along shores and at estuaries and rive mouths, as well as affect soil pore pressure at dikes and levees on which transportation facilities are constructed. These factors, among others, must be addressed through geotechnical and hydrological studies conducted in coordination with Caltrans. Caltrans encourages multi-agency collaboration with partner agencies to achieve multi-benefit approaches to protect bayfront development, infrastructure, and assets from sea level rise and other climate change impacts. Partnership can help distribute potential mitigation costs while balancing environmental justice concerns to achieve equitable adaptation solutions.

Caltrans requests and analysis that fully addresses the projected sea level rise of 3.5 ft and flooding concerns from such rise. Additionally, please address how the proposed flood protection measures, such as floodwalls, may conflict with existing State drainage facilities. Include all existing State and local drainage facilities on the plans. Proposed drainage/flooding design changes need to address any drainage-related conflicts. Please coordinate with Caltrans to address drainage solutions and potential drainage concerns in the project area.

Include an explanation of how the proposed flood protection facilities (floodwalls, levees, flood gates, pump stations, etc.) will be maintained and how resources (funding, personnel) for maintenance of such facilities will be allocated or made available. Consideration of regular maintenance of flood protection facilities is an integral part of a successful flood protection management plan.

Lead Agency
As the Lead Agency, the County of San Mateo is responsible for all project mitigation, including any needed improvements to the State Transportation Network (STN). The project's fair share contribution, financing, scheduling, implementation responsibilities and lead agency monitoring should be fully discussed for all proposed mitigation measures.

Equitable Access
If any Caltrans facilities are impacted by the project, those facilities must meet American Disabilities Act (ADA) Standards after project completion. As well, the project must maintain bicycle and pedestrian access during construction. These

access considerations support Caltrans' equity mission to provide a safe, sustainable, and equitable transportation network for all users.

Encroachment Permit
Please be advised that any permanent work or temporary traffic control that encroaches onto Caltrans' ROW requires a Caltrans-issued encroachment permit. As part of the encroachment permit submittal process, you may be asked by the Office of Encroachment Permits to submit a completed encroachment permit application package, digital set of plans clearly delineating Caltrans' ROW, digital copy of signed, dated and stamped (include stamp expiration date) traffic control plans, this comment letter, your response to the comment letter, and where applicable, the following items: new or amended Maintenance Agreement (MA), approved Design Standard Decision Document (DSDD), approved encroachment exception request, and/or airspace lease agreement. Your application package may be emailed to D4Permits@dot.ca.gov.

Please note that Caltrans is in the process of implementing an online, automated, and milestone-based Caltrans Encroachment Permit System (CEPS) to replace the current permit application submittal process with a fully electronic system, including online payments. The new system is expected to be available during 2022. To obtain information about the most current encroachment permit process and to download the permit application, please visit https://dot.ca.gov/programs/traffic-operations/ep/applications.

Thank you again for including Caltrans in the environmental review process. Should you have any questions regarding this letter, or for future notifications and requests for review of new projects, please email LDR-D4@dot.ca.gov.

Sincerely,

Mark Leong

MARK LEONG
District Branch Chief
Local Development Review

c: State Clearinghouse

NATIVE AMERICAN HERITAGE COMMISSION

May 02 2022

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April 27, 2022

Tess Byler, CHG
San Francisquito Creek Joint Powers Authority
2100 Geng Road, Suite 210
Palo Alto, CA 94303

Re: 2022040504, Strategy to Advance Flood Protection, Ecosystems and Recreation along San Francisco (SAFER) Bay Project, San Mateo County

Dear Ms. Byler:

The Native American Heritage Commission (NAHC) has received the Notice of Preparation (NOP), Draft Environmental Impact Report (DEIR) or Early Consultation for the project referenced above. The California Environmental Quality Act (CEQA) (Pub. Resources Code §21000 et seq.), specifically Public Resources Code §21084.1, states that a project that may cause a substantial adverse change in the significance of a historical resource, is a project that may have a significant effect on the environment. (Pub. Resources Code § 21084.1; Cal. Code Regs., tit.14, §15064.5 (b) (CEQA Guidelines §15064.5 (b)). If there is substantial evidence, in light of the whole record before a lead agency, that a project may have a significant effect on the environment, an Environmental Impact Report (EIR) shall be prepared. (Pub. Resources Code §21080 (d); Cal. Code Regs., tit. 14, § 5064 subd.(a)(1) (CEQA Guidelines §15064 (a)(1)). In order to determine whether a project will cause a substantial adverse change in the significance of a historical resource, a lead agency will need to determine whether there are historical resources within the area of potential effect (APE).

CEQA was amended significantly in 2014. Assembly Bill 52 (Gatto, Chapter 532, Statutes of 2014) (AB 52) amended CEQA to create a separate category of cultural resources, "tribal cultural resources" (Pub. Resources Code §21074) and provides that a project with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a significant effect on the environment. (Pub. Resources Code §21084.2). Public agencies shall, when feasible, avoid damaging effects to any tribal cultural resource. (Pub. Resources Code §21084.3 (a)). **AB 52 applies to any project for which a notice of preparation, a notice of negative declaration, or a mitigated negative declaration is filed on or after July 1, 2015.** If your project involves the adoption of or amendment to a general plan or a specific plan, or the designation or proposed designation of open space, on or after March 1, 2005, it may also be subject to Senate Bill 18 (Burton, Chapter 905, Statutes of 2004) (SB 18). **Both SB 18 and AB 52 have tribal consultation requirements**. If your project is also subject to the federal National Environmental Policy Act (42 U.S.C. § 4321 et seq.) (NEPA), the tribal consultation requirements of Section 106 of the National Historic Preservation Act of 1966 (154 U.S.C. 300101, 36 C.F.R. §800 et seq.) may also apply.

The NAHC recommends consultation with California Native American tribes that are traditionally and culturally affiliated with the geographic area of your proposed project as early as possible in order to avoid inadvertent discoveries of Native American human remains and best protect tribal cultural resources. Below is a brief summary of portions of AB 52 and SB 18 as well as the NAHC's recommendations for conducting cultural resources assessments.

Consult your legal counsel about compliance with AB 52 and SB 18 as well as compliance with any other applicable laws.

AB 52

AB 52 has added to CEQA the additional requirements listed below, along with many other requirements:

1. Fourteen Day Period to Provide Notice of Completion of an Application/Decision to Undertake a Project: Within fourteen (14) days of determining that an application for a project is complete or of a decision by a public agency to undertake a project, a lead agency shall provide formal notification to a designated contact of, or tribal representative of, traditionally and culturally affiliated California Native American tribes that have requested notice, to be accomplished by at least one written notice that includes:

- **a.** A brief description of the project.
- **b.** The lead agency contact information.
- **c.** Notification that the California Native American tribe has 30 days to request consultation. (Pub. Resources Code §21080.3.1 (d)).
- **d.** A "California Native American tribe" is defined as a Native American tribe located in California that is on the contact list maintained by the NAHC for the purposes of Chapter 905 of Statutes of 2004 (SB 18). (Pub. Resources Code §21073).

2. Begin Consultation Within 30 Days of Receiving a Tribe's Request for Consultation and Before Releasing a Negative Declaration, Mitigated Negative Declaration, or Environmental Impact Report: A lead agency shall begin the consultation process within 30 days of receiving a request for consultation from a California Native American tribe that is traditionally and culturally affiliated with the geographic area of the proposed project. (Pub. Resources Code §21080.3.1, subds. (d) and (e)) and prior to the release of a negative declaration, mitigated negative declaration or Environmental Impact Report. (Pub. Resources Code §21080.3.1(b)).

- **a.** For purposes of AB 52, "consultation shall have the same meaning as provided in Gov. Code §65352.4 (SB 18). (Pub. Resources Code §21080.3.1 (b)).

3. Mandatory Topics of Consultation If Requested by a Tribe: The following topics of consultation, if a tribe requests to discuss them, are mandatory topics of consultation:

- **a.** Alternatives to the project.
- **b.** Recommended mitigation measures.
- **c.** Significant effects. (Pub. Resources Code §21080.3.2 (a)).

4. Discretionary Topics of Consultation: The following topics are discretionary topics of consultation:

- **a.** Type of environmental review necessary.
- **b.** Significance of the tribal cultural resources.
- **c.** Significance of the project's impacts on tribal cultural resources.
- **d.** If necessary, project alternatives or appropriate measures for preservation or mitigation that the tribe may recommend to the lead agency. (Pub. Resources Code §21080.3.2 (a)).

5. Confidentiality of Information Submitted by a Tribe During the Environmental Review Process: With some exceptions, any information, including but not limited to, the location, description, and use of tribal cultural resources submitted by a California Native American tribe during the environmental review process shall not be included in the environmental document or otherwise disclosed by the lead agency or any other public agency to the public, consistent with Government Code §6254 (r) and §6254.10. Any information submitted by a California Native American tribe during the consultation or environmental review process shall be published in a confidential appendix to the environmental document unless the tribe that provided the information consents, in writing, to the disclosure of some or all of the information to the public. (Pub. Resources Code §21082.3 (c)(1)).

6. Discussion of Impacts to Tribal Cultural Resources in the Environmental Document: If a project may have a significant impact on a tribal cultural resource, the lead agency's environmental document shall discuss both of the following:

- **a.** Whether the proposed project has a significant impact on an identified tribal cultural resource.
- **b.** Whether feasible alternatives or mitigation measures, including those measures that may be agreed to pursuant to Public Resources Code §21082.3, subdivision (a), avoid or substantially lessen the impact on the identified tribal cultural resource. (Pub. Resources Code §21082.3 (b)).

7. Conclusion of Consultation: Consultation with a tribe shall be considered concluded when either of the following occurs:

a. The parties agree to measures to mitigate or avoid a significant effect, if a significant effect exists, on a tribal cultural resource; or

b. A party, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached. (Pub. Resources Code §21080.3.2 (b)).

8. Recommending Mitigation Measures Agreed Upon in Consultation in the Environmental Document: Any mitigation measures agreed upon in the consultation conducted pursuant to Public Resources Code §21080.3.2 shall be recommended for inclusion in the environmental document and in an adopted mitigation monitoring and reporting program, if determined to avoid or lessen the impact pursuant to Public Resources Code §21082.3, subdivision (b), paragraph 2, and shall be fully enforceable. (Pub. Resources Code §21082.3 (a)).

9. Required Consideration of Feasible Mitigation: If mitigation measures recommended by the staff of the lead agency as a result of the consultation process are not included in the environmental document or if there are no agreed upon mitigation measures at the conclusion of consultation, or if consultation does not occur, and if substantial evidence demonstrates that a project will cause a significant effect to a tribal cultural resource, the lead agency shall consider feasible mitigation pursuant to Public Resources Code §21084.3 (b). (Pub. Resources Code §21082.3 (e)).

10. Examples of Mitigation Measures That, If Feasible, May Be Considered to Avoid or Minimize Significant Adverse Impacts to Tribal Cultural Resources:

a. Avoidance and preservation of the resources in place, including, but not limited to:

i. Planning and construction to avoid the resources and protect the cultural and natural context.

ii. Planning greenspace, parks, or other open space, to incorporate the resources with culturally appropriate protection and management criteria.

b. Treating the resource with culturally appropriate dignity, taking into account the tribal cultural values and meaning of the resource, including, but not limited to, the following:

i. Protecting the cultural character and integrity of the resource.

ii. Protecting the traditional use of the resource.

iii. Protecting the confidentiality of the resource.

c. Permanent conservation easements or other interests in real property, with culturally appropriate management criteria for the purposes of preserving or utilizing the resources or places.

d. Protecting the resource. (Pub. Resource Code §21084.3 (b)).

e. Please note that a federally recognized California Native American tribe or a non-federally recognized California Native American tribe that is on the contact list maintained by the NAHC to protect a California prehistoric, archaeological, cultural, spiritual, or ceremonial place may acquire and hold conservation easements if the conservation easement is voluntarily conveyed. (Civ. Code §815.3 (c)).

f. Please note that it is the policy of the state that Native American remains and associated grave artifacts shall be repatriated. (Pub. Resources Code §5097.991).

11. Prerequisites for Certifying an Environmental Impact Report or Adopting a Mitigated Negative Declaration or Negative Declaration with a Significant Impact on an Identified Tribal Cultural Resource: An Environmental Impact Report may not be certified, nor may a mitigated negative declaration or a negative declaration be adopted unless one of the following occurs:

a. The consultation process between the tribes and the lead agency has occurred as provided in Public Resources Code §21080.3.1 and §21080.3.2 and concluded pursuant to Public Resources Code §21080.3.2.

b. The tribe that requested consultation failed to provide comments to the lead agency or otherwise failed to engage in the consultation process.

c. The lead agency provided notice of the project to the tribe in compliance with Public Resources Code §21080.3.1 (d) and the tribe failed to request consultation within 30 days. (Pub. Resources Code §21082.3 (d)).

The NAHC's PowerPoint presentation titled, "Tribal Consultation Under AB 52: Requirements and Best Practices" may be found online at: http://nahc.ca.gov/wp-content/uploads/2015/10/AB52TribalConsultation_CalEPAPDF.pdf

SB 18

SB 18 applies to local governments and requires local governments to contact, provide notice to, refer plans to, and consult with tribes prior to the adoption or amendment of a general plan or a specific plan, or the designation of open space. (Gov. Code §65352.3). Local governments should consult the Governor's Office of Planning and Research's "Tribal Consultation Guidelines," which can be found online at: https://www.opr.ca.gov/docs/09_14_05_Updated_Guidelines_922.pdf.

Some of SB 18's provisions include:

1. Tribal Consultation: If a local government considers a proposal to adopt or amend a general plan or a specific plan, or to designate open space it is required to contact the appropriate tribes identified by the NAHC by requesting a "Tribal Consultation List." If a tribe, once contacted, requests consultation the local government must consult with the tribe on the plan proposal. **A tribe has 90 days from the date of receipt of notification to request consultation unless a shorter timeframe has been agreed to by the tribe.** (Gov. Code §65352.3 (a)(2)).
2. No Statutory Time Limit on SB 18 Tribal Consultation. There is no statutory time limit on SB 18 tribal consultation.
3. Confidentiality: Consistent with the guidelines developed and adopted by the Office of Planning and Research pursuant to Gov. Code §65040.2, the city or county shall protect the confidentiality of the information concerning the specific identity, location, character, and use of places, features and objects described in Public Resources Code §5097.9 and §5097.993 that are within the city's or county's jurisdiction. (Gov. Code §65352.3 (b)).
4. Conclusion of SB 18 Tribal Consultation: Consultation should be concluded at the point in which:
    a. The parties to the consultation come to a mutual agreement concerning the appropriate measures for preservation or mitigation; or
    b. Either the local government or the tribe, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached concerning the appropriate measures of preservation or mitigation. (Tribal Consultation Guidelines, Governor's Office of Planning and Research (2005) at p. 18).

Agencies should be aware that neither AB 52 nor SB 18 precludes agencies from initiating tribal consultation with tribes that are traditionally and culturally affiliated with their jurisdictions before the timeframes provided in AB 52 and SB 18. For that reason, we urge you to continue to request Native American Tribal Contact Lists and "Sacred Lands File" searches from the NAHC. The request forms can be found online at: http://nahc.ca.gov/resources/forms/.

NAHC Recommendations for Cultural Resources Assessments

To adequately assess the existence and significance of tribal cultural resources and plan for avoidance, preservation in place, or barring both, mitigation of project-related impacts to tribal cultural resources, the NAHC recommends the following actions:

1. Contact the appropriate regional California Historical Research Information System (CHRIS) Center (http://ohp.parks.ca.gov/?page_id=1068) for an archaeological records search. The records search will determine:
    a. If part or all of the APE has been previously surveyed for cultural resources.
    b. If any known cultural resources have already been recorded on or adjacent to the APE.
    c. If the probability is low, moderate, or high that cultural resources are located in the APE.
    d. If a survey is required to determine whether previously unrecorded cultural resources are present.

2. If an archaeological inventory survey is required, the final stage is the preparation of a professional report detailing the findings and recommendations of the records search and field survey.
    a. The final report containing site forms, site significance, and mitigation measures should be submitted immediately to the planning department. All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum and not be made available for public disclosure.

b. The final written report should be submitted within 3 months after work has been completed to the appropriate regional CHRIS center.

3. Contact the NAHC for:

a. A Sacred Lands File search. Remember that tribes do not always record their sacred sites in the Sacred Lands File, nor are they required to do so. A Sacred Lands File search is not a substitute for consultation with tribes that are traditionally and culturally affiliated with the geographic area of the project's APE.

b. A Native American Tribal Consultation List of appropriate tribes for consultation concerning the project site and to assist in planning for avoidance, preservation in place, or, failing both, mitigation measures.

4. Remember that the lack of surface evidence of archaeological resources (including tribal cultural resources) does not preclude their subsurface existence.

a. Lead agencies should include in their mitigation and monitoring reporting program plan provisions for the identification and evaluation of inadvertently discovered archaeological resources per Cal. Code Regs., tit. 14, §15064.5(f) (CEQA Guidelines §15064.5(f)). In areas of identified archaeological sensitivity, a certified archaeologist and a culturally affiliated Native American with knowledge of cultural resources should monitor all ground-disturbing activities.

b. Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the disposition of recovered cultural items that are not burial associated in consultation with culturally affiliated Native Americans.

c. Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the treatment and disposition of inadvertently discovered Native American human remains. Health and Safety Code §7050.5, Public Resources Code §5097.98, and Cal. Code Regs., tit. 14, §15064.5, subdivisions (d) and (e) (CEQA Guidelines §15064.5, subds. (d) and (e)) address the processes to be followed in the event of an inadvertent discovery of any Native American human remains and associated grave goods in a location other than a dedicated cemetery.

If you have any questions or need additional information, please contact me at my email address: Cody.Campagne@nahc.ca.gov.

Sincerely,

Cody Campagne

Cody Campagne
Cultural Resources Analyst

cc: State Clearinghouse

CALIFORNIA STATE LANDS COMMISSION
100 Howe Avenue, Suite 100-South
Sacramento, CA 95825-8202

JENNIFER LUCCHESI, *Executive Officer*
(916) 574-1800
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or for Spanish **800.855.3000**

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Governor's Office of Planning & Research

Jun 15 2022

STATE CLEARINGHOUSE

Established in 1938

June 15, 2022

File Ref: SCH # 2022040504

Tess Byler
San Francisquito Creek Joint Powers Authority
2100 Geng Road
Palo Alto, CA 94303

VIA REGULAR & ELECTRONIC MAIL: tbyler@sfcjpa.org

Subject: Notice of Preparation (NOP) for an Environmental Impact Report (EIR) for the Strategy to Advance Flood Protection, Ecosystems and Recreation along San Francisco Bay Project, San Mateo County

Dear Tess Byler:

The California State Lands Commission (Commission) staff has reviewed the subject NOP for an EIR for the Strategy to Advance Flood Protection, Ecosystems and Recreation along San Francisco Bay Project (Project), which is being prepared by the San Francisquito Creek Joint Powers Authority (SFCJPA). The SFCJPA, as a California public agency proposing to carry out the Project, is the lead agency under the California Environmental Quality Act (CEQA) (Pub. Resources Code, § 21000 et seq.). The Commission is a trustee agency because of its trust responsibility for projects that could directly or indirectly affect State sovereign land and their accompanying Public Trust resources or uses. Additionally, because the Project involves work on State sovereign land, the Commission is also a responsible agency. Commission staff requests that the SFCJPA consult with us on preparation of the Draft EIR (DEIR) as required by CEQA section 21153, subdivision (a), and the State CEQA Guidelines section 15086, subdivisions (a)(1) and (a)(2).

Commission Jurisdiction and Public Trust Lands

The Commission has jurisdiction and management authority over all ungranted tidelands, submerged lands, and the beds of navigable lakes and waterways. The Commission also has certain residual and review authority for tidelands and submerged lands legislatively granted in trust to local jurisdictions (Pub. Resources Code, §§ 6301, 6306). All tidelands and submerged lands, granted or ungranted, as well as navigable lakes and waterways, are subject to the protections of the Common Law Public Trust.

As general background, the State of California acquired sovereign ownership of all tidelands and submerged lands and beds of navigable lakes and waterways upon its admission to the United States in 1850. The State holds these lands for the benefit of all people of the State for statewide Public Trust purposes, which include but are not limited to waterborne commerce, navigation, fisheries, water-related recreation, habitat preservation, and open space. On tidal waterways, the State's sovereign fee ownership extends landward to the ordinary high-water mark as generally indicated by the mean high tide line (MHTL), except for areas of fill or artificial accretion or where the boundary has been fixed by agreement or a court. On navigable non-tidal waterways, including lakes, the State holds fee ownership of the bed of the waterway landward to the ordinary low water mark and a Public Trust easement landward to the ordinary high-water mark, except where the boundary has been fixed by agreement or a court. Such boundaries may not be readily apparent from present day site inspections.

After review of the information contained in the NOP and our in-house records, Commission staff has determined that portions of the Project area will include State-owned sovereign land under the jurisdiction of the Commission. Therefore, a lease from the Commission will be required for any portion of the Project encroaching on State sovereign land. Please contact George Asimakopoulos, Public Land Management Specialist (see contact information below), for further information on the extent of the Commission's jurisdiction and lease application requirements. The Commission has a lease in this vicinity with the U.S. Department of the Interior, Fish and Wildlife Service including Ravenswood Slough. On August 20, 1981, the Commission authorized a General Lease – Public Agency Use, Lease No. PRC 6045.9, for the operation, management, protection, and maintenance of State sovereign land to be used in conjunction with the San Francisco Bay National Wildlife Refuge, which encompasses refuge areas in Alameda, San Mateo, and Santa Clara counties. The lease will expire August 31, 2047. The Commission has a lease in the vicinity of Flood Slough with the Menlo Park Sanitary District. On December 20, 1979, the Commission amended a Permit – Public Agency Use, No. PRC 5468.9, for the construction and maintenance of a sanitary pumping station. This lease will expire on May 31, 2044. The Project area may contain other leases or existing facilities.

Project Description

The Project will provide resiliency to coastal flooding and sea level rise in East Palo Alto and Menlo Park as well as habitat and recreation improvements. The SFCJPA is collaborating with the South Bay Salt Ponds Restoration Project to restore former salt production ponds, Pond R1 and Pond R2, located in the Ravenswood Complex, as part of the Project. The Project will construct levees, floodwalls, and other flood protection features necessary to enable the restoration of tidal action to these ponds. The Project also proposes to increase the diversity of habitat by building tidal salt marsh-upland transition zone habitat (transition zone habitat) on the bayward slope of appropriate segments of the levee adjacent to existing and/or restored tidal salt marsh. In addition, the Project proposes to enhance recreational access to the shoreline by creating new sections of the Bay Trail and by placing existing sections of the Bay Trail atop new

levees where they will be less susceptible to flooding. Consistent with CEQA, the Project EIR will contain both project-level and program-level evaluations.

Environmental Review

Commission staff requests that the consider the following comments when preparing the DEIR.

General Comments

1. Project Description: A thorough and complete Project Description should be included in the DEIR in order to facilitate meaningful environmental review of potential impacts, mitigation measures, and alternatives. The Project Description should be as precise as possible in describing the details of all allowable activities (e.g., types of equipment or methods that may be used, maximum area of impact or volume of sediment removed or disturbed, seasonal work windows, locations for material disposal, construction schedule and staging areas, etc.), as well as the details of the timing and length of activities. Thorough descriptions will facilitate Commission staff's determination of the extent and locations of its leasing jurisdiction, make for a more robust analysis of the work that may be performed, and minimize the potential for subsequent environmental analysis to be required. Please be as specific as possible regarding all proposed work within the Commission's jurisdiction waterward of the MHTL and all other land under Commission jurisdiction.

2. Permits and Approvals: Please update the Permits and Approvals table on page 11 of the NOP to state that a lease will be required from the Commission.

Biological Resources

3. The DEIR should disclose and analyze all potentially significant effects on sensitive species and habitats in and around the Project area, including special-status wildlife, fish, and plants, and if appropriate, identify feasible mitigation measures to reduce those impacts. The SFCJPA should conduct queries of the California Department of Fish and Wildlife's (CDFW) California Natural Diversity Database and U.S. Fish and Wildlife Service's (USFWS) Special Status Species Database to identify any special-status plant or wildlife species that may occur in the Project area. The DEIR should also include a discussion of consultation with the CDFW, USFWS, and the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS), including any recommended mitigation measures and potentially required permits identified by these agencies.

4. Construction Noise: The DEIR should also evaluate noise and vibration impacts on fish and birds from construction, restoration, or flood control activities in the water and levee systems. Mitigation measures could include species-specific work windows as defined by CDFW, USFWS, and NMFS. Again, staff recommends early consultation with these agencies to minimize the impacts of the Project on sensitive species.

Cultural Resources

5. Title to Resources: The DEIR should also mention that the title to all archaeological sites and historic or cultural resources on or in the tide and submerged lands of California is vested in the State and under the jurisdiction of the California State Lands Commission (Pub. Resources Code, § 6313). Commission staff requests that the SFCJPA consult with Staff Attorney Jamie Garrett should any cultural resources on state lands be discovered during construction of the proposed Project. In addition, staff requests that the following statement be included in the DEIR's Mitigation and Monitoring Plan: "The final disposition of archaeological, historical, and paleontological resources recovered on State sovereign land under the jurisdiction of the California State Lands Commission must be approved by the Commission."

Hydrology and Sea Level Rise

6. In the Environmental Setting section of the DEIR, please provide detail regarding the Project area's surface hydrology features and characteristics, groundwater characteristics, history of flood events and any known land uses and structures subject to flood hazards, and any flood zone designations for the Project area. In addition to Federal Emergency Management Agency standards for sea level rise with flood protection structures, identify all coastal adaptation plans applicable to the Project area and describe how the Project will implement the sea level rise goals and objectives of these plans. Describe how proposed construction activities with levees, flood walls, and other flood protection structures will be designed to withstand future projections of sea level rise and elevated groundwater levels and enhance resiliency to restored tidal areas. Describe proposed monitoring programs and adaptive management measures to achieve restoration and flood protection goals. Describe how flood protection structures will be designed for compatibility with existing tidal restoration and habitat management goals for the Project region and will avoid adverse impacts to adjacent properties.

Recreation

7. Please provide a comprehensive description of existing recreational uses and public access to the Bay Trail and San Francisco Bay. Describe how proposed improvements to the Bay Trail will enhance public access to the Bay and uses with the trail, including protection from coastal flooding. Describe any restrictions or limitations on public access to the Project area during construction, and methods to provide notice and accommodations to the public prior to construction.

Alternatives

8. In addition to describing mitigation measures that would avoid or reduce the potentially significant impacts of the Project, the SFCJPA should identify and analyze a range of reasonable alternatives to the proposed Project that would attain most of the Project objectives while avoiding or reducing one or more of the

potentially significant impacts. (State CEQA Guidelines § 15126.6.) Alternatives to construction methods, materials, and access should be considered that minimize impacts to public use of the Bay Trail.

Environmental Justice

9. Environmental justice is defined by California law as "the fair treatment and meaningful involvement of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies." (Gov. Code § 65040.12) This definition is consistent with the Public Trust Doctrine's principle that management of trust lands is for the benefit of all people.

   The Commission adopted an updated Environmental Justice Policy and Implementation Blueprint in December 2018 to ensure that environmental justice is an essential consideration in the agency's processes, decisions, and programs. The twelve goals outlined in the Policy reflect an urgent need to address the inequities of the past, so they do not continue. Through its policy, the Commission reaffirms its commitment to an informed and open process in which all people are treated equitably and with dignity, and in which its decisions are tempered by environmental justice considerations.

   Although not legally required in a CEQA document, Commission staff suggests that the SFCJPA include a section describing the environmental justice community outreach and engagement undertaken in developing the DEIR and the results of such outreach. The California Office of Environmental Health Hazard Assessment developed the CalEnviroScreen mapping tool to assist agencies with locating census tracts near proposed projects and identifying the environmental burdens, should there be any, that disproportionately impact those communities. Environmental justice communities often lack access to the decision-making process and experience barriers to becoming involved in that process. It is crucial that these communities are consulted as early as possible in the project planning process. Commission staff strongly recommends using the CalEnviroScreen tool and then, as applicable, reaching out through local community organizations, such as the California Environmental Justice Alliance. Engaging in early outreach will facilitate more equitable access for all community members. In this manner, the CEQA public comment process can improve and provide an opportunity for more members of the public to provide input related to environmental justice. Commission staff also recommends incorporating or addressing opportunities for community engagement in mitigation measures. Commission staff will review the environmental justice outreach and associated results as part of any future Commission action.

Thank you for the opportunity to comment on the NOP for the Project. As a trustee and responsible agency, the Commission requests that you consult with us on this Project and keep us advised of changes to the Project Description and all other important developments. Please send additional information on the Project to the Commission staff listed below as the DEIR is being prepared. Please refer questions concerning

environmental review to Jason Ramos, Senior Environmental Scientist, at (916) 574-1814 or via e-mail at Jason.Ramos@slc.ca.gov. For questions concerning archaeological or historic resources under Commission jurisdiction, please contact Jamie Garrett, Staff Attorney, at Jamie.Garrett@slc.ca.gov or (916) 574-0398. For questions concerning Commission leasing jurisdiction, please contact George Asimakopoulos, Public Land Management Specialist, at (916) 574-0990, or via e-mail at george.asimakopoulos@slc.ca.gov.

Sincerely,

Nicole Dobroski, Chief
Division of Environmental Planning
and Management

CC: Office of Planning and Research
G. Asimakopoulos
J. Ramos
J. Garrett

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Transmitted Via Electronic Mail

June 15, 2022

Governor's Office of Planning & Research

Jun 16 2022

STATE CLEARINGHOUSE

Tess Byler
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San Francisquito Creek Joint Powers Authority
2100 Geng Road, Suite 210
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Via email: <TByler@sfcjpa.org>

SUBJECT: Notice of Preparation of a Draft Environmental Impact Report for the *Strategy to Advance Flood Protection, Ecosystems and Recreation along San Francisco (SAFER) Bay* Project, in East Palo Alto and Menlo Park, San Mateo County (BCDC Inquiry File No. MC.MC.7415.026; SCH #2022040504)

Dear Tess Byler:

Thank you for the opportunity to comment on the Notice of Preparation (NOP) of a Draft Environmental Impact Report (DEIR) for the *Strategy to Advance Flood Protection, Ecosystems and Recreation along San Francisco (SAFER) Bay Project*, received in our office on April 25, 2022. The proposed project is located along seven miles of San Francisco Bay shoreline in the cities of Menlo Park and East Palo Alto. It is divided into eight segments stretching from the Menlo Park/Redwood City border to the East Palo Alto/Palo Alto border. The project is intended to protect people, property and infrastructure from current tidal flooding and projected sea level rise through engineered and natural features that aim to enhance shoreline ecosystems and improve recreational opportunities.

The San Francisco Bay Conservation and Development Commission (Commission) is a responsible agency for this project and will rely on the DEIR when it considers the project. Our staff has prepared comments outlining specific Commission issues or policies that should be addressed either in the DEIR or through the Commission permitting process as appropriate, based on the project details in the NOP. As we receive additional details on the project, we will be able to provide more detailed responses and can work closely with the project proponents to ensure the project is consistent with Commission laws and policies.

The comments below are based on the McAteer-Petris Act and the Commission's San Francisco Bay Plan (Bay Plan). Commission staff has initially identified and summarized several policies and policy areas that are likely to apply to the project, however we also encourage you to review the McAteer-Petris Act and Bay Plan directly to ensure the project design complies with all relevant sections of these documents.

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Commission Jurisdiction

Portions of the project would be located within the Commission's jurisdiction. In the proposed project area, there are three distinct jurisdiction types, defined in detail in the McAteer-Petris Act (Section 66610) and summarized as follows:

a. San Francisco Bay, being all areas that are subject to tidal action, including all sloughs, and specifically, the marshlands lying between mean high tide and five feet above mean sea level; tidelands (land lying between mean high tide and mean low tide); and submerged lands (land lying below mean low tide);

b. A shoreline band consisting of all territory located between the shoreline of San Francisco Bay (as defined above) and a line 100 feet landward of and parallel with that line, but excluding any portions of salt ponds as described below; and

c. Salt ponds, consisting of all areas which have been diked off from the bay and have been used during the three years from [approximately 1966 to November 11, 1969] for the solar evaporation of bay water in the course of salt production.

The Commission's jurisdiction also includes all areas formerly subject to tidal action that have been filled since September 17, 1965. Within its jurisdiction, Commission permits are required for activities that involve placing fill, extracting materials, or making any substantial change in use of any water, land or structure. Permits are issued if the Commission finds the activities to be consistent with the McAteer-Petris Act and the policies of the Bay Plan.

The DEIR should provide a detailed and complete project description, clarify where the project would occur within the Commission's Bay, 100-foot shoreline band, and salt ponds jurisdictions, and identify the Commission's permitting role and the federal government's permitting role.

Wildlife Refuge Priority Use Area

Section 66602 of the McAteer-Petris Act states, in part, that certain water-oriented land uses along the bay shoreline are essential to the public welfare of the Bay Area; these priority use areas are designated on the Bay Plan Maps. As shown on Map 7, there are multiple areas of the project site classified as a "Wildlife Refuge" Priority Use Area, including Faber Tract Marsh; Laumeister Marsh; Ravenswood Ponds R1, R2, and SF2; and other areas on the site as indicated on the Map. Pursuant to the Commission's authority under the McAteer-Petris Act and the Bay Plan, these areas must be reserved for wildlife refuge purposes, and any activities therein must be consistent with Bay Plan policies describing appropriate uses and other considerations for wildlife protection and wildlife refuges, including policies related to Public Access; Recreation; and Fish, Other Aquatic Organisms, and Wildlife, as described further below.

The DEIR should discuss those areas of the project site that are designated for wildlife refuge priority use, the consistency of any proposed uses with this designation and, if there are inconsistencies, how the project proponents plan to resolve them.

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Commission Law and Bay Plan Policies Relevant to the Project

Bay Fill

Section 66605 of the McAteer-Petris Act sets forth the criteria necessary to authorize placing fill in the Bay and certain waterways. It states, among other things, that further filling of the Bay should only be authorized if it is the minimum necessary to achieve the purpose of the fill and if harmful effects associated with its placement are minimized. According to the Act, fill is limited to water-oriented uses or minor fill for improving shoreline appearance or public access, and should be authorized only when no alternative upland location is available for such purpose. The Bay Plan policies were recently amended to allow greater amounts of fill in the Bay for habitat enhancement, restoration, or sea level rise adaptation of habitat. Such projects must be designed to: a) minimize near-term adverse impacts to and loss of existing Bay habitat and native species; b) provide substantial net benefits for Bay habitats and native species; and c) be scaled appropriately for the project and necessary sea level rise adaptation measures in accordance with the best available science.

The DEIR should indicate the amount of fill that would be placed and extracted in the Commission's jurisdiction for the project overall and for each specific project area, as well as the uses associated with the proposed new fill for each specific area. Depending on the amount of net total fill proposed and the uses proposed on fill, the Commission may require fill removal or habitat restoration elsewhere, in accordance with Bay Plan policies related to mitigation (described further below).

Public Access and Recreation

Section 66602 of the McAteer-Petris Act states, in part, "that maximum feasible public access, consistent with a proposed project, should be provided." In addition, the Bay Plan includes a number of relevant policies related to Public Access and Recreation. The Public Access policies provide that maximum feasible public access to and along the waterfront, and on permitted fills, should be provided in and through every new development in the Bay or on the shoreline, whether it be for housing, industry, port, airport, public facility, wildlife area, or other use for wildlife and restoration areas.

Additional Public Access policies focus on minimizing impacts from public access on wildlife; avoiding significant adverse impacts from sea level rise and flooding; ensuring the access is accessible, inclusive, and appropriate for the local community culture and environment; consulting the Public Access Design Guidelines in design of the public access area; and other important considerations. Furthermore, the policies provide that the Design Review Board, composed of design and planning professionals, should advise the Commission on the design and adequacy of proposed public access.

In addition to the Public Access Policies, the Bay Plan Recreation policies describe requirements for recreation areas, including that diverse and accessible recreational facilities should be well distributed around the shores of the Bay; should present opportunities for people of all races,

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cultures, ages and income levels; should be compatible with wildlife and adjacent land uses; and should be clearly posted with signs and easily available from nearby public streets or other public areas. Trails that can be used as part of the Bay Trail should be developed and placed as close to the shore as feasible, considering protection of wildlife and habitat and risks associated with flooding and sea level rise.

There are also Recreation policies related specifically to waterfront parks and wildlife refuges, including that interpretive information should be provided about wildlife, habitat, and related elements; that where feasible and appropriate, opportunities for environmental education, community service, volunteer, and related programs should be provided; and that historic buildings in waterfront parks and water refuges should be preserved and made accessible to the public where appropriate.

Please see multiple comments below related to public access and recreation that should be addressed in the DEIR.

Maximum Feasible Public Access. To allow the Commission to evaluate consistency of the project with the laws and policies summarized above, please describe in detail the existing and proposed (i.e. new or enhanced) public access areas, amenities, and recreation opportunities, and how these project components have been designed to conform with our laws and policies. In addition, the DEIR should analyze the number and type of new users expected at the site, their expected impacts to existing public access areas, and whether the proposed new or enhanced public access areas is expected to accommodate these users and/or mitigate for any public access impacts; providing this information will help the Commission determine whether the public access proposed with the project is the maximum feasible consistent with the proposed project.

Design Review Board Review. Furthermore, due to the large scale of this project and its importance to regional public access, the project is likely to require review by BCDC's Design Review Board (DRB). The first DRB review typically occurs during the pre-application process, with a potential need for additional reviews thereafter. Our staff will work directly with the project team on this.

Existing Public Access. Please note that there are multiple existing public access areas at or near the project site, some of which are BCDC-required public access and/or form part of the Bay Trail, including trails along Faber Tract and Laumeister Marsh, Cooley Landing, Ravenswood Open Space Preserve, and Pond SF2. The project should be designed to minimize adverse impacts to these areas during construction, and should include use of well-managed, phased public access detours or closures where necessary. Commission staff will be happy to help you identify these areas and existing permit requirements, and review proposed detour or closure plans.

Trail Network and Connectivity. Please describe the entire proposed trail network and how it will be designed to be accessible and maximize connectivity with adjacent trails, parking, and public transportation. New or improved trails that are appropriate for the Bay Trail should be designed to current Bay Trail standards, and should be planned in close coordination with BCDC

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and relevant staff from the Metropolitan Transportation Commission. Please also describe why there is such a large range in the amount of new and improved trails (1 to 2.5 miles according to the NOP).

Wildlife Impacts. Please describe sensitive wildlife and habitat at the site, and how public access areas and amenities would be designed to avoid or minimize impacts on these areas. The project proponents should also coordinate closely with appropriate agencies, including the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, and the California Department of Fish and Wildlife, to ensure that public access areas and amenities are designed and managed appropriately.

Public Access Improvements. To the extent feasible at this stage of the design, please identify locations and types for proposed public access improvements, including furnishings, signage, and other amenities, and how these improvements would be maintained and designed to be accessible to persons with disabilities.

Public access funding. Please describe how construction and maintenance of public access areas and improvements would be funded both initially and in the long term.

Please also see the section below related to Climate Change and Safety of Fills, which discusses concerns related to flooding and sea level rise that are relevant to public access and recreation.

Appearance Design, and Scenic Views

The Bay Plan includes policies related to Appearance, Design, and Scenic Views that are applicable to the project. These policies provide, among other requirements, that maximum effort should be made to provide, enhance, or preserve views of the Bay and shoreline, especially from public areas; that planning waterfront development should include participation by professionals knowledgeable of the Commission's concerns, such as landscape architects, urban designers, or architects; and that vista points should be provided and made accessible to the public.

The DEIR should describe how the project would maximize views to the Bay and take maximum advantage of the shoreline setting. Proposed structures, including levees, floodwalls, and fencing, should be designed to avoid or minimize visual barriers to the Bay. If there are areas where unavoidable and significant adverse impacts to existing Bay views would occur, the project should include proposed alternative enhancements to public access and/or views to the Bay to mitigate for this loss. In particular, it appears that a proposed floodwall near Infinity Auto Salvage (Figure 6) would be approximately 4.7 feet higher than the road, which would result in significant adverse Bay view impacts; the DEIR should discuss impacts to Bay views in this area and any alternative options to minimize or mitigate for these impacts.

Please also describe whether habitat protection fencing would be proposed between trails and transition zones or other habitat areas, and how impacts on views to the Bay would be minimized.

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Salt Ponds and Mitigation

Based on the project description in the NOP, we understand that the project is likely to include tidal restoration of existing diked salt ponds, and potentially some managed pond enhancement for western snowy plover habitat, as compensatory mitigation for unavoidable impacts to tidal wetlands and aquatic habitats. The Bay Plan includes policies on both Salt Ponds and Mitigation that are relevant for this activity.

Salt Pond Policy No. 3 states, in part, that any project that would restore, enhance, or convert salt ponds should include clear and specific long-term and short-term biological and physical goals, success criteria, a monitoring program, and provisions for long-term maintenance and management needs. The policy provides further guidance on project design and evaluation, including in relation to anticipated habitat types, flood management, mosquito abatement, non-native species, siting and design of appropriate public access, avoiding adverse effects on wildlife, and various water quality protection measures.

The Bay Plan also has policies related to mitigation that will apply to the project. Policy 1 states, in part, that projects should be designed to avoid adverse impacts to Bay resources. Whenever adverse impacts cannot be avoided, they should be minimized to the greatest extent practicable. Finally, measures to compensate for unavoidable adverse impacts should be required. Mitigation is not a substitute for meeting the other requirements of the McAteer-Petris Act.

The remaining policies provide additional requirements for projects that require compensatory mitigation, among them that "…mitigation projects should be sited and designed within a Baywide ecological context, as close to the impact site as practicable," that "communities surrounding both the project and the compensatory mitigation site should be meaningfully involved in an equitable and culturally-relevant manner," that "resource restoration should be selected over creation where practicable" and that "transition zones and buffers should be included in mitigation projects where feasible and appropriate."

Similar to Salt Pond Policy No. 3, Mitigation Policy No. 8 requires, in part, that mitigation projects include clear project goals; clear and measurable performance standards; a monitoring and reporting plan designed to identify potential problems early and determine appropriate remedial actions; a contingency plan to ensure the success of the mitigation project; and provisions for the long-term maintenance, management and protection of the mitigation site.

We understand that the ratio of restored marsh vs. enhancement of managed ponds for snowy plover habitat is still being evaluated in collaboration with the South Bay Salt Ponds Restoration Project. The DEIR should describe and analyze in detail alternatives for the compensatory mitigation restoration program that are being considered, taking into account the policies summarized above. A strong rationale should be provided for the preferred ratio once selected, based on expected near-term impacts and long-term ecological benefits for each option. Please note that additional mitigation may be required if the Commission determines that the project would not be self-mitigating.

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Fish, Other Aquatic Organisms and Wildlife

The policies in this Bay Plan section address the benefits of fish, other aquatic organisms and wildlife, and the importance of protecting the Bay's subtidal habitats, native, threatened or endangered species, and species that are candidates for listing as endangered or threatened. Policy No. 1 requires that the Bay's tidal marshes, tidal flats and subtidal habitat be conserved, restored and increased "to the greatest extent feasible." The DEIR should address how the construction and use of the proposed project would meet these policies and avoid or minimize impacts to special-status species and habitat in the Bay. The project proponents should continue coordinating with appropriate wildlife resource agencies, including the California Department of Fish and Wildlife, the National Marine Fisheries Service, and the U.S. Fish and Wildlife Service.

Tidal Marshes and Tidal Flats

Bay Plan policies in this section provide limitations on projects that would substantially harm tidal marshes or tidal flats and guidance on the restoration of these habitats. Among the policies, Policy No. 3 requires that projects avoid or minimize impacts to transition zones between tidal and upland habitats, and should provide new transition zones where feasible and appropriate. Policy No. 5 states that to the extent feasible, habitat projects should be sustained by natural processes; increase habitat connectivity; restore hydrological connections; provide opportunities for endangered species recovery; and provide opportunities for landward migration of Bay habitats. Policy Nos. 6, 7, and 8 include other important design considerations for tidal marsh restoration projects, including the need for a well-designed monitoring and adaptive management plan and for maximizing the capacity of restoration projects to adapt with sea level rise. Policy No. 10 states that based on scientific ecological analysis, project need, and consultation with the relevant federal and state resource agencies, fill may be authorized for habitat enhancement, restoration, or sea level rise adaptation of habitat.

The DEIR should discuss in detail any filling or other activities that would occur in tidal marshes or tidal flats; the anticipated effects on these habitats, how the impacts will be avoided, minimized and mitigated for; and analysis of the potential impacts and benefits of project alternatives that may involve more or less fill in wetland areas. Commission staff recognize that some fill may be necessary to restore habitat areas, provide transition zones, and allow for sea level rise adaptation of habitat. Any fill for habitat proposed as part of the project should be designed with a balance that will minimize near-term adverse impacts to, and maximize long-term net benefits for, Bay habitats and native species.

Water Quality

The policies in this Bay Plan section address water quality and require Bay water pollution to be prevented to the greatest extent feasible. New projects are required to be sited, designed, constructed and maintained to prevent or minimize the discharge of pollutants in the Bay by controlling pollutant sources at the project site, using appropriate construction materials, and applying best management practices. The DEIR should address how the construction and use of

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the proposed project would be designed to control stormwater runoff and pollution to the Bay. The DEIR should also identify the role of the State and Regional Water Boards in reviewing and approving the project.

Policy No. 4 requires that, "[w]hen approving a project in an area polluted with toxic or hazardous substances, the Commission should coordinate with appropriate local, state and federal agencies to ensure that the project will not cause harm to the public, to Bay resources, or to the beneficial uses of the Bay." Moreover, Shoreline Protection Policy No. 8 states that "contamination remediation projects…should integrate the best available science on sea level rise, storm surge, and associated groundwater level changes into the project design in order to protect human and ecological health by preventing the mobilization of contaminants into the environment and preventing harm to the surrounding communities."

The DEIR should identify whether any portions of the project site are polluted with toxic or hazardous substances, any anticipated effects associated with such contaminants including with future sea level rise anticipated through the life of the project, how these risks would be addressed, and the role other agencies will take in the review.

Finally, Policy No. 7 requires that, whenever practicable, native vegetation buffer areas should be used in place of hard shoreline and bank erosion control methods (e.g. flood walls) where appropriate and practicable. The DEIR should identify the approach the project will take in terms of shoreline protection at the site, and discuss where the use of vegetation in favor of hard shoreline protection would be appropriate and feasible.

Environmental Justice and Social Equity

The proposed project would take place in and adjacent to communities classified as having high levels of vulnerability based on social and environmental factors, according to BCDC's Community Vulnerability Mapping Tool and the CalEnviroScreen tool. As such, relevant Bay Plan policies on Environmental Justice and Social Equity will apply to the project. These policies require, in part, that equitable, culturally-relevant community outreach and engagement be conducted by project applicants to meaningfully involve potentially impacted communities for major projects and appropriate minor projects in underrepresented and/or identified vulnerable and/or disadvantaged communities. The policies also state that potential disproportionate impacts on vulnerable communities should be identified and addressed in collaboration with the potentially impacted communities. In addition, Shoreline Protection Policy No. 2, Public Access Policy No. 5, and Mitigation Policy No. 3 require appropriate and meaningful community outreach for these portions of the project.

The project proponents should conduct meaningful community engagement throughout the project planning, design, and permitting, and should describe these efforts in detail in the DEIR and associated permit application materials. In the BCDC permit application process, we will require a detailed description of all community engagement that occurred during design, including the following information:

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- the number and types of outreach activities, including a description of how the activities were designed to be accessible and relevant for local communities;
- the estimated number of groups and individuals reached, including a description of how those groups and individuals represent relevant local community interests;
- a description of any potential disproportionate impacts on local communities identified during project design, and how these impacts have been or will be addressed; and
- any concerns raised during outreach activities, including a description of whether and how those concerns have been (or will be) addressed, and a description and rationale for any community concerns you do not currently plan to address.

You may also wish to consult our Frequently Asked Questions webpage on these policies here. In addition, please see mapping resources of community vulnerability and community-based organizations here.

Safety of Fills and Climate Change

The Bay Plan has several policies relevant for the project related to climate change, sea level rise, and safety of fills. Climate Change Policy No. 2 requires, in part, that "a risk assessment should be prepared by a qualified engineer,…based on the estimated 100-year flood elevation that takes into account the best estimates of future sea level rise and current flood protection and planned flood protection….A range of sea level rise projections for mid-century and end of century based on the best scientific data available should be used...[the] assessment should identify all types of potential flooding, degrees of uncertainty, consequences of defense failure, and risks to existing habitat from proposed flood protection devices. "

Policy No. 3 states that where such risk assessments show vulnerability to public safety, projects should be designed to be resilient to a mid-century sea level rise projection, and an adaptive management plan should be developed to address sea level rise impacts beyond mid-century through the life of the project.

In addition, Policy No. 4 in the Bay Plan Safety of Fills section states that structures on fill or near the shoreline should have adequate flood protection including consideration of future relative sea level rise as determined by engineers. The policy states that, "adequate measure should be provided to prevent damage from sea level rise and storm activity that may occur on fill or near the shoreline over the expected life of a project…New projects on fill or near the shoreline should either be set back from the edge of the shore so that the project will not be subject to dynamic wave energy, be built so the bottom floor level of structures will be above a 100-year flood elevation that takes future sea level rise into account for the expected life of the project, be specifically designed to tolerate periodic flooding, or employ other effective means of addressing the impacts of future sea level rise and storm activity."

These policies should be read in combination with Public Access Policy No. 5, which states in part, that public access areas "should be sited, designed, managed and maintained to avoid significant adverse impacts from sea level rise and shoreline flooding."

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For the project site, the DEIR should identify the Mean Higher High Water, the 100-year-flood elevation, mid- and end-of-century rise in sea level projections, anticipated site-specific storm surge effects, and a preliminary assessment of the project's vulnerability to future flooding and sea level rise. The DEIR should also describe how the project has been designed for adapting to, tolerating, and managing sea level rise and shoreline flooding at the site to ensure the project is resilient to mid-century sea level rise projections, and how it can adapt to end of the century projections. For example, the DEIR should indicate whether the levees and floodwalls could be raised in the future if needed, taking into account spatial constraints, whether the underlying soils would support additional fill, and other limitations. The DEIR should indicate whether any proposed long-term adaptation strategies would adversely affect or reduce in size public access areas, and possible ways to minimize or mitigate for these effects.

In addition, the DEIR should include a discussion of groundwater at the site, how it is expected to impact the levees and floodwalls both at construction and with future sea level rise, and how any risks from groundwater rise would be addressed.

The project may need to go before the Commission's Engineering Criteria Review Board (ECRB), which reviews projects "for the adequacy of their specific safety provisions, and make[s] recommendations concerning these provisions [and] prescribe[s] an inspection system to assure placement and maintenance of fill according to approved designs." Our staff will work with you to determine whether ECRB review and early guidance is necessary.

Shoreline Protection

The Bay Plan establishes criteria by which new shoreline protection projects may be authorized and by which existing shoreline protection may be maintained or reconstructed. Policy No. 1 describes important technical requirements for shoreline protection projects, including related to flooding and sea level rise. Policy No. 5 requires that "all shoreline protection projects should evaluate the use of natural and nature-based features such as marsh vegetation, levees with transitional ecotone habitat, mudflats, beaches, and oyster reefs, and should incorporate these features to the greatest extent practicable…Ecosystem benefits, including habitat and water quality improvement, should be considered in determining the amount of fill necessary for the project purpose." New shoreline protection projects should also avoid adverse impacts to natural resources and public access, and mitigation or alternative public access must be provided when avoidance is not possible.

The DEIR should describe in detail all existing and proposed shoreline protection features at the site, including an analysis of their potential to adversely impact natural resources and public access, and how the impacts would be avoided, minimized, or mitigated for. Commission staff appreciates that the project would include softer habitat transition zones in many areas. In areas where hard, non-natural shoreline protection features (such as floodwalls) are proposed, the DEIR should describe and analyze the feasibility of using natural or nature-based alternatives as described in the policies above.

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Public Trust

The public trust doctrine holds that navigable waters and tidal lands are the property of the state and must be protected for public use and enjoyment. The Bay Plan policies on public trust lands states, in part, that when taking actions on such land, the Commission "should assure that the action is consistent with the public trust needs for the area and, in the case of lands subject to legislative grants, would also assure that the terms of the grant are satisfied and the project is in furtherance of statewide purposes." Public trust uses cited in the Bay Plan include commerce, navigation, fisheries, wildlife habitat, recreation and open space.

The DEIR should indicate where the State's public trust requirements apply to the proposed project and discuss how the project affects and would be consistent with the public trust.

Thank you for providing the staff with an opportunity to review the NOP for the DEIR for the *Strategy to Advance Flood Protection, Ecosystems and Recreation along San Francisco (SAFER) Bay Project*. We recognize the importance and scope of this project and hope these comments aid you in preparation of the DEIR. We look forward to working with you and the project sponsors as the project is developed and through the permitting stage. If you have any questions regarding this letter or the Commission's policies and permitting process, please do not hesitate to contact me at 415-352-3668 or schuyler.olsson@bcdc.ca.gov.

Sincerely,

SCHUYLER OLSSON
Senior Environmental Scientist (Specialist)

San Francisco Bay Conservation and Development Commission
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SO/ra

cc: State Clearinghouse, <state.clearinghouse@opr.ca.gov>

Sent via electronic mail: No hard copy to follow

June 15, 2022
Place ID 833545

San Francisquito Creek Joint Powers Authority
Attn: Tess Byler
2100 Geng Road, Suite 210
Palo Alto, CA 94303
Email: tbyler@sfcjpa.org

Subject: Strategy to Advance Flood Protection, Ecosystems and Recreation along San Francisco Bay, Notice of Preparation of Environmental Impact Report, San Mateo County

Dear Ms. Byler:

The San Francisco Bay Regional Water Quality Control Board (Water Board) appreciates the opportunity to comment on the Notice of Preparation (NOP) of an Environmental Impact Report (EIR) for the Strategy to Advance Flood Protection, Ecosystems and Recreation (SAFER) along San Francisco Bay (Project), prepared by the San Francisquito Creek Joint Powers Authority (JPA). The Project, located within the cities of Menlo Park and East Palo Alto, proposes to construct engineered and natural features to protect property and infrastructure from current tidal flooding and projected sea level rise, enhance shoreline ecosystems, and improve recreational opportunities. The purpose of this letter is to provide feedback on the Project's potential environmental effects and potential alternatives to avoid and minimize these impacts to aquatic resources.

Avoidance & Minimization of Impacts, Alternatives Analysis

The Water Board adopted U.S. EPA's CWA Section 404(b)(1) "Guidelines for Specification of Disposal Sites for Dredge or Fill Material," dated December 24, 1980 (Guidelines), in its Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) for determining the circumstances under which filling of wetlands, streams, or other waters of the State may be permitted. Additionally, the State Water Resources Control Board adopted the Procedures for the Discharge of Dredged or Fill Materials to Waters of the State (Procedures) on April 2, 2019. The Procedures incorporated the Guidelines and detail the procedures for the submission, review, and approval of applications for activities that could result in the discharge of dredged and fill material to waters of the state. The Guidelines prohibit all discharges of fill material into regulated waters of the United States, unless a discharge, as proposed, constitutes the least environmentally damaging practicable alternative (LEDPA) that will achieve the basic project purpose. As such, before issuing water quality certification for the Project, we need to be able to find that the Project has avoided and minimized impacts to the maximum extent practicable as described in the Procedures and Basin Plan Section 4.23.4.

The EIR should evaluate a range of potential alternatives under reasonably foreseeable climate change conditions and assess the short-term vs. long-term impacts and benefits to identify the circumstances under which proposed dredge or fill discharges appropriately avoid, minimize, or

compensate for impacts to waters of the State. The alternatives should also discuss existing constraints to explain whether various flood protection alignments can shift landward to further avoid impacts to waters of the State. For example, has the Project evaluated shifting alignments landward by modifying/raising Highway 84 to serve as the landward flood barrier; identifying a more suitable long-term location for PG&E's substation; and in areas where land uses include low density buildings and surface parking? Climate adaptation measures should be designed to provide flood protection in the near-term while allowing for a range of future actions to address uncertainty. As such, actions that provide flood protection as far landward as practicable are preferable.

Natural and nature-based infrastructure are preferable to traditional infrastructure (e.g., levees, seawalls, riprap) to support beneficial uses. Since nature-based approaches rely on natural processes to adapt to climate change, their location and design must be tailored to site-specific conditions and desired functions. Ecotone levees should be built as far landward as practicable to minimize settling and impacts to aquatic resources and to maximize habitat restoration. Where practicable, different nature-based measures can be combined to provide enhanced shoreline protection and beneficial uses. For example, beaches can be combined with wetland restoration to further dissipate wave energy, naturally armor shorelines from erosion, and provide valuable habitat.

Where nature-based infrastructure is not practicable, hybrid approaches combining traditional and nature-based measures are preferable to alternatives that only include traditional infrastructure. For example, engineered features should incorporate habitat enhancements as much as practicable, such as living seawalls or construction of habitat mounds to provide high tide refugia.

For additional information related to climate change and adaptation relevant to Water Board permitting of dredge or fill activities, please refer to the proposed Climate Change Basin Plan Amendment. The Amendment incorporates into the Basin Plan (1) information on climate change and how it might affect the region's waters, (2) efforts to support long-term resilience of aquatic habitats in the region, and (3) questions and information that may be relevant when the Water Board permits dredge or fill activities in or near the region's shorelines, especially climate adaptation projects.

Project Impacts

To facilitate evaluation of potential impacts to waters of the State, the EIR should include sufficient information on the Project's impacts by distinguishing between temporary impacts, permanent impacts, conversion of waters to uplands, and conversion from one aquatic habitat to another type of aquatic habitat (type conversion). A better understanding of the Project's impacts will assist the JPA to plan for appropriate compensatory mitigation since different types of impacts will require different types of mitigation as discussed in more detail below.

Compensatory Mitigation

We support the Project's coordination with the South Bay Salt Ponds Restoration Project to restore either tidal marsh or a mix of tidal marsh and enhanced managed pond habitat in Ponds R1 and R2. The NOP also notes the potential for tidal marsh restoration of the bayward portion of Pond SF2 and the adjacent diked marsh between Pond SF2 and the Cooley Marsh, and western snowy plover breeding habitat enhancement in Pond R3.

The EIR should include information on how the Project will meet the California Wetland Conservation Policy, the primary goal of which is to ensure no overall net loss and to achieve a long-term net gain in the quantity, quality, and permanence of wetland acreage and functions. In

doing so, it is important to distinguish between different types of mitigation such as creation, restoration, and enhancement. Fill placed in waters of the State that converts wetlands to uplands will require mitigation through wetland creation (i.e., wetlands created/restored in current uplands), thereby resulting in no net loss or a net gain in waters of the State. Impacts from Project activities that convert one aquatic habitat type to another aquatic habitat type (type conversion) may be offset by the enhanced beneficial uses and overall long-term environmental net benefit resulting from the type conversion.

We recognize that nature-based features such as ecotone levees can result in near-term impacts to the acreage, functions, and values of waters of the State, but in the context of climate change can have less impacts and more benefits over the long term. For climate adaptation projects where fill placed in waters of the State converts wetlands to uplands in the near-term, mitigation is not required if these areas are inundated within 30 years and are converted back to waters of the State again. Please refer to the Ocean Protection Council's guidance and evaluate the medium-high risk aversion scenario to estimate the extent of fill placement that will be inundated within 30 years.

Construction Fill Material

Project construction will require importing a considerable amount of fill material. The Project should develop a quality assurance project plan (QAPP) that establishes a process for evaluating the quality of fill material to ensure that imported fill is suitable for placement and is protective of aquatic habitat. The QAPP should detail how fill material will be screened, screening levels for contaminants including laboratory testing methods, and transport and placement procedures.

Post-construction Stormwater Management

The Project proposes improvements to recreational access along the shoreline which will result in newly created or replaced impervious surfaces. Impervious surfaces are known to impact waters of the State by increasing erosion and sedimentation through hydromodification (i.e., changes in runoff volume and duration) and by collecting and concentrating pollutants in runoff. The EIR should describe measures that will be implemented to avoid and minimize impacts to water quality from runoff. For impervious surfaces associated with trails, runoff can be directed to adjacent vegetated areas, to non-erodible permeable areas, or towards the outboard side of levees. If runoff is directed to adjacent vegetated areas, a 2:1 or lesser ratio of impervious to pervious surface (or a vegetated area that is at least half the width of the trail) is preferred. Management of runoff from project impervious surfaces should be consistent with Provision C.3 of the Municipal Regional NPDES Stormwater Permit (Order No. R2-2022-0018), and associated technical guidance.

Closing

If you have any questions, please contact Agnes Farres of my staff at (510) 622-2401 or by email to agnes.farres@waterboards.ca.gov.

Sincerely,

Keith H. Lichten, Chief
Watershed Management Division

Cc: Water Board, Victor Aelion, victor.aelion@waterboards.ca.gov
Corps, SF Regulatory Branch, Frances Malamud-Roam, frances.p.malamud-roam@usace.mil
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BCDC, Schuyler Olsson, schuyler.olsson@bcdc.ca.gov
U.S. EPA, Sahrye Cohen, cohen.sahrye@epa.gov

CITY OF EAST PALO ALTO
Office of the City Manager

June 7, 2022

San Francisquito Creek Joint Powers Authority
Attn.: Ms. Margaret Bruce, Executive Director
2100 Geng Road, Suite 210
Palo Alto, CA 94303

Subject: Comments to the Notice of Preparation for the SAFER Bay Project

Dear Ms. Bruce;

The City supports the SAFER Bay Project (Project).

This comment letter documents the City's concerns about the information contained in the Notice of Preparation (NOP) dated April 22, 2022.

General Plan and Ravenswood Business District (RBD) Specific Plan

The City is responsible for regulating land use within its boundaries.

The Project levees and improvements are proposed within the RBD Specific Plan (Specific Plan) area. As identified in the General Plan, the RBD is high priority for the City for future redevelopment. The General Plan and Specific Plan recognize the value of the Bay, specifically the Ravenswood Open Space Preserve and the Palo Alto Baylands Natural Preserve. The City's policies place great importance on the connected public open spaces within this area and making sure that new development is compatible and provides benefits to the community. The City has concerns about the impact of the proposed levee on future development and the ability to implement the Specific Plan goals. The parks and trails provide space for active and passive recreation and enhance the visual appearance of the City. The levee may limit the ability to realize these goals. The General Plan also values community involvement. Policy 1.7 encourages public involvement in every aspect of park and open space acquisition, design, construction and programming. The City requests that the SFCJPA work with East Palo Alto to design a levee system that will not limit the ability to implement the City's goals and policies regarding the RBD. The City would appreciate greater coordination to ensure that both the SFCJPA and City's goals are met, including presentations to the City Council regarding how the City's concerns are being addressed, not less than quarterly. The coordination should also include greater public involvement.

As part of the planning application process, the City will require, as a condition of approval, certain landowners to dedicate construction, maintenance, and public access easements for the levee and Bay Trail. The location of the easements will consider recreational uses and shoreline access improvements in the 100 feet shoreline band proposed by the landowners. The City is

concerned that the proposed levee alignment will be inconsistent with the landowner-provided easements.

The Specific Plan includes the Loop Road that connects to University Avenue to Bay Road. A proposed levee alignment shows the Loop Road, Bay Trail, and levee in a narrow corridor between the University Village subdivision and the railroad right-of-way. The City is concerned that the proposed improvements will not fit within the narrow corridor.

A levee alignment in the North of Bay Road reach shows the Bay Trail relocated onto the 2020 Bay Road property, EPA Waterfront property, and Infinity Auto Salvage property. The City is concerned that high-speed bicycles on the relocated Bay Trail may be inconsistent with the pedestrian areas proposed as part of the recreational uses and shoreline access improvements on the properties.

Parks Master Plan and Martin Luther King Jr. Park Master Plan

Proximity and access to high-quality parks, green spaces, and recreation areas have positive and long-lasting impacts on individual and community health. Research confirms that living close to a park significantly increases how frequently residents exercise, and reduces cardiovascular disease, and childhood obesity rates.

Unfortunately, East Palo Alto's park system is scarred with the historic impacts of inequitable investment and racialized land-use decisions that have concentrated environmental injustice and lack of public investment in the City compared to neighboring cities. East Palo Alto is "park poor."

For today's population of close to 30,000 people, the City currently only has approximately 24 acres of accessible public park land. To achieve the minimal goal of 3.0 park acres per 1000 people, the Parks Master Plan has the challenge of identifying an additional 66 park acres. The General Plan's population projection for 2035 adds more than 7,000 new residents, increasing the total park area deficit in the future to 112 acres. Overall, the Bay Trail and the shoreline park opportunities identified as part of future developments are critical to ensuring the City provides the park and open spaces needed to ensure residents have options for recreation and improved physical and mental health and wellness.

The existing Bay Trail and its adjacent open spaces along the City's perimeter are critical public park resources for the community today. It is important for the levee improvement project to identify the trailheads and access points planned for the Bay Trail and to maximize the number of access points between the community and the new Bay Trail.

In addition, the open spaces and shoreline band areas identified in the RBD Specific Plan and Martin Luther King, Jr. Park Master Plan are critical future opportunities to meet the community's park needs today and in the future. The planned improvements at Martin Luther King, Jr. Park include expansion to the west towards the Bay. The City is concerned that the Project will not consider the future park improvements.

Throughout many phases of community engagement efforts for the future of East Palo Alto's shoreline, a common theme has included the opportunity to expand public access as part of the redevelopment and infrastructure improvements. The design of the 3-to-1 levee slopes along the City-facing perimeter should include opportunities for adjacent properties to back-fill and

meet the new Bay Trail grade, creating an accessible, gradual slope that maximizes the area available for usable public access and recreation. Those areas could also be designed to provide more open space and recreational uses.

Climate Action Plan

The levee is critical to support the City's planned resiliency and adaptation to sea level rise. The City is concerned about how the SFCJPA will implement the levee to ensure critical infrastructure is fully protected from sea level rise and mitigates anticipated impacts into the future. The levee design shall adhere to the 'Citys Climate Action Plan, <https://www.cityofepa.org/econdev/page/climate-action-plan> concurrently under public review. Design standards shall ensure guidance provided by the California Ocean Protection Council (OPC) and San Mateo County's Sea-Level Rise Vulnerability Assessment are followed. <http://seachangesmc.org/vulnerability-assessment/>

According to San Mateo County's Assessment, the City of East Palo Alto has 335 acres of land at risk in the baseline scenario, 714 acres in the mid-level scenario, and 992 acres in the high-end scenario. Nearly 60 percent of East Palo Alto's population and almost all of the City's wetlands are vulnerable to sea level rise under the mid-level scenario. Critical infrastructure and community-serving facilities included energy and water infrastructure, local roadways, schools, emergency shelters, and parks would also be impacted by sea level rise. Design considerations of the planned levee shall result in infrastructure which equates to resiliency across all sea level rise risks including increased wave action, rising groundwater tables and saltwater intrusion, increased erosion (i.e., landward shoreline retreat) and changes in sediment supply in lands pertaining to the proposed project.

Vehicle Access to Levee and Bay Trail

Vehicle access points to the top of the levee should be provided for maintenance vehicles, police vehicles, fire vehicles/equipment, and ambulances. The City is concerned that the levee may not be sufficiently wide to allow vehicles to safely drive on the levee due to the steep embankment. The City is concerned that the levee/Bay Trail may not be sufficiently wide to allow for vehicles, pedestrians and cyclists to pass moving and/or parked vehicles. The City also is concerned that the levee may have an inadequate number of access points for vehicles, that the levee pavement section may not be designed for vehicle traffic, and that the geometric design of the Bay Trail may not accommodate vehicles, especially near the PG&E poles and towers and the existing Bay Trail alignment near Runnymede Street.

Pedestrian, Cyclists, and Persons with Disabilities Access to Bay Trail

Along the Bay shoreline, BCDC's land use authority relates primarily to public access. The Commission bases the approval of a project primarily on whether the development provides maximum feasible public access, consistent with the project. The City shares the BCDC's goals regarding providing maximum feasible access to the shoreline. The City's priorities regarding public access are identified in the 2007 East Palo Alto Bay Access Master Plan. The City is concerned that the maximum feasible public access to the Bay shoreline is provided.

Existing access points to the Bay Trail are located at Daphne Way, O'Connor Street, Cypress Street, Garden Street, Runnymede Street, Weeks Street, Bay Road, and Martin Luther King, Jr.

Park, etc. The Project should maintain existing access points to the Bay Train and these should be reconstructed by the Project.

The landowners in the RBD development plan to significantly increase the shoreline access on their properties.

New and feasible access points to the Bay Trail should be considered at Beech Street, Stevens Avenue, Fordham Street, Rutgers Street, and Tulane Avenue which terminate near the existing or relocated Bay Trail. The City is concerned that new access points may not be considered near the existing or relocated Bay Trail.

The City is concerned that ADA compliant access to the Bay Trail will not be provided.

Contaminated Soil and Groundwater

Contaminated soil and groundwater are well-known and documented issues in areas from the Weeks Street terminus, north along East Palo Alto's shoreline to Fordham Street. Additionally, imported topsoil in northern properties of the City from Demeter Street to Fordham Street have been documented to include PCBs and other constituents of concern. The City recommends that the following Permitting agencies shall be included in design review for these areas to ensure appropriate remediation: California Department of Toxic Substances Control, the Environmental Protection Agency, and the Bay Area Air Quality Control Board.

A levee alignment crosses the Infinity Auto Salvage property, as well as other properties that may have contaminated soil and/or ground water. If the Project acquires any property in fee and the eventual property owner is the City, the City is concerned about the City's liability associated with the contaminated soil and/or groundwater on the properties.

Tidal Marsh Overlooks on Bay Trail

An overlook can provide a place for cyclists and pedestrians to stop and clear the Bay Trail, view the marshes, sit at a bench and rest, and read educational and information signage. The City is concerned that the Project will not provide overlooks for people to clear the trail, rest, and enjoy various amenities.

Lighting of Bay Trail for Public Safety

As part of the City's public outreach effort for the City's Park Master Plan, residents identified adding lighting to increase visibility at night as the most important and best means to address public safety concerns at parks.

Lighting on the Bay Trail will help address residents' safety concerns and increase utilization of the Bay Trail in the City. Lighting would also benefit the cyclist safety as many commute to work via the Bay Trail before and after dark.

City Storm Drain Facilities

Storm drain facilities, including drainage pipes, outfalls, ditches, swales, retention basins, pump stations, and overland sheet flows convey storm water from the City to Bay. The City is concerned that the Project may obstruct storm water or reduce the capacity of the facilities.

Minimizing Construction Impacts

Impacts to residents, business, and infrastructure during the construction of the Project.is of concern.

Parking within the City is limited. The Project should provide on-site parking for all construction personnel, construction offices/trailers, and staging areas for materials and equipment. The City may implement a Resident Parking Permit program that would limit parking on streets to residents.

Damage to city streets and impacts to traffic due to trucking and hauling, especially hauling of embankment material is a major concern. Project shall adhere to the requirements of Municipal Code Section 8.28 including allowable haul routes determined by the Public Works Director.

Staging or lining up trucks before loading or offloading materials should take place on-site or on private property as a contract requirement. No staging of trucks will be permitted on City streets.

Minimizing the construction noise disturbing residents is a priorirty. Hours of construction activity shall be limited to hours described in Municipal Code Section 15.04.125 unless further limited by the Public Works Director. For example, installing sheet piles may be limited to hours from 9 am to 4 pm. Any deviations from the allowable hours of construction activity shall be approved by the Public Works Director.

Settlement of nearby structures due to construction activities needs to be avoided. The Project should implement of settlement monitoring program to address settlement concerns, complaints, and claims.

Well planned Bay Trail detours will improve cyclists' experience during construction. The City is concerned that the design of detours may not be included in the construction contracts. The detour design should include creating Class II bikeways where Class II bikeways are not feasible.

Public Notices including door hangers, social meetings postings, or websites are essential to informing the public about changes to their daily life. The Project should develop a comprehensive public outreach plan for construction activities.

The Project should consider phasing construction within a reach as opposed to closing an entire reach for the duration of construction. As construction windows may be limited for environmental reasons, the construction contract should ensure the Bay Trail is useable when no construction is permitted due to environmental restrictions to the greatest extent feasible.

Stormwater pollution generated by the Project is a concern of the City. The construction contract should require daily sweeping of City streets, including haul routes, inlet protection, and site watering to minimize airborne dust.

The City is concerned about the Contractor importing contaminated soil for construction. An independent lab should be hired by the SFCJPA to test material, as opposed to the Contractor sampling and testing the material.

City Permits

The Project will require City Permits, which may include the following:

1. Encroachment Permit(s). (Municipal Code Sections 13.06.200 and 13.06.280)
2. Hauling /Oversize Load Transportation Permit(s) (Municipal Code Sections 8.28 and 10.36)
3. Grading Permit(s) (Municipal Code Section 15.48)
4. Tree Removal Permit(s) (Municipal Code Section 18.28)

City Streets

The proposed levee is near the cul-de-sacs on Weeks Street, Runnymede Street, Garden Street, Cypress Street, Beech Street, and O'Connor Street. The cul-se-sacs are essential for allowing vehicles, especially fire vehicles/equipment, to turn around. The City is concerned that the levee may adversely impact existing cul-de-sacs.

Any modifications to the City streets shall comply with the City's design and construction standards, as well as the City's adopted Green Infrastructure Plan. Green Infrastructure | City of East Palo Alto (cityofepa.org) <https://www.cityofepa.org/publicworks/page/green-infrastructure>

Storm Water Pump Station Improvements

The City will improve the Storm Water Pump Station (Pump Station) near O'Connor Street. The improvements will include (a) installing a new above ground diesel fuel storage tank on the north side of pump station at the elevation of the existing Bay Trail; and (b) removing the existing underground fuel storage tanks on the east side of the Pump Station. The City is concerned that the Project will not consider the future improvements at the Pump Station.

Bay Trail and Levee Maintenance

The portions of the existing Bay Trail within the City are maintained by the City, City of Palo Alto, and Mid-Peninsula Regional Open Space District. The City is concerned about any increase in human resources and/or financial resources that would be necessary for the post-construction maintenance of the Bay Trail and Tidal Marsh Transition Zones by the City.

The proposed 3:1 levee embankment side-slopes will be difficult for workers to safely maintain due to the steepness. Embankment side-slopes not steeper than 4:1 are industry standard (See Caltrans Highway Design Manual). If 3:1 side-slopes are required by the Project, the City is concerned that low to no maintenance plantings will not be installed on the side-slopes to minimize maintenance of the embankment slopes.

Future Levee Construction

Sea level rise may require an increase to top of levee elevation. Increasing the top of levee requires increasing the width of the levee embankment footprint. The City wishes to avoid filling the tidal marsh transition zone if the top of levee elevation must be increased. Permitting and construction of a project within the tidal marsh transition zones is more difficult than compared

to a project on the landward side of the levee. The City is concerned that adequate space on the landward side of the levee will not be provided for the additional embankment width required to increase the top of levee elevation, if required.

Levee Crossings at Bay Road and Railroad Crossings

The levee will pass over Bay Road and the Union Pacific Railroad tracks near University Avenue. The City is concerned about how the SFCJPA will implement the levee at Bay Road and the Railroad Crossing crossings including effectiveness and impact to the roads and railroads when deployed and not deployed.

The City looks forward to working with the SFCJPA to implement the Project.

Sincerely,

Patrick Heisinger

Patrick Heisinger
Interim City Manager

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PLANNING & DEVELOPMENT SERVICES
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June 6, 2022

Tess Byler, Senior Project Manager
San Francisquito Creek Joint Powers Authority
2100 Geng Road, Suite 210
Palo Alto, CA 94303
Email: tbyler@sfcjpa.org

RE: Notice of Preparation of Environmental Impact Report, Strategy to Advance Flood Protection, Ecosystems and Recreation along San Francisco (SAFER) Bay

Thank you for including the City of Palo Alto in the environmental review process for the above-referenced project.

Project Understanding
The Project, *Strategy to Advance Flood Protection, Ecosystems and Recreation along San Francisco (SAFER) Bay*, would be located within multiple parcels within the City of East Palo Alto and Menlo Park. The Project includes actions within the Don Edwards National Wildlife Refuge (Refuge), including Refuge-managed land in Laumeister and Faber Tract Marshes, which are not located within the City of Palo Alto's jurisdiction, but that are owned by the City of Palo Alto (specifically APNS 063-580-090 and 063-580-100). The City understands that the SAFER Bay Project is intended to provide resiliency to coastal flooding and sea level rise in East Palo Alto and Menlo Park as well as habitat and recreation improvements. Construction of the Project is proposed to occur in phases. Improvements within the South of Bay Road reach, which would be partially located on land owned by the City of Palo Alto, are proposed to begin in 2025. The EIR will consider the creation of broad, gently sloped tidal marsh-upland transition zones and trail modifications that elevate the Bay Trail, reducing the trail's exposure to flooding. Overall, the project includes more than 550 acres of habitat restoration and 1 to 2.5 miles of new or modified trails.

The City of Palo Alto provides the following comments in response to the Notice of Preparation.

Recreation

- For reaches that are proposed to be evaluated at a Project level, the EIR must provide figures that clearly show the trail alignment. The figures and text should clearly indicate the width of the proposed trail. Per California Manual on Uniform Traffic Control Device standards, shared use paths are at least eight feet wide, preferably 10 feet.
- Indicate the proposed surface material for the Bay Trail. All portions of the Bay Trail that are currently paved must be replaced in kind. Because this is an important regional bicycle trail connection, the City supports improving the Bay Trail with paving where feasible. In areas where paving is not feasible, any proposed surfacing material must be bicycle friendly. The EIR should discuss long-term maintenance of the trail, especially where surface improvements are planned. The EIR should clearly identify the responsible parties for the long-term maintenance of the trail pavement and any associated accessories (i.e. benches, bollards, trash bins, etc.) that are to be placed on the trail.

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Vegetation Management and Maintenance

- Vegetation management along the current Bay Trail in the South of Bay Road reach has been challenging because the areas adjacent the trail are filled with tall, invasive weeds (e.g. fennel, mustard, Lepidium). The EIR should discuss what type of vegetation is proposed adjacent the trail. The City recommends that the SFCJPA consider an integrated design approach to weed management. Specifically, the design should consider proposing dense, native plants along the trail. Select native plant species that can outcompete the invasive species and require less maintenance (i.e. won't require mowing or grow into the trail). If the project involves planting plants right up to the edge of the trail (within 3') the design should consider proposing dense, native low-growing plants (e.g. Frankenia, marsh heather, salt grass, etc.)
- Clarify whether there is proposed irrigation to establish the plants and, if so, the source of the irrigation. Identify the proposed maintenance period to ensure vegetation is established as well as who will be responsible for maintaining the vegetation post-planting and long-term.
- Would the proposed levee within the South of Bay Road be a horizontal levee, ecotone levee, earthen levee, or flood wall? It is unclear from the figures in the NOP what is proposed for this reach. The EIR must describe in detail who will be responsible for long-term maintenance of any proposed structure or irrigation system. A conceptual maintenance agreement should be required prior to finalizing the project design.
- In the past, the City has identified undermining of the Bay Trail due to ground burrowing rodents (e.g. ground squirrels). The City recommends that the proposed Bay Trail be designed in a manner that helps to prevent issues with ground burrowing rodents by using an integrated pest management approach in its design.

Cultural and Tribal Cultural Resources

- If Archeological or Tribal Cultural Resources are uncovered during construction on property owned by the City of Palo Alto, the City shall be notified of the discovery. Any proposed mitigation for the South of Bay Road reach, which is partially proposed on land owned by the City, should specify this requirement.

Coordination

The City requests that the SFCJPA continue to coordinate with the City of Palo Alto throughout the SAFER Bay EIR process as this project could affect the analysis and conclusions of the City's Sea Level Rise Adaptation Plan project.

Approvals

Because the project is not located within the City of Palo Alto's jurisdiction, it is not anticipated that permits from the City would be required. However, Council approval would be required for any proposed easements to construct and maintain flood infrastructure on the City's property. Additionally, the City recommends coordinating with its Airport department regarding permits that may be required from the FAA for work within the vicinity of the Palo Alto Airport.

Should you have any questions regarding this letter and the City's comment, please contact Claire Raybould at (650) 329-2116 or Claire.Raybould@cityofpaloalto.org or Jonathan Lait at Jonathan.Lait@cityofpaloalto.org.

Sincerely,

DocuSigned by:
293CF322E1294F6...

Director, Planning & Development Services

NOP - Strategy to Advance Flood Protection, Ecosystems and Recreation along San Francisco (SAFER) Bay Project

Wilson, Joanne <jwilson@sfwater.org>

Mon 6/6/2022 4:36 PM

To: Tess Byler <tbyler@sfcjpa.org>

Cc: Ramirez, Tim <TRamirez@sfwater.org>;Natesan, Ellen <ENatesan@sfwater.org>;Rando, Casey <crando@sfwater.org>;Russell, Rosanna S <RSRussell@sfwater.org>;Cheung, Angela <ACheung@sfwater.org>;Wayne, Lisa B <LBWayne@sfwater.org>;Read, Emily <ERead@sfwater.org>;Herman, Jane <jherman@sfwater.org>;Li, Annie (PUC) <ali@sfwater.org>;Feng, Stacie <SFeng@sfwater.org>;Gabriel, Ryan L <RGabriel@sfwater.org>;Rodgers, Heather <HeRodgers@sfwater.org>;Wong, Christopher J <CJWong@sfwater.org>;Mendoza, Jonathan S <JSMendoza@sfwater.org>;DeGraca, Andrew <adegraca@sfwater.org>

2 attachments (374 KB)

FINAL Interim Water Pipeline Right of Way Policy.pdf; FINAL-Amended Right of Way Integrated Vegetation Management Policy.pdf;

Hello Ms. Byler: Thank you for this opportunity to provide comments on behalf of the San Francisco Public Utilities Commission (SFPUC) on the Notice of Preparation (NOP) of an Environmental Impact Report (EIR) for the above-referenced project pursuant to the California Environmental Quality Act (CEQA).

SFPUC's Ravenswood site is located in the City of Menlo Park and the City of East Palo Alto, south of the Dumbarton Bridge and along the San Francisco Bay with an entrance/egress on University Avenue. This site is critical for water operations and a vital part of a regional water system that supplies water to 2.5 million water customers in the Bay Area. The City and County of San Francisco, through its SFPUC, has owned the land in the project area since 1930. The SFPUC facilities in, under and on the land include the Bay Tunnel, a valve house, large water transmission pipelines, appurtenances, and other facilities including a water quality building and materials and equipment storage on site. Access to pipelines, valve structures and the tunnel portal at the SFPUC's Ravenswood site must be maintained at all times. National security protocols limit third-party access to the lands on which the SFPUC has its utility operations. Assuming that the SFPUC may grant access to its secured facilities for the project, the project proponent should understand that any use of the SFPUC lands will first require a written agreement and payment of a use fee prior to the commencement of the project on SFPUC lands.

The SFPUC has policies that limit third-party uses and improvements on San Francisco property due to the presence of high-pressure, subsurface water transmission lines and appurtenances and other infrastructure located above-grade. Please see the attached
Interim Water Pipeline ROW Use Policy and Integrated Vegetation Management Policy for more information about land use restrictions on the ROW. A written agreement for a secondary use on SFPUC property may occur only if the SFPUC determines that the
secondary use does not in any way interfere with, endanger, or damage existing or future SFPUC operations, security, or facilities.

The SFPUC prohibits any use on its ROW property that:
1. Cannot be removed promptly or otherwise would conflict with the SFPUC's ability to construct, maintain, operate, or conduct emergency repairs of its facilities.

2. Would conflict with SFPUC legal obligations related to SFPUC parcels subject to easements or other agreements held by adjoining landowners or third parties. Further research by the SFPUC's Real Estate Services is needed, but it is possible that certain SFPUC parcels may not be available for the proposed use.

3. Would conflict with the resolution of unauthorized third-party encroachments that currently exist on some SFPUC ROW parcels.

4. Would create an unreasonable burden for the SFPUC (or its ratepayers) in the use of its property for utility purposes. The SFPUC reasonably anticipates that its property will be available for future utility infrastructure and capital projects. Revocable licenses and leases issued by the SFPUC contain standard language requiring any lessee or licensee of SFPUC lands to mitigate the effects for the disruption of its land uses, including recreational use, on SFPUC lands, even if the SFPUC is causing the disruption of
these land uses. This includes required mitigation under the California Environmental Quality Act (CEQA).

5. Is otherwise inconsistent with SFPUC plans and policies (see attached).

This list is not exhaustive. The SFPUC retains the right to disallow any use that, at the SFPUC's sole discretion, may interfere with, endanger or damage existing or future SFPUC operations, security, or facilities.

In addition to the above comments, please provide the following specific information in the draft EIR:

1. Please identify the SFPUC's Ravenswood site in Figure 1

2. The project boundaries are unclear; please revise the project site map.

3. The location of proposed project improvements, such as levees, is unclear. Please revise the project site map so that we can understand exactly what improvements and/or alterations are proposed on SFPUC property and how they might affect SFPUC infrastructure and operations..

4. In the list of "Permits and Approvals", please add the SFPUC (on behalf of the City and County of San Francisco). Any improvements proposed on SFPUC property would require written authorization (a discretionary action) and the SFPUC must be identified as a responsible agency in the EIR. If the proposed project were to go forward on SFPUC property, the SFPUC would be required to draft responsible agency findings pursuant to CEQA.

5. We are researching whether the marshy area at the SFPUC's Ravenswood property was a mitigation site for an SFPUC capital improvement project under the Water System Improvement Project (WSIP). We will verify this information, and if there is an existing SFPUC mitigation site, provide comments on the draft EIR on the implications of this for the SAFER project.

SFPUC Project Review Process

Proposed projects and other activities on any San Francisco property must undergo the Project Review Process if the project will include construction; digging or earth moving; clearing; installation; the use of hazardous materials; other disturbance to watershed
and ROW resources; or the issuance of new or revised leases, licenses and permits. This review is done by the SFPUC's Project Review Committee

(Committee).

The Committee is a multidisciplinary team with expertise in natural resources management, environmental regulatory compliance, engineering, water quality and real estate. Projects and activities are vetted by the Committee for consistency with SFPUC plans and policies.

In reviewing a proposed project, the Committee may conclude that modifications or avoidance and minimization measures are necessary. Large and/or complex projects may require several project review sessions to review the project at significant planning and design stages.

To initiate the Project Review process, please download and fill out a Project Review application at Project Review and Land Use - Bay Area | SFPUC. Please submit the completed application to projectreview@sfwater.org and it will be scheduled for the next available Project Review meeting.

Thank you for considering these comments. If you have any questions or require more information, please contact me.

Sincerely,

Joanne Wilson

Joanne Wilson
Senior Land and Resources Planner
Natural Resources and Lands Management Division
Water Enterprise
1657 Rollilns Road
Burlingame, CA 94010

Please consider the environment before printing this email.


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Services of the San Francisco Public Utilities Commission

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SFPUC Interim Water Pipeline Right of Way Use Policy for San Mateo, Santa Clara, and Alameda Counties

Approved January 13, 2015

by

SFPUC Resolution No. 15-0014

as an amendment to the SFPUC Real Estate Guidelines

SFPUC Water Pipeline Right of Way Use Policy for San Mateo, Santa Clara, and Alameda Counties

As part of its utility system, the San Francisco Public Utilities Commission (SFPUC) operates and maintains hundreds of miles of water pipelines. The SFPUC provides for public use on its water pipeline property or right of way (ROW) throughout Alameda, Santa Clara, and San Mateo counties consistent with our existing plans and policies. The following controls will help inform how and in which instances the ROW can serve the needs of third parties—including public agencies, private parties, nonprofit organizations, and developers—seeking to provide recreational and other use opportunities to local communities.

Primarily, SFPUC land is used to deliver high quality, efficient and reliable water, power, and sewer services in a manner that is inclusive of environmental and community interests, and that sustains the resources entrusted to our care. The SFPUC's utmost priority is maintaining the safety and security of the pipelines that run underneath the ROW.

Through our formal Project Review and Land Use Application and Project Review process, we may permit a secondary use on the ROW if it benefits the SFPUC, is consistent with our mission and policies, and does not in any way interfere with, endanger, or damage the SFPUC's current or future operations, security or facilities.[1] No secondary use of SFPUC land is permitted without the SFPUC's consent.

These controls rely on and reference several existing SFPUC policies, which should be read when noted in the document. Being mindful of these policies while planning a proposed use and submitting an application will ease the process for both the applicant and the SFPUC. These controls are subject to change over time and additional requirements and restrictions may apply depending on the project.

The SFPUC typically issues five-year revocable licenses for use of our property, with a form of rent and insurance required upon signing.[2]

Note: The project proponent is referred to as the "Applicant" until the license agreement is signed, at which point the project proponent is referred to as the "Licensee."

[1] SFPUC Guidelines for the Real Estate Services Division, Section 2.0.
[2] SFPUC Guidelines for the Real Estate Services Division, Section 3.3.

I. *Land Use, Structures, and Compliance with Law*

The following tenets govern the specifics of land use, structures, and accessibility for a project. Each proposal will still be subject to SFPUC approval on a case-by-case basis.

A. SFPUC Policies. The Applicant's proposed use must conform to policies approved by the SFPUC's Commission, such as the SFPUC's Land Use Framework (http://sfwater.org/index.aspx?page=586).

B. Americans with Disabilities Act Compliance. The Applicant must demonstrate that a Certified Access Specialist (CASp) has reviewed and approved its design and plans to confirm that they meet all applicable accessibility requirements.

C. Environmental Regulations. The SFPUC's issuance of a revocable license for use of the ROW is subject to compliance with the California Environmental Quality Act (CEQA). The Applicant is responsible for assessing the potential environmental impacts under CEQA of its proposed use of the ROW. The SFPUC must be named as a Responsible Agency on any CEQA document prepared for the License Area. In addition, the Applicant shall provide to SFPUC a copy of the approved CEQA document prepared by the Applicant, the certification date, and documentation of the formal approval and adoption of CEQA findings by the CEQA lead agency. The SFPUC will not issue a license for the use of the ROW until CEQA review and approval is complete.

D. Crossover and Other Reserved Rights. For a ROW parcel that bisects a third party's land, the Applicant's proposed use must not inhibit that party's ability to cross the ROW. The Applicant must demonstrate any adjoining owner with crossover or other reserved rights approves of the proposed recreational use and that the use does not impinge on any reserved rights.

E. Width. The License Area must span the entire width of the ROW.
   - *For example, the SFPUC will not allow a 10-foot wide trail license on a ROW parcel that is 60 feet wide.*

F. Structures. Structures on the ROW are generally prohibited. The Licensee shall not construct or place any structure or improvement in, on, under or about the entire License Area that requires excavation, bored footings or concrete pads that are greater than six inches deep.

   i. Structures such as benches and picnic tables that require shallow (four to six inches deep) cement pads or footings are generally permitted on the ROW. No such structure may be placed directly on top of a pipeline or within 20 feet of the edge of a pipeline.

   ii. The SFPUC will determine the permitted weight of structures on a case-by-case basis.

- *When the SFPUC performs maintenance on its pipelines, structures of significant weight and/or those that require footings deeper than six inches are very difficult and time-consuming to move and can pose a safety hazard to the pipelines. The longer it takes the SFPUC to reach the pipeline in an emergency, the more damage that can occur.*

G. Paving Materials. Permitted trails or walkways should be paved with materials that both reduce erosion and stormwater runoff (e.g., permeable pavers).

H. License Area Boundary Marking. The License Area's boundaries should be clearly marked by landscaping or fencing, with the aim to prevent encroachments.

I. Fences and Gates. Any fence along the ROW boundary must be of chain-link or wooden construction with viewing access to the ROW. The fence must include a gate that allows SFPUC access to the ROW.[3] Any gate must be of chain-link construction and at least 12 feet wide with a minimum 6-foot vertical clearance.

II. *Types of Recreational Use*

Based on our past experience and research, the SFPUC will allow simple parks without play structures, community gardens and limited trails.

A. Fulfilling an Open Space Requirement. An applicant may not use the ROW to fulfill a development's open space, setback, emergency access or other requirements.[4] In cases where a public agency has received consideration for use of SFPUC land from a third party, such as a developer, the SFPUC may allow such recreational use if the public agency applicant pays full Fair Market Rent.

B. Trail Segments. At this time, the SFPUC will consider trail proposals when a multi-jurisdictional entity presents a plan to incorporate specific ROW parcels into a fully connected trail. Licensed trail segments next to unlicensed parcels may create a trail corridor that poses liability to the SFPUC. The SFPUC will only consider trail proposals where the trail would not continue onto, or encourage entry onto, another ROW parcel without a trail and the trail otherwise meet all SFPUC license requirements.

III. *Utilities*

A. Costs. The Licensee is responsible for all costs associated with use of utilities on the License Area.

[3] SFPUC Right of Way Requirements.
[4] SFPUC Guidelines for the Real Estate Services Division, Section 2.0.

B. Placement. No utilities may be installed on the ROW running parallel to the SFPUC's pipelines, above or below grade.[5] With SFPUC approval, utilities may run perpendicular to the pipelines.

C. Lights. The Licensee shall not install any light fixtures on the ROW that require electrical conduits running parallel to the pipelines. With SFPUC approval, conduits may run perpendicular to and/or across the pipelines.

- Any lighting shall have shielding to prevent spill over onto adjacent properties.

D. Electricity. Licensees shall purchase all electricity from the SFPUC at the SFPUC's prevailing rates for comparable types of electrical load, so long as such electricity is reasonably available for the Licensee's needs.

IV. *Vegetation*

A. The Applicant shall refer to the SFPUC Integrated Vegetation Management Policy for the *minimum* requirements concerning types of vegetation and planting. (http://www.sfwater.org/index.aspx?page=431.) The Licensee is responsible for all vegetation maintenance and removal.

B. The Applicant shall submit a Planting Plan as part of its application.

(Community garden applicants should refer to Section VII.C for separate instructions.)

i. The Planting Plan should include a layout of vegetation placement (grouped by hydrozone) and sources of irrigation, as well as a list of intended types of vegetation. The SFPUC will provide an area drawing including pipelines and facilities upon request.

ii. The Applicant shall also identify the nursery(ies) supplying plant stock and provide evidence that each nursery supplier uses techniques to reduce the risk of plant pathogens, such as Phytophthora ramorum.

V. *Measures to Promote Water Efficiency*[6]

A. The Licensee shall maintain landscaping to ensure water use efficiency.

B. The Licensee shall choose and arrange plants in a manner best suited to the site's climate, soil, sun exposure, wildfire susceptibility and other factors. Plants with similar water needs must be grouped within an area controlled by a single irrigation valve

[5] SFPUC Land Engineering Requirements.
[6] SFPUC Rules and Regulations Governing Water Service to Customers, Section F.

C. Turf is not allowed on slopes greater than 25 percent.

D. The SFPUC encourages the use of local native plant species in order to reduce water use and promote wildlife habitat.

E. Recycled Water. Irrigation systems shall use recycled water if recycled water meeting all public health codes and standards is available and will be available for the foreseeable future.

F. Irrigation Water Runoff Prevention. For landscaped areas of any size, water runoff leaving the landscaped area due to low head drainage, overspray, broken irrigation hardware, or other similar conditions where water flows onto adjacent property, walks, roadways, parking lots, structures, or non-irrigated areas, is prohibited.

VI. *Other Requirements*

A. Financial Stability. The SFPUC requires municipalities or other established organizations with a stable fiscal history as Licensees.

   i. Applicants must also demonstrate sufficient financial backing to pay rent, maintain the License Area, and fulfill other license obligations over the license term.

B. Smaller, community-based organizations without 501(c)(3) classifications must partner with a 501(c)(3) classified organization or any other entity through which it can secure funding for the License Area over the license term. Maintenance. The Licensee must maintain the License Area in a clean and sightly condition at its sole cost.[7] Maintenance includes, but is not limited to, regular weed abatement, mowing, and removing graffiti, dumping, and trash.

C. Mitigation and Restoration. The Licensee will be responsible, at its sole cost, for removing and replacing any recreational improvements in order to accommodate planned or emergency maintenance, repairs, replacements, or projects done by or on behalf of the SFPUC. If the Licensee refuses to remove its improvements, SFPUC will remove the improvements I at the Licensee's sole expense without any obligation to replace them.

D. Encroachments. The Licensee will be solely responsible for removing any encroachments on the License Area. An encroachment is any improvement on SFPUC property not approved by the SFPUC. Please read the SFPUC ROW Encroachment Policy for specific requirements. If the Licensee fails to remove encroachments, the SFPUC will remove them at Licensee's sole expense. The Licensee must regularly patrol the License Area to spot encroachments and remove them at an early stage.

[7] SFPUC Framework for Land Management and Use.

E. Point of Contact. The Licensee will identify a point of contact (name, position title, phone number, and address) to serve as the liaison between the Licensee, the local community, and the SFPUC regarding the License Agreement and the License Area. In the event that the point of contact changes, the Licensee shall immediately provide the SFPUC with the new contact information. Once the License Term commences, the point of contact shall inform local community members to direct any maintenance requests to him or her. In the event that local community members contact the SFPUC with such requests, the SFPUC will redirect any requests or complaints to the point of contact.

F. Community Outreach.

i. Following an initial intake conversation with the SFPUC, the Applicant shall provide a Community Outreach Plan for SFPUC approval. This Plan shall include the following information:

1. Identification of key stakeholders to whom the Applicant will contact and/or ask for input, along with their contact information;

2. A description of the Applicant's outreach strategy, tactics, and materials

3. A timeline of outreach (emails/letters mailing date, meetings, etc.); and

4. A description of how the Applicant will incorporate feedback into its proposal.

ii. The Applicant shall conduct outreach for the project at its sole cost and shall keep the SFPUC apprised of any issues arising during outreach.

iii. During outreach, the Applicant shall indicate that it in no way represents the SFPUC.

G. Signage. The SFPUC will provide, at Licensee's cost, a small sign featuring the SFPUC logo and text indicating SFPUC ownership of the License Area at each entrance. In addition, the Licensee will install, at its sole cost, an accompanying sign at each entrance to the License Area notifying visitors to contact the organization's point of contact and provide a current telephone number in case the visitors have any issues. The SFPUC must approve the design and placement of the Licensee's sign.

VII. *Community Gardens*

The following requirements also apply to community garden sites. As with all projects, the details of the operation of a particular community garden are approved on a case-by-case basis.

A. The Applicant must demonstrate stable funding. The Applicant must provide information about grants received, pending grants, and any ongoing foundational support.

B. The Applicant must have an established history and experience in managing urban agriculture or community gardening projects. Alternatively, the Applicant may demonstrate a formal partnership with an organization or agency with an established history and experience in managing urban agriculture or community gardening projects

C. During the Project Review process, the Applicant shall submit a Community Garden Planting Plan that depicts the proposed License Area with individual plot and planter box placements, landscaping, and a general list of crops that may be grown in the garden.

D. The Applicant shall designate a Garden Manager to oversee day-to-day needs and serve as a liaison between the SFPUC and garden plot holders. The Garden Manager may be distinct from the point of contact, see Section VI.E.

E. The Licensee must ensure that the Garden Manager informs plot holders about the potential for and responsibilities related to SFPUC repairs or emergency maintenance on the License Area. In such circumstances, the SFPUC is not liable for the removal and replacement of any features on the License Area or the costs associated with such removal and replacement.

F. The Licensee must conduct all gardening within planter boxes with attached bottoms that allow for easy removal without damaging the crops.

Hetch Hetchy
Regional Water System
Services of the San Francisco Public Utilities Commission

AMENDMENT TO THE

RIGHT OF WAY INTEGRATED VEGETATION MANAGEMENT POLICY

Approved January 13, 2015

by

SFPUC Resolution No. 15-0014

12.000 RIGHT OF WAY INTEGRATED VEGETATION MANAGEMENT POLICY

12.001 General

The San Francisco Public Utilities Commission ("SFPUC") is responsible for the delivery of potable water and the collection and treatment of wastewater for some 800,000 customers within the City of San Francisco; it is also responsible for the delivery of potable water to 26 other water retailers with a customer base of 1.8 million. **The following policy is established to manage vegetation on the transmission, distribution and collection systems within the SFPUC Right of Way ("ROW") so that it does not pose a threat or hazard to the system's integrity and infrastructure or impede utility maintenance and operations.**

The existence of large woody vegetation[1], hereinafter referred to as vegetation, and water transmission lines within the ROW are not compatible and, in fact, are mutually exclusive uses of the same space. Roots can impact transmission pipelines by causing corrosion. The existence of trees and other vegetation directly adjacent to pipelines makes emergency and annual maintenance very difficult, hazardous, and expensive, and increases concerns for public safety. The risk of fire within the ROW is always a concern and the reduction of fire ladder fuels within these corridors is another reason to modify the vegetation mosaic. In addition to managing vegetation in a timely manner to prevent any disruption in utility service, the SFPUC also manages vegetation on its ROW to comply with local fire ordinances enacted to protect public safety.

One of the other objectives of this policy is to reduce and eliminate as much as practicable the use of herbicides on vegetation within the ROW and to implement integrated pest management (IPM).

12.002 Woody Vegetation Management

1.0 Vegetation of any size or species will not be allowed to grow within certain critical portions of the ROW, pumping stations or other facilities as determined by a SFPUC qualified professional, and generally in accordance with the following guidelines.

1.1 Emergency Removal

SFPUC Management reserves the right to remove any vegetation without prior public notification that has been assessed by a SFPUC qualified professional as an immediate threat to transmission lines or other utility infrastructure, human life and property due to acts of God, insects, disease, or natural mortality.

1.2 Priority Removal

Vegetation that is within 15 feet of the edge of any pipe will be removed and the vegetative debris will be cut into short lengths and chipped whenever possible. Chips will be spread upon the site where the vegetation was removed. Material that cannot be chipped will be hauled away to a proper disposal site.

[1] Woody vegetation is defined as all brush, tree and ornamental shrub species planted in (or naturally occurring in) the native soil having a woody stem that at maturity exceeds 3 inches in diameter.

If vegetation along the ROW is grouped in contiguous stands[2], or populations, a systematic and staggered removal of that vegetation will be undertaken to replicate a natural appearance. Initial removal[3] will be vegetation immediately above or within 15 feet of the pipeline edges; secondary vegetation[4] within 15 to 25 feet from pipelines will then be removed.

1.3 Standard Removal

Vegetation that is more than 25 feet from the edge of a pipeline and up to the boundary of the ROW will be assessed by a SFPUC qualified professional for its age and condition, fire risk, and potential impact to the pipelines. Based on this assessment, the vegetation will be removed or retained.

1.4 Removal Standards

Each Operating Division will develop its own set of guidelines or follow established requirements in accordance with local needs.

2.0 All stems of vegetation will be cut flush with the ground and where deemed necessary or appropriate, roots will be removed. All trees identified for removal will be clearly marked with paint and/or a numbered aluminum tag.

3.0 Sprouting species of vegetation will be treated with herbicides where practicable, adhering to provisions of Chapter 3 of the San Francisco Environment Code.

4.0 Erosion control measures, where needed, will be completed before the work crew or contractors leave the work site or before October 15 of the calendar year.

5.0 Department personnel will remove in a timely manner any and all material that has been cut for maintenance purposes within any stream channel.

6.0 All vegetation removal work and consultation on vegetation retention will be reviewed and supervised by a SFPUC qualified professional. All vegetation removal work and/or treatment will be made on a case-by-case basis by a SFPUC qualified professional.

7.0 Notification process for areas of significant resource impact that are beyond regular and ongoing maintenance:

7.1 County/City Notification – The individual Operating Division will have sent to the affected county/city a map showing the sections of the ROW which will be worked, a written description of the work to be done, the appropriate removal time for the work crews, and a contact person for more information. This should be done approximately 10 days prior to start of work. Each Operating Division will develop its own set of guidelines in accordance with local need.

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[2] A stand is defined as a community of trees possessing sufficient uniformity in composition, structure, age, arrangement, or condition to be distinguishable from adjacent forest communities to form a management unit.
[3] Initial removal is defined as the vegetation removed during the base year or first year of cutting.
[4] Secondary vegetation is defined as the vegetative growth during the second year following the base year for cutting.

7.2 Public Notification – The Operating Division will have notices posted at areas where the vegetation is to be removed with the same information as above also approximately 10 days prior to removal. Notices will also be sent to all property owners within 300 feet of the removal site. Posted notices will be 11- by 17-inches in size on colored paper and will be put up at each end of the project area and at crossover points through the ROW. Questions and complaints from the public will be handled through a designated contact person. Each Operating Division will develop its own set of guidelines in accordance with local needs.

12.003 Annual Grass and Weed Management

Annual grasses and weeds will be mowed, disked, sprayed or mulched along the ROW as appropriate to reduce vegetation and potential fire danger annually. This treatment should be completed before July 30 of each year. This date is targeted to allow the grasses, forbs and weeds to reach maturity and facilitate control for the season.

12.004 Segments of ROW that are covered by Agricultural deed rights

The only vegetation that may be planted within the ROW on those segments where an adjacent owner has Deeded Agricultural Rights will be: non-woody herbaceous plants such as grasses, flowers, bulbs, or vegetables.

12.005 Segments of ROW that are managed and maintained under a Lease or License

Special allowance may be made for these types of areas, as the vegetation will be maintained by the licensed user as per agreement with the City, and not allowed to grow unchecked. Only shallow rooted plants may be planted directly above the pipelines.

Within the above segments, the cost of vegetation maintenance and removal will be borne by the tenant or licensee exclusively. In a like fashion, when new vegetative encroachments are discovered they will be assessed by a SFPUC qualified professional on a case-by-case basis and either be permitted or proposed for removal.

The following is a guideline for the size at maturity of plants (small trees, shrubs, and groundcover) that may be permitted to be used as landscape materials. Note: All distance measurements are for mature trees and plants measured from the edge of the drip-line to the edge of the pipeline.

- Plants that may be permitted to be planted directly above existing and future pipelines: shallow rooted plants such as ground cover, grasses, flowers, and very low growing plants that grow to a maximum of one foot in height at maturity.
- Plants that may be permitted to be planted 15–25 feet from the edge of existing and future pipelines: shrubs and plants that grow to a maximum of five feet in height at maturity.
- Plants that may be permitted to be planted 25 feet or more from the edge of existing and future pipelines: small trees or shrubs that grow to a maximum of twenty feet in height and fifteen feet in canopy width.

Trees and plants that exceed the maximum height and size limit (described above) may be permitted within a leased or licensed area provided they are in containers and are above ground. Container load and placement location(s) are subject to review and approval by the SFPUC.

Low water use plant species are encouraged and invasive plant species are not allowed.

All appurtenances, vaults, and facility infrastructure must remain visible and accessible at all times. All determinations of species acceptability will be made by a SFPUC qualified professional.

The above policy is for general application and for internal administration purposes only and may not be relied upon by any third party for any reason whatsoever. The SFPUC reserves the right at its sole discretion, to establish stricter policies in any particular situation and to revise and update the above policy at any time.

GENERAL MANAGER
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June 15, 2022

Tess Byler, Senior Project Manager
San Francisquito Creek Joint Powers Authority
tbyler@sfcjpa.org

SENT VIA E-MAIL TO: tbyler@sfcjpa.org

Subject: **SAFER Bay Notice of Preparation of an Environmental Impact Report** (SCH # 2022040504)

Dear Ms. Byler:

On behalf of the Midpeninsula Regional Open Space District (Midpen), we respectfully submit the following comments regarding the San Francisquito Creek Joint Powers Authority's (SFCJPA) Notice of Preparation (NOP) of an Environmental Impact Report (EIR) for the Strategy to Advance Flood Protection, Ecosystems and Recreation along the San Francisco Bay (SAFER Bay) Project.

Midpen has preserved over 65,000 acres of open space land on the San Francisco Bay Peninsula. Our mission is:

> *To acquire and preserve a regional greenbelt of open space land in perpetuity; protect and restore the natural environment; and provide opportunities for ecologically sensitive public enjoyment and education.*

While much of Midpen's open space lands are along the ridge of the Santa Cruz Mountains, Midpen owns and manages Ravenswood Open Space Preserve (Preserve), which is located along the shore of the San Francisco Bay in East Palo Alto. Midpen recently completed a new 0.6-mile segment of the San Francisco Bay Trail (Bay Trail) at the Preserve. In addition, Midpen also owns a portion of Cooley Landing Park, which was developed in partnership with the City of East Palo Alto (City). Operated by the City, Cooley Landing Park is located on a peninsula at the eastern end of Bay Road.

Midpen is focused on how the SAFER Bay Project improvements in Reaches 5, 7 and 8 (Dumbarton Approach, North of Bay Road – East Palo Alto, and South of Bay Road – East Palo Alto) would impact Ravenswood Open Space Preserve, Cooley Landing Park and the Bay Trail at Ravenswood.

Midpen agrees with the SFCJPA's determination that an EIR is the appropriate level of environmental review and that all environment factors listed under the CEQA Guideline Appendix G should be evaluated in the EIR. In particular, the SFCJPA should conduct the following studies and coordination, and include the findings in the EIR:

Biological Resources

Midpen's Ravenswood Preserve and the City's Cooley Landing Park contain highly sensitive and regulated resources. As such, Midpen should be included in discussions with the SFCJPA, the City, and appropriate regulatory agencies related to proposed Project improvements within Midpen lands. The EIR should include analysis of the impacts to the adjacent sensitive wetlands, tidal marsh lands, and protected species to ensure that the site's sensitive resources and wildlife movement along the shoreline are fully protected from the implementation of flood protection measures for the built environment.

Midpen requests that the following considerations and analysis be incorporated into the Project design and environmental review:

- In general, use broad sloped or ecotone levees wherever possible versus standard levees with more abrupt slopes or floodwalls as they provide enhanced ecological benefits in support of sensitive habitats, special status species (Ridgway's rail, salt marsh harvest mouse, tidal marsh plants) and flood protection.

- Ponds R1 and R2 currently provide substantial seasonal breeding habitat for the federally threatened western snowy plover. Restoration of these ponds should include alternative options to mitigate the loss of the existing habitat. These alternatives should include enhancements to R3 and SF2 to ensure these sites are productive/viable as plover habitat or consider leaving some select areas of RI and R2 that could provide flat, elevated, bare ground appropriate for breeding habitat. Specifically, retaining nesting islands in SF2 should be analyzed for the feasibility of providing habitat for plovers and terns in the short-term, and Ridgeway's rail and salt marsh harvest mouse in the long-term, if the islands become vegetated.

- Analyze and consider the need for measures to avoid conflicts between recreation and native species. Project implementation may result in plovers and other shorebirds nesting on recreational trails, especially adjacent to lost habitat. Consider and analyze alternatives to reduce these conflicts.

- Coordinate with researchers (USGS, USFWS, others) that are studying Pond SF2 to understand the potential for impacts to SF2 from the implementation of a proposed transition zone habitat east of SF2.

As the NOP states on page 6,

> "A later phase of the project may include tidal marsh restoration of the bayward portion of Pond SF2 and the adjacent diked marsh between SF2 and the Cooley Marsh (located in the Ravenswood Open Space Preserve). This action would substantially improve tidal marsh habitat connectivity for wildlife movement along the bayshore."

As such, the EIR should consider the potential of the future improved tidal marsh when developing appropriate and compatible Project alternatives for Reach 5 and 7.

Hazards and Hazardous Materials

According to the City's Ravenswood / 4 Corners TOD Specific Plan, the Ravenswood Business District (the area adjacent to Reach 5/6, 7, and 8) has a large number of industrial sites contaminated by past activities. The EIR should include an analysis of potential water quality impacts resulting from contamination discharge related to soil disturbance as part of the Project implementation.

For Project implementation, clean soils are critical to prevent water quality degradation and the introduction of invasive species and pathogens. If imported soil will be required, develop and analyze soil quality standards for identifying and sourcing appropriate clean, weed-free imported soils.

Hydrology and Water Quality

Midpen understands the Project goals are to address current tidal flooding and projected sea level rise. Comprehensive flood prevention must also address stormwater flows, therefore, the Project design and environmental review should consider and analyze upland stormwater flows and appropriate water discharge and holding, if necessary.

Recreation

Midpen understands that the Project includes proposed improvements to existing recreational access to the shoreline, including elevating the shoreline trails to reduce trail exposure to flooding, and construction of new trails that connect to the existing Bay Trail. The Draft EIR should include:

- Analysis of the proposed Project's temporary and permanent impacts to recreational uses along the Bay Trail. Outreach and coordination with Midpen and other affected land management agencies for the Bay Trail should be addressed prior to and during construction, including the coordination on any anticipated closures to nearby trails and Bay Road that leads to Ravenswood Open Space Preserve and Cooley Landing Park.
- Analysis and consideration of measures to mitigate the potential for conflicts between recreation and biological resources/sensitive species and habitats. Project implementation may result in plovers and other shorebirds nesting on recreational trails, especially adjacent to lost habitat. Consider and analyze alternatives to reduce these conflicts.

Aesthetics

The EIR should include analysis of the proposed Project impacts to the views of the Bay from recreational trails, adjacent parks, and surrounding neighborhoods.

Traffic and Transportation

The EIR should include analysis of the proposed Project impacts (temporary and permanent) to the existing Bay Trail and impacts to the proposed transportation improvements included in the Ravenswood Business District / 4 Corners Specific Plan.

Ravenswood Business District / 4 Corners Specific Plan Update

The City is currently conducting an update to the Ravenswood Business District / 4 Corners Specific Plan to consider allowing an increased density of development in the area adjacent to the Project area. Midpen recommends that the SFCJPA coordinate closely with the City to understand potential future development associated with the Ravenswood Business District (RBD) / 4 Corners Transit-Oriented Development (TOD) Specific Plan Update in order to develop appropriate flood control measures for not only current conditions, but future developments.

Alternatives Analysis Coordination with Public/Private Landowners within the Project Area

We strongly recommend that the SFCJPA continue working closely with the City of East Palo Alto, the San Francisco Public Utilities Commission, Midpen, other public stakeholders as well as private landowners to identify additional Project or segment alternatives to be considered in the EIR, while considering impacts and mitigation strategies for the whole Project.

Specifically, Midpen requests that the EIR analyze Project alternatives that:

- Prioritize the implementation of broad sloped or ecotone levees wherever possible,
- Retain the new Ravenswood Bay Trail segment, and
- Evaluate the potential for restoration to and assess impacts on the Ravenswood triangle.

Midpen requests that the SFCJPA consult with Midpen on design alternatives affecting the Ravenswood Bay Trail and Preserve prior to the initiation of an environmental analysis. Once the Draft EIR is available for public review and comments, please send notification to Planning Manager Jane Mark at jmark@openspace.org and Senior Planner Gretchen Laustsen at glaustsen@openspace.org. We appreciated the opportunity to review and submit comments on the NOP.

Sincerely,

Susanna Chan
Assistant General Manager

CC: Midpeninsula Regional Open Space District Board of Directors
Ana M. Ruiz, General Manager, Midpeninsula Regional Open Space District
Alice Kaufman, Green Foothills
Eileen McLaughlin, Citizens Committee to Complete the Refuge
Matthew Brown, San Francisco Bay National Wildlife Refuge Complex

Citizens Committee to Complete the Refuge

P.O. Box 23957, San Jose, CA 95153 Tel: 650-493-5540 Email: cccrrefuge@gmail.com www.bayrefuge.org

Comments submitted via electronic mail

June 15, 2022

Tess Byler, Senior Project Manager
San Francisquito Creek Joint Powers Authority
2100 Geng Road
Palo Alto CA 94303
Via email: tbyler@sfcjpa.org

RE: Notice of Preparation of an Environmental Impact Report for the Strategy to Advance Flood Protection, Ecosystems and Recreation along San Francisco (SAFER) Bay Project

Dear Ms. Byler:

Citizens Committee to Complete the Refuge appreciates the opportunity to provide scoping comments in response to the April 22, 2022 Notice of Preparation (NOP) of an Environmental Impact Report (EIR) issued by the San Francisquito Creek Joint Powers Authority (SFCJPA) for the SAFER Bay Project (Project). We commend the SFCJPA for its efforts to address the important challenge of protecting bayside communities from flooding and sea level rise.

We are also submitting a Memorandum from Dr. Peter Baye, Coastal Ecologist, Botanist, dated June 15, 2022 regarding the proposed project and attached to these comments.

Citizens Committee to Complete the Refuge (CCCR) has spent decades protecting the Bay's tidal wetlands and listed and rare species, and has an ongoing interest in wetlands restoration and acquisition. Our senior members worked with Congressman Don Edwards to obtain congressional authorization in 1972 to establish the Refuge. Since then, our organization has taken an active interest in Clean Water Act, Endangered Species Act, CEQA/NEPA regulations and National Wildlife Refuge System Administrative Act policies and implementation at the local, state and national levels, demonstrating our ongoing commitment to wetland, wildlife and Refuge issues.

Additionally, we have participated as a stakeholder in the US Fish and Wildlife Service Tidal Marsh Ecosystem Recovery Plan, the San Francisco Bay Conservation and Development Commission Adapting to Rising Tides and Bay Adapt processes, the San Francisco Estuary

Partnership, the San Francisco Bay Joint Venture and the South Bay Salt Pond Restoration Project. Our participation in these processes demonstrates our recognition of the threats posed by climate change and more specifically, sea level rise, and the challenges that face our region as we work to protect the current and future health of San Francisco Bay and our communities. With those interests, and a relationship with the Don Edwards San Francisco Bay National Wildlife Refuge, we previously had the opportunity to comment to the SFCJPA on the San Francisquito Creek Flood Protection Bay to 101 Project, a project that has some connection to the Project described in this Notice of Preparation. We are also submitting a Memorandum from Dr. Peter Baye, Coastal Ecologist, Botanist, dated June 14, 2022 regarding the proposed project.[1]

Our comments are based on Project information provided in the NOP, the 2016 *"SAFER Bay East Palo Alto and Menlo Park Public Draft Feasibility Report"* (Feasibility Report) referenced in the NOP, and the presentation slides and recording from the May 19, 2022 SAFER Bay Project NOP Meeting which are posted on the SFCJPA website (http://sfcjpa.org).

Project Description

According to the NOP, the Project site is located along approximately 7 miles of the shoreline of San Francisco Bay from the Menlo Park/Redwood City border south to the East Palo Alto/Palo Alto border. The Project has been divided into 8 segments or reaches, all located within the cities of Menlo Park and East Palo Alto. Project actions will take place on both public and privately owned property including:

> *"…the Don Edwards National Wildlife Refuge (Refuge), including Refuge-managed land in Laumeister and Faber Tract Marshes (owned by City of Palo Alto) and Ravenswood Open Space Preserve (owned by Midpeninsula Open Space District). The Project also includes actions within land owned by the San Francisco Public Utilities Commission, the Cargill Corporation, and many others; and within the Caltrans State Route 84 right-of-way at the western approach to the Dumbarton Bridge*."

The purpose of the Project is "…*to protect people, property and infrastructure from current tidal flooding and projected sea level rise through engineered and natural features that enhance shoreline ecosystems and improve recreational opportunities*." A combination of levees, floodwalls and flood risk reduction structures with be utilized to meet current FEMA coastal flood protection requirements and provide protection from 3.5 feet of anticipated sea level rise. The project proponent states the proposed Project would include more than 550 acres of habitat restoration and 1 to 2.5 miles of new or improved trails.
The NOP states:

> "*Consistent with CEQA, the SAFER Bay Project EIR will contain both project-level and program level evaluations. Those Project components with sufficient design and construction information will be evaluated at a project level of detail and those lacking*

[1] Memorandum from Dr. Peter Baye, Coastal Ecologist, Botanist, dated June 14, 2022 to CCCR, attached hereto as Exhibit 1.

sufficient detail will be evaluated programmatically, in accordance with CEQA Guidelines Sections 15161 and 15168."

As identified in NOP *Figure 1: Project Location and Components*, only two reaches, "Substation and Marsh Restoration" and "South of Bay Road – East Palo Alto" will be evaluated at the "project level of detail" in the EIR.

In sections below, the comments of this letter will be grouped as:

- General comments
- Comments regarding the proposed alignment reaches, organized from north to south
- Comments identifying significant sections for impact analysis

General Comments

Safer Bay Project and the Refuge

The Don Edwards San Francisco Bay National Wildlife Refuge (Refuge) is an important partner with the SAFER Bay Project. Lands owned and/or managed by the Refuge represent the largest geographic portion of adjacent properties potentially impacted by the Project.

According to the agency's 2013 *Comprehensive Conservation Plan*[2], "The Refuge was established with three major purposes. The most important of these is the preservation of the natural resources of the South Bay, which include among others the habitat of migratory birds, harbor seals, and threatened and endangered species. The second major purpose is to provide environmental education and wildlife interpretation opportunities to Bay Area schools and residents. Third, the Refuge will ensure the protection of an important open space resource and other wildlife-oriented recreation opportunities for the enjoyment of local residents and visitors (EDAW 1974)."

The Refuge was established to protect special status species and other fish and wildlife, and all actions undertaken must be compatible with protection of those resources. In discussion that follows, you will find comments that demonstrate how these Refuge priorities, mandated by Congress, apply to specific proposals and topics of the Project's NOP.

★ To facilitate the Project's working relationship with the Refuge, the EIR needs to (1) include the Refuge's Comprehensive Conservation Plan as a planning resource, (2) add the USFWS/Refuge to its list of Permits and Approvals (p.7, NOP) for permitted access to Refuge lands and (3) consult with Refuge management on any Project needs involving Refuge lands inclusive of the Faber and Laumeister marshes.

Future "Draft Project Description"

The *SAFER Bay Notice of Preparation (NOP) Scoping Meeting Presentation Slides* from the May 19, 2022 public meeting include a slide entitled "Environmental Impact Report Process" (Slide No. 8). The slide presents a timeline and flow chart indicating that a "Project Description

[2] Don Edwards San Francisco Bay National Wildlife Refuge Comprehensive Conservation Plan 2013: https://permanent.fdlp.gov/gpo51796/index.htm

Review" will take place in 2023, prior to the preparation of the Draft EIR. In the *May 19, 2022 SAFER Bay project NOP Meeting Recording,* the public was informed that "although not required, a draft project description will be released for public review in August 2023".

We are very heartened to learn that agencies and the public will have an additional opportunity for review and comment on what we might assume will be a much more robust and complete project description.

- ★ The DEIR must ensure that sufficient information is included on Project design details and potential environmental impacts for a "meaningful response", for the reaches that will be analyzed at the project level in the EIR and sufficient information regarding potential direct and indirect impacts that may arise in future phases to enable the agencies and public to provide substantive comments.

<u>Tiering and Subsequent CEQA Project-Level Analysis</u>

Regarding review of project elements currently being evaluated at the program level, the NOP states, *"Supplemental CEQA for those aspects of the Project evaluated in the SAFER Bay EIR at a program level of detail will occur before construction of those elements."* (Page 8)

Under CEQA Guidelines Section 15168(c)(1), subsequent CEQA review may be either an EIR or Negative Declaration ("If a later activity would have effects that were not examined in the program EIR, a new Initial Study would need to be prepared leading to either an EIR or a Negative Declaration. That later analysis may tier from the program EIR as provided in Section 15152.").

- What does the SAFER Project consider "*supplemental CEQA*"?
- Would future reaches currently being considered at the program level be subject to a full EIR prior to construction, or would a Negative Declaration be used?
- Will the level of subsequent CEQA analysis be different for each Project reach?
- The forthcoming Draft Project Description and/or the EIR should outline how the supplemental CEQA process will unfold for the specific program-level reaches, and describe the process for subsequent opportunities for agency and public review and comment. It is particularly important to inform agencies and the public whether or not there will be opportunities to review and provide comment on future phases, as design of those phases moves forward or whether the programmatic DEIR will be the only opportunity for public review and comment.

<u>Accuracy of Statements of Proposed Actions</u>

In discussions below, we will discuss issues related to Project proposals of nature-based actions such as restoration on lands of the Refuge. Our discussion will address issues of impacts of concern on habitat and wildlife but we should not ignore an issue that may mislead the public and agencies dependent on a CEQA document.

In the NOP, (p.7) we find:

> **Tidal Marsh-Upland Transition Zone Habitat at Pond R1/R2.** The Project ***will construct*** a broad, gently sloped habitat transition zone that will increase the surface area and vertical extent of transition zone habitat adjacent to the footprint of restored tidal salt marsh. High tide refugia could also be created within portions of Pond R1 to provide escape cover within the restored marsh. The locations of transition zone habitat will depend upon the footprint of restored tidal habitat versus enhanced managed pond habitat (to be determined in collaboration with the SBSPRP project management team). (italics added).
>
> **Tidal marsh-upland transition zone habitat construction at Pond R4**. Similar to Pond R2***, the Project will construct*** a broad, gently sloped habitat transition zone that will increase the surface area and vertical extent of transition zone habitat relative to the amount of transition zone habitat restored in Pond R4 by the SBSPRP. The design will be developed in collaboration with the SBSPRP project management team. (italics added)

Both items present the proposal with the certainty of "will construct." We find this statement disturbing as our research while preparing to respond to the NOP included asking the SBSPRP and the Refuge about the NOP proposals, learning that neither agency has any agreements with the Project for such actions. Our further concern is that the CEQA intent "to inform" is here instead misinformation provided to the public and agencies who may depend on it in responses to the NOP.

- ★ In the EIR, statements of proposed actions must be accurate to the status of that action. If Project actions are to occur on lands of other jurisdictions, the EIR should be able to cite a completed agreement of the parties for the action or, minimally, amend statements of proposed action appropriately e.g. agreement pending.

<u>Concurrent Project-Level EIR for All Reaches with Proposed Pond Restoration</u>

The South Bay Salt Pond Restoration Project (SBSPRP) has yet to initiate its Phase 3 planning process for the ponds that have not already been designated for either tidal marsh restoration or enhanced managed ponds. Refuge Ponds R1, R2 and SF2 are all currently managed ponds that may be considered for complete or partial restoration to salt marsh habitat in the future. SBSPRP decisions on conversion of ponds to tidal marsh are based on ongoing scientific studies that inform the "adaptive management" process required by the 2007 *South Bay Salt Pond Restoration Project Final Environmental Impact Statement/Report.* All decisions must also be consistent with the legally-mandated purpose of the Refuge's federally-protected lands.

Decisions on future tidal marsh restoration of R1 and R2 may be dependent on habitat decisions for SF2, and vice-versa, especially with respect to ensuring the retention of adequate breeding habitat, or enhancement of habitat, for endangered western snowy plovers. While Ponds R1 and R2 are in a reach that will be analyzed at the project level in the EIR, Pond SF2 will not undergo a detailed project-level analysis until some future time.

Since decisions on future habitat designations for these three ponds cannot be made in isolation, it may be appropriate for the Project, in consultation with the SBSPRP and the Refuge, to consider conducting a project-level analysis for SF2 at this time as well; specifically, to obtain the required Refuge and SBSPRP determination as to whether or where placement

of any SAFER levees within these ponds will be appropriate for habitat restoration or enhancement.

Restoration as Mitigation for Project Impacts

Habitat restoration of over 550 acres is an important element of the overall Project as stated below in this excerpt from the NOP *Project Overview* on page three:

> *"The SFCJPA is collaborating with the South Bay Salt Ponds Restoration Project to restore former salt production ponds, Pond R1 and Pond R2, located in the Ravenswood Complex, as part of the SAFER Bay Project. The restoration scenarios include tidal marsh or a combination of tidal marsh and managed ponds. The Project will construct levees, floodwalls and other flood protection features necessary to enable the restoration of tidal action to these ponds and includes design and construction of the pond restoration itself in order to mitigate for the Project's impacts to jurisdictional wetlands and aquatic habitats. The Project also proposes to increase the diversity of habitat by building tidal salt marsh-upland transition zone habitat (transition zone habitat) on the bayward slope of appropriate segments of levee adjacent to existing and/or restored tidal salt marsh."* (Emphasis added)

It would be inappropriate to assume that ponds R1 and R2 will be converted to tidal wetlands. While restoration to tidal wetlands of as many acres of salt ponds as possible is one of the goals of the South Bay Salt Pond Restoration Project, it has always been recognized that there is a delicate balance of habitats and habitat use that must be maintained. One of the project objectives of the SBSPRP is to maintain populations of salt pond dependent migratory waterbirds such as the Wilson's and red-necked phalaropes, eared grebes, and Bonaparte's gulls, as well as salt pond-dependent special status species such as the western snowy plover. When considering the overall habitat mosaic in the South Bay, and the critical acres needed for specific Bay wildlife species, the SBSPRP and Refuge may conclude that the best ecologically-based decision is to leave Ponds R1, R2 and SF2 entirely as managed ponds.

- What effect would this have on the Project's ability to mitigate for Project impacts to jurisdictional wetlands and aquatic habitats?
- In order to address the possibility that the number of acres available for Project habitat restoration may not be adequate for mitigation, the EIR must include details on the location, functional value and acreage of existing jurisdictional wetlands and aquatic sites that could be directly and indirectly impacted by Project actions, and provide mitigation strategies that do not require the use of lands that may already be encumbered by restrictions in use.

Levee Design Details

As subsequent comments in this letter will demonstrate, it is clear that the two levee design graphics were not sufficient information, particularly for project-level discussions. Along the ~7 miles of Project shoreline, the variations in siting, of differing inboard and outboard conditions and the common obstacles of ordinary infrastructure all lead to the conclusion that there must be many variations of levee footprint, height, slope/partial slope/no slope and more in levee design. While we made attempts to answer questions by building charts, it was clear more information was needed and may be very pertinent to, say, someone whose home would be near the future levee. The EIR needs to provide in-depth levee information in plain language

but with the appropriate level of detail so the public and agencies may better understand the changes ahead.

- ★ The Project Description of the EIR must include discussion, charts and images suitable for every project-level action and sufficient to make program-level consideration informative.

Comments on Specific Reaches, North to South

Marsh Road

The Feasibility Report provides two options for this reach. Based on the NOP *Figure 1: Project Location and Components,* it appears that Option 2 has been selected for analysis in the program-level EIR. This option would raise the existing levee along the Bayfront Canal from Marsh Road to the Redwood City border. Since the Feasibility Report was issued in 2016, the Bayfront Canal & Atherton Channel Flood Protection and Ecosystem Restoration Project has been completed - a collaborative effort between the cities of Atherton, Menlo Park and Redwood City, San Mateo County and the Refuge. The new infrastructure components of this flood control project must be reflected in the existing conditions section of the EIR.

Additionally, The Bayfront Canal is directly adjacent to the Cargill salt ponds which are all in the Congressionally-authorized expansion boundary for the Refuge. Should these adjacent Cargill ponds become available for acquisition and restoration to tidal marsh in the future, this levee could provide high marsh habitat and room for marsh migration with sea level rise.

- ★ The EIR should explore a design alternative for the levee on this reach that could accommodate (or at least not preclude) a possible future addition of an extended 30:1 slope on the bayside of the SAFER levee.

Bedwell Bayfront Park

The NOP *Figure 1* shows this reach extending from Marsh Road to high ground within Bedwell Bayfront Park.

- ★ The new Draft Project Description should provide a sufficient level of detail for agencies and the public to understand how the Project will increase flood protection in this reach within the constraints of existing water control structures, the roadway into the park, the adjacent Flood Slough waters and wetlands and Refuge Pond S5.

Bayfront Expressway

This reach extends from the high ground of Bedwell Bayfront Park down to Bayfront Expressway adjacent to Refuge Ponds R4, R5 S5 and R3, and then continues along the highway to the edge of the Tech Campus reach. It is very important that the SFCJPA continues to work closely with the South Bay Salt Pond Restoration Project (SBSPRP) and the Refuge on the levee design elements for this reach.

The NOP doesn't reflect the existing conditions on Refuge lands in this area that will be impacted by proposed Project levees shown in NOP *Figure 1* and *Figure 2 Cross-Section of Levee with Transition Zone Habitat (Bedwell Bayfront Park).* (Although *Figure 2* is labeled as Bedwell Bayfront Park, it appears to apply to the Bayfront Expressway reach.) As part of its Phase 2 implementation, the SBSPRP has installed a water control structure between Pond R5 and R4, and is expected to complete construction of a habitat transition zone along the perimeter of Pond R4 by the end of 2022.

- ★ To what extent, if any, would the Project's Proposed Transition Zone Habitat section within Pond 4 (as depicted in NOP *Figure 1*) be needed?

Other than the levee cross section provided for the small area with transition zone habitat in R4, the NOP includes no information on the dimensions or footprint for the remaining levee sections between Pond 3 and S5/R6 and along Bayfront Expressway. The SBSPRP Phase 2 plans currently being implemented call for Pond R3 to remain a managed pond for endangered western snowy plover breeding habitat; therefore, levees for this reach should be designed to have a smaller footprint in order to have the least amount of fill placed inside Refuge Ponds R3 and R5.

- ★ The EIR must provide details on the number of acres in Refuge ponds that would be permanently impacted from fill, identify and analyze direct and indirect impacts to the Refuge and special status species and also describe how impacts to Refuge lands and wildlife during and after levee construction will be minimized or mitigated.

Tech Campus

The Tech Campus reach is located around the Meta (Facebook) East campus and along the north side of Bayfront Expressway. It crosses the Ravenswood Pump Station Outfall near the southeast corner of the Meta campus.

Because this proposed section of levee borders approximately 1.25 linear miles of Ravenswood Slough (an estimated total of 28 acres), and transects the connection at the Ravenswood Pump Station to the Caltrans wetland mitigation area south of Bayfront Expressway, it has the potential to significantly impact jurisdictional wetlands and waters. In addition, the levee sections to the west and north of the tech campus could potentially affect the Refuge's levee on the opposite side of Ravenswood Slough that protects Pond R3 habitat for shorebirds, including the federally threatened western snowy plover.

The Feasibility Report states that Ravenswood Slough in the Tech Campus area, "…*is not currently high-quality tidal marsh*." The Feasibility Report and NOP provide no criteria or assessment for reaching this conclusion. This description implies that Ravenswood Slough does not provide valuable wildlife habitat.

Ravenswood Slough has been documented to support the federal and state listed endangered and state fully protected Ridgway's rail (RIRA). In the 2020 Invasive Spartina Project RIRA survey results noted the detection of 14 RIRA[3]. The Project determination that Ravenswood Slough in this reach is not high quality is also inconsistent with our recent observations, and the photo-documentation of this tidal marsh we provide below. All photos were taken by G. Raabe.



Brackish wetlands on east side of campus showing Ravenswood Slough at Bayfront Expressway across from the Ravenswood Pump Station.



Ravenswood Slough wetlands looking east along the Bayfront Expressway section of the Tech Campus reach, Pond R3 on the left.

[3] California Ridgway's rail Surveys for the San Francisco Estuary Invasive Spartina Project 2020; https://spartina.org/documents/InvasiveSpartinaProject_RIRAReport2020.pdf



Ravenswood Slough wetlands looking north from Tech Campus existing levee.



Ravenswood Slough wetlands from northwest corner of Tech Campus, Bedwell Bayfront Park in the background.



Ravenswood Slough wetlands looking south, existing Tech Campus levee on left, Pond R3 on right.



Ravenswood Slough west of the tech campus during high tide.

This area of Ravenswood Slough west of the tech campus is currently being used by Killdeer and Black-necked Stilts, and their young. Photos taken June 6, 2022.



Adult and fledgling Killdeer foraging in Ravenswood Slough salt marsh.



Adult and fledgling (in vegetation) Black-necked Stilts in Ravenswood Slough salt marsh.

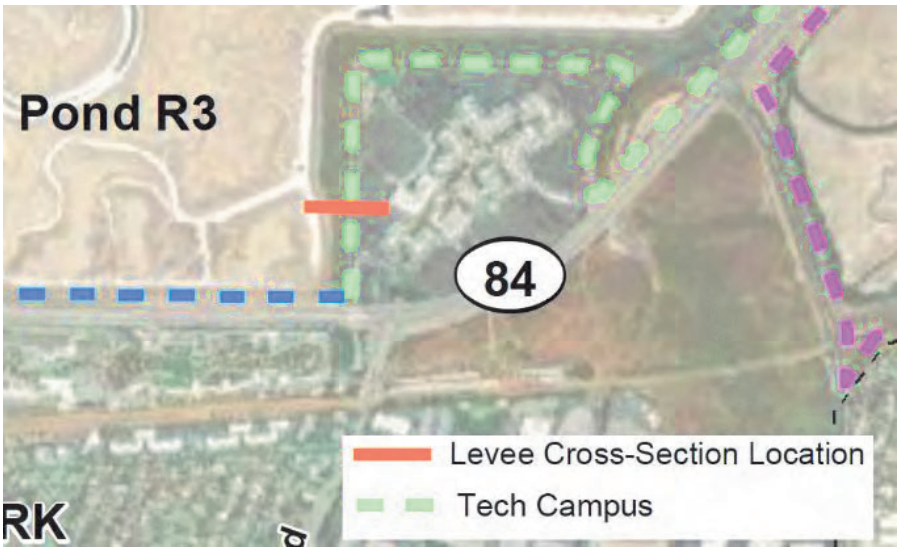
Black-necked Stilt populations have experienced precipitous declines in the south San Francisco Bay[4], so any habitat suitable for this species to use for breeding is important and should be considered worth protecting.

The Feasibility Report description that this is not a high-quality salt marsh could lead the public to assume it is not suitable habitat for the federally endangered salt marsh harvest mouse. We now know the mouse occupies a diversity of vegetation in addition to pickleweed, and can inhabit muted tidal marshes[5].

The Feasibility Report's unsubstantiated characterization of Ravenswood Slough salt marsh in this area could influence agency and public comments with respect to the scope and content of the EIR. The EIR must include accurate documentation of the extent and ecological value of existing Biological Resources in this reach, including listed species, and provide alternatives that avoid, minimize or mitigate impacts to habitat and wildlife.

Information Needed on the extent of Tidal Marsh Habitat Loss:

The NOP does not provide information on potential Project impacts to the salt marsh habitat in this section of Ravenswood Slough; however, using the figures provided in the NOP (Figures 1,3 and 4) it is clear that there is a potential for loss of salt marsh along 1.25 miles of Ravenswood Slough from the proposed Project levee.



Excerpt from NOP Figure 1 showing location of levee cross-section.

[4] Hartman, C.A., Ackerman J.T., Schacter, C., Herzog M.P., Tarjan L.M, Wang, Y., Strong, C., Tertes, R., and Warnock, N. 2021. Breeding Waterbird Populations Have Declined in South San Francisco Bay: An Assessment Over Two Decades. San Francisco Estuary and Watershed Science, 19(3). https://doi.org/10.15447/sfews.2021v19iss3art4

[5] Barthman-Thompson, L., Smith, K. and Riley, M. 2017. Salt Marsh Harvest Mouse Survey Bias, New Results for China Camp State Park. Poster Abstracts, State of the San Francisco Bay Estuary Conference, Oct 10-11, 2017. https://www.sfestuary.org/wp-content/uploads/2017/09/SOE17Abstract2_Conserving_SMHM.pdf

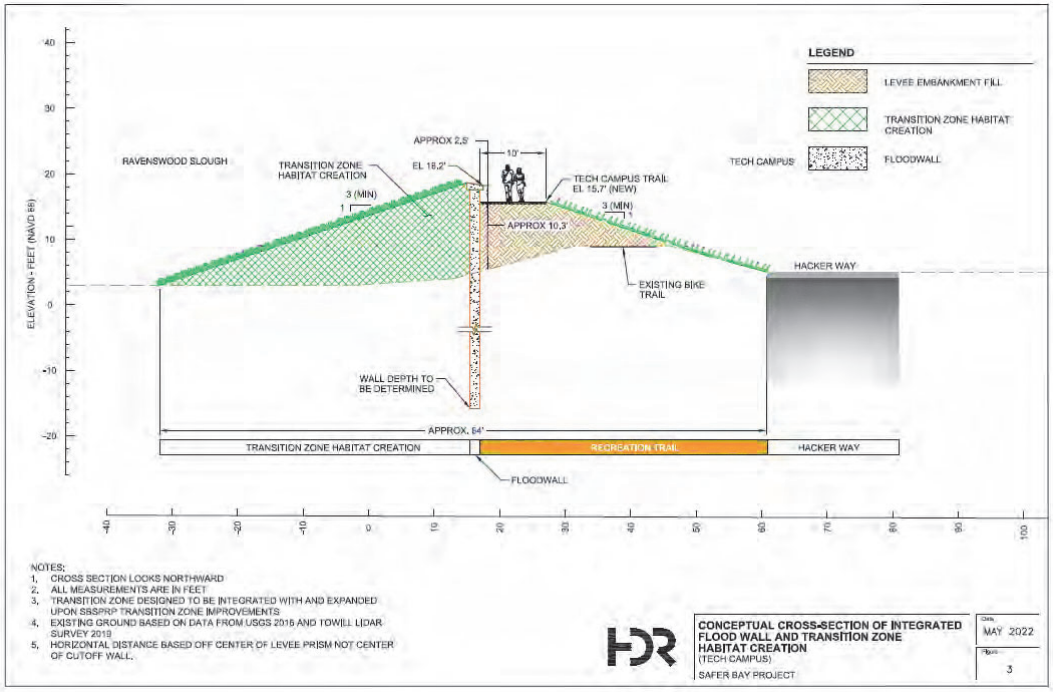


Figure 3 from the NOP shows a levee with an 84-foot base extending from the edge of Hacker Way west into Ravenswood Slough.

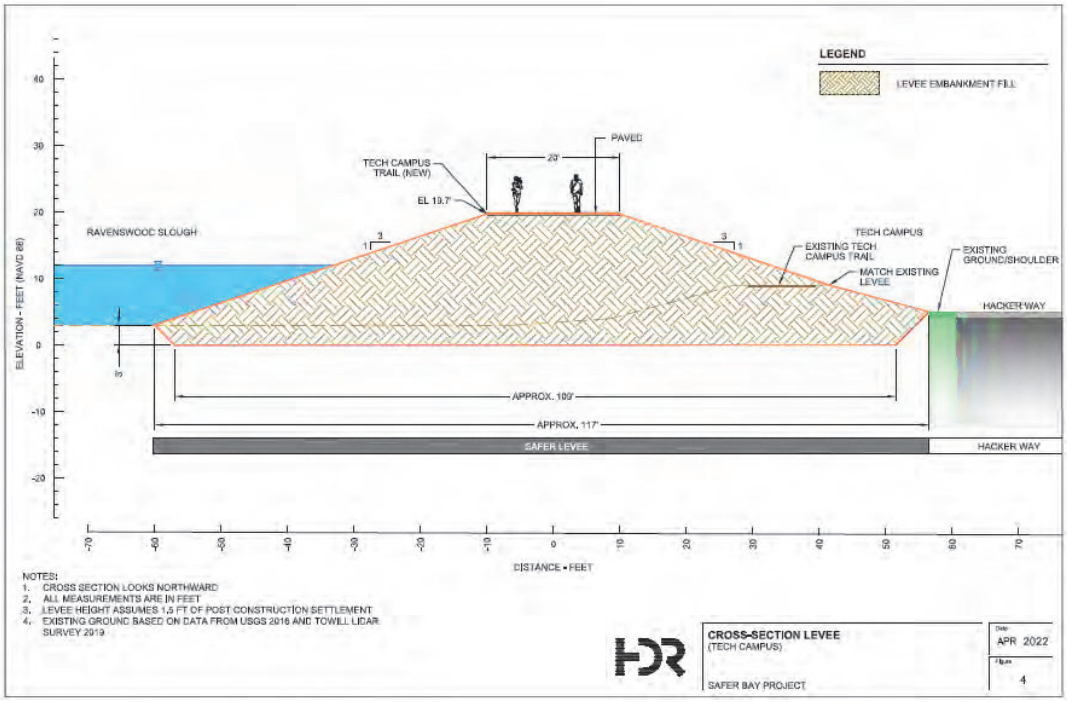


Figure 4 from the NOP shows a levee with an 117-foot base extending from the edge of Hacker Way west towards Ravenswood Slough.

Additionally, the NOP provides no information on the design and footprint for the levee section along Bayfront Expressway, and therefore the potential for impacts to tidal marsh habitat in this area is unknown.



Tech Campus section (– – –) adapted from NOP Figure 1. ??? = area of unknown levee design and footprint along Bayfront Expressway.

★ For each alternative considered in the EIR for this reach, even at the program level, there must be specific locations and acreage provided for any wetlands and waters that could be temporarily, permanently, directly and indirectly impacted from the Project. The types of impacts and acreages of impacts should be provided in a table – (e.g. temporary, permanent, direct, indirect, habitat type, acreage).

<u>Potential Impacts to the Levee Protecting Pond R3:</u>

Converging shorelines increase tidal amplitude towards the landward end of enclosed estuaries[6]. Without knowing the extent to which a proposed levee may encroach into Ravenswood Slough, thereby increasing the convergence of the shorelines, it is not possible to determine what impact increased tidal amplitude may have on the structural integrity of the Pond R3 levee across the slough (even without sea level rise) that protects habitat for shorebirds and breeding western snowy plover from inundation.

[6] Holleman, R. C., and M. T. Stacey (2014), Coupling of sea level rise, tidal amplification, and inundation, J. Phys. Oceanogr., 44(5), 1439–1455, doi:10.1175/JPO-D-13-0214.1.



Ravenswood Slough wetlands looking west from existing Tech Campus levee, with Pond R3 levee across the slough.

Below are three Google Earth overlays showing approximate shoreline locations in Ravenswood Slough under different conditions: 1) current, 2) with an 84-foot wide levee base along the perimeter of the tech campus and 3) with a 117-foot wide levee base. Shorelines are estimated from the location of saltmarsh vegetation on the Google Earth image and field observations. The shoreline realignment drawn in the second and third figures is limited to levee sections where Hacker Way parallels Ravenswood Slough because the NOP only provides information for the proposed levee relative to Hacker Way, the perimeter roadway on the tech campus.



Current conditions showing convergent shorelines (yellow line) of Ravenswood Slough going inland (north to south).



Ravenswood Slough shoreline with base of 84-foot levee extending west from Hacker Way, showing increased convergence of the shorelines.



Ravenswood Slough shoreline with base of 117-foot levee extending west from Hacker Way, showing increased convergence of the shorelines.

★ The EIR should include an analysis of the potential hydrological changes in Ravenswood Slough (including changes in tidal amplitude) from the Tech Campus levee, and how those changes could impact the levee protecting the shorebird habitat in the Refuge's Pond R3.

Alternative for Consideration:

The SBSPRP plan for Pond R3, currently being implemented, is to enhance this managed pond for shorebirds and western snowy plover nesting habitat, and not restoration to tidal marsh. This decision was published in the *South Bay Salt Pond Restoration Final Environmental Impact Statement/Report, Phase 2 Executive Summary* in April 2016. On Page 7 of the NOP, there is a statement that the Project would provide habitat enhancement for nesting plovers in Pond R3; however, the NOP included updated figures for this reach (Figures 3 and 4) with the same 2016 Feasibility Report levee designs for possible restoration to tidal marsh. These designs are for a levee with a large footprint and "transition zone habitat" extending well into Ravenswood Slough. There appears to be no reason at this point to have a larger levee with a transition zone surrounding the tech campus.

★ In order to avoid or minimize impacts to the Ravenswood Slough wetlands and endangered species, the Project should reconsider the Feasibility Report's Reach 4, Option 1 levee shown in Figure 16 below, or another levee design that eliminates any permanent fill in Ravenswood Slough.

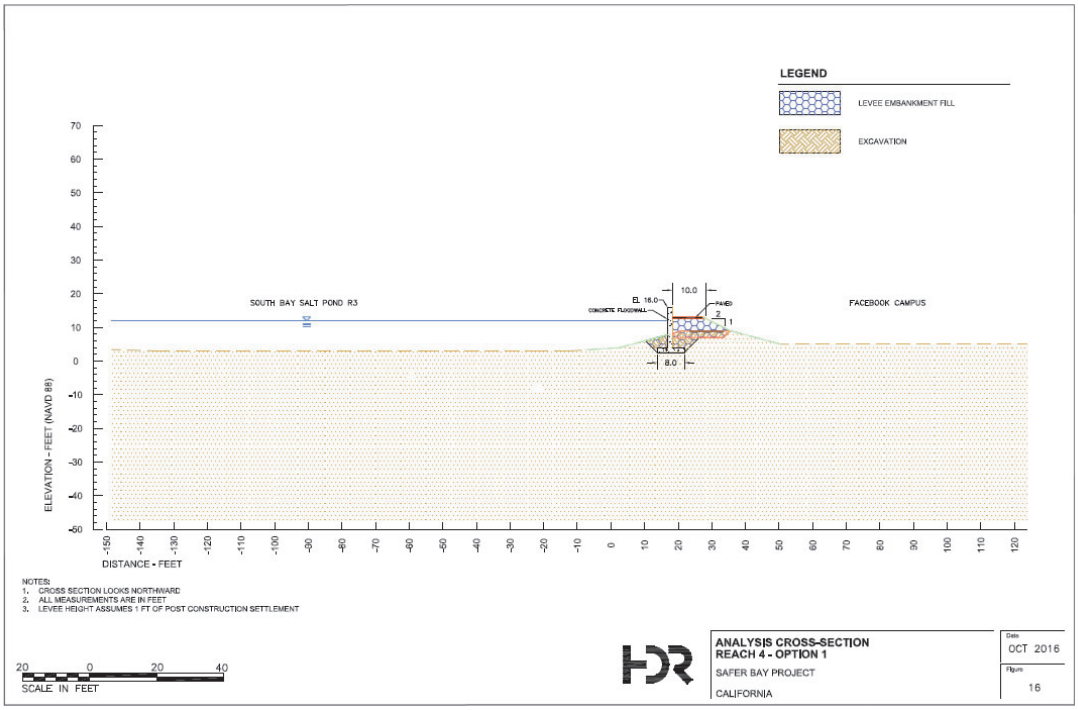


Figure 16 from the Feasibility Report showing the Option 1 floodwall with a greatly reduced Project footprint. Ravenswood Slough is on the left.

Substation and Marsh Restoration (Project Level EIR)

As shown in NOP *Figure 1*, the proposed levee for this reach surrounds the perimeter of the PG&E substation, and continues along the two edges of Bayfront Expressway adjacent to the Refuge's Pond R2. NOP *Figure 5 Cross-Section of Levee with Transition Zone Habitat Creation* shows that the proposed SAFER levee, including the 30:1 sloped, bayside transition zone habitat, would extend approximately 560 feet out from the edge of the PG&E property.

As mentioned in our general comments, the SBSPRP has not completed the planning process for Ponds R1 and R2 with respect to potentially restoring tidal marsh, enhancing the existing managed ponds, or creating a combination of the two habitats.

- ★ The EIR for this reach may need to analyze a range of options for levee placement and design, and for enhancing wildlife habitat in these ponds. Following consultation with the SBSPRP and the Refuge to obtain options consistent with their goals, the Project should include an appropriate number of alternatives to analyze. Additionally, migratory shorebirds and breeding Western Snowy Plovers utilize these ponds; therefore, the EIR should identify potential impacts to wildlife from levee construction and provide corresponding mitigation measures.

Dumbarton Bridge West Approach, Levee Expressway Crossing and SF2 alignment.

The NOP's Project Location and Components map (Figure 1), suggests levee locations along Bayfront Expressway at its bridge approach and also three connections bisecting or adjoining the Refuge's Pond SF2. Even though this part of the Project is program-level, it is a concern that the map's suggestions omit mention of various options developed in the 2020 Dumbarton

Bridge West Approach + Adjacent Communities Resilience Study[7] (DBWA Study). Those options can affect best placement of the Project's levees. By the time actions described under program-level planning commence, Caltrans may have adopted DBWA options that may alter locations for a levee crossing of the Expressway and the route of the levee within or around Pond SF2.

The EIR must include the following analysis and set standards that will guide project-level planning.

- Present the six options shown in the Conclusions of the DBWA Study with discussion about how they each might affect the Project's levee locations, levee connections and the best site for the Expressway crossing. For instance, in options that include a longer or shorter elevated roadway, where are sites that are optimal for the Expressway crossing? Pending Caltrans decision on length of an elevated roadway, how does the landing location of the roadway affect levee alignments on the roadside or with SF2?

- As Program-level guidance, set the standard that project level planning include in-depth **biological resource assessments (BRA)** as required under Menlo Park's Connect Menlo, identifying impacts unique to alignment-habitat combinations. For example, the BRA findings of a levee next to Ravenswood Slough would differ from a levee next to the western snowy plover habitat in SF2. Analysis would occur for impacts along both sides of the expressway, from the Mosely Tract through Ravenswood Slough and similarly along SF2. Additionally the BRA analysis would need to include how the planned levee type impacted habitat and consider if an alternate form of levee could avoid or minimize impacts.

- Figure 1 suggests three **possible levee alignments in SF2**. It is of significance that these Refuge lands are required under Refuge priorities and the National Wildlife Refuge System Administrative Act[8] to dedicate the highest priority to wildlife and the habitat they require. Any levee crossing, new or increased in size can cause extensive temporary and permanent impact on the wildlife that require this habitat, multiplied by the number of levee alignments built. The greatest impact would occur for levees bisecting and disrupting habitat such as the alignment shown near the Bay or that of the existing berm separating the migratory bird island pond and snowy plover habitat. For these reasons **we recommend that the EIR consider a University Avenue levee only.**

- For any alignment within or adjoining SF2, the EIR needs to set the program-level standard that project-level planning (supplemental CEQA action) will report the existence of a completed formal agreement with the Refuge for the action proposed.

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[7] Dumbarton Bridge West Approach + Adjacent Communities Resilience Study, 2020; https://mtc.ca.gov/sites/default/files/documents/2021-05/Dumbarton-Bridge-West-Approach-Adjacent-Communities-Resilience-Study-Final-Report.pdf

[8] National Wildlife Refuge Administrative Act of 1966 and as amended: https://www.govinfo.gov/content/pkg/COMPS-3011/pdf/COMPS-3011.pdf

The "Loop Road"

During the June 19th Public Scoping Meeting, Project staff described a SF2 alignment bisecting habitat described above proposed to be built large enough to provide a road connecting East Palo Alto to Bayfront Expressway and called the "**Loop Road**." As we have also been commenting on plans for the Ravenswood Business District (RBD) in East Palo Alto, we knew of a proposal for a Loop Road within that City dating back to the 2013 RBD Specific Plan[9]. We are also aware that there are significant concerns among East Palo Alto officials questioning whether that Loop Road will ever be built.

From our prior comments about wildlife disturbance, it is apparent that building a road would vastly escalate impacts on the species of SF2. That very issue is likely why Congress, through the NWRSAA, expressly limited public use on Refuges to passive recreation and environmental education if/when/where it is compatible with adjoining habitats. As set forth in the Act:

> Sec. 4 (a)(1)
>
> (2) The mission of the System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.
>
> Sec 5: Definitions
>
> For purposes of this Act:
> (1) The term ''**compatible use**'' means a wildlife-dependent recreational use or any other use of a refuge that, in the sound professional judgment of the Director, will not materially interfere with or detract from the fulfillment of the mission of the System or the purposes of the refuge.
> (2) The terms ''**wildlife-dependent recreation''** and ''wildlife dependent recreational use'' mean a use of a refuge involving hunting, fishing, wildlife observation and photography, or environmental education and interpretation. (emphasis added)

★ The NWRSAA neither describes or authorizes any other public use, not roads nor any other construct serving only humans. **The EIR discussion of alternatives needs to list the Loop Road proposal as having been considered and rejected.**

[9] City of East Palo Alto, Ravenswood Business District Specific Plan 2013, p.78, Goal TRA-4 and related policies : https://www.cityofepa.org/sites/default/files/fileattachments/community_amp_economic_development/page/9021/final_spec_plan_feb_2013.pdf

Levee Alignment and Potential Marsh Enhancement North of Bay Road in East Palo Alto.

The East Palo Alto shoreline has a nature-based SLR asset that is unique among Bay cities: its entire length features thriving tidal marshes. An objective then is to protect by avoidance and, where needed, enhance existing marshes to be paired with inboard levees. Here is a place where SLR adaptation needs no manmade introduction, just encouragement and protection. If there is any location with the possibility of inland marsh migration, it should be considered as well.

Alignment Alternatives.

The Project, in NOP Figure 1, presents **two alternative alignments**, one following the existing Bay Trail berm as it cuts through marsh as a border of the Ravenswood Open Space Preserve (ROSP). The other sits on high ground adjoining edges of Eastern Slough and the marsh edge. The first would require substantial fill in wetlands in order to build a stable levee and presents engineering challenges to avoid interference with the flow of Eastern Slough, risking long-term impact on the hydrology of the inner marsh area. It was reassuring to hear (Tess Byler, personal communication with Eileen McLaughlin) that the SFCJPA had told the Bay Integrated Restoration Regulatory Team (BIRRT) that the Project would put no fill in the Bay. If that is the Project's intent and as fill and construction disruption would have significant impacts to wildlife, habitat and hydrology, then in the EIR **the Bay Trail alternative should be rejected and excluded from consideration even as a program-level option in the EIR.**

We recommend that the Project retain the high ground levee alternative with EIR consideration with discussion of the reasons for doing so. As this alignment appears to avoid Bay fill, it simultaneously preserves the deepest, most flood protective reach of tidal marsh on the East Palo Alto shoreline. The EIR should analyze issues and impacts including Project right-of-way on privately-owned lands, realignment of the Bay Trail and presence of hazardous materials. The land nearest Bay Road is well documented as an EPA Superfund site (aka Romic site) and the existing auto salvage business is both a levee obstacle and hazardous waste concern. Infinity Salvage has been in business at this site for decades and, to public knowledge, has never had its soils tested for hydrocarbon and other hazards that may have accumulated, possibly seeping beyond its boundary including toward Eastern Slough. The high ground alignment would also need to use land that the 2013 RBDSP set aside for a possible "Loop Road." At this time and from our participation in RBDSP Update planning, there is no indication that East Palo Alto will build that road.

Marsh and Slough Enhancement



There is an **opportunity for the Project to provide marsh enhancement** that may improve existing nature-based tidal marsh protection. Near the unused rail corridor, a narrow reach of the Eastern Slough and marsh extend inland from the slough's northern mouth. The slough continues, completing the Eastern Slough that wraps around the Ravenswood Open Space Preserve. The marsh continues inland becoming an "inner" marsh largely isolated between the Bay Trail berm in the ROSP and developed lands. Hydrologically, it is fed by the Eastern Slough. These peripheral marshes have been described as low quality, an indication that it is an ecologically inefficient location, commonly caused by the action of humans. In this case a hydrological factor is a berm that extends out from the railroad ROW, narrowing the northern mouth of the slough and thereby restricting tidal flow.

★ Given that increasing the depth of marsh (distance from mudflat edge to shore) also increases its SLR and sea surge protection, it is in the best interest of East Palo Alto to use the opportunity to enhance this slough and marsh and improve protection of the North of Bay Road Shoreline.

South of Bay Road - East Palo Alto (Project Level EIR)

This project-level segment of levee and its alignment would provide direct flood protection for a community composed largely of single-family homes and a business district that has proposals for very substantial office and retail development. The Bay Trail separates these developed sites from broad expanses of healthy tidal marsh lining this shore of the San Francisco Bay and home to the endangered Ridgway's rail. Mostly conserved as part of the Don Edwards Refuge, the marshes are a cost-free sea surge mitigation asset to the East Palo Alto community and a carbon sink. But, with SLR, the marshes need to be paired with a substantial levee. This segment of the proposed levee borders Laumeister and Faber Marshes Most of the Laumeister and Faber Marshes are conserved wetlands held as part of the Don Edwards National Wildlife Refuge, while a band along the Bay Trail edge is privately owned. Regardless of jurisdiction, these

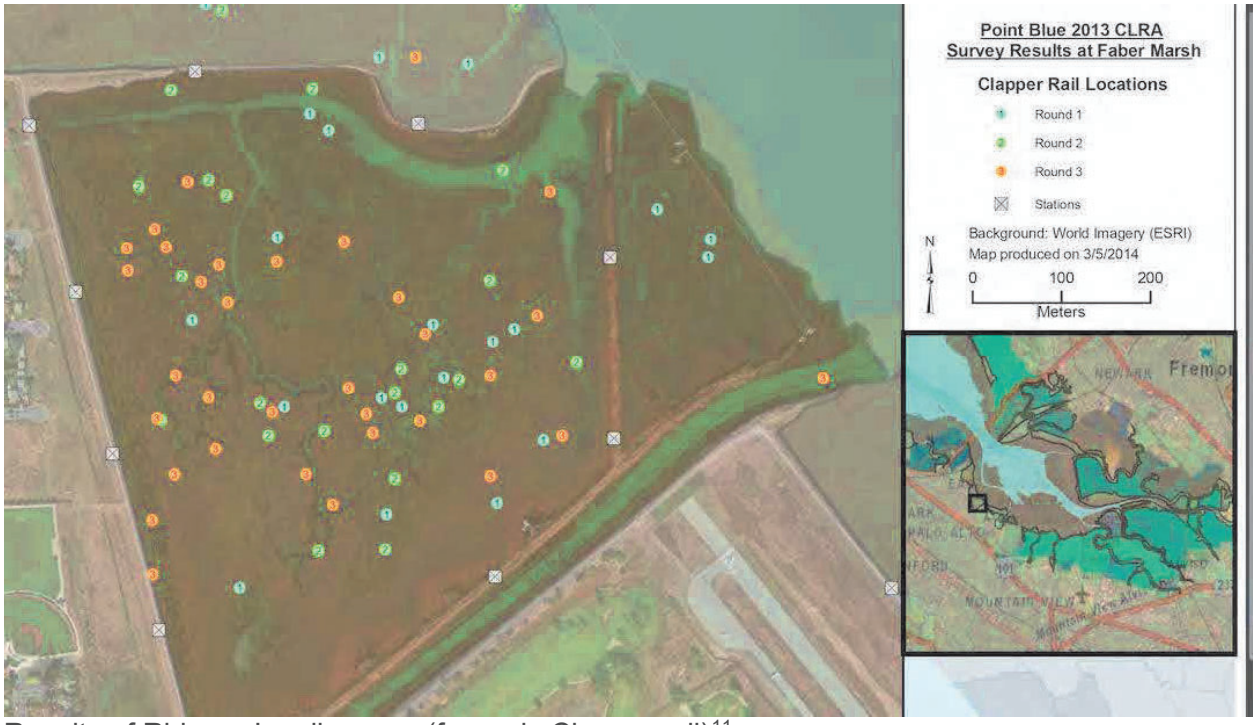
wetlands provide existing, nature-based sea level rise protective function that mitigates sea surges and potentially allows for lower levee height.

The NOP displays two options for the Levee South of Bay Road (LSBR) on pages 20-21. Because of varied inland constraints on the one side and the potential for sea surge on the outboard side both privately-held and Refuge wetlands, the EIR needs to:

- Provide a comprehensive discussion of potential levee types, varied by location and relationship to exposure to wave dynamics, rising seas and utilization of existing marshes as nature-based SLR adaptation or situations that offer potential to enhance or establish nature-based wave mitigation.
- Include examples of levees requiring a narrower footprint on the Bay side, for example where it is sufficient that vegetated slope starts midway on a sea wall.
- Analyze how the presence and extent of marsh may or may not mitigate the wave-reflective impact of a flood wall, inclusive of shoreline erosion potential. If such a wall is needed, discuss how impacts will be mitigated.
- As the Project designs predict settlement of the levee, the EIR should discuss and identify locations where settlement and instability may produce maintenance issues.
- Provide levee information in graphics and charts to allow local residents or business owners to know what type of levee they will be seeing day to day and how it might change their neighborhood. Please see charts on following pages that may be examples of their function as an information tool.

A critically important Project objective should be to preserve the habitat that exist as part of the flood protection solution. Endangered Ridgway's rail and salt marsh harvest mice use the marshes and it is expected that California black rail and salt marsh wandering shrew are present.[10] The following figure shows the result of a Ridgway's rail survey in Faber Marsh that provides a sense of the importance of this habitat to wildlife, as well as the broad extent for natural productivity and carbon sequestration.

[10] The EIR should conduct an up-to-date search of relevant material including the previously cited Refuge Comprehensive Conservation Plan and rail studies of the Point Blue Conservation Center.



Results of Ridgway's rail survey (formerly Clapper rail)[11]

Laumeister Marsh is a prehistoric remnant marsh.[12] The marsh was included in a USGS study of marsh accretion. The study, completed before current SLR revisions, concludes: "The Laumeister is primarily composed of high-marsh vegetation, and low marsh is dominated with Spartina. Model results showed that high accretion rates, due, in part, to high suspended-sediment concentrations in south San Francisco Bay, would sustain high-marsh habitat through 2060 (0.57 m SLR). Once the rate of sea-level rise increased in the second half of the century, Laumeister would begin to lose relative elevation and transition to predominantly mid-marsh habitat by 2080 (0.85 m SLR). By 2100, Laumeister would transition predominantly to low-marsh habitat (1.23 m SLR)."[13] There is a possibility that sediment supply will increase during the coming decades which would assist the marshes in keeping up with the more recent SLR forecasts.[14] Lastly, over a 50-100 year horizon, there will be other options to consider to protect these valuable marshes whether it be offshore reefs, refugia or sediment addition to increase elevations to prevent degradation and loss.[15]

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[11]https://www.waterboards.ca.gov/rwqcb2/water_issues/hot_topics/SFCP/Technical_%20Doc/Faber%20Marsh%20clapper%20rail%20Survey%202013.pdf

[12] Palaima, A. (Ed.). (2012). Ecology, conservation, and restoration of tidal marshes: The San Francisco estuary. Univ of California Press.

[13] Thorne, Karen M., et al. *Final report for sea-level rise response modeling for San Francisco Bay estuary tidal marshes*. Ed. John Yutaka Takekawa. US Department of the Interior, US Geological Survey, 2013

[14] Stern, M. A., Flint, L. E., Flint, A. L., Knowles, N., & Wright, S. A. (2020). The future of sediment transport and streamflow under a changing climate and the implications for long-term resilience of the San Francisco Bay-Delta. Water Resources Research, 56(9), e2019WR026245.

[15] Thorne, K. M., Freeman, C. M., Rosencranz, J. A., Ganju, N. K., & Guntenspergen, G. R. (2019). Thin-layer sediment addition to an existing salt marsh to combat sea-level rise and improve endangered species habitat in California, USA. Ecological Engineering, 136, 197-208.

Because of the importance of this habitat and its relatively good position in relation to future accretion, there should be no or an absolute minimum of bay fill in the Levee South of Bay Road. The NOP raises a concern that extending the levee into the Bay is still considered as an option for this segment: "Preliminary options to be considered for evaluation in the EIR include other Project alignment and design options identified in the Feasibility Report."[16] Of particular concern is the old Option 2 which "consists of a new levee built on the Bay side of the existing levee." [17]

- ★ **An option to "build on the Bay side of the existing levee" for the Laumeister and Faber sections should be listed as considered and rejected and not receive further analysis.**

Tables showing alternative levee options for the Levee South of Bay Road

Just as charts were useful for our analysis, charts on this page and the next might be useful in presenting levee information in the EIR. The NOP provides two recommended Project options for this reach which appear to be consistent with the objective to protect wetland habitat. The two cross sections shown for the Project begin construction at the edge of the current Bay Trail and preserve the existing roughly 3 to 1 slope to the wetlands below on the bayside. The options are provided on Pages 20 and 21 of the NOP.

The following table provides a summary of the dimensions of these options which can then be compared to the available space. Measurements are in feet.

Options	Integrated Flood Wall, feet, P. 20	Trail on levee top, No flood wall, feet, P. 21
Elevation of levee top	18.2	18.2
Elevation of Bay Trail	15.7	18.2
Elevation of inland property	8	8
Trail width	10	20
Transition zone horizontal dimension: minimum	20	20
Transition zone horizontal dimension: maximum	49	49
Overall distance from Bay edge of current trail to existing inland ground: minimum	58	73

[16] SAFER_Notice+of+Preparation.Rev_6May2022+(1).pdf, Page 8

[17] Public Draft Feasibility Report, SAFER Bay Project, Strategy to Advance Flood protection, Ecosystems and Recreation along San Francisco Bay East Palo Alto and Menlo Park {2016), San Francisquito Creek Joint Powers Authority

Overall distance from Bay edge of current trail to existing inland ground: maximum	87	101

We considered how well these designs would fit available space. Using Google Earth's ruler, we estimated distances from the outer edge of the current trail to a constraining feature. Starting at the south end of the Trail and working north, the space between the current trail edge and constraining features diminishes. Initially, there appears to be room for the trail-on-top levee at the south, and farther north conditions are likely to require the Flood Wall option. There are exceptions where none of the designs fit and other options should be considered.

Distance – current trail edge to inner ground at points moving south to north	**Estimated Feet available**
At O'Connor Pump bayshore flood pond	92
At MLK Park to drainage trend ditch line	80
At Beech street to drainage ditch	79
At Cypress Street to drainage trend ditch line *	66
At Garden street	60
North of Garden St. the drainage ditch is rerouted closer to bay	37
At the end of Runnymede things are complex:	
To drainage south of Runnymede	69
At bend closest approach to drainage	21
At bend closest approach to lot	34
North of bend along houses closest to trail	23 to 28
Along Rhône-Poulenc site in RBD	8
At the closest distance to Bay Road PGE Station	32

*The ditch trend line is the prevailing course. At the access overpasses, one of the "bridge" culverts is closer to the Bay. The assumption here is that those narrower spots can be addressed by replacing the access paths with ones that ramp up to the higher levee.

Exceptions to the Project options:

A walking tour of the South of Bay Road segment with an eye on planning for the Ravenswood Business District identified a variety of conditions and infrastructure that may require specialized levee adaptation such as: right of way on private property and on high ground, the bend and narrow point in the Bay Trail near Runnymede, stormwater outflows, drainage ditches that parallel the alignment, the O'Connor Pump House, public access at multiple locations, previously unknown locations of contaminated soil and power towers.

The EIR needs to discuss how the Project will resolve each of these situations (and others perhaps) and what impacts are incurred and how they will be mitigated.



Impact Analysis of the Levee South of Bay Road

In this section we refer to additional direct, indirect and cumulative impacts of the Project that must be considered in the SAFER EIR.

The intent of the Project options described for South of Bay Road on pages 20 and 21 is to preserve the existing refugia slope from the edge of the current trail to the wetlands. For any exceptions that require Bay fill the EIR must describe and evaluate every feasible flood protection design to avoid fill.
If mitigation is required for any levee impacts in this segment, the EIR must consider and select enhancement options within or for Laumeister and Faber Marshes.

Some construction impact seems unavoidable to the transition/refugia slope and adjacent wetlands. The EIR must describe those impacts and recommend mitigation on site. For example, if there are impacts to the existing transition zone, it may be possible to do invasive plant control there and add native perennials while creating the transition slope.[CH1]

The EIR must consider options, such as the ones described above, to fit a SAFER levee into a smaller horizontal space when necessary to avoid wetland fill.

No matter which of the bayside slopes is designed there may be the potential for additional transition habitat to be created along the higher levee. The DEIR should identify and provide details regarding the success criteria that will be utilized for the project, describe what ongoing resource management is required and how it will be funded.

The EIR must consider the direct and indirect cumulative effects of the proposed developments in East Palo Alto and interactive effects between those and the SAFER Projects. Examples of some of the possible effects are settlement, groundwater distribution, stormwater distribution and pumping, night lighting, increase in human impacts and litter on the bay habitats. The EIR should provide a description of mitigation measures that will be implemented at each segment that will address impacts to biological and hydrological resources, hazards, etc.

Describe the effects of improved Bay Trail facilities and access on increasing human use and impacts. Describe ongoing litter control and removal programs required to mitigate the effects. Describe how to human disturbance to wetland habitat and wildlife will be addressed. Define who will be responsible for monitoring and addressing issues that might arise.

The SAFER Project must obtain agreements with local jurisdictions to prohibit night lighting and light trespass on the levee, Bay Trail and bay habitats. [CH2]

The EIR must consider how the inner side of the levee and new overpass access ramps can help preserve the drainage ditch and stormwater capacity and its usefulness for fresh to brackish water habitat.

Not only is Nature of service to humans for flood control, but Nature must be preserved for its inherent values. The EIR must provide integrated assessment, consideration and planning for the wetlands and bay habitats adjacent to the SAFER levee in this segment and that will involve partnership with the USFWS and agreements when necessary.

The EIR must describe the special value and nature of prehistoric, never-diked wetlands such as Laumeister Marsh, and precautions that are appropriate to preserve those areas.

HYDROLOGY AND WATER QUALITY

For the SAFER Project, a number of water-related issues need to be considered for analysis in the EIR.

<u>Tidal channel and Erosion impacts of the Proposed levees</u>

The Project proposes to construct levees, floodwalls and some structures that may combine characteristics of each and do so along ~7 miles of shoreline. Some may have earthen slopes of varied height and length. Each of those structures may have local or wave-reflective impacts. Varying by levee type, high water events and location, impacts of each variation need to be analyzed and impacts mitigated, if possible. Analysis must be completed for:

- Tidal Channels (3:1 slope levee)(Ravenswood Slough, Eastern Slough, site-specific small sloughs):
    - Potential impacts of wave reflection on opposite earthen banks
    - Potential marsh erosion at the base of floodwalls following high-water wave action or storm surge
    - For a levee extending into a channel, potential alteration of channel flow with possible increased erosive action on the far bank
- Flood walls (vertical structures)
    - Wave force reflection when directly facing the incoming waves
    - Wave force reflection at a 90 degree angle to incoming waves
    - Erosion impacts of soils at base of floodwall, direct or angled

- Major storm events or series of moderate storm events

  SLR levees are designed to keep water out while storm events can produce significant ponding particularly on impervious surfaces and/or saturated soils. It is also true that SFCJPA is not responsible for each city's stormwater system. Nonetheless in a sudden, major storm event, water can accumulate rapidly inboard of a levee wall. The EIR must analyze, by location, vulnerability issues and how they could be mitigated.

- In East Palo Alto consider conditions described in a LAFCO Municipal Services Report. Its recent study[18] of the EPA Sanitary District included assessments of all City Services including **Stormwater** Services. Those findings identified several vulnerabilities that could impact inboard flooding, The report noted that currently 56% of the City is designated at elevated risk of flooding from any source.

  An area of concern is storm drain deficiencies. The MSR discussion describes the entire stormwater system. The city-wide system of drainpipes includes some 430 nodes (manholes, inlets, similar). Of those, modeled analysis identified 68 nodes where some level of flooding could be expected. Among those, 33 would be locations of flooding of one foot or more.

  In the EIR, analysis should identify impacted nodes in the vicinity the levee and plan mitigation comparable to risks such as the depth of potential flooding

Climate Challenge: Water above and below ground

As the SFCJPA is well aware and associated with climate change, meteorological shifts have already changed the local climate: extended periods of drought and less frequent but intense, major storms or sequential storms such as last October's atmospheric river. Such storms test local stormwater systems

[18] LAFCo Municipal Service Report, East Palo Alto Sewer District: p. 74

and, by infiltration, sewer systems and produce surface ponding and localized flooding. Steadily, over the decades of development envisioned on the EPA and Menlo Park shorelines, rising groundwater (subsurface aquifers) will exacerbate the problem. At the program-level the EIR needs to set a framework for development actions that can adapt and survive these climate changes and to preserve the effectiveness of the levee system planned.

- ★ The EIR needs to assess: How might rising groundwater affect the stability and structural integrity.of a levee?

An important reference to consult is a report prepared by the San Francisco Estuary Institute for the City of Sunnyvale: Sea-level rise impacts on shallow groundwater in Moffett Park.[19] This report is specific to findings in Moffett Park but its analysis is useful, discussing potential impacts and adaptation action for development. Notably its sources for groundwater data are from existing well databases, not involving any physical hydrologic study. SFEI has consulted with many entities and could help the SFCJPA assess this ~7 mile shoreline project.

As food for thought, here is the list of potential rising groundwater impacts compiled in the SFEI report:

- Corrosion. Salinity impacting below ground infrastructure
- Buoyancy. Buoyant force impact on foundations, buried utilities and pipes, roads
- Seepage. Seepage into subsurface structures, floors, walls
- Infiltration: Infiltration into stormwater and sewage pipelines reducing capacity
- Liquefaction: Higher water tables increase liquefaction risk
- Damage to vegetation: Saturated soils and/or higher salinity can impact plants
- Contaminant mobilization: Movement in existing remediation or of unidentified contaminants
- Emergence flooding. Site-dependent; even non-emergent levels can exacerbate surface flooding

Notably, sitting on an alluvial fan that is already a threat for liquefaction, the question is: will rising groundwater make it worse?

Biological Resources

For CCCR, this topic is usually central to our comments. We have mentioned concern about issues impacting wildlife, habitat and wetlands throughout this letter. One recommendation that we made in earlier discussion was the recommendation to have a qualified biologist perform a Biological Resource Assessment (BRA). BRAs are required by Menlo Park which has a detailed description of BRA actions. We hope the Project agrees that it would make good sense to use that analysis tool for the entire Project and for identification of the Project's Biological impacts and mitigations.

We also refer the Project to the attached Memorandum provided to CCCR by Dr. Peter Baye. His expertise as a coastal wetlands scientist is invaluable as a resource in planning for EIR analysis.

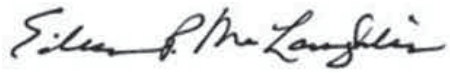
[19] SFEI et al, Sea-level rise impacts on shallow groundwater in Moffett Park, November 2021; https://static1.squarespace.com/static/5e38a3dd6f9db304821e8e5e/t/61a7b37743ec4b770e11ee73/1638380421678/Moffett+Park+Specific+Plan+Groundwater+Addendum.pdf

We appreciate the opportunity to offer the comments included here and we look forward to the release of that Draft Project Description.

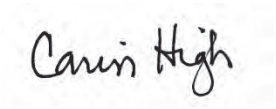
Yours truly,



Gail Raabe
Co-Chair
Citizens Committee to Complete the Refuge



Eileen McLaughlin
Board Member
Citizens Committee to Complete the Refuge



Carin High
Co-Chair
Citizens Committee to Complete the Refuge



Rick Johnson
Wetlands Advocate
Citizens Committee to Complete the Refuge

ATTACHMENT: Exhibit #1 Memorandum of Peter Baye, Ph.D, Coastal Ecologist

CC: Matt Brown, SF Bay National Wildlife Refuge Complex
Dave Halsing, SCC, Executive Mgr, SBSPRP

Exhibit #1



Peter R. Baye, Ph.D.
Coastal Ecologist, Botanist
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MEMORANDUM

To: Citizen's Committee to Complete the Refuge, Palo Alto
Date: June 14, 2022
SUBJECT: San Francisquito Creek Joint Powers Authority SFCJPA Notice of Preparation (CEQA): Strategy to Advance Flood Protection, Ecosystems and Recreation along San Francisco Bay Project Environmental Impact Report considerations

Executive summary:

- **Bayland landscape settings** (non-tidal baylands, uplands, high tide line position, and tidal marsh) should provide a framework for design and impact assessment. All plan view figures showing alignment of levee and transition zone habitat designs, and impact analysis should be clearly framed in relation to their position within bayland landscape (landform and habitat) settings. Drawings and designs should clearly display the degree to which new levees and constructed transition zone (ecotone) slopes are set back landward of the high tide line, or encroach into existing tidal marsh.

- **Substrate specifications** used to construct habitat transition zones, especially the root zone (upper soil profile) are essential for assessment of project feasibility and environmental effects. They are as essential to project description as elevations.

- **Phasing for incremental construction of habitat transition zones over time, in pace with sea level rise**. Just as the NOP indicates the potential need to phase construction for logistical project needs, environmental impact minimization needs also justify evaluation of alternatives that include incremental "thin-layer" lifts of sediment for gradual construction of habitat transition zones, within the range of (non-destructive) burial tolerance of transition zone vegetation.

- **High tide refuge design and assessment should include the entire tidal marsh-upland gradient, not just the high tide line**. We support the NOP to assess the entire distribution of high tide refuge habitat across the tidal marsh landscape, and plan for long-term integrated co-management of high tide refuge habitat both within constructed transition zones, and in the related tidal salt marsh platform.

In addition, we recommend explicit focus on project impacts on non-native plant species invasions (spread of wildland upland and wetland weeds), and mitigation measures based

on integrated weed management during all project stages, including pre-construction management and imported fill selection, stockpiling, and handling.

Recreational trail alignments and vegetation designs should be integrated to minimize behavioral impacts of trail uses on wildlife in tidal marshes and transition zones.

Memorandum to Citizens Committee to Complete the Refuge:

1. As requested, I have reviewed the SFCJPA Notice of Preparation for the flood protection/ecosystem/recreation project in the South Bay, and I am providing CCCR with some recommendations for EIR preparation to support meaningful, adequate environmental assessment of this complex project and environmental setting, over a project life of about a century.

2. Programmatic environmental assessment considerations

2.1. Location-dependent and setting-dependent environmental assessment. The Project proposes to "increase the diversity of habitat by building tidal salt marsh-upland transition zone habitat (transition zone habitat) on the bayward slope of appropriate segments of levee adjacent to existing and/or restored tidal salt marsh." This general description does not distinguish the fundamental design and impact context of whether levee features are built landward or bayward of the existing high tide line, in tidal wetland gradients. Impacts and ecological performance of levees, horizontal levees, habitat transition zones, etc. are more dependent on location and the context of environmental setting than they are on their dimensions and slopes. The impacts of constructing new levees or habitat transition zones are not all inherent in design features. They depend on the surrounding habitats and physical geography, and their positions within the land-shore gradient. Position and siting of levee features within the land-shore gradient include major contrasting differences in *bayland landscape settings* such as:

- Construction of habitat transition fill slopes (zones) in non-tidal baylands restored to tidal hydrology ("blank slate" bayland setting; no fill encroachment or truncation of existing tidal marsh);
- Set-back of constructed habitat transition fill slopes landward of or up to the existing high tide line adjacent to existing tidal marshes, where landward retreat spaces may be feasible (no fill encroachment or truncation of existing tidal marsh; e.g. Palo Alto Horizontal Levee pilot project);
- Potential encroachment of habitat transition fill slopes, or levees, into existing tidal marshes; distinguish fill encroachment into narrow fringing tidal marshes and wide tidal marsh platforms with creek networks.

These distinct bayland landscape settings, considering both land-side and bay-side constraints and environmental sensitivities, are particularly important for assessing whether a "typical" cross-section design may be likely to provide net habitat resilience and enhancement during sea level rise, or whether it would risk excessive near-term encroachment and truncation of

shrinking tidal marsh habitats, which undergo both submergence from sea level rise, and bay-edge erosion. The EIR should introduce and organize discussion of impact assessments and project designs in explicit context of bayland landscape settings like these. Figure 1 of the NOP (project location and components) does not represent bayland landscape settings or levee alignments across them. Corresponding plan view figures in the EIR should make levee alignments and positions plain, in relation to tidal marsh and high tide line positions. Otherwise, programmatic environmental assessment of typical project designs would almost certainly result in confusing or misleading general conclusions. The more reach-specific (shoreline segment-specific) programmatic environmental assessments of designs are, the more likely they are to provide a basis for clear understanding of near-term and long-term potential impacts, and support meaningful, specific comments.

2.2. Substrate-dependent and hydrology-dependent ecological performance. Substrate types, sources, and specifications for levees, habitat transition zones, or horizontal levees are not discussed in the NOP. The massive size of the project, even if constructed over long periods of time, would require commensurate massive volumes of imported fill. Substrate characteristics affecting vegetation composition (such as porosity, bulk density, percentage clay, percentage sand, percentage gravel or rock fragments, weed seed bank density and composition) or vegetation dynamics (drought impacts) depend on both fill source constraints, and on substrate design specifications. Vegetation composition, structure, and dynamics shaped by substrate, in turn, shapes habitat functions. The habitat functions of representative or typical conceptual levee cross-section designs (figures 2-8, NOP) cannot be predicted or meaningfully interpreted without reference to substrate attributes and sources. Upland subsoils, bay sediments, and terrestrial alluvial sediments have highly significant persistent differences as substrates for vegetation of levees and habitat transition zones. These differences are inherent, and generally cannot be modified feasibly by amendments or vegetation management.

For example, the substrate properties influence the height and density of vegetation cover bordering public trails. This is an important variable for screening wildlife visual cues, and limiting human disturbance, or entry of habitat areas by people or off-leash dogs. Some mitigation measures may depend on vegetation “buffer zones” along trails that restrict access. Those functions would depend on substrate conditions that enable design vegetation to perform them.

Substrate that restricts root development or amplifies dieback, injury or growth inhibition effects of drought, may cause a target vegetation to convert to either weed-dominated vegetation, or more sparse, open non-target vegetation types, or cause excessive need for maintenance beyond the capacity of managers (which is often the case on constructed levees).

Substrate is particularly important for assessment of potential failure to meet ecological objective (or mitigation requirements) for marsh wildlife high tide refuge habitat at or above the high tide line. Substrates that inhibit growth or survivorship of tall, dense vegetation cover during and after droughts, or promote competition of weeds over target vegetation, may negate basic project goals. Substrate specifications are essential to assessment of terrestrial ecotone high tide refuge habitat.

The EIR should clarify substrate and hydrology assumptions for location-specific levee designs, distinguishing between "dry" (winter-moist, summer-dry), well-drained habitat transition zones, and constructed sub-irrigated slope wetlands, like the Oro Loma and Palo Alto horizontal levee demonstration projects. The ecological and hydrological functions and habitat structure of wetland horizontal levees are qualitatively different from those of "dry" habitat transition zones, and their potential ecological interactions with contiguous tidal marsh are also significantly different.

The EIR should therefore either state assumptions for substrate used to construct "topsoil" and subsoil root zones, or include concept-level specifications for them, and assess the performance of vegetation and habitat related to substrate. The EIR should distinguish the substrate and hydrology of wetland horizontal levees, and their effects on vegetation and habitat structure on the slope and in the adjacent tidal marsh (brackish marsh gradients) if they may be included in the project.

3.0 Resource-specific environmental impact and design considerations

3.1 Sea level design criteria and programmatic evaluation of phased construction. The project adopts Ocean Protection Council (OPC) guidance to plan resilience for 3.5 feet of sea level "additional 3.5 feet of tidal elevation to account for anticipated sea level rise as well as other applicable FEMA design criteria…". The NOP also states [p. 5] "In some cases, levees might be constructed and raised in stages given the long-term impacts of sea level rise and budget limitations… precise routes within some reaches have not been finalized and could depend on funding, land acquisition…." Similarly, the EIR should consider alternatives and mitigation measures that include levee or habitat transition zones also raised in stages or increments to distribute and dissipate habitat impacts over decades, minimize near-term wetland fill impacts, in closer pace with sea level rise rather than a full century ahead of it. If all project alternatives have criteria set for flood control levees to meet 3.5 feet of sea level rise (including extreme sea level events), single construction levee projects would have to place fill all at once for a century of sea level rise. Where levee/habitat transition zone fills may encroach tidal marsh, this impact may have non-linear impacts on marsh habitats, as tidal drainage networks and wildlife home ranges become reconfigured by bayward habitat transition zone fills, including uplands that may not be reached by the high tide line for decades.

For example, "thin lift" sediment lifts in tidal marshes (generally 15-20 cm or less, depending on vegetation type and sediment burial tolerance) are designed to allow rapid direct vegetative recovery of buried vegetation, more than new colonization of bare substrate. A similar method of thin-layer "construction" should be evaluated for incremental construction of lower habitat transition zones if they encroach on existing tidal salt marsh (e.g., sediment fans deposited by hydraulic slurry placement, or mechanically placed unconsolidated muds washed into fans by high pressure hoses). If all levee and habitat transition zone construction is restricted to upland (landward of high tide line) sites, this measure may not be needed for initial project construction, but it may be considered as a maintenance or adaptive management measure to keep pace with higher-than expected rates of sea level rise, with reduced impact.

3.2 High tide refuge habitat analysis within and landward of tidal marsh platforms. The NOP states [p. 5] "An assessment of high tide refugial habitat functions in the face of sea level rise will be performed in existing high-quality marshes. This assessment will be utilized in collaboration with resource agencies to determine if and where the project would propose construction of transition zone or other types of high tide refugial habitats in existing high-quality marshes." This is very appropriate and necessary for environmental assessment. The EIR should not presume that all or most important high tide refuge habitat either is or should be along the landward edge (high tide line) of tidal marsh habitats in all settings. Well-distributed high tide refuge habitats occur within home ranges of salt marsh wildlife species, especially in tall vegetation canopies along well-drained tidal creek banks, as well as at landward edges of marshes, where terrestrial predator risks may offset some of their benefits. The EIR should consider active management of internal marsh high tide refuge habitats as potential mitigation for short-term and long-term impacts of levee construction, to enhance resilience of cross-shore high tide refuge habitats (landward-edge and interior refuge habitats interacting at different tide levels. The EIR should not conflate marsh substrate elevations with the actual high tide refuge cover (leafy vegetation canopy height above marsh substrate and water surface elevations during marsh submergence).

3.3. Tidal Marsh-Upland Transition Zone Habitat. The EIR should distinguish highly contrasting types of "transition zones", "horizontal levees" that are suitable habitats for target species which are not compatible in the same vegetation types and locations. For example, the NOP identifies high tide refuge habitat for salt marsh harvest mouse and California Ridgway's rail in constructed broad, gently sloped tidal marsh-upland transition zones or "horizontal levees", and also rare plants like California sea-blite (note spelling; not "blight", meaning disease) and salt marsh bird's-beak. While mouse and rail high tide refuge habitats share the same basic requirement for tall, dense patches of vegetation above highest tide elevations, this habitat is entirely incompatible with the vegetation and substrate conditions for salt marsh bird's-beak and California sea-blite, which in turn occupy different high marsh substrate and vegetation types (sparse, short turfy salt marsh and pan edges, and coarse, well-drained estuarine beach or high marsh berms, respectively). The EIR planning to accommodate these contrasting species within the project area (and snowy plovers as well) requires geographic demarcation of designed bayland landscape settings.

The EIR should clarify and define explicit working definitions and criteria (including slopes, substrates, hydrology, vegetation types) for all project-defining terms like "horizontal levee", "habitat transition zone", "ecotone levee", noting both synonyms and relevant distinctions. Over-broad use of the same terms like "horizontal levee" for slopes as steep as 6:1 or dryland vegetation, and tule-covered wetland slopes as flat as 20:1 can be confusing and misleading, and preclude clear understanding of important attributes like buffer zones, wildlife screening, and high tide refuge habitat distribution.

3.4. Western Snowy Plover Breeding Habitat Enhancement and bayland landscape setting. The NOP states that there "has been a loss of the ecosystem services that tidal marsh habitat provides, including nesting and foraging habitat and upland refugia for threatened and

endangered species such as California Ridgeway's rail, western snowy plover, and salt marsh harvest mouse". Tidal marsh per se does not provide habitat for western snowy plover. Other tidal marsh-adjacent bayland habitats, including estuarine beaches and playa-like dry salt evaporation pond beds or similar unvegetated (or minimally vegetated) high-albedo habitats support western snowy plover habitats. The NOP correctly identifies pond R3 (not tidal marsh) as existing snowy plover habitat. The EIR should explain the long-term management planning status of pond R3 in the Refuge (managed salt pond versus tidal marsh) under 3.5 ft of sea level rise during the project design life. Tidal marsh transition zone features and amendments with Pacific oyster shell are not relevant to western snowy plovers; oyster shell habitat enhancement for snowy plovers requires a hypersaline or seasonally disturbed non-tidal or above-tide setting that restricts vegetation. The EIR should clarify that sustainable, feasible snowy plover habitat enhancement measures would be excluded in vegetated habitats like tidal marshes, and restricted to either salt pond, managed saline lagoon, or coarse (shell, sand, gravel) bay beach habitats.

3.5 Invasive plant species spread and management during and after construction. Disturbed soils during construction phases provide increased opportunities and vectors for dispersal and colonization of non-native invasive plant populations already established in tidal marsh edges and levees. Imported fill also brings a high risk of new invasive plant species colonization. The EIR should assess the existing range of invasive plants that are established on levees and high salt marsh habitats in the project area, the potential for increased spread and population size during and after construction, and adequate, feasible mitigation measures (an integrated weed management plan) based on early detection and management during and after staging, construction, and establishment phases.

3.6. Recreational trail alignments, designs, and mitigation measures. The EIR should consider opportunities to set back recreational trails as far as possible from the bayward slopes of levees or habitat transition zones, instead of designing them for full levee top (road) span. The bayward side of the levee top should be evaluated in the EIR designs as components of buffer zones that provide vegetative screening (knee-high or taller brushy or bristly native upland scrub vegetation; or dense, tall tule/bulrush vegetation on wetland horizontal levee slopes) to discourage people or dogs from establishing social trails to transition zone wildlife habitats. Recreational trail designs should also evaluate the feasibility of incorporating blinds to allow compatible wildlife viewing in sensitive areas where spur trails may cause excessive long-term wildlife disturbance. Wide transition zone habitats should be expected to become potential breeding habitats for terrestrial wildlife and some waterfowl, and movement corridors for terrestrial wildlife using tidal marshes; they would not be just a buffer zone or high tide refuge habitat for tidal marsh wildlife.

SIERRA CLUB
LOMA PRIETA CHAPTER

SIERRA CLUB
BAY ALIVE

June 15, 2022

Tess Byler, Senior Project Manager
San Francisquito Creek Joint Powers Authority
2100 Geng Road
Palo Alto, CA 94303
tbyler@sfcjpa.org

Dear Ms. Byler,

The Sierra Club's Loma Prieta Chapter and Bay Alive Campaign respectfully submit the following comments on the Notice of Preparation for the San Francisquito Creek Joint Powers Authority's (SVCJPA) Environmental Impact Report for the project titled *Strategy to Advance Flood Protection, Ecosystems and Recreation along San Francisco (SAFER) Bay.*

Our chapter has a deep interest in the San Francisco Bay and its ecosystems, as well as areas near the Bay where development may impact natural resources and climate resilience in the region. We recognize and support the importance of the SAFER Bay Project in providing flood protection for communities near the Bay as sea levels rise. However, we have concerns about some aspects of the proposed project that we hope to see addressed in the Draft Environmental Impact Report (DEIR). We also wish to reinforce and support the comments submitted by the South Bay Salt Pond Restoration Project on June 3, 2022 (attached). Our comments are listed below.

General Comments

Construction of a new levee with a 60-100 foot base including placement of a floodwall, increasing ground elevation to 16-17 feet (NAVD 88) and addition of minimum 3:1 (horizontal:vertical) slopes requires significant fill and, as a result, reduces wetland habitat throughout the area and negatively impacts wildlife. We acknowledge that this may be necessary in some areas to achieve the goals of the project. However, wherever possible, new levees should be located upland of existing wetlands, on land, to minimize Bay fill and the associated loss of wetland habitat and impact on wildlife. This is consistent with East Palo Alto's Ravenswood Business District Specific Plan Policy LU-9.4 that says in part:

“Rights-of-way for levees or other structures protecting inland areas from tidal flooding should be sufficiently wide on the upland side to allow for future levee widening to support additional levee height so that no fill for levee widening is placed in the Bay.”

The SAFER project plans show ponds as they exist today and do not reflect the future plans for ponds in the Don Edwards San Francisco Bay National Wildlife Refuge as described in South Bay Salt Pond Restoration Project’s multi-phase implementation plan. Existing plans for future pond operation in the Refuge must be reflected in the environmental impact analysis for the project. Similarly, we would like to see the DEIR include Meta’s Willow Village project and East Palo Alto’s Ravenswood Business District Specific Plan Update in a cumulative impact analysis.

Specific Comments

First, we urge you to drop construction of a roadway for vehicle traffic between SF2 ponds in the Don Edwards San Francisco Bay National Wildlife Refuge from the project alternatives to be considered in the DEIR. Use of the refuge as a roadway is in direct conflict with the purpose of the refuge which is to preserve and enhance wildlife habitat. A roadway would have a significant negative impact on wildlife using the SF2 ponds, both during construction and under normal use. It would also require additional Bay fill to be used between the SF2 ponds, resulting in a permanent loss of habitat potential.

We are similarly concerned about the extension of that roadway into East Palo Alto. In our May 16, 2022 scoping letter regarding East Palo Alto’s Ravenswood Business District Specific Plan Update (attached), we expressed significant concern about encroachment from new development and associated infrastructure constraining width and alignment options for the SAFER Levee and reducing flexibility for future heightening of the levee. We maintain that the best and highest use of the lands proposed for the Loop Road in East Palo Alto is a flood protection levee that can be raised over time to protect the University Village area.

Second, we are concerned about the location of the segment of the SAFER Levee between Ravenswood Slough and Hacker Way. The new higher levee should be located inland of the Ravenswood Slough toward Hacker Way. It is critical to site this new higher levee upland of the Ravenswood Slough toward Meta Headquarters parking area to minimize the loss of habitat and the impacts on wildlife.

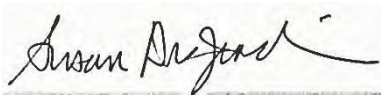
Third, we are concerned about the plans for the North of Bay Road segment of the SAFER Levee in that it includes only a floodwall, inboard of the Bay Trail, and no obvious plans to raise or relocate the Bay Trail. A new higher levee and Bay Trail should be constructed upland of wetlands on land similar to plans for the SAFER Levee segment South of Bay Road. Plans to assure the continued viability of this section of the Bay Trail should not be delayed as a future continuous Bay Trail should be a goal of the project.

Finally, we are concerned about construction impacts on sensitive Bay ecosystems in the project area. We recommend a baseline Biological Resource Assessment (BRA) be performed as part of the environmental analysis for this project and established as a standard methodology

for subsequent project level environmental review. BRAs should be undertaken for each reach and bio-niches within the reach. Please see page 4 of the attached May 16 Joint Scoping Letter to the City of East Palo Alto for a recommended BRA approach.

We appreciate the opportunity to participate in this project's development and request that you include alternatives in your environmental impact report that include no roadway between SF2 ponds, location of the SAFER levee segment north of Bay Road in East Palo Alto upland of any marshland and location of the SAFER levee segment around Meta Headquarters completely upland of the Ravenswood Slough.

Respectfully,



Susan DesJardin
Bay Alive Chair
Sierra Club Loma Prieta Chapter



Jennifer Chang Hetterly
Bay Alive Coordinator
Sierra Club Loma Prieta Chapter

Attachments:

- South Bay Salt Pond Restoration Project Comment letter, dated June 3, 2022
- Joint Scoping Comments to the City of East Palo Alto regarding the Ravenswood Business District Specific Plan Update, dated May 16, 2022

May 16, 2022

Amy Chen, Community Development Director
City of East Palo Alto, Planning Division
1960 Tate Street (Attn: RBD Project)
East Palo Alto, CA 94303
rbd@cityofepa.org

Dear Ms. Chen,

The Loma Prieta Chapter of the Sierra Club, the Citizens Committee to Complete the Refuge, Green Foothills, and Sequoia Audubon Society respectfully submit the following comments regarding the Notice of Preparation (NOP) for the Supplemental Environmental Impact Report (SEIR) for the Ravenswood Business District/4 Corners Transit-Oriented Development Specific Plan (RBDSP) Update.

Our organizations have a deep interest in the San Francisco Bay and its ecosystems, as well as areas near the Bay where development may impact natural resources and climate resilience in the region. We recognize the critical role that the RBDSP Update will play in shaping the future of East Palo Alto and its natural resources along the San Francisco Bay. We have participated in community meetings, engaged with local residents, community groups, and city staff/consultants, and commented to the Planning Commission and City Council throughout the planning process. Please see our full scoping comments below.

Project Description

We understand that this is a programmatic EIR and that environmental review for future projects will tier off of the SEIR. Nevertheless, it is known to the City that current development proposals (which together exceed this project's maximum office/R&D square footage) would shift new development away from the Bay Road core that was envisioned in and subject to environmental

review in the 2013 Specific Plan. Instead, these projects would concentrate the plan area's building intensity and height in areas adjacent to the wetlands, introducing substantial additional development and human impacts to sensitive habitat areas. This expected geographic shift and concentration of building intensity should be reflected in the project description and its impacts should be specifically evaluated in the SEIR.

We understand from the City's May 9, 2022 scoping meeting that mitigations adopted in the 2013 RBD/4 Corners Specific Plan FEIR will carry over and be supplemented with additional mitigation measures in the SEIR for this RBDSP Update. Please clearly identify in the SEIR any mitigation measures that are intended to update or supersede mitigations adopted in the 2013 FEIR as well as which measures they supplant.

Alternatives

Please include and analyze an environmental alternative that incorporates a wetlands setback[1] to avoid or minimize development and use impacts on the Bay's ecology while also accommodating bayside wetland migration (nature based adaptation) and enabling the San Francisco Creek Joint Powers Authority's preference for a wide sea level rise levee that can be raised over time as sea level rise worsens. Such an alternative could include an alternative Plan configuration that retains proposed housing but reduces office density or directs development intensity away from the Bay.

Community workshops and city study sessions regarding the RBDSP Update indicated that the proposed loop road is both controversial and likely to produce mixed results at best for local traffic conditions. We encourage you to evaluate all alternatives both with, and without the loop road.

Cumulative Impacts

Please include these projects in the cumulative analysis: SAFER Bay project, Facebook's Willow Village and other proposed new biotech building(s) in Menlo Park's bayfront area, Dumbarton Corridor project.

ENVIRONMENTAL IMPACT ANALYSIS AND MITIGATION CATEGORIES

We note that the NoP omits several potential CEQA environmental analysis categories. Because (1) the proposed RBDSP Update could more than double the allowed office/R&D/Lab square footage in the Plan area, (2) the City can reasonably anticipate concentration of that development along the shoreline, and (3) the allowed intensity and height may change for some

[1] A Wetlands Setback alternative establishing a 300-foot setback for new development was analyzed in the 2013 Specific Plan DEIR and judged to be "the next most environmentally superior alternative after the No Project Alternative." The Wetlands Setback was the recommended alternative coming out the 2013 DEIR. 2013 Draft Environmental Impact Report for the City of Palo Alto Ravenswood/4 Corners TOD Specific Plan, p. 5-30.

land use designations, we encourage you additionally to evaluate impacts in these areas: Aesthetics, Land Use and Planning, Population and Housing, Public Services, and Recreation through the SEIR.

AESTHETICS

Given the substantial increase in development potential and anticipated shift of development intensity within the plan area from Bay Road to bayfront, Aesthetics should be included in the SEIR scope of analysis, providing guidance to developers, perhaps with modeled building heights, of acceptable limits for development. The SEIR should carefully identify scenic resources, including open views of the Bay and foothills in the East Bay, sunrise over the bay, baylands, mature vegetation, and historic resources that may be affected, and should identify those resources that are likely to be impacted by the anticipated development program. Specific standards for building bulk and maximum building widths should be identified to preserve community viewsheds and avoid or minimize potential impacts of tall buildings, such as shadowing from buildings, glare from morning sun reflected onto the bay from glazing, and wind tunnels around tall buildings.

AIR QUALITY/GREENHOUSE GAS EMISSIONS

A detailed study of the impact of construction is needed. Construction activities and construction equipment will have an ongoing impact on air emissions, noise, and vibration. The SEIR should provide a quantitative analysis of air emissions and noise/vibration attributable to construction (including the use of heavy equipment, construction worker traffic, etc.), and provide appropriate standards and control measures for future projects under the Plan.

BIOLOGICAL RESOURCES

When it comes to shoreline locales around the Bay, East Palo Alto and the RBDSP shore are indeed rich. The bayland marshes spread out from the Dumbarton rail right of way, surround Cooley Landing and stretch eastward toward San Francisquito Creek. Its richness can be measured by multiple values: simple, restful pleasure in wild, open space; tidal habitat serving many wildlife species, some endangered; an established, vegetated tidal plain mitigating tidal surges; a carbon exchange engine equal to or perhaps better than rain forests and most of the wetlands are already protected at no cost to the City.

In sum, these wetlands are an ecological treasure for which East Palo Alto and the RBDSP must provide all appropriate care. We understand that the SEIR must perform a thorough review of the entire RBDSP area. Our comments here will focus on shoreline and near shoreline natural communities.

The SEIR should establish a Biological Resource Assessment standard for tiered projects.

For the SEIR, the Biological Resources analysis needs to reach beyond the CEQA checklist and regional databases to establish appropriate standards to be used by tiered projects. Please consider the Biological Resource Assessment (BRA) approach described below, as you develop standards for tiered project biological resource analysis.

> Biological Resource Assessment (BRA): For tiered projects, a baseline biological resource assessment must be performed and submitted by a qualified biologist for any site that may impact sensitive biological resources. Sensitive biological resources triggering the need for the baseline BRA shall include wetlands occurrences or suitable habitat for special-status species, sensitive natural communities, and important movement corridors for wildlife such as green corridors and shorelines.
>
> The BRA will assess natural habitats occurring on or adjacent to a project site including wetlands, mature trees, unused structures that could support species like swallows or special-status bats or other biological resources. The BRA will consider seasonality including nesting resources for migratory or locally resident birds.
>
> The baseline BRA shall provide a determination on whether any sensitive biological resources are present on or adjacent to the site, including jurisdictional wetlands and waters, essential habitat for special-status species, and sensitive natural communities. If jurisdictional wetlands and/or waters are suspected to be present on the site, a jurisdictional delineation confirmed by the U.S. Army Corps of Engineers (USACE) will be provided as part of the baseline BRA.
>
> The baseline BRA will also include consideration of existing conservation plans that apply to adjoining lands. For the RBDSP shoreline projects these include the Don Edwards National Wildlife Refuge (Refuge) Comprehensive Conservation Plan[2] and any similar plan the Midpeninsula Regional Open Space District (MPROSD) has for the Ravenswood Open Space Preserve. In such instances, the BRA will also include consultation with staff of the Refuge and of the MPROSD.
>
> The baseline BRA for any project along the shoreline, regardless of natural resource owner, will also consider the US Fish and Wildlife Service Tidal Marsh Recovery Plan[3] and relevant references of the South Bay Salt Pond Restoration Project.

The SEIR should perform a similar Biological Resource Assessment and identify both direct and indirect impacts using best available data.

In addition to establishing the BRA role for tiered projects, please employ similar standards for the SEIR analysis, especially for areas along the shoreline, and identify both direct and indirect impacts based on the full development potential proposed in the RBDSP Update. Conservation

[2] Don Edwards National Wildlife Refuge Comprehensive Conservation Plan 2012; https://permanent.fdlp.gov/gpo51796/index.htm

[3] US Fish and Wildlife Service Tidal Marsh Recovery Plan, 2013: https://ecos.fws.gov/docs/recovery_plan/TMRP/20130923_TMRP_Books_Signed_FINAL.pdf

managers for lands along the shoreline must be consulted as they have more relevant and complete data than any regional database, especially with regards to federally endangered species like Ridgway's rail and the salt marsh harvest mouse, both present along the RBDSP shoreline. The documents already mentioned should be used in SEIR analysis by qualified biologists. The SEIR must use the best available data in order to adequately update the RBDSP.

Impacts of Concern

Priority: For all impacts on wildlife and habitats the highest and best mitigation is avoidance.

Human Disturbance

Alternatives proposed in the NoP would produce exceptional increases in human density and activity near wetlands and other natural communities. The SEIR needs to analyze the biological impacts of such presence in regard to noise, litter, encroachment in habitats, dogs off leashes, food trucks, use of helium balloons and similar activities.

1. Evaluate and mitigate potential impacts on resident, nesting and migratory wildlife of any trash inclusive of food and food-contaminated trash that may be introduced by food vendors or picnickers especially along the shoreline inclusive of attraction of flocking gulls, pigeons or predators of any kind.
2. Evaluate and mitigate the potential impacts of increased human traffic using outdoor recreation infrastructure like trails. Studies have shown that wildlife retreat when humans move along trails[4] and that waterfowl are particularly intolerant of recreational trail use.[5]
3. Evaluate and mitigate impacts of noise on wildlife arising from events of any size or large gatherings along the shoreline or amidst developed shoreline projects.
4. Evaluate and mitigate impacts of human intrusion into and destruction of habitats.
5. Evaluate and mitigate impacts of people walking their dogs off-leash particularly adjoining shoreline wetland habitats, habitats of endangered species. Enforcement is challenging but some methods can be more effective than others as discussed by Mountain View's Senior Biologist Phil Higgins in a Palo Alto webinar last November.[6]

Predation

Increased human presence and tall structures will increase predation along the shoreline. Analysis must identify and mitigate to minimize predation. For wetland species, those predators

[4] Trulio, L. A., & Sokale, J. (2008). Foraging Shorebird Response to Trail Use around San Francisco Bay. *The Journal of Wildlife Management*, *72*(8), 1775–1780. http://www.jstor.org/stable/40208460

[5] Lynne A. Trulio and Heather R. White "Wintering Waterfowl Avoidance and Tolerance of Recreational Trail Use," *Waterbirds* 40(3), 252-262, (1 September 2017). https://doi.org/10.1675/063.040.0306

[6] Phil Higgins, Balancing Public Access and Habitat Enhancement in the Baylands,11/16/21, webinar @ ~1:50:02; https://www.sfestuary.org/truw-pahlp/

include racoons, opossums, skunks, foxes, rats and roaming cats. Predation is of major concern for the endangered species that live in the shoreline marshes.

1. Evaluate and mitigate outdoor feeding of animals along the shoreline by prohibiting the practice on lands of any new development and the Bay Trail. Outdoor feeding attracts and concentrates any and all of the species mentioned above and each will roam in wetlands consuming eggs, nestlings or adults inclusive of endangered species.
2. Evaluate and mitigate by controlling food trash that would cause gulls to congregate, species that also predate eggs or young of other wildlife.
3. Evaluate and mitigate building design near the shoreline to prevent perching or nesting of avian predators.
4. Evaluate and mitigate tree selection along or near the shoreline to control avian predators by prohibiting trees along the shoreline public access right of way and avoiding tall or spiking tree shapes in nearby, setback locations.
5. Evaluate and mitigate project level landscaping to avoid places where predator species might hide in daylight hours.

Disruption of tidal wetlands

Wetlands are uniquely sensitive to impacts from actions on surrounding lands and necessarily are subject to Clean Water Act as well as wildlife and habitat legal protections regardless of land ownership and location of the BCDC band. As such actions such as construction or landscape management along the RBDSP shoreline must be carefully monitored and mitigated even if equipment or workers never touch the marsh. Dust and seeds of invasive species can travel on even slight breezes. Oil spills or other contaminants may travel to sensitive habitats within the Plan area, particularly north of Bay Road and close to and within the BCDC buffer zone.

Both temporary and permanent impacts to these wetlands must be evaluated and avoided, including impacts resulting from construction activities such as grading, installation of subsurface infrastructure and placing of fill to raise the height of buildings or installation of flood barriers such as anticipated in the SAFER Bay Project. In addition,

1. Mitigation Measure BIO-5 from the 2013 Ravenswood Four Corners/TOD Specific Plan FEIR should be amended to apply to all potentially impacted wetland habitats, private or publicly owned, inclusive of those identified as under State or federal jurisdiction and to require that no fill material be placed on the wetlands.
2. Construction and landscaping practices should evaluate and mitigate impacts of work like construction (temporary impact) and landscaping (temporary and repetitive) on sensitive wetlands by setting standards and monitoring compliance for all such actions.
    a. Place dirt piles away from the shoreline, covering with tarps when not in use.
    b. Require tire washing for all vehicles used on the site to avoid import of invasive plant species.
    c. If pile driving is necessary, use methods that minimize noise and are confined to limited periods of time and incorporate all actions needed to protect the federally endangered Ridgway's rail. See 2f below.

d. Do not permit night-time construction activities along the shoreline to avoid impacts on night-active species in the marshes. If any exceptions to night-time construction activities, require that all needed lighting be shielded, directed down and away from the sensitive habitats.
e. Landscapers should not use blowers near the wetlands as the practice will send seeds, dust, and other contaminants into the wetlands. Blower noise would also disrupt the quiet of the shoreline environment for people and wildlife.
f. Construction and noise require all appropriate protections for the federally endangered Ridgway's rail. The BRA of shoreline projects must (1) include rail surveys to establish existing conditions and again prior to any noise or other marsh impacts, (2) observe nesting season construction restrictions if the rails are within 700' and (3) work in consultation with the US Fish and Wildlife Service before and throughout construction activity having any potential impacts.
g. Consistent with 2013 RBDSP Policy LU-9.4, the SEIR should establish development standards that ensure adequate "Rights-of-way" for SAFER project preferred-design levees and be sufficiently wide on the upland side to allow for future levee widening to support additional levee height and ensure that no fill for levee construction or widening is placed in the Bay. Please see further comments under Land Use and Planning.

Bird Safety

Human infrastructure threatens communities and ecosystems with significant impacts. Collisions with buildings alone kill nearly 1 billion birds per year, highlighting the necessity for bird-safe design to protect local and migratory bird populations. Please study any potential impacts of the project's design on bird populations, such as the likelihood of bird-strikes. Consider the following policies as mitigation:

1. The applicability of the Bird-safe policy of the 2013 RBDSP should be expanded to include all commercial development regardless of habitat proximity.
2. For residential development, we ask for the addition of bird-safe design requirements for developments within 300-ft from riparian habitats, wetlands and open space.

Light Pollution

Artificial light at night from this infrastructure causes significant impacts. Light disrupts the circadian rhythm of living beings which can impact mating, foraging, and migration behaviors, sometimes with lethal results. Light pollution has also been correlated with increased cancer risks and hormone disruption in humans. To mitigate these impacts, we recommend that the impacts of light pollution be studied and that the following standards be established.

1. Require shielded lights and prohibit up-lighting.
2. All lighting shall have a correlated color temperature of 2700 Kelvin or less City-wide.

3. All lighting shall be angled downwards and facing away from the Bay or other habitat areas[7].
4. Timers, dimmers, shades, and occupancy sensors should be used in commercial buildings to ensure that lights are turned off when buildings are not in use. Non-essential lights should be turned off at 10pm.
5. Lighting fixtures should be coordinated with street tree placement and species.
6. Construction lighting should not be exempted from outdoor lighting standards in shoreline areas within the plan area.

Shading

Analyze and mitigate daylight attenuation impacts on the health and survival of the bayland ecosystem due to shadowing by tall adjacent buildings. Studies have shown the importance of sunlight[8] to estuarine ecosystems and that shadowing from bridges[9] and docks[10] can negatively affect plant growth and invertebrate density in estuarine ecosystems. By extension, tall buildings along East Palo Alto's treeless marsh plain that thrives in open sunlight are likely to introduce even broader shadow impacts. Please include shadow studies to analyze shading impacts on the baylands from buildings. Mitigations should include setback standards that apply to shoreline projects developed under the RBDSP and also require stepped-back heights for building design as well as avoidance of recreation or other features that extend over bayland habitat.

Glare and lightcast

Analyze and mitigate glare and night light cast from windows with building design guidelines that avoid both impacts on surrounding natural communities especially marsh wetlands.

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[7] This aligns with East Palo Alto Municipal Code Section 18.34.110 - Outdoor Light and Glare: All outdoor lighting shall be arranged so as to keep light directed only on the subject property. It is unlawful to create illumination exceeding 0.1 foot-candles on any adjacent property. It is unlawful to create or allow direct glare, whether from floodlights or from high temperature processes (e.g., combustion, welding, etc.) visible at the property line in violation of Section 18.34.110

[8] Thom et al. 2008 Light Requirements for Growth and Survival of Eelgrass Zostera marina L in Pacific Northwest USA Estuaries https://www.researchgate.net/publication/226247644_Light_Requirements_for_Growth_and_Survival_of_Eelgrass_Zostera_marina_L_in_Pacific_Northwest_USA_Estuaries

[9] Broome et al. 2005 Effects of Shading from Bridges on Estuarine Ecosystems. CTE/NCDOT Joint Environmental Research Program Final Report https://connect.ncdot.gov/projects/research/RNAProjDocs/2001-12FinalReport.pdf

[10] Logan et al. 2017 Effects of Docks on Salt Marsh Vegetation: An Evaluation of Ecological Impacts and the Efficacy of Current Design Standards https://www.mass.gov/doc/effects-of-docks-on-salt-marsh-vegetation-an-evaluation-of-ecological-impacts-and-the-efficacy/download

Pesticides and rodenticides

Analyze and mitigate both pesticides and rodenticides with avoidance practices as each is known to kill desired species, directly or indirectly. Pesticides used along the often windy shoreline can both impact habitat and become a water quality contaminant.

GEOLOGY AND SOILS

Please see Hazards and Hazardous Materials, below.

HAZARDS AND HAZARDOUS MATERIALS

The Ravenswood District Specific Plan SEIR should evaluate the cumulative impacts of all hazardous waste sites and other chemical pollution within the Plan Area

1. Due to chemical contamination of large areas of the Plan Area by past and ongoing land uses, it is critical that the SEIR evaluate the impact of hazardous chemicals on anticipated future land uses. It is not appropriate to defer those evaluations to the project-specific EIRs, as the Plan's development goals may not be realistic or economically feasible due to the decades-long timeframes and high costs of site remediation. Additionally, the SEIR should address the cumulative health and environmental impact of pollutant releases from multiple hazardous waste sites within the Plan Area.

   The SEIR should address the following topics related to hazardous chemicals within the Plan Area should:

   Evaluate the suitability of properties within the Plan Area for future development using current toxicity values published by the USEPA and DTSC. The cleanup requirements for the Rhone-Poulenc[11] and Romic[12] sites are based on toxicity screening values for cancer risk, noncancer health impacts, and estuarine protection from 1988 (Rhone-Poulenc) and 2004 (Romic), respectively. If more health-protective values have since been published, the contractor should use those values to assess the risk associated with future land uses.

1. Anticipate likely near-term changes to cleanup requirements based on toxicity assessments currently in progress at USEPA or DTSC. Several examples follow:

[11] *UNITED STATES OF AMERICA, Plaintiff, vs. STARLINK LOGISTICS, INC., Defendant. Consent Decree.* https://elr.info/sites/default/files/doj-consent-decrees/r_starlink_logistics_inc._consent_decreefinal.pdf

[12] *Land Use Covenant and Agreement, Environmental Restrictions*, and *Final Remedy Decision for Former Romic Environmental Technologies Corporation Facility, East Palo Alto, California.* https://19january2017snapshot.epa.gov/www3/region9/waste/romic-eastpaloalto/pdf/Romic-Decision-Comment-Response.pdf

a. The IRIS reevaluation of inorganic arsenic, expected to be completed in the next year, may result in more stringent soil and groundwater cleanup levels. This would impact the Rhone-Poulenc site, where arsenic at up to 500 parts per million remains in subsurface soils.
b. USEPA has declared the intention to add two chemicals within the category of Per-and-poly-fluorinated alkyl substances (PFAS) to the RCRA and CERCLA hazardous chemicals lists in 2022, and to promulgate Ambient Water Quality Criteria for those chemicals. The Romic facility treated wastes from electronics manufacturing, which could indicate the presence of PFAS in soil and groundwater at this site. New site investigations could be required to determine if these chemicals are present in soil and groundwater, as well as in adjacent estuarine waters and sediments.

2. Evaluate the impact of land covenants or deed restrictions on the entire Plan Area. The Romic site (12.6 acres) and Rhone-Poulenc site (5 acres) have land covenants or deed restrictions prohibiting many land uses, and that also prohibit any activities disturbing soil or pumping groundwater without written permission from the regulator. Construction of multi-story buildings on soil prone to liquefaction will require extensive boring and dewatering.

3. Evaluate the impact of construction activities and new construction across the Plan Area on the following:

    a. **Compatibility with existing remediation and groundwater monitoring systems**
    Construction activities and new construction should not damage or prevent operation of existing remediation and monitoring systems, such as impermeable caps, monitoring wells, or the biobarrier at the Romic site that is attempting to prevent pollutants from entering the Eastern Slough. In addition, redevelopment should not be allowed to prohibit, limit, or significantly complicate future environmental remediation.
    b. **Changes to groundwater flow directions or rates due to pumping for borehole drilling and dewatering of building foundations**
    Consolidation of soils by dewatering and placement of building foundations will create a subsurface barrier, shifting groundwater flow.
    c. **Transport of contaminated soils as dust to adjacent residential neighborhoods, schools, sensitive or vulnerable populations, and wetlands**
    d. **The potential for subsurface utilities such as sewers or electrical lines to act as conduits for transport of hazardous soil vapors into buildings**
    This is of particular concern at the Romic site, which has both a dense non-aqueous phase layer (DNAPL) of halogenated solvents such as trichloroethene

(TCE) at the bottom of several aquifers and a floating oil layer atop the groundwater that may contain toxic pollutants such as benzene and toluene.[13]

4. Address the potential human health and environmental impacts of the current and historical auto salvage yards and other industries that bordered the western and southern sides of the Romic site[14], and were not investigated in the Romic assessment. Several of those properties have deed restrictions.[15] Pollutants commonly present at auto salvage sites include oil, heavy metals, ethylene glycol, and arsenic.[16]

5. Investigate the transport of hazardous substances from the Plan Area to estuarine sediments and waters. Neither the Romic nor the Rhone-Poulenc site actions included an assessment of sediment contamination or water quality in estuarine channels adjacent to those sites. The 2008 Romic remediation plan states that such an assessment would take place at a future date, but as of 2022 that has not occurred. The Plan EIR contractor should evaluate cumulative impacts to aquatic species from all pollution sources on the East Slough and other waters that could potentially receive groundwater or surface runoff from the Plan Area. Eventually, there will need to be a long-term monitoring plan for estuarine water quality.

The SEIR should evaluate the potential for sea-level rise to worsen pollution of surface soils within and beyond the Plan Area.

Sea-level rise is projected to lead to increased direct flooding of the Plan Area (see Figure 1), which is already at risk from King Tides and storm surges. Without raised levees or other shoreline protection along the entire bayfront, future development will be at risk from more frequent floods. A less recognized hazard that should be evaluated in the Plan EIR is groundwater flooding and the potential for rising water tables to bring buried pollutants to the ground surface and to transport additional pollutants into wetlands. Land within the Plan Area is likely to experience groundwater flooding with a 1-meter rise in sea level.[17] In the East Bay, groundwater bubbling out of manhole covers has been reported 250 feet from the shoreline.[18] Rising water tables and tidal fluctuations could move contamination from buried soils to the surface and force hazardous vapors along utility conduits into buildings. The Plan EIR should include a detailed hydrologic evaluation of this potential pathway for chemical exposures.

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[13] *First Semiannual 2021 Groundwater Monitoring and Remediation Evaluation Report, Bay Road Holdings Site, 2081 Bay Road, East Palo Alto, California. August 16, 2021.* https://www.epa.gov/ca/bay-road-holdings-llc-formerly-romic-environmental-technologies-corporation

[14] Google Earth Historical Imagery, October 1991.

[15] State Water Resources Control Board Geotracker. https://geotracker.waterboards.ca.gov/

[16] https://www3.epa.gov/npdes/pubs/sector_m_autosalvage.pdf

[17] Plane, E., Hill, K., and C. May. "A Rapid Assessment Method to Identify Potential Groundwater Flooding Hotspots as Sea Levels Rise in Coastal Cities. "Water. 2019, 11, 2228.

[18] "Groundwater and sea level rise: What's at risk?" Kristina Hill, UC-Berkeley. *Sea Level Rise and Shoreline Contamination Regional Workshop*, December 2021.



Figure 1. Projected flooding (blue shading) with 1-meter sea-level rise (https://cimc.epa.gov/)

BioScience projects may bring heightened safety risks due to sea level rise and associated groundwater rise.

Please evaluate and mitigate potential safety risks related to an expansion of life science/lab facilities in the plan area. In an urbanized setting, the biological materials being studied could become a regional health hazard if allowed to escape. Furthermore, siting of such facilities in shoreline areas, identified as flood zones, can create vulnerabilities for the Bay ecology as sea levels rise and 100-year flood events occur with increased frequency; placement in areas where soil liquefaction in seismic events could lead to structural failure also pose heightened biosafety hazards. Please consider guidance in the attached April 11, 2022 letter to East Palo Alto.

HYDROLOGY AND WATER QUALITY

Stormwater Services

As part of its analysis of EPASD Sewer Services, the LAFCo MSR[19] reviewed and described other service systems in East Palo Alto including Stormwater Services. Those findings identified several vulnerabilities that could impact the RBDSP area and that should be analyzed in the SEIR. Notably and related to the RBDSP, the MSR discussion noted risks associated with City location by the Bay, sea level rise, and deficiencies of the pump station and storm drain system. Currently 56% of the City is designated at elevated risk of flooding.

[19] LAFCo Municipal Service Report, East Palo Alto Sewer District: p. 74

Areas of Concern

O'Connor Street Pump Station improvements

This is the stormwater system's sole pump station, draining into San Francisquito Creek. The MSR cited the City's 2015 Storm Drain Master Plan as a resource that identified in good detail improvements needed in the Stormwater System including the pump station. East Palo Alto has made some improvements recently and is planning more work in 2022-2023. Equipment in the facility, such as its water pumps, no longer work efficiently and thus pose risk to the community upstream in major storm events. As this is critical infrastructure and an existing condition, the SEIR needs to discuss and analyze potential impacts if the pump station continues in status quo.

Storm drain deficiencies

The MSR discussion describes the entire stormwater system of which the RBDSP area is a major component. The city-wide system of drainpipes includes some 430 nodes (manholes, inlets, similar). Of those, modeled analysis identified 68 nodes where some level of flooding could be expected. Among those, 33 would be locations of flooding of one foot or more. In the SEIR, analysis should identify impacted nodes within the RBDSP area and provide a map to show locations inclusive of degree of risk such as the depth of potential flooding.

Climate Challenge: Water above and below ground

Associated with climate change, meteorological shifts have already changed the local climate: extended periods of drought and less frequent but intense, major storms or sequential storms such as last October's atmospheric river. Such storms test local stormwater systems and, by infiltration, sewer systems and produce surface ponding and localized flooding. Steadily, over the decades of development envisioned for the RBD, rising groundwater (subsurface aquifers) will exacerbate the problem. For the RBDSP, the SEIR needs to set a framework for development actions that can adapt and survive these climate changes and to preserve the outcomes the Specific Plan pursues.

An important reference to consult is a report prepared by the San Francisco Estuary Institute for the City of Sunnyvale: Sea-level rise impacts on shallow groundwater in Moffett Park.[20] This report is specific to findings in Moffett Park but its analysis is useful, discussing potential impacts and adaptation action for development. Notably its sources for groundwater data are from existing well databases, not involving any physical hydrologic study. SFEI has consulted with East Palo Alto on urban ecology and should be on groundwater risk planning. Although, in the scoping meeting, Troy Reinhalter said that there would be no groundwater study, we urge

[20] SFEI et al, Sea-level rise impacts on shallow groundwater in Moffett Park, November 2021; https://static1.squarespace.com/static/5e38a3dd6f9db304821e8e5e/t/61a7b37743ec4b770e11ee73/1638380421678/Moffett+Park+Specific+Plan+Groundwater+Addendum.pdf

the project team to reconsider that decision so that the RBD might benefit from that baseline preparation for the future.

As food for thought, here is the list of potential impacts compiled in the SFEI report:

- Corrosion. Salinity impacting below ground infrastructure
- Buoyancy. Buoyant force impact on foundations, buried utilities and pipes, roads
- Seepage. Seepage into subsurface structures, floors, walls
- Infiltration: Infiltration into stormwater and sewage pipelines reducing capacity
- Liquefaction: Higher water tables increase liquefaction risk
- Damage to vegetation: Saturated soils and/or higher salinity can impact plants
- Contaminant mobilization: Movement in existing remediation or of unidentified contaminants
- Emergence flooding. Site-dependent; even non-emergent levels can exacerbate surface flooding

Again, given the RBDSP hydro-geologic location, we strongly urge inclusion of groundwater analysis in the SEIR and use it to set an adaptive framework for RBDSP area development.

LAND USE AND PLANNING

Consider shoreline overlay to accommodate SAFER Levee and avoid Bay fill.

In the 2013 RBDSP on p. 73, the City established the following policy:

> Policy LU-9.4: For development projects within the BCDC jurisdiction:
> New projects on fill or near the shoreline should either be set back from the edge of the shore so that the project will not be subject to dynamic wave energy, be built so the bottom floor level of structures will be above a 100-year flood elevation that takes future sea level rise into account for the expected life of the project, be specifically designed to tolerate periodic flooding, or employ other effective means of addressing the impacts of future sea level rise and storm activity. **Rights-of-way for levees or other structures protecting inland areas from tidal flooding should be sufficiently wide on the upland side to allow for future levee widening to support additional levee height so that no fill for levee widening is placed in the Bay.** (emphasis added)

This policy statement makes several important points. Sufficient land width must be provided for flood protection structures and no fill is to be placed in the Bay. In 2013 the SAFER Bay levee was already under discussion through the San Francisquito Creek Joint Powers Authority (SFCJPA) and was anticipated to protect a flood-weary city from oncoming sea level rise. Even in 2013 the City anticipated, as reflected in LU-9.4, that the original levee, when built, would subsequently require added height and width.

Time has moved on. The SFCJPA completed a feasibility study and its NoP for a programmatic EIR has been released concurrent with the scoping period of the RBDSP Update. Clearly much more is known about the SAFER levee and requirements of its construction.

The LAFCo MSR discussion mentioned that, since 1940, City residents have suffered through eight major flood events, all fluvial. As is well understood and the purpose of the SAFER levee, City residents, schools and businesses require this sea level rise protection, need it as a priority construction for long-term health and safety.

It is time to use recent, available information to define and apply a land use overlay preserving lands for the SAFER levee and critical community protection and to update or replace LU-9.4 using that information.

Reserve land for the SAFER levee. To date neither the 2013 RBDSP nor any other City document identifies and protects land needed to prepare the City for sea level rise. In recent years, the City has seen multiple proposals from developers whose projects encroach on the shoreline, allowing only sufficient land for the Bay Trail with no set aside for the City's critical levee infrastructure.

> **SAFER levee width**. In a discussion with the Tess Byler,[21] SAFER Project Manager for the SFCJPA, we learned that the SFCJPA's *preferred* engineered levee design would be a structure with a 3:1 slope, 20' wide upper surface. Such a structure could have a width footprint of potentially100' or more particularly if including the width for height requirements of the 2013 LU-9.4. In comments about flood walls (vertical structures), we learned they were not preferred but would be used where shoreline space is limited such as the bayward side of the PG&E substation on Bay Road. **We recommend that the SEIR analysis include discussions with the SFCJPA to directly acquire data to be used to define the width of land that needs to be reserved for the levee.** The same conversations should substantiate the value the preferred levee type provides to the City and its residents.
>
> **SAFER levee location**. As stated in the existing LU-9.4, the City does not want any fill for levee construction put into the Bay. That reference was speaking only to the addition of height to a future levee. Revisions need to include all actions regarding the levee including original construction. Regulatory oversight for the SAFER levee is coordinated by the BIRRT (Bay Integrated Restoration Regulatory Team), a team composed of representatives of all regulatory agencies that have Bay responsibilities. We learned that the SAFER project has committed to the BIRRT that the levee will not be built in Bay wetlands. As such, the City must set aside sufficient land that lies inland from the Bay wetland edge and without regard to existing locations of the Bay Trail or the BCDC band. For SEIR analysis, here again discussions with the SFCJPA are essential.

[21] Virtual meeting, Tess Byler, SFCJPA, 04/19/22

SAFER levee and the BCDC band. There is a popular misunderstanding that the BCDC band is the only jurisdiction affecting where development can occur on the shoreline. The SAFER Bay levee is critical city infrastructure, the project has initiated CEQA and levees are already being built or planned in other Bay locations. For the SEIR, analysis should include discussion with BCDC to clarify jurisdictional status regarding the levee in addition to discussions with the SFCJPA.

We strongly recommend that the RBDSP Update adopt specific SAFER levee guidelines and establish a dedicated levee right-of-way.

SAFER levee and the Loop Road. Considering the levee needs discussed above, it is apparent that lands proposed for the Loop Road in the 2013 RBDSP will be needed for construction of a levee that will protect the University Village area. It is our recommendation that that is the best and highest use of the "Loop Road" location. **The SEIR should update the Loop Road analysis accordingly.**

POPULATION AND HOUSING

Given the substantial proposed increase in development intensity under the RBDSP Update, the SEIR should study the expanded project's impact on city-wide and regional jobs/housing balance and evaluate and mitigate displacement impacts as well as gentrification impacts due to poor jobs match and proposed new amenities.

PUBLIC SERVICES

Please evaluate the potential for the RBDSP Update to necessitate the expansion or construction of additional facilities or services and include potential new facilities for public safety services, schools, community services and similar institutions. in the Water Supply Assessment.

RECREATION

East Palo Alto is currently well below the City's target ratio of 3.9 acres of parkland per 1,000 residents. The 2013 Specific Plan proposed adding 30 acres of new parks and trails. Because the RBDSP Update scenarios anticipate much more residential and commercial growth in the plan area, the SEIR should evaluate how park and recreation facilities in the plan area will fulfill the Specific Plan's goals and parkland requirements. The SEIR should:

1. Analyze what the potentially underserved recreational needs are for future residents, employees, and visitors to the Plan area and evaluate the need for additional parkland and recreation facilities (including access and parking) to accommodate increased demand.

2. Evaluate the impacts of increased resident and employee recreational activity on the quality and accessibility of recreational facilities in and near the Plan area including libraries, community centers, Cooley Landing, Ravenswood Open Space Preserve, the Bay Trail, and Jack Farrell Park. Include mitigations to maintain service levels and address increased wear and tear on existing nearby facilities.

3. Consider the mitigation potential of recreational open space along the bay front serving as temporary stormwater catchment areas for flooding in extreme storm events.

TRANSPORTATION

1. Loop road: Analyze whether the loop road indicated around the west side marsh can be built on existing land and if so, whether it is feasible without taking space from the backyards of residences 9using eminent domain), impacting adjoining wetlands or obstructing alignment of the planned SAFER Bay levee along the planned route.
2. If a loop road is included, provide traffic studies for traffic that such a loop road would carry (especially during commute hours), and the safety impacts on the adjacent neighborhood, from cut through traffic generated by the loop road.
3. Analyze traffic studies with no loop road. See comments under Land Use, above.
4. Analyze potential for including a safe slow network of streets with slow auto traffic, pedestrian priority and safe bike lanes to encourage mode shift away from auto usage.
5. Analyze the effectiveness of including wider sidewalks and adequate street lighting to encourage safe walking on streets that would benefit from these amenities.

UTILITIES AND SERVICE SYSTEMS

Impact of rising groundwater

The RBDSP area is served by a variety of utilities that rely on underground conduits and other utilities that may be seriously impacted by rising groundwater associated with sea level rise. Please see the rising groundwater discussion in our comments on Hydrology and Water Quality.

Sewer System Analysis

Recently, San Mateo County LAFCo released a draft Municipal Services Report[22] (MSR), an updated review of sewer services provided by the East Palo Alto Sanitary District. EPASD is the primary sewer service provider for the RBDSP area. The MSR's Summary[23] includes a long list of issues of concern and companion list of recommendations. Currently management of action on the issues is in the hands of EPA SD. Per the MSR, that management could be in the hands

[22] SMC LAFCo, draft MSR Update, East Palo Alto Sewer District: https://www.cityofepa.org/sites/default/files/fileattachments/city_manager039s_office/page/21302/epa-epasd-wbsd_msr-update_2022-03-28_draft.pdf
[23] LAFCo Municipal Service Report, East Palo Alto Sewer District: pp. 96-99, "Summary of East Palo Alto Determinations"

of the City of East Palo Alto through an available LAFCo action that would transfer jurisdictional authority.

Deficiencies of the EPASD sewage collection system

It is a serious health and safety concern that, as reported in the MSR,[24] 70% (~21 miles) of the existing EPASD sewer system has a carrying capacity that is substandard at 6" diameter, needing upgrading to 8", and increasing the risk of surcharge or overflows during major storm events. Additionally substantial but unidentified parts of the collection system are still composed of the original clay pipe with brick and mortar manholes, aged infrastructure that is at high risk of failure.

1. **The SEIR should analyze and provide a baseline of existing location and physical conditions of the sewer services, especially for the EPASD-served area**. The analysis should provide maps of the existing sewer pipeline system showing where it is located and what is known about pipe conditions. Even if EPASD cannot or will not provide all the necessary data (as the MSR reported), analysis should report all pipeline data that is available, provide a method to add pipeline data for planning use as it becomes available and evaluate impact significance arising from lack of data.

2. The West Bay Sanitary District (WBSD) provides sewer services to a small portion of the RBDSP area. As such **the SEIR analysis should include a description of that service area, primarily the University Village area including certain adjoining lands on the shoreline**. In its discussion of WBSD,[25] the MSR remarks mention that collection capacity issues exist in that system as well but without identifying location. A map of that collection system with locations of substandard pipelines, if any exist in the RBDSP area, should be included. WBSD is a significantly larger service that the MSR discussion describes as better managed and generally more reliable.

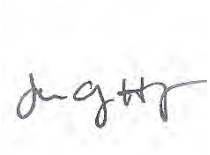
3. New RBDSP Utility Policy: One action taken in the SEIR can be to create a new utility policy establishing a process toward resolution of significant sewer services impacts. In addition to condition issues already discussed, the MSR exposes a wide-ranging list of deficiencies that together indicate that the EPASD, as current service provider, is unable or unlikely to fulfill requirements in the RBDSP area. The Specific Plan should analyze and address that issue as a priority. **We suggest that the RBDSP Update include a new policy**, such as the following:

   > The City of East Palo Alto will pursue actions to improve sewer services for health and safety reliability, timeliness for new tie-ins and expansion of collection capacity for the purpose of providing for community quality of life and economic growth.

[24] LAFCo Municipal Service Report, East Palo Alto Sewer District: p. 105, "Wastewater Services"
[25] LAFCo Municipal Service Report, East Palo Alto Sewer District: p. 155

Thank you for the opportunity to submit comments on the RBDSP Update NOP. We look forward to continued engagement in the Specific Plan Update process and review of the draft SEIR.

Sincerely,



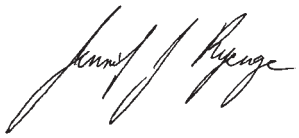
Jennifer Chang Hetterly
Campaign Lead, Bay Alive
Sierra Club Loma Prieta Chapter



Eileen McLaughlin
Board Member
Citizens Committee to Complete the Refuge



Alice Kaufman
Policy and Advocacy Director
Green Foothills



Jennifer Rycenga
President
Sequoia Audubon Society

HARVEST
PROPERTIES

June 15, 2022

Ms. Tess Byler
Senior Project Manager
San Francisquito Creek Joint Powers Authority
2100 Geng Road
Palo Alto, CA 94303

RE: Harvest Properties' Comments on the Notice of Preparation
Draft Environmental Impact Report
Strategy to Advance Flood Protection Ecosystems and Recreation along San Francisco (SAFER) Bay

Dear Ms. Byler,

Thank you for the opportunity to comment on the Notice of Preparation (NOP) for the SAFER Bay Project, proposed by the San Francisquito Creek Joint Powers Authority (SFCJPA). Harvest Properties (Harvest) supports the goal of the SAFER Bay Project to provide resiliency to coastal flooding and sea level rise in East Palo Alto and Menlo Park as well as habitat and recreation improvements.

Summary

As described in this letter, we have identified the impacts that a 7:1 levee slope as proposed in the NOP would have on Harvest's The Landing project. Specifically, it would eliminate the recreational and open space amenities that the community has expressed as critical for East Palo Alto's waterfront. In the spirit of partnership, and with a shared goal of providing resiliency to coastal flooding and sea level rise, as well as maximizing habitat and recreation improvements and benefits to the community, Harvest has identified and now proposes a *hybrid slope option* for the SFCJPA's consideration, which we have mapped and included as an attachment to this letter. There are certain constraints that are unavoidable, and will necessitate a more traditional levee with a 2:1 slope in limited areas. However, for the majority of our property's waterfront, Harvest is open to the possibility of including a 3:1 slope, and in some locations, a 7:1 slope. We therefore request that this hybrid slope option is evaluated in the forthcoming Safer Bay Project Environmental Impact Report and as part of the ultimate alignment. The following includes additional detail.

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Harvest Properties / The Landing

Harvest Properties is the property owner of approximately 19 acres in East Palo Alto: 1990 Bay Road, 1175 Weeks Street, 1250 Weeks Street and 1103 Weeks Street. As part of our proposed development (The Landing) to the City of East Palo Alto (City or EPA), Harvest is proposing a mixed-use development project that includes a variety of uses including a 95-unit 100% affordable housing development, commercial office and life-science space, subsidized ground floor retail space dedicated to local East Palo Alto (EPA) businesses, and approximately seven (7) acres of open space and recreational amenities. On top of this, Harvest is proposing other significant community benefits, such as: much needed infrastructure improvements; grants to help build and support local small business and entrepreneurship in EPA; local co-working space for EPA residents to start and grow their businesses; grants to support the growth and diversity of EPA's cultural arts; a commissary kitchen free of charge to EPA residents; a community marketplace for local EPA businesses and residents to showcase their goods; and, a wide variety of recreational amenities (i.e. playground, fitness area, dog park, community garden, community plaza for community events and gathering, walking and biking trails, and family picnic areas along the Bayfront) *(Exhibit 1: Selected Project Renderings).*

Exhibit 1: Selected Project Renderings (The Landing)

Affordable Housing project: 95 low-income units with ground floor community-oriented uses



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Community Marketplace, including Commissary Kitchen



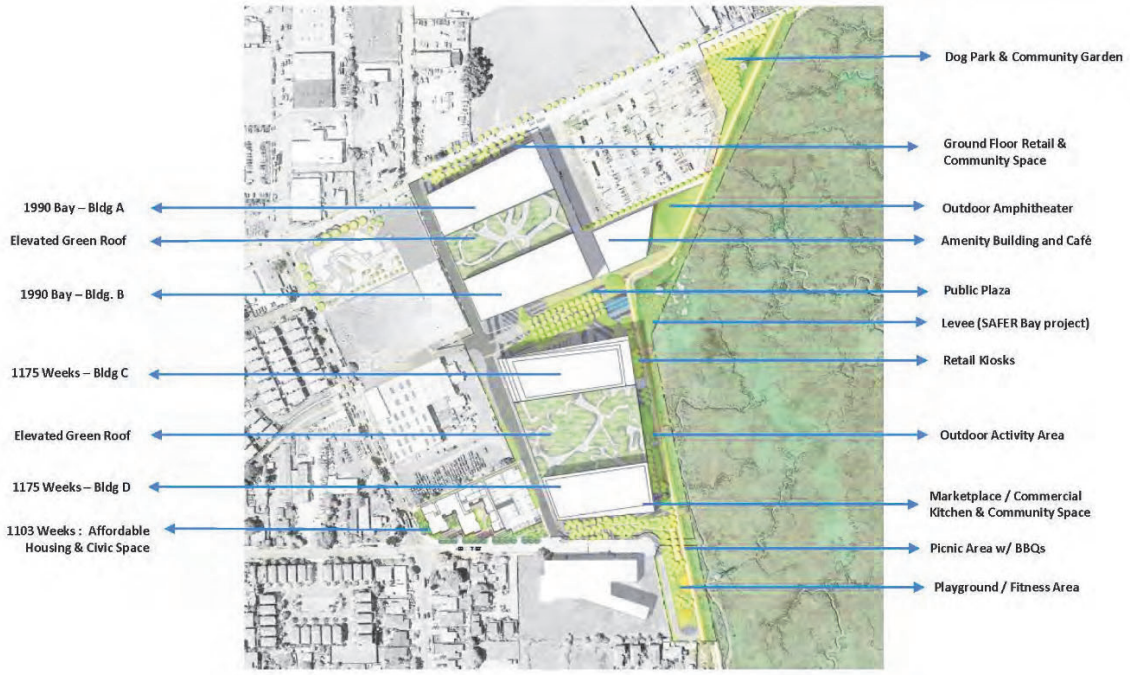
Subsidized retail space dedicated to EPA local businesses



As you can see from the below diagram (*Exhibit 2*: *Project Context*), Harvest's properties are located along one-half (½) mile of shoreline, adjacent to the Laumeister Marsh, which includes sensitive habitat areas. In addition to City requirements for protection of these areas, these tidal marshes are highly regulated via State and federal wildlife protections, wetland protections, and water quality protections. Additionally, our team is cognizant of BCDC's 100' shoreline band, that is located along our properties' shoreline. We have designed The Landing to ensure that there are not any structures or buildings within this shoreline setback area. The BCDC shoreline band is programmed entirely for publicly accessible open space and recreational amenities.

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Exhibit 2: Project Context



As part of our proposed development, we will be incorporating ecological design practices with the goal of avoiding, where possible, and minimizing potential disturbances that can affect the ecological values of the marsh. Measures have been developed based on the City of East Palo Alto's 2013 Ravenswood Business District (RBD) Specific Plan and Environmental Impact Report and will continue to be refined in close coordination with the City and SFCJPA. Such measures will likely include those intended to reduce noise and light effects from our development, potential for disturbance from people and pets, stormwater runoff, impervious cover, bird-safe measures, and potential for increased opportunities for predator and invasive species access.

Additionally, prior to Harvest's purchase of the properties, the properties at 1990 Bay Road and 1175 Weeks, underwent approximately forty years of environmental remediation, culminating in the issuance of a closure report by the Regional Water Quality Control Board, in the form of a Risk Management Plan (RMP). Harvest will be abiding by the requirements prescribed in this RMP during the construction of The Landing. The SFCJPA will also be required to follow the rules and procedures of this regulatory document. In particular, to preserve water quality within Laumeister Marsh, the levee slope and core should be designed to retain the integrity of the previously remediated soils, now and in the future. The levee design should minimize contact with remediated soils during construction and should avoid and minimize future exposure of tidal surface and ground water to remediated soils as sea level rises.

Finally, as the SFCJPA is aware, PG&E's Cooley Landing Substation is located at the northern end of our property, and its high voltage towers and lines are situated along the entire extent of the waterfront. Harvest is currently working collaboratively with PG&E to ensure that The Landing's design is accommodating the needs and constraints of PG&E's infrastructure. Any future SAFER Bay levee design and construction will also

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need to pay close attention to the existing Substation as well as the towers and overhead lines' location and alignment.

City of East Palo Alto: Planned Community Benefits

For the past three years since Harvest's purchase of the aforementioned properties, we have had over 100 meetings with community organizations, residents, local businesses, and community stakeholders and leaders in East Palo Alto. Over this period of time, we have listened to the community regarding their needs, desires, aspirations, and vision for East Palo Alto. Time and time again, we have heard how important it is to activate the waterfront of East Palo Alto with a wide variety and range of both passive and active recreational uses: bicycle and walking trails, children's playgrounds, fitness areas, basketball courts, dog parks, community gardens, BBQ areas, picnic benches, grassy areas for the community to gather, and public plazas that can be used for community celebrations and festivals. We have also heard how important it is to honor the history of East Palo Alto, its origins as a City, its diversity as a Community of Color, and its rich and diverse cultural traditions. These objectives were clearly and robustly articulated in the City of East Palo's comment letter on the NOP, dated June 7, 2022.

The proposed plan for the Landing that Harvest has submitted to the City of East Palo Alto includes *all of the above uses along the waterfront,* in a manner that honors the existing fabric of the adjacent residential and commercial neighborhoods in EPA, as well as respects the shoreline's wetlands and habitat. While it is typical for a levee to create a berm, with a slope down to lower, existing inland ground, as part of The Landing, Harvest has proposed that the entire site be raised by approximately 5 feet to match the grade of the Bay Trail and the levee. This has a number of positive community benefits and comes at a significant cost. It creates a seamless transition from the Bay Trail and levee to all the inland recreational amenities, and it also provides unobstructed views of the waterfront as the top of levee is at the same elevation as The Landing's amenities. *(Exhibit 3: Integration of The Landing / Bay Trail / Levee)*

Exhibit 3: Integration of The Landing / Bay Trail / Levee

View of Levee, Bay Trail, and 1175 Building (including Community Marketplace)



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View of Levee, Bay Trail, and public amenities (including local EPA retail kiosks)



Additionally, it is important to note that The Landing's waterfront uses are consistent with the proposed mix of recreational uses and amenities, that are currently part of the City of East Palo Alto's 2013 Ravenswood Business District (RBD) Specific Plan, and the proposed update of the Specific Plan, currently underway in the City.

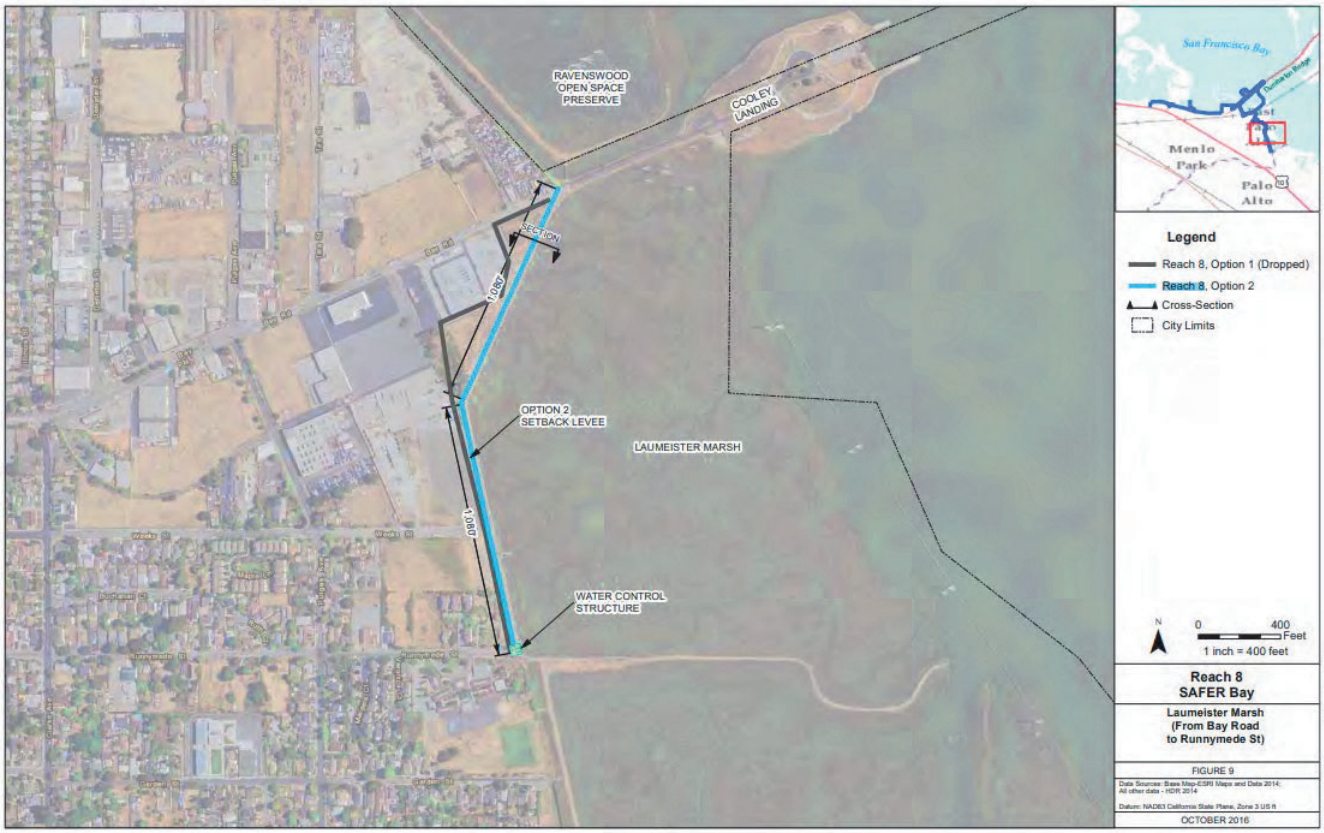
SAFER Bay Project - Feasibility Report Background

During our due diligence, community outreach and project planning phases for The Landing, our planning efforts have been informed by the *Safer Bay Project, Public Draft Feasibility Report* from 2016[1] (Feasibility Report). The Feasibility Report shows our site as part of Reach 8, with two levee alignment options (*Exhibit 4: Feasibility Report Figure 9*). Option 1 (in black) shows an alignment with greater setbacks. That alignment was marked as "dropped," and we understood based on conversations with SFCJPA staff that Option 1 was no longer being pursued. Option 2 (shown in blue) shows a new levee alignment built on the Bay side of the existing levee, with restored transition zone habitat along the Baylands Nature Preserve/Laumeister Marsh from Bay Road to Runnymede Street. As shown in Option 2 and as confirmed in conversations with SFCJPA staff, new levee work was expected to be contained to the BCDC 100-foot shoreline band and would have the benefit of future floor and sea level rise protection. This would also be consistent with City planning including the RBD Specific Plan and allow more recreation and open space use that East Palo Alto sorely needs.

[1]https://static1.squarespace.com/static/5f21f9097be3cf17ef8a9984/t/5f52c3a62d8df66606d8eeb5/1599259580017/SAFER_Bay_Public_Draft_Feasibility_Report_Summary_Oct._2016_.pdf

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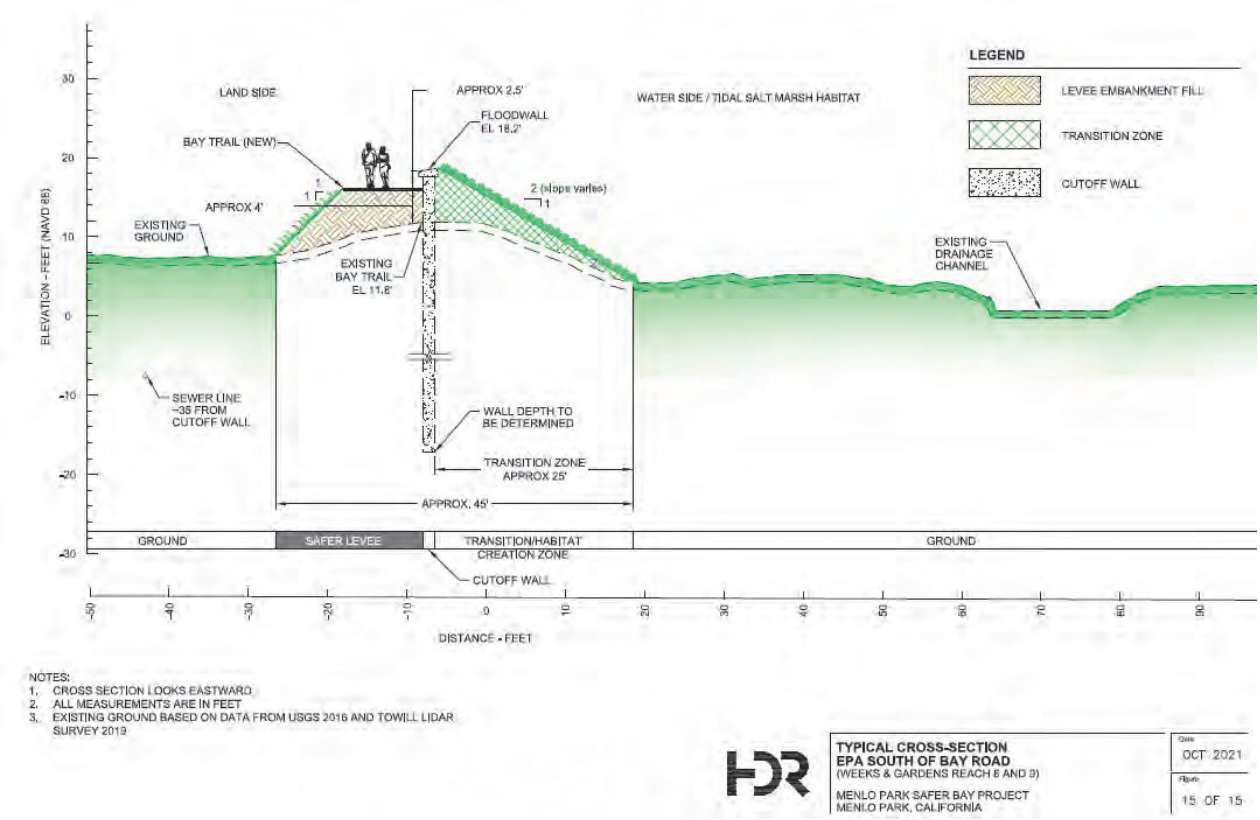
Exhibit 4: Feasibility Report Figure 9



Further, based on the SFCJPA's prior conceptual Cross-Section provided to Harvest, our design and engineering team had always assumed that a 2:1 slope would be designed and constructed along our property's waterfront. Please see *Exhibit 5: Typical Cross-Section, EPA South of Bay Road* for this diagram provided by the SFCJPA. We submitted our Pre-Application in February 2020 and our Major Application in October 2021 to the City of East Palo Alto based on this conceptual Cross-Section provided to us by the SFCJPA and earlier conversations with SFCJPA staff members.

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Exhibit 5: Typical Cross-Section, EPA South of Bay Road (SFCJPA diagram)



NOP: Conceptual Cross-Sections

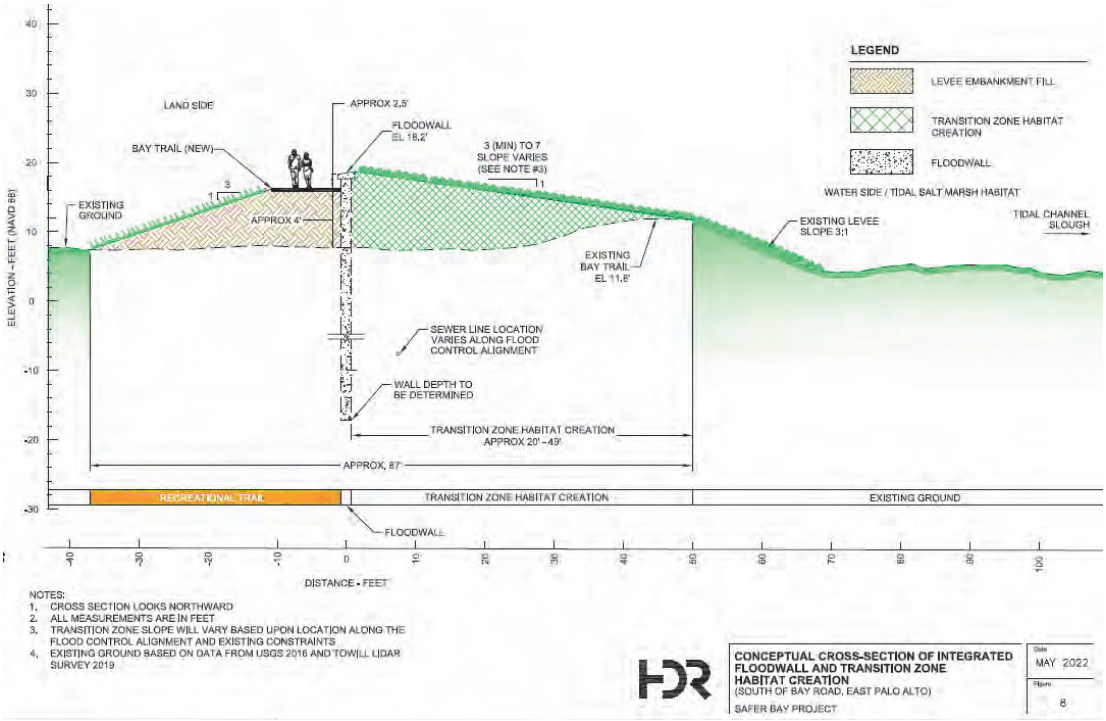
It was not until the NOP for the SAFER Bay project was recently released that we were made aware that SFCJPA was now contemplating a different conceptual Cross-Section, indicating a range of 3:1 to 7:1 for its Transition Zone. As mentioned above, this creates significant problems for our current site plan, and will prevent the community's goals of maximizing recreational and open space amenities from being realized. It may also continue a troubling pattern of poorer communities and communities with largely non-white populations bearing the brunt of environmental impacts, including infrastructure meant to address environmental harms that also serves to protect wealthier, whiter communities.

The NOP presents two (2) "Conceptual Cross-Sections of Integrated Floodwall and Transition Zone, Habitat Creation," for the area south of Bay Road (*Exhibit 6: Figure 8 & Figure 9).* The Cross-Sections depicted are in the same location of The Landing project, as our properties extend south of Bay Road to south of Weeks Street. A slope of 3:1 (min) to 7:1 Transition Zone Habitat Creation is presented in these Cross-Sections, with a reference to Note 3 on the same page, which states: "Transition Zone will vary based upon location along the Flood Control Alignment and Existing Constraints."

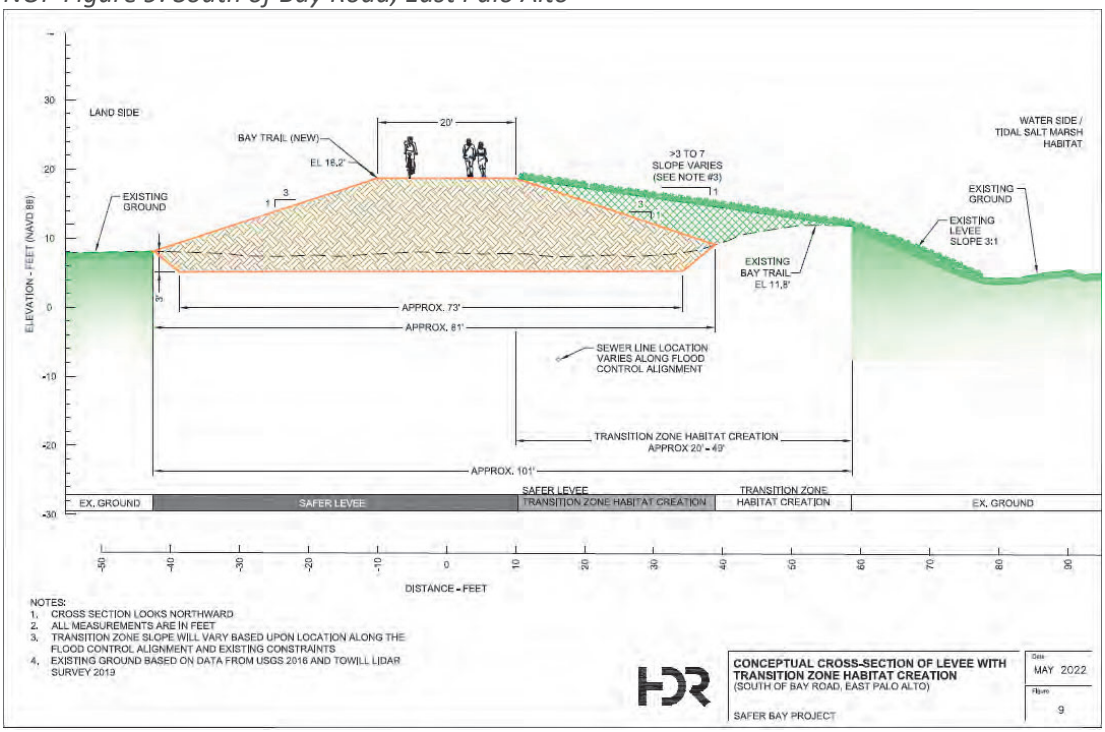
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Exhibit 6 : Conceptual Cross-Sections of Integrated Floodwall and Transition Zone, Habitat Creation

NOP Figure 8: South of Bay Road, East Palo Alto



NOP Figure 9: South of Bay Road, East Palo Alto

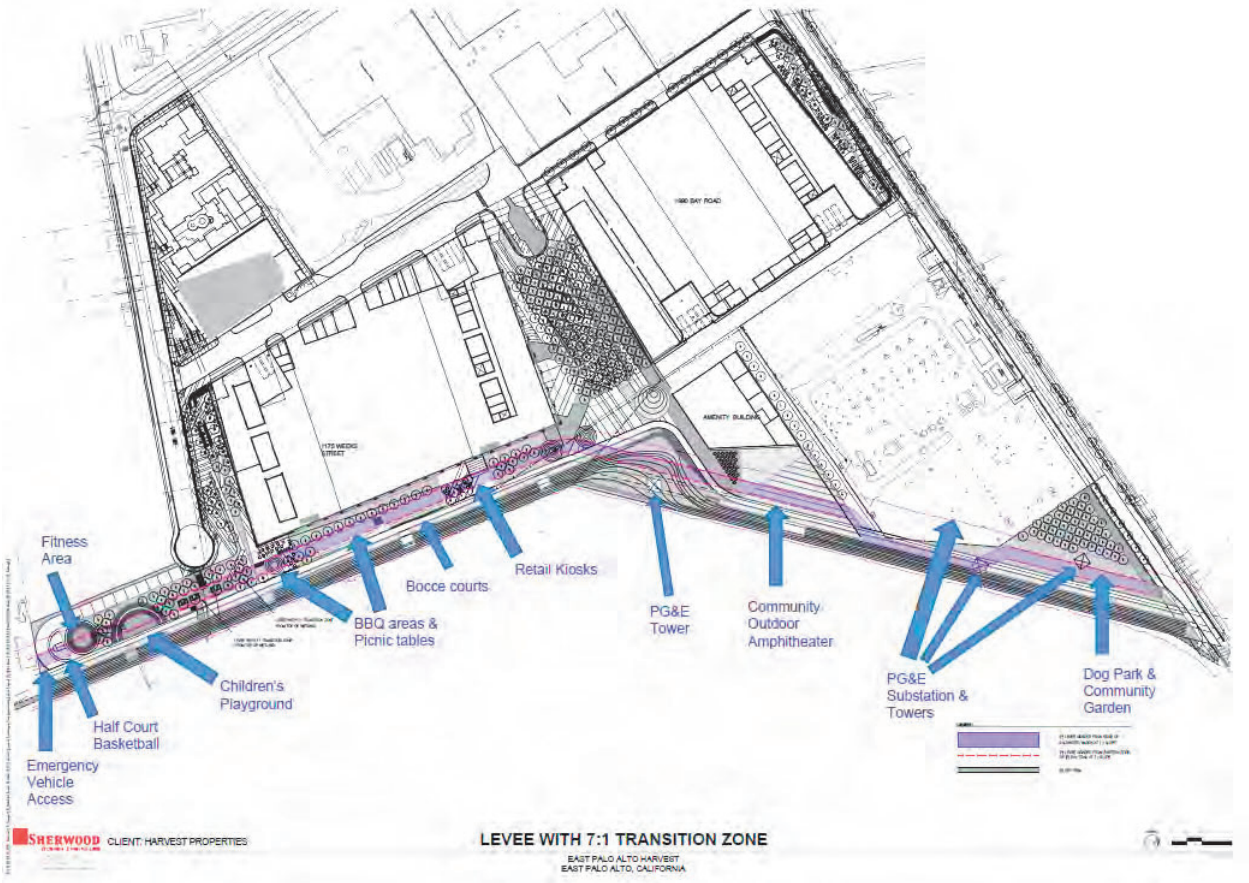


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Impacts to the Landing Project and the Community

While we can appreciate the goal of maximizing this Transition Zone, it is critical to note that for portions of our site, anything greater than a 3:1 slope (and in some locations 2:1 slope) would *eliminate* the recreational and open space amenities that the community has expressed as critical for EPA's waterfront. Please see *Exhibit 7: Levee with 7:1: Transition Zone.* As can be seen in this diagram, a 7:1 slope would extend inland into our property, by nearly 50 feet. If a transition zone of 7:1 were constructed along our property's frontage, this would eliminate the possibility of the construction of the community's children's playground, ½ court basketball court, fitness area, picnic benches, BBQ areas, outdoor seating and the viability of future retail along that frontage. There would simply not be adequate room to construct these amenities. Additionally, the emergency vehicle access road that curves down from the end of the Weeks Street cul-de-sac would also would not be able to be constructed, which would create severe fire and emergency vehicle access problems. Others of The Landing's amenities would also be drastically reduced in size, such as the project's public plazas, and grassy amphitheater lawns, and waterfront seating areas.

Exhibit 7: Levee with 7:1: Transition Zone



Note that the purple band in the Exhibit above represents the location of a 7:1 levee (including the Bay Trail), and, how far this would infringe into Harvest's property.

Additionally, as was mentioned above, PG&E's Cooley Landing Substation is located at the northern end of our property, and its high voltage towers and lines are situated along the entire extent of the waterfront. As can

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be seen in Exhibit 7 above, with a 7:1 sloped levee, there would be several conflicts that would need to be addressed by SFCJPA in adapting and working around the existing Substation and high voltage towers and lines.

The *San Francisco Bay Shoreline Adaptation Atlas* is a science-based framework for developing climate adaptation strategies that are "appropriate for our diverse shoreline settings and that take advantage of natural processes in the [San Francisco] Bay."[2] Accordingly, it contains an extensive analysis of sea level projections and potential adaptation measures around the entire San Francisco Bay, including East Palo Alto specifically. Entities including Marin County, San Mateo County, the MTC, and BCDC are already applying the *Adaptation Atlas* within their planning frameworks. The *Adaptation Atlas* importantly states that while ecotone levees may have some benefits over traditional flood risk management levees in terms of ecosystem function, in the "Policy Considerations" discussion (page 86) it states that ecotone levees are "largely untested," and "will require considerable volumes of material to construct, with high associated costs." Harvest believes this "experimental" method of addressing flood risk management and sea level rise may come at too high an economic and social cost, including losing sight of the needs and desires of the community and City of East Palo Alto, and providing the community with the open space and recreational amenities that they desire.

Harvest / SFCJPA Collaboration: Hybrid Levee Option

Prior to submitting our Pre-Application to the City of East Palo Alto in early 2020, Harvest met with the SFCJPA to discuss our proposed plans, and at that time, began a collaborative working partnership with the organization. It is critical that Harvest and the SFCJPA work together on the design, engineering, and eventual construction of the levee, as we are neighbors, and it will take close coordination and partnership to plan for and execute the development of The Landing and the SAFER Bay project.

In the spirit of this partnership, and with a shared goal of providing resiliency to coastal flooding and sea level rise as well as maximizing habitat and recreation improvements and benefits to the community, we have re-visited our site plan to explore the possibility of incorporating more gentle ecotone slopes into our proposed plans. As Note 3 in the NOP's Cross-Sections acknowledges, there are certain "constraints" that are unavoidable, and will necessitate a more traditional levee with a 2:1 slope in limited areas. However, for the majority of our property's waterfront, we are open to the possibility of including a 3:1 slope, and in some locations, a 7:1 slope. Please see attached *Exhibit 8: Hybrid Levee Option.*

We are proposing a 2:1 slope for two particular site-constrained areas of the site: 1) PG&E Cooley Landing substation pinch point (to the north); 2) Community park with emergency vehicle access to the Bay Trail (to the south). This area includes the children's playground, fitness areas, ½ court basketball court, seating areas. For these locations, a 2:1 sloped levee will allow both flood and sea level rise protection as well as the protection of critical infrastructure and community benefits. It is important to note that there is a single-family residence just south of our proposed community park area that would also be negatively impacted by a gentler Transition Zone; a 2:1 sloped levee is likely the best and only alternative for this property.

[2] San Francisco Estuary Institute, San Francisco Bay Shoreline Adaption Atlas, (April 2019), at page 13, available at: https://www.sfei.org/sites/default/files/toolbox/SFEI%20SF%20Bay%20Shoreline%20Adaptation%20Atlas%20April%202019_highres.pdf, [hereinafter Adaptation Atlas].

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Along the majority of our property's frontage, it may be possible to incorporate a 3:1 slope, at the expense of more generous landscaped seating areas, that are currently programmed for these areas. For those portions of our property that are less space constrained, our plan can accommodate a gentler 7:1 slope. This occurs in two locations: 1) adjacent to the public plaza and amphitheater area, and 2) community garden and dog park area. As noted below, it is critical to note that incorporating levee slopes of 3:1 to 7:1 will necessitate the levee's footprint to infringe on Harvest's property, and a form of easement or conveyance of property (via eminent domain or negotiated agreement) will be necessary.

As previously mentioned, up until one month ago, under the direction and guidance of the SFCJPA, our prior design was based upon a 2:1 levee slope. The Cross-Sections presented in the NOP present a number of challenges for our current site plan. In the spirit of partnership, Harvest has worked with its engineering and design team to create the hybrid levee option. This hybrid levee option appropriately and reasonably balances our property interests, community expectations for amenities and flooding, sea level rise and habitat preservation. It is important to note that Harvest will not be able to make any other adjustments to this revised site plan, as it already represents significant changes to our site plan. Additionally, we feel the SFCJPA will be pleased with this option's creation of additional wetland areas on Harvest's property (i.e., additional square footage of wetland areas) that do not currently exist along the shoreline.

Easements / Eminent Domain

One point that we would like to raise is that in the course of recent conversations regarding the potential levee alignments, we have heard no discussion of how or whether SFCJPA intends to seek fee purchase or permanent easements over the property, which would be necessary for the ultimate levee alignment, and which would only have higher costs in the event a more gentle 7:1 slope is selected for a larger area. Similarly, we have not heard whether such actions will be accomplished through condemnation (and whether SFCJPA is authorized by its Joint Powers Agreement to take such action) or negotiated agreements. Further, how will the significant costs of doing so be funded? We urge SFCJPA to consider and disclose these factors as part of the consideration of potential alignments.

Conclusion

Harvest greatly appreciates the opportunity to provide our comments on the NOP for the SAFER Bay project, proposed by the SFCJPA. We look forward to future dialogue and collaboration with the SFCJPA as the SAFER Bay project progresses. Our collective goals should be to provide resiliency to coastal flooding and sea level rise in East Palo Alto and Menlo Park, maximize habitat and recreation improvements, while ensuring that the East Palo Alto community's goals, aspirations, vision and needs are addressed and met at the highest level.

If you should have any questions or comments, please do not hesitate to reach out to us.

Sincerely,

Kim Diamond

Kim Diamond
Managing Director of Development
Harvest Properties

Attachment: Exhibit 8: Hybrid Levee Option

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Exhibit 8: Hybrid Levee Option



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2548 Mission Street
San Francisco, CA 94110
www.sherwoodengineers.com

CLIENT: HARVEST PROPERTIES

HYBRID LEVEE OPTION

EAST PALO ALTO HARVEST
EAST PALO ALTO, CALIFORNIA

NORTH 0 25' 50' 100'

June 6, 2022

RAVENSWOOD SHORES BUSINESS DISTRICT, LLC (RSBD)
PO Box 51862, Palo Alto CA 94303
Jeff Poetsch, President -
Phone - 650-207-4994 / email - jeffcp@earthlink.net

June 13, 2022

Ms. Tess Byler, Senior Project Manager
San Francisquito Creek Joint Powers Authority
2100 Geng Road, Suite 210
Palo Alto, CA 94303

Via e-mail - tbyler@sfcjpa.org

RE: Comments to the Notice of Preparation ("NOP") for the Strategy to Advance Flood Protection, Ecosystem and Recreations along San Francisco Bay Project Environmental Impact Report

Dear Ms. Byler:

The Ravenswood Shores Business District is a California limited liability company comprised of the majority of the landowners and businesses located in the 100-acre Ravenswood Redevelopment Area of East Palo Alto. Membership includes about seventeen corporate and non-profit property owners and was established to speak with one voice for the benefit of our membership. The organization works in partnership with the City and other agencies / stakeholders such as the SFCJPA to coordinate and support necessary infrastructure improvements in the Ravenswood area of East Palo Alto. Our members include ALL of the private property owners who will be directly impacted by the construction and maintenance of the proposed levee construction in the Ravenswood.

Pursuant to the April 22, 2022 Notice of Preparation ("NOP") for the Strategy to Advance Flood Protection, Ecosystems and Recreation (SAFER) along San Francisco Bay Environmental Impact Report, on behalf of the Ravenswood Shores Business District, I wanted to raise the following issues, comments, and concerns.

1. Project Objectives - Given the soil contamination levels in several of the sites both South of Bay Road and North of Bay Road, project objectives should include the enhancement of the environmental remediation requirements of these sites and insuring that SAFER Bay Project implementation does not expose additional contamination. Contaminated soil excavation should be avoided. Any proposed levee development should comply with the current remediation orders by Regional Water Quality Control Board, the Environmental Protection Agency, and the California Department of Toxic Substances.

2 Shoreline Protection -. Several Areas along both the South of Bay Road and North of Bay Road segments, will benefit from the proposed filling of the inboard areas to raise the overall site to elevations 16' feet. As such, the inboard area is not at any risk of "levee" failures. Consideration should be given in these areas for only minor additional enhancements of the outboard segments of the shoreline protection. An example of this is best outlined in Figures 3, 6 and 7, where there is only "fill" and no levee base excavation required.

San Francisquito Creek Joint Powers Authority
SAFER Bay Project - Notice of Preparation
June 11, 2022

3. Recreation - East Palo Alto, as an economically disadvantaged community, has limited access to park and other recreation spaces. While the implementation of the SAFER Bay Project, may in some locations enhance San Francisco Bay access, in other areas, the proposed levee may encroach on planned development of open space and other City amenities.

4. Impacts on University Village Neighborhood - Generally, the University Village area of East Palo Alto is low elevation. The alignment of the levee in this area will have significant impacts on both the residences that may abut the levee as well as storm water drainage considerations. No resident will want a 17-foot levee in their back yard. And the need for adequate storm drainage collection and storage must be considered as the University Village has the potential to become a "bath tub" if alignment issues are not considered fully.

5. Ecotone Levees - Where ecotone levees are being considered, a design that pushes into the wetland areas of the project should be considered. The ecotone levee provides a significant ecological benefit for the various species inhabiting the wetlands by providing refuge during storm and flooding events. However, this benefit should not be at the sole expense of the inbound land.

It is critical in evaluation of the SAFER Bay Project, that the multiple needs and concerns of the community, the residents, the landowners, the employees in the City of East Palo Alto are given appropriate consideration to the many environmental concerns including impacts on wetlands, other habitat and area species. There are complicated issues of environmental contamination, storm water drainage, recreational access, development community benefits that must be equitably considered in the development of this project specific and programmatic project Environmental Impact Report

Thank you for your consideration of these issues.

Sincerely,

Jeff Poetsch

Jeff Poetsch, President and Executive Director
Ravenswood Shores Business District

Comments to the Notice of Preparation for the SAFER Bay Project

Jeff Poetsch <jeffcp@earthlink.net>

Wed 6/15/2022 1:49 PM

To: Tess Byler <tbyler@sfcjpa.org>

Cc: Margaret Bruce <mbruce@sfcjpa.org>

Hi Tess - I wanted to augment my June 6 letter with 2 other issues that should be addressed in the consideration of the various options for the SAFER Bay EIR analysis

North of Bay Storm Drainage - As noted in my June 6 letter the University Village area (as well as some of the sites on Demeter, Pulgas and Tara are at low elevation. Currently storm drainage is accommodated in this area by a storm drainage outflows along Purdue (which also collects the norther portion of the storm drainage from Demeter, Pulgas and Tara, a separate drainage at exiting at the east end of Stevens and then another separate drainage exiting at the northeast end of Fordham. Clearly this storm drainage, which already experiences some flooding at storm events and king tides needs to be coordinated with the level alignment and potential storm water collection. What we definitely want to avoid is necessitating pump stations at each of these storm drainage outflows - which in turn require redundancy at a very high cost.

Utility Easements - As we know, the current utility easements - both PGE and EPASD are within the areas where levees may be developed. As we have discussed, relocating any of the high voltage electrical towers is prohibitively expensive. And making sure we can accommodate effectively the EPASD sewer line which currently runs adjacent to the Bay Trail, needs to be a high priority.

Thanks for noting these comments

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SAN FRANCISQUITO CREEK
JOINT POWERS AUTHORITY

May 19, SAFER Bay Scoping Meeting
Public Comments

Question	Asker Name	Answer
Will this project help with not having a need for flood insurance?	Anonymous Attendee	Answered live. The project scope includes submitting a request to FEMA for a Letter of Map Revision to remove properties from special flood hazard area.
Would you provide a link to the maps in this presentation?	Anonymous Attendee	Answered live. Yes. All of these slides are available on our website.
This is a comment not questions. It was stated that SAFER will work with the US Forest Service re. salt pond restoration. Correctly, it is the US Fish & Wildlife Service.	Eileen McLaughlin	Answered live. Yes. that's right. We know that! Thanks for catching that. We'll make that clear.
Feedback - on the lower right-hand corner, you may increase the size of the slide in edit mode to 100%	Marlene Santoyo	Answered live. Thank you for your suggestion.
It seems that the marsh located East of Hwy 84 and North of University has not revegetated very well? Is there a new way to recreate the marsh habitat?	Scott Marshall	Answered live. These are managed ponds and not tidal marsh.
Can you zoom in on the slides?	Virginia Portillo	We are. The system is only doing it a little at a time. Thanks!
The road proposed through pond SF2 is Federal land owned by the Don Edwards National Wildlife Refuge. Administrative law of National Wildlife Refuges authorize lands held for the primary purpose of protection of wildlife and habitat to public use. You must discuss this concept with USFWS staff.	Eileen McLaughlin	We are aware of the limitations. Under CEQA we need to analyze and disclose all potential impacts within our document.

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May 19, SAFER Bay Scoping Meeting
Public Comments

Question	Asker Name	Answer
East Palo Alto Engineering Division 1.) Since the newer Bay Road construction, I am wondering what type of wear if any that it might have in terms of construction traffic. 2.) How will this levee be maintained? I am assuming for long veg in terms of vegetation growth 3.) What environmental impacts will this have on the residents leading up to the 84 via the Dumbarton. 4.) What features would this leveee have that might be accommodating to the newer buildings that will exist within the very near future	Kevin Lewis	Because the project designs are still very preliminary, we can't answer these questions specifically. SFCJPA will continue to coordinate closely with the City on planning, design, construction, and maintenance issues.
Kevin and/or Tess 1.) Will this new trail have a portion within the 20ft wide travel a paved dedicated bike lane extended from the 84? 2.) Will there be any emergency ingress/egress of this new trail? If so, where would ingress/egress show within your design?	Kevin Lewis	SFCJPA will continue to coordinate closely with the City on design and construction issues.
Will the EIR include concerns about light pollution from new buildings?	Sheila Brady	The SAFER Bay project is not proposing any new buildings. The issues associated with light pollution would be evaluated by developers. Safety lighting on new Bay Trail segments that are constructed on top of levees may be evaluated in the SAFER EIR.
What is the sequence of projects?	Anonymous Attendee	Sequence of both design and construction are going to be based significantly by available funding. The actual construction schedule would be established by selected contractor.

SAN FRANCISQUITO CREEK
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May 19, SAFER Bay Scoping Meeting
Public Comments

Question	Asker Name	Answer
Once all parcels are removed from the flood plain, will there be no need any more to measure Base Flood Elevation and build only above it, for development planning/approval?	Grace Popple	After construction is completed, a Letter of Map Revision (LOMR) will be submitted to FEMA. The LOMR package will include relevant documentation, such as collected field data, engineering analyses and design, and operations and maintenance systems. FEMA will review the documentation to verify if it satisfies Title 44 of the Code of Federal Regulations Section 65.10. If the flood control system provides reasonable assurance that protection from the base flood exists, FEMA will accredit the levee system and the Special Flood Hazard Area will be modified to remove parcels from the floodplain. .
Thank you for engaging. How does your work on "loop road" interact with other public consultation and decision-making on whether and how to build this?	Grace Popple	Any decision on a loop road would be made in consultation with many entities including property owners, stakeholders, and the community. The City of East Palo Alto has commissioned a traffic study to evaluate traffic flow and results of this will also be considered.
Tess & Kevin 1 Because the Runnymede School is often heavily trafficked, what would be your approach/process to mitigate any conflict in terms of construction vehicles?2 2 Will the existing drainage ravine coming into the Runnymede area traveling towards Bay Road be widened much like our previous creek project?	Kevin Lewis	Design details will be worked out with the City of East Palo Alto, and other key stakeholders.
I have asthma and health complications how will that affect me?	Anonymous Attendee	We assume the question is in regard to potential air quality issues during construction. Construction activities and its impacts on several sensitive receptors will be analyzed in depth in the draft EIR.

SAN FRANCISQUITO CREEK
JOINT POWERS AUTHORITY

May 19, SAFER Bay Scoping Meeting
Public Comments

Question	Asker Name	Answer
In the previous project a trail was dug up unexpectedly and we had to scramble to get it fixed. How will we avoid similar events this time?	Grace Popple	Answered Live Posting and notices for trails closures and alternative route were posted as required during the completed creek project. Closer engagement with residents and the bicycling community is planned as part of SAFER.
I have PTSD and already suffer from the traffic on Willow and getting to my home on Haven, how will this effect it? is it going to be worst?	Anonymous Attendee	The project will have temporary construction traffic (trucks and equipment) during construction, but there will be no long term change in traffic flow on Willow as a result of this project.
To Kevin: Please provide documents showing that the Federal government has agreed in any way to hand over lands in SF2 to anyone.	Eileen McLaughlin	Answered live. This appears to be a misunderstanding. The SFCJPA did not state and would not state that lands would be 'handed over' to the SFCJPA. We are coordinating closely with the South Bay Salt Ponds Project and the Don Edwards refuge regarding mutually beneficial habitat restoration and sea level rise resiliency actions.
If the levees are increased in height a few feet, how will the local creeks drain into the bay during a high tide and a heavy rain event? Yes, I will contact you directly in the future.	Scott Marshall	SAFER will address high tides, rising seas and the overall effects on local hydrology, including high precipitation events and rising groundwater. We recognize the need to preserve creek and storm drain conveyance and will consider appropriate engineering solutions.
Kevin & Tess Please look to me in terms of construction travel, which streets via approach and exiting the project.	Kevin Lewis	Answered Live. We will convene a project management team as we get closer to construction that you will be invited to be on. Many of these issues will need to be worked out through cooperative planning.

SAN FRANCISQUITO CREEK
JOINT POWERS AUTHORITY

May 19, SAFER Bay Scoping Meeting
Public Comments

Question	Asker Name	Answer
Our wildlife is already suffering from Facebook building and how is this helping?	Anonymous Attendee	The SAFER Bay project's effects on wildlife will be evaluated in the DEIR. Overall, the project is being planned to have an overall positive long-term effect on habitat that will be beneficial to local flora and fauna.
In the previous project there were very limited months of the year in which construction could occur because of the breeding cycles of various endangered animals and birds. What are the construction months that are possible for this area?	Grace Popple	There will likely be similar restricted, specific work windows due to the presence of special status species in the area.
In your slide about issues to be investigated in the EIR I don't see any mention about wildlife, particularly threatened species and migratory birds. Will that be addressed?	Davena Gentry	Yes, wildlife will be evaluated in the DEIR. Overall, the project is being planned to have an overall positive long-term effect on habitat that will be beneficial to threatened species and migratory birds.
Will there will be opportunities for the public to help with the replanting of the salt ponds?	Sheila Brady	Answered live. Yes, likely with our educational outreach partner at Grassroots Ecology.
Would you be able to point to what you are talking about?	Anonymous Attendee	Answered live
Hi there - Long-time listener, first-time caller...Where are all of these questions from the other attendees? I only see two from Eileen McLaughlin. I'd love to see what everyone else is asking.	Dave Halsing	Answered Live Dave - I have no idea why you can't see all of the questions!!!
The Belle Haven neighborhood suffers very similar impacts and will need some mitigation.	Pam D Jones	Answered live Agreed. Belle Haven will be addressed at a project level under the City of Menlo Park's FEMA BRIC SAFER Bay project.
Thank-you!	Pam D Jones	Thank you, Pam
Thank you for getting momentum behind the effort to protect us from floods, and for sharing the plans and taking our questions!	Grace Popple	Thank you, Grace

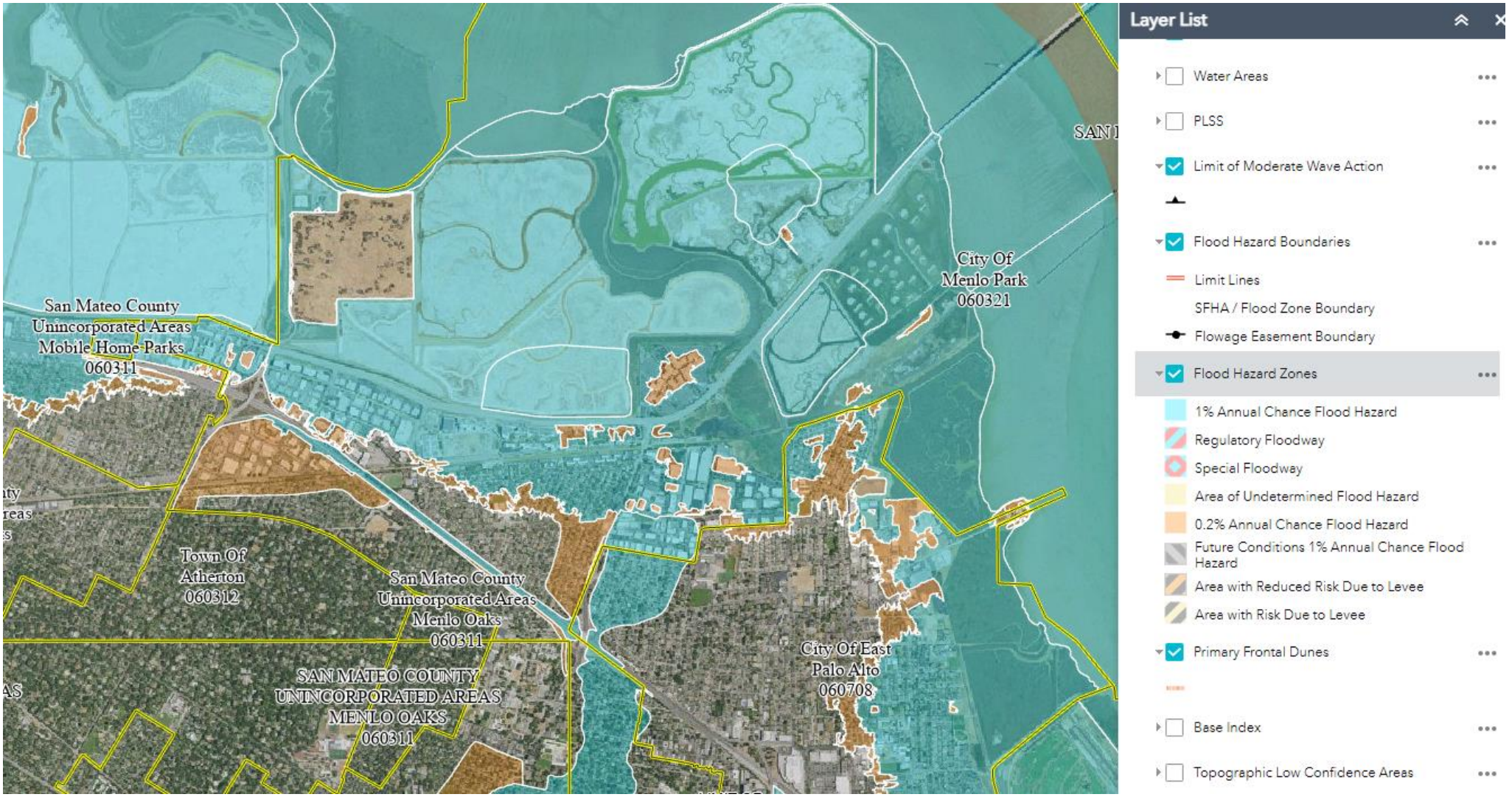
SAN FRANCISQUITO CREEK
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Public Comments

Question	Asker Name	Answer
@SheliaBrady Save the Bay is always doing restoration work, check them out!	Davena Gentry	No response needed
Please tell Sheila Brady that Save The Bay also plans and organizes volunteer revegetation efforts at Ravenswood.	Dave Halsing	No response needed

Appendix FEMA

FEMA Flood Hazard Zones Near SAFER Bay Project



SOURCE: Federal Emergency Management Agency, FEMA's National Flood Hazard Layer (NFHL) Viewer, June 2024. Accessed September 25, 2024.

Appendix INFRA

Disposition of Utilities and Other Encroachments

Table INFRA-1: Disposition of Utilities and Other Encroachments for SAFER Bay Project Alignment

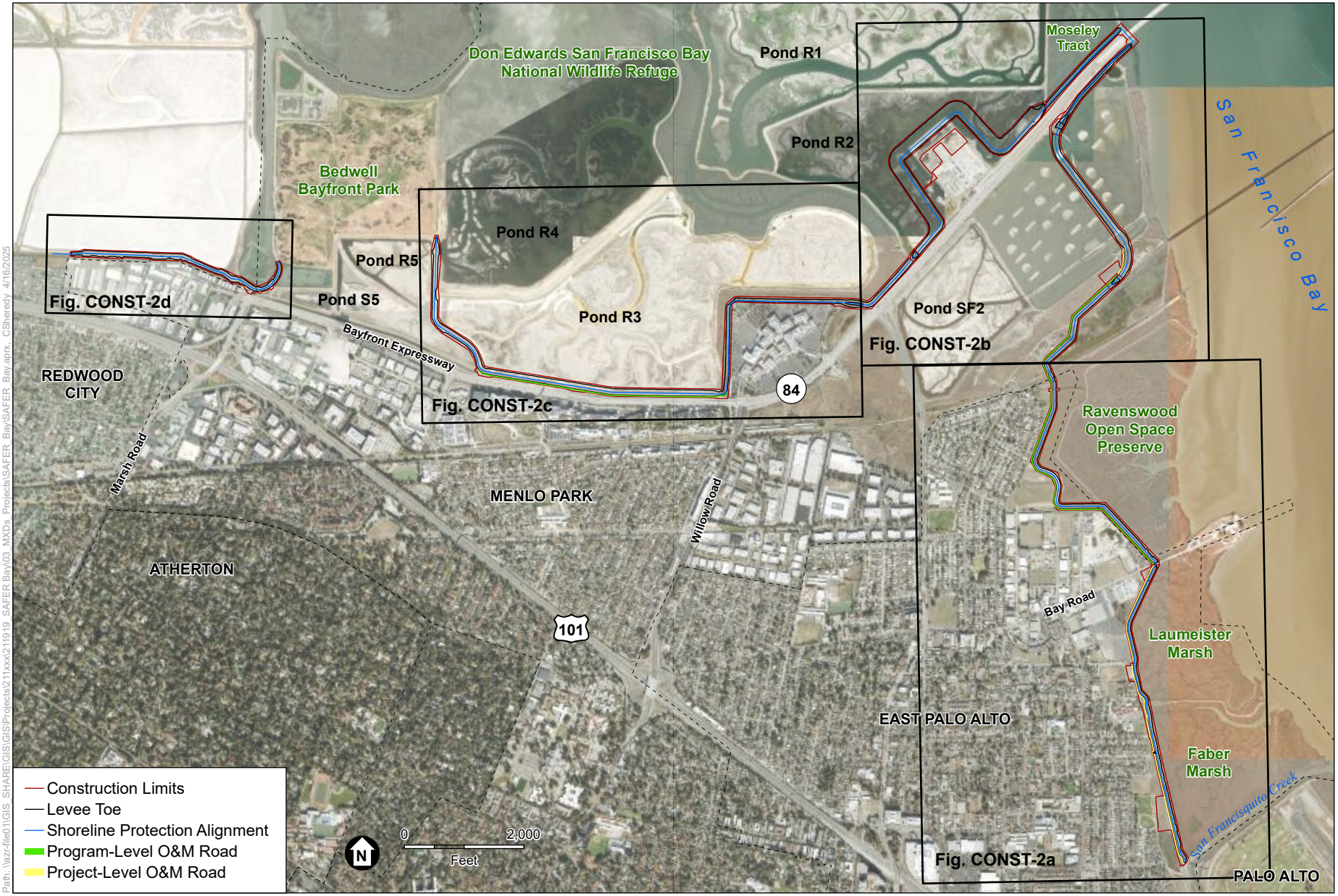
Highlighted rows indicate: no change (protect in place), evaluated at a project level, and evaluated at a program level.

Reach	Stationing*	Encroachment	Description	Action
So. of Bay Rd	South of 0+00	O'Connor Pump Station	A stormwater pump station which penetrates the San Francisquito Creek West Levee	Protect in Place
So. of Bay Rd	0+00 to 5+50	Drainage Basin	Earthen drainage basin appx. 45-ft from landside toe	Protect in Place
So. of Bay Rd	5+50 to 27+75	Runnymede Drainage Ditch	Existing earthen stormwater drainage ditch along the landside toe	Generally Protect in Place, Relocation segment
So. of Bay Rd	0+00 to 24+60	Sewer Line and Manholes	Sewer line and manholes appx. 20- to 45-feet from the landside toe	Relocate
So. of Bay Rd	11+60	Landside Bay Trail Access Ramp	10-foot-wide access ramp from Martin Luther King Park	Replace
So. of Bay Rd	19+05	Landside Bay Trail Access Ramp	10-foot-wide access ramp from Cypress Street	Replace
So. of Bay Rd	21+95	Landside Foot Path and Ditch Crossing	Earthen foot path from Garden Street with non-engineered ditch crossing	Remove
So. of Bay Rd	21+10 to 52+50	Landside Chain Link Fence	Chain link fence with barbed wire at landside toe from Garden St access to Bay Road	Replace
So. of Bay Rd	22+00 to 52+50	Overhead Transmission Lines	Overhead electrical transmission lines adjacent to and crossing the alignment	Protect in Place
So. of Bay Rd	25+43	Transmission Tower	Electrical transmission tower at landside toe	Protect in Place with retaining wall
So. of Bay Rd	27+80	Bay Trail Access Point	Paved access ramp from Runnymede Street with post and cable fence	Replace
So. of Bay Rd	27+80	Culvert	Culvert under ramp to be designed at future design phase following hydraulic analyses	Replace
So. of Bay Rd	28+00 to 39+00 (appx.)	Tidal Channel	Tidal channel through Laumeister Marsh, follows natural path north of drainage structure.	Replace per Habitat Restoration Basis of Design
So. of Bay Rd	29+00	Drainage Structure	Concrete drainage structure on west side of drainage ditch	Protect in Place
So. of Bay Rd	33+28	Transmission Tower	Electrical transmission tower at bayside toe	Protect in Place
So. of Bay Rd	33+28	Bayside Access Point	Transmission tower access path, ditch crossing, and ramp to embankment crown	Replace
So. of Bay Rd	34+50	Bay Trail Access Point	10-foot-wide access path from Weeks Street with bollard access control	Replace
So. of Bay Rd	34+74 to 42+00	Capped Containment Cell	Capped containment cell for contaminated material abutting landside construction limit, slurry wall at northside of property, Land Use Control area	Protect in Place
So. of Bay Rd	42+27	Transmission Tower	Electrical transmission tower abutting landside construction limit	Protect in Place
So. of Bay Rd	45+00 to 51+00	Cooley Landing Substation	Electrical substation	Protection in Place
So. of Bay Rd	47+85	Transmission Tower	Electrical transmission tower abutting landside construction limit	Protect in Place
No. of Bay Rd	52+38	Bay Road	Bay Road intersects Bay Trail, bollards for access control, striped pedestrian crossing across Bay Road	Replace
No. of Bay Rd	53+00	Bay Trail Entrance	Public trail entrance from Bay Road crosswalk and sidewalks, access control bollards, signage, and trash receptacles for public use.	Replace
No. of Bay Rd	53+31	Bay Trail Bridge	10-foot-wide, 70-foot-long Bay Trail footbridge spanning the drainage ditch.	Replace access point, remove bridge
No. of Bay Rd	53+64	Access Control Gate	Wire fence with swing gate for public access control at end of footbridge.	Replace
No. of Bay Rd	53+64 to 73+00	Tidal Channel	Landside tidal channel within or abutting footprint.	Relocate
No. of Bay Rd	73+40	Storm Drain Penetration	Storm drain penetration at curve in alignment, penetration remains within part of footprint.	Replace
No. of Bay Rd	82+20	Drainage Ditch	Drainage ditch crosses alignment.	Remove and Regrade Landside
No. of Bay Rd	95+33	Bay Trail	Raised wooden walkway segment of Bay Trail crosses alignment (to be designed under future phases)	Replace
No. of Bay Rd	98+50	Railroad	Railroad track crosses alignment.	Protect-in-place
No. of Bay Rd	101+20 to 101+80	Overhead Transmission Lines	Overhead electrical transmission lines	Protect-in-place
No. of Bay Rd	102+37 to 103+18	Fencing (SFPUC Ravenswood Station)	Barrier fencing associated with SFPUC Ravenswood Pump Station (pending additional coordination with SFPUC management).	Relocate
Dumbarton App.	102+90	Concrete Headwall	Concrete headwall within footprint, likely with associated pipe	Replace
Dumbarton App.	107+00 to 108+00	Above-ground Pipe Crossings	Two above ground pipes cross alignment, associated with SFPUC Ravenswood Station.	Replace or Demolish
Dumbarton App.	124+00	Viewing Platform	Public viewing platform located appx. 180- feet west of STA 124+00.	Relocate (part of habitat project, not flood control embankment)
Dumbarton App.	125+25	Ravenswood Pond Complex Segment of the Bay Trail (SF2 Trail)	Aggregate base Bay Trail segment constructed on the crown of an earthen embankment bordering Pond SF2. Access to the segment is from the main Bay Trail Highway Path and is discontinuous from the rest of the trail.	Relocate
Dumbarton App.	148+00 to 151+56	Bay Trail Highway Path	Paved 8-foot-wide Bay Trail which crosses under the Dumbarton Bridge and extends southwest past the Project alignment.	Replace
Dumbarton App.	148+00 to 151+56	Highway 84 Frontage Road	Paved 2-lane, 24-foot-wide frontage road.	Protect in Place
Dumbarton App.	151+56 to 187+00	Highway 84 Frontage Road	Paved 2-lane frontage road.	Protect in Place

Reach	Stationing*	Encroachment	Description	Action
Dumbarton App.	151+56 to 163+30	Concrete Drainage Ditch within Project footprint	Concrete-lined drainage ditch along Bay Trail and frontage road, culverts under Pond SF2 access ramps.	Replace
Dumbarton App.	168+65	Viewing Platform	Concrete viewing platform and access path cross alignment.	Relocate
Dumbarton App.	169+28 to 170+12	Dumbarton Bridge	Dumbarton Bridge, 2 concrete abutments, 1 set of concrete bridge piers, 2 lane paved frontage road.	Protect in Place
Dumbarton App.	171+00	Pumphouse	Pumping facility intersects alignment. Chain link fence, gate, bollards at frontage road entrance.	Protect in Place
Substation and Marsh Restoration	200+00 to 235+00	Ravenswood Substation	Electrical substation, owned by PG&E.	Protect in Place
Substation and Marsh Restoration	189+30	Concrete Retaining Wall	Concrete and Sheet Pile wall on the east side of the Pond R2 berm.	Partial Removal
Substation and Marsh Restoration	189+30	Access Gate	Pipe gate controlling access from Highway 84 frontage road to pond maintenance road	Relocate; requires coordination with owner
Substation and Marsh Restoration	190+00	Concrete Retaining Wall	Concrete wall on the west side of the Pond R2 berm.	Remove
Substation and Marsh Restoration	190+00 to 199+00	Earthen Access Road	Pond maintenance road intermittently abutting footprint.	Protect in Place
Substation and Marsh Restoration	201+00	Overhead Transmission Lines	Overhead transmission lines crossing the alignment.	Protect in Place
Substation and Marsh Restoration	212+60	Elevated Walkway	Elevated walkway for transmission tower access intersects alignment.	Replace
Substation and Marsh Restoration	212+60	Overhead Transmission Lines	Overhead transmission lines crossing the alignment.	Protect in Place
Substation and Marsh Restoration	221+60	Elevated Walkway	Elevated walkway for transmission tower access intersects alignment.	Replace
Substation and Marsh Restoration	221+60	Overhead Transmission Lines	Overhead transmission lines crossing the alignment.	Protect in Place
Substation and Marsh Restoration	236+00 to 243+30	Earthen Access Road	Pond maintenance road within footprint.	Relocate
Substation and Marsh Restoration	242+20	Water Line	Water line crossing from Highway 84 into Pond R2, exposed along pond access road.	Relocate
Substation and Marsh Restoration	243+30	Access Gate	Pipe gate controlling access from Highway 84 frontage road to pond maintenance road, north of footprint.	Protect in Place
Tech Campus	243+00 to 253+50	Earthen Access Road	Pond maintenance road within footprint.	Relocate
Tech Campus	248+00 to 251+00	Drainage Ditch	SBSPRP Pond R3 drainage ditch within Project footprint.	Relocate
Tech Campus	256+40	Drainage Ditch	SBSPRP Pond R3 drainage ditch crosses Project footprint.	Relocate
Tech Campus	259+00 to 292+00	Pedestrian and Bike Path	Approximately 8-foot-wide paved public path on earthen embankment bordering the tech campus parking lot.	Replace
Tech Campus	265+50	Bench	Bench for public use.	Replace
Tech Campus	271+75	Access Ramp	Earthen landside ramp.	Replace
Tech Campus	274+38	Access Ramp	Earthen landside ramp.	Replace
Tech Campus	276+87	Bench	Bench for public use.	Replace
Tech Campus	277+00 to 278+90	Viewing Platform	Wooden viewing platform and access path on bayside of alignment.	Replace
Tech Campus	280+80	Access Ramp	Earthen landside ramp.	Replace
Tech Campus	290+50	Access Ramp	Paved landside ramp.	Replace
Tech Campus	292+00	Access Ramp	Paved landside ramp.	Replace
Tech Campus	292+50	Drainage Ditch	SBSPRP Pond R3 drainage ditch within Project footprint.	Replace
Tech Campus	293+00	Access Road	Pond maintenance road within footprint.	Replace
Bayfront Expressway	293+00 to 333+50	Pedestrian and Bike Path	Approximately 8-foot-wide paved public path between Bayfront Expressway (Highway 84) and Pond R3 abuts landside Project footprint.	Protect in Place
Bayfront Expressway	294+00 to 333+50	Water Line	Water line exposed along Pond R3 limit.	Relocate
Bayfront Expressway	343+00	Water Control Structure	Concrete control structure with gated conveyance channel through existing berm between Ponds R3 and S5, rock slope protection on both sides of berm.	Replace
Bayfront Expressway	356+80	Water Control Structure	Concrete control structure with gated conveyance channel through existing berm between Ponds R4 and R5, rock slope protection on both sides of berm.	Replace
Bedwell-Bayfrt Pk	500+00 to 507+50	Marsh Road	Paved 2-lane public road.	Replace
Bedwell-Bayfrt Pk	502+70	Water Control Structure	Culvert between ponds	Improve with Future Design
Bedwell-Bayfrt Pk	504+25	Water Control Structure	Concrete structure controlling flow within the Bayfront Canal, includes 2 gates.	Improve with Future Design
Bedwell-Bayfrt Pk	505+50	Utility Pole	Wooden utility pole with overhead transmission lines, guy wires.	Relocate
Bedwell-Bayfrt Pk	506+60	Box Culvert	20-foot-wide concrete box culvert which conveys water under Marsh Road.	Improve with Future Design
Bedwell-Bayfrt Pk	507+00	Utility Pole	Wooden utility pole with overhead transmission lines, guy wires.	Relocate
Bedwell-Bayfrt Pk	507+65	Chain Link Fence and Gate	Fence and gate controlling access to Silicon Valley Clean Water Pump Station from Marsh Road.	Replace
Bedwell-Bayfrt Pk	507+65 to 509+62	Menlo Park Pump Station	Alignment extends along north limit of paved pump station yard.	Improve with Future Design
Bedwell-Bayfrt Pk	506+70 to 510+50	Water Line	Waterline within levee footprint	Replace
Bedwell-Bayfrt Pk	509+60 to 509+95	Bayfront Canal Bridge	12-foot-wide access bridge over Bayfront Canal, provides access between pond maintenance roads and Menlo Park Pump Station.	Replace
Marsh Road	510+50	Drainage Pipe	Drainage pipe penetrates existing berm, pipe appears to extend from pumping station, across the canal, through berm into pond.	Replace
Marsh Road	510+50 to 542+34	Water Line	Water line exposed along pond limit.	Replace
Marsh Road	510+50 to 542+34	Bayfront Canal	Canal abuts landside of Project footprint.	Protect in Place

SOURCE: HDR Inc., 2024. Design Documentation Report, SAFER Bay Project, Tables 3 through 6. September 6.
* Stationing is based on HDR, Inc.'s SAFER Bay Project 10% Programmatic Plans (July 2024) and 30% Design Submittals (June and July 2024).

Appendix CONST
Construction Limits

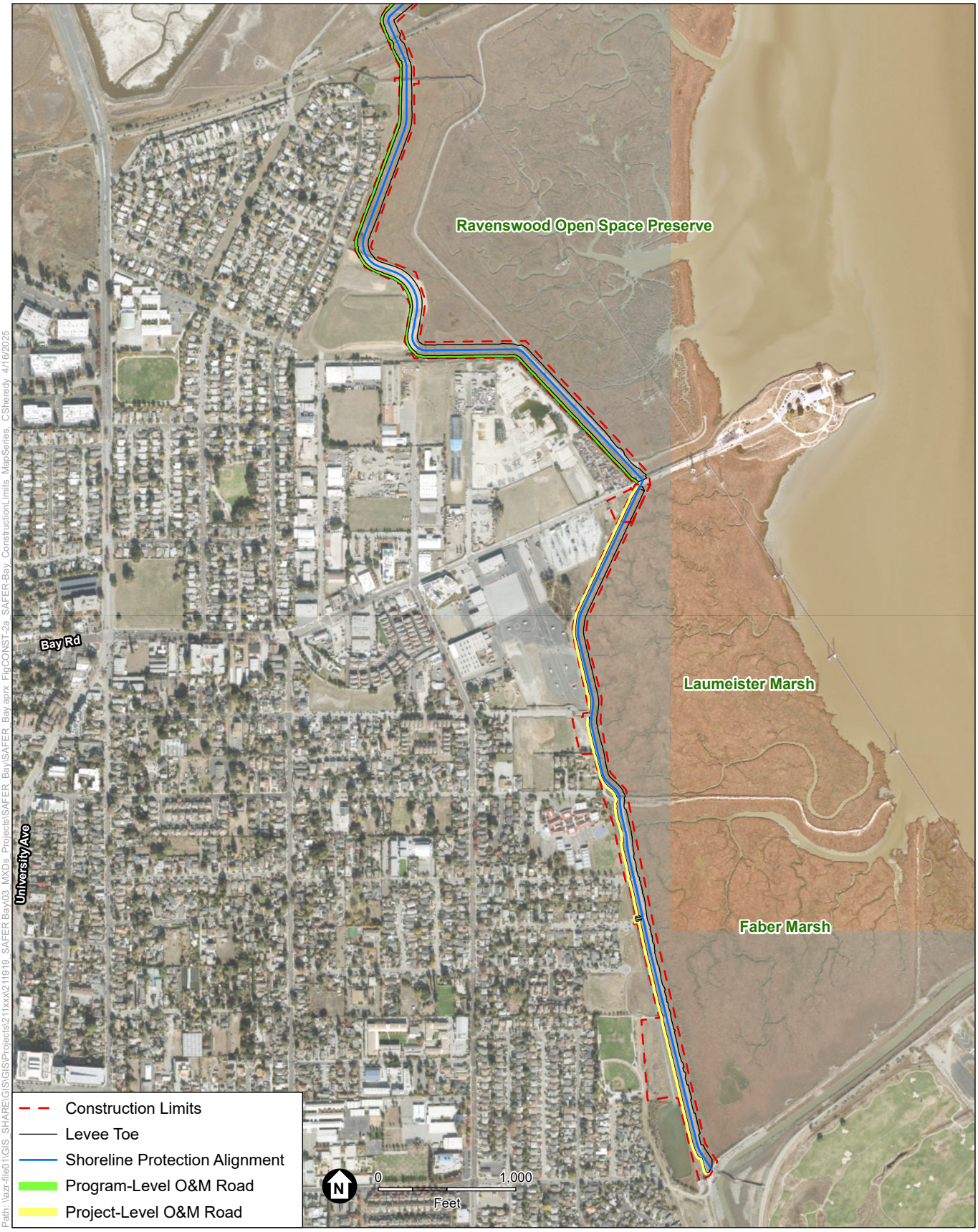


SOURCES: NAIP Imagery, 2024; HDR, 2024; ESA, 2025

SAFER Bay Project

Figure CONST-1
Construction Limits for Shoreline Protection Features - Overview

ESA



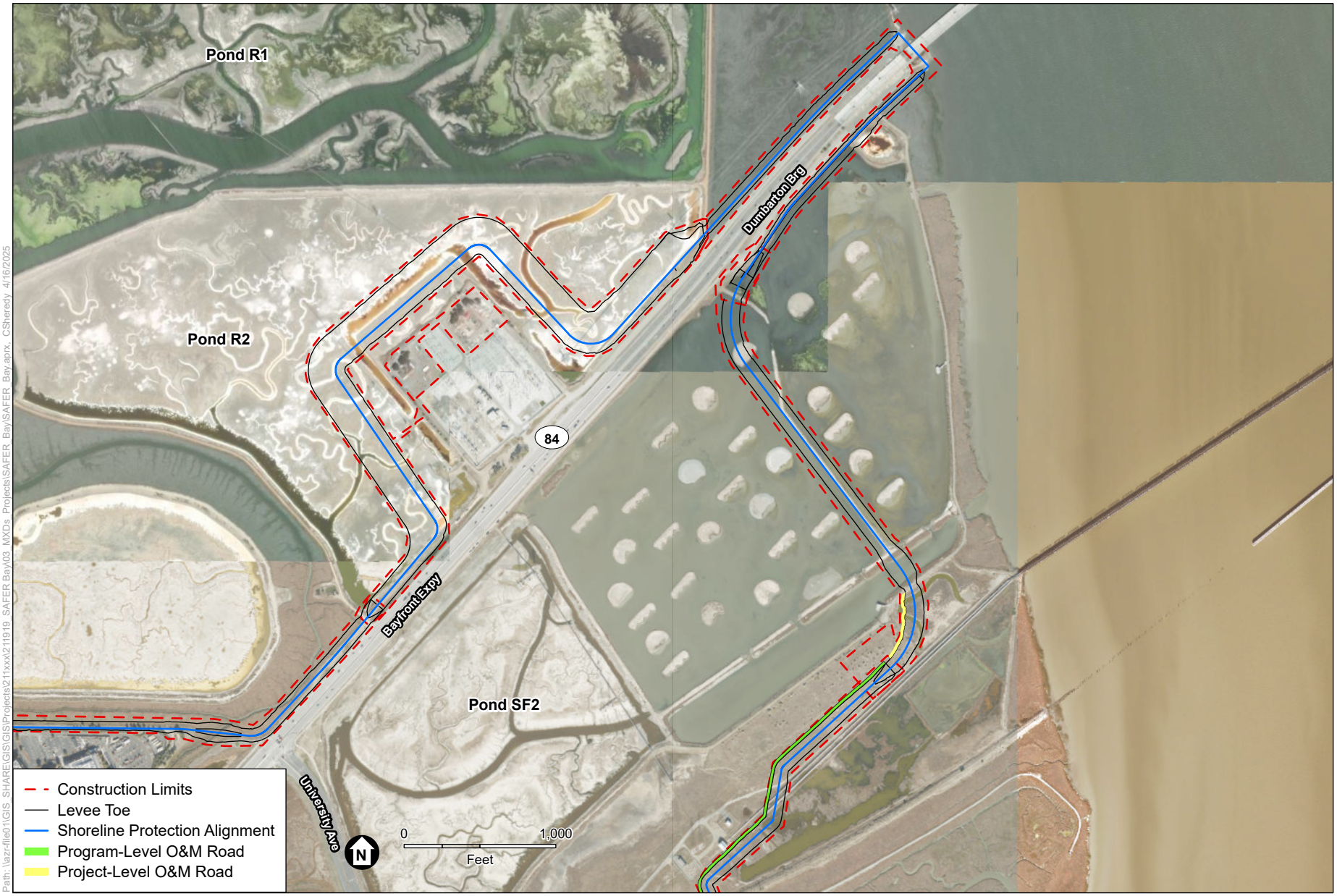
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SOURCES: NAIP Imagery, 2024; HDR, 2024; ESA, 2025

SAFER Bay Project

Figure CONST-2a
Construction Limits for Shoreline Protection Features - South of Bay Road and North of Bay Road Reaches

ESA

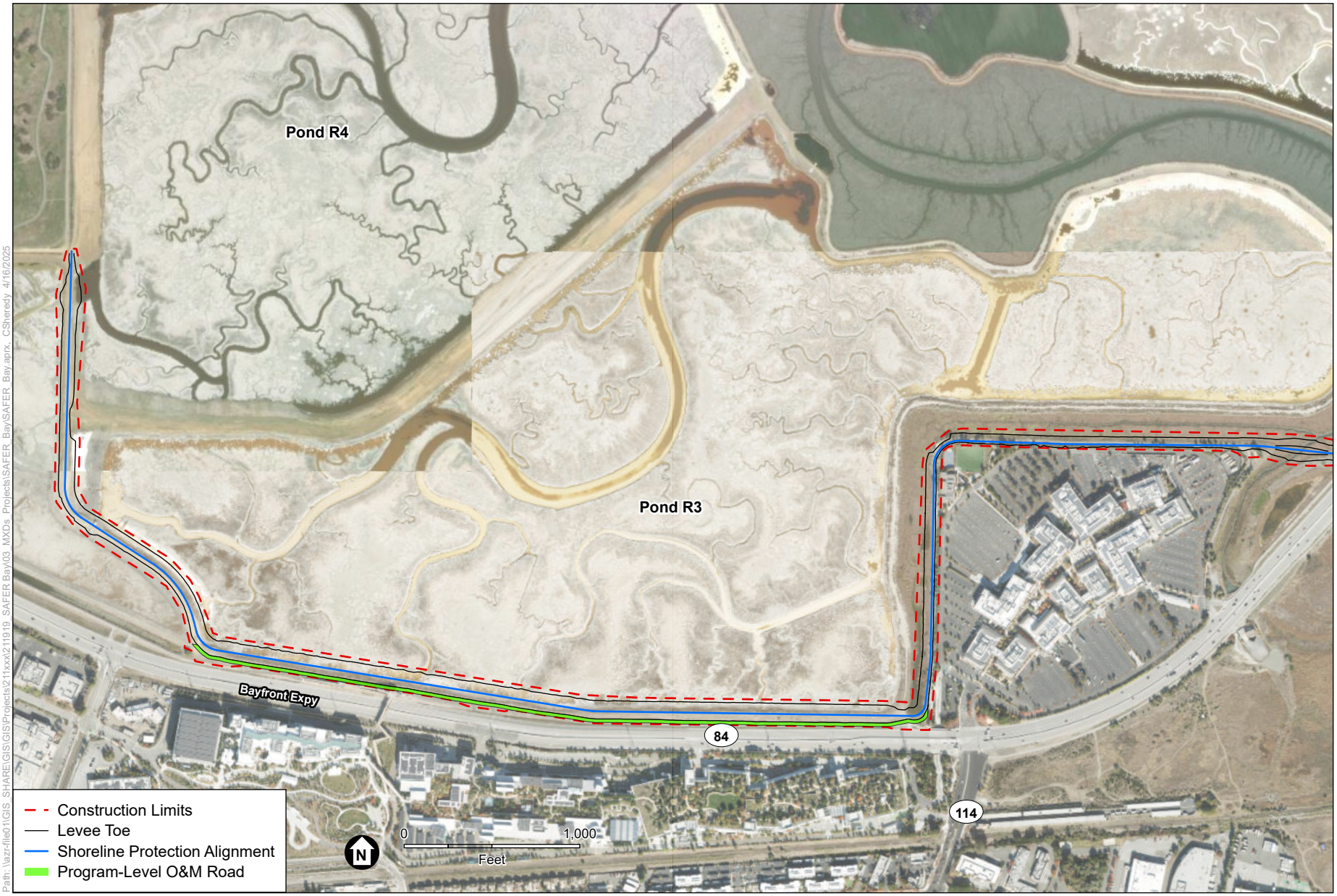


SOURCES: NAIP Imagery, 2024; HDR, 2024; ESA, 2025

SAFER Bay Project

Figure CONST-2b
Construction Limits for Shoreline Protection Features - Dumbarton Approach, Substation and Marsh Restoration, and Tech Campus Reaches

ESA



SOURCES: NAIP Imagery, 2024; HDR, 2024; ESA, 2025

SAFER Bay Project

Figure CONST-2c
Construction Limits for Shoreline Protection Features - Tech Campus and Bayfront Expressway Reaches

ESA



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SOURCES: NAIP Imagery, 2024; HDR, 2024; ESA, 2025

SAFER Bay Project

Figure CONST-2d
Construction Limits for Shoreline Protection Features - Bedwell Bayfront Park and Marsh Road Reaches

ESA

Appendix PGE

PG&E Transmission Tower Information

PGE-1 Introduction and Background

Transmission towers that are owned and operated by Pacific Gas and Electric Company (PG&E) provide power to the San Francisco Bay Peninsula and are supported by footings placed along the south San Francisco Bay shoreline, including in the vicinity of the former salt ponds proposed for tidal restoration as part of the Strategy to Advance Flood Protection, Ecosystems and Recreation along San Francisco (SAFER) Bay Project (SAFER Bay Project or Project). The Project would restore tidal action to former salt ponds R1 and R2, located north of State Route 84 at the western end of Dumbarton Bridge. Approximately 14 PG&E transmission towers have footings within Ponds R1 and R2, where the restoration of tidal actions could expose PG&E tower footings to corrosion. PG&E would evaluate the potential for the SAFER Bay Project to affect the transmission towers in accordance with applicable design and building standards. If PG&E determined that improvements to the towers were needed, the California Public Utilities Commission (CPUC), as the lead agency under the California Environmental Quality Act (CEQA), would evaluate the potential environmental impacts associated with those improvements in CEQA documentation prior to approving that project.

The purpose of this appendix is to present and disclose a description of potential improvements that might be needed to the towers, based on prior restoration projects, and to present an evaluation of potential impacts associated with such improvements. If PG&E were to conclude that improvements to the footings of the transmission towers are necessary due to Project implementation, the information in this appendix could assist the CPUC in CEQA evaluations. The timing of tower footing upgrades (i.e., whether they would need to proceed pond breaching) would be determined by PG&E. As indicated below, many of the mitigation measures identified in Chapter 3 of this EIR could mitigate potentially significant impacts from such improvements.

The proposed SAFER Bay Project restoration features are like the activities undertaken as part of the South Bay Salt Pond Restoration Project (SBSPRP), which included restoring tidal action to former salt ponds southeast of the SAFER Bay Project area (among other locations). Tidal restoration for the SBSPRP required reinforcement of PG&E tower footings where tidal action was restored to ensure that high tides would not corrode the metal tower structure above the concrete footings. The tower reinforcement description below was developed based on information in the 2016 environmental impact statement/environmental impact report (EIS/EIR) for the SBSPRP Phase 2[1] and the Clean Water Act Section 401 Water Quality Certification for the SBSPRP Phase 2.

PGE-2 Tower Reinforcement Description

Based on previous work completed for SBSPRP Phase 2, which included evaluation of restoration of tidal action to Pond A2W, PG&E could determine that transmission towers in Ponds R1 and R2 could require reinforcement up to the high tide line to account for the introduced tidal flux. The concrete pedestals on which the towers stand could be reinforced with additional concrete placed atop the existing concrete and higher on the tower legs to protect the metal portions of the towers from the corrosive action of saltwater from the highest tides, or by other methods to be determined by PG&E. If concrete is placed atop the

[1] U.S. Fish and Wildlife Service/California State Coastal Conservancy, South Bay Salt Pond Restoration Project Final Environmental Impact Statement/Report, Phase 2, April 2016.

existing concrete on the tower footings then no fill of waters of the U.S. or state would occur. Previous tower reinforcements conducted for the SBSPRP Phase 2 included:

- Construction of temporary cofferdams around each tower,
- Dewatering from within the coffer-dammed area,
- Pouring concrete into forms on the foundations, and
- Removal of the cofferdams and any other temporary structures required for the work.

Up to 14 towers in Ponds R1 and R2 could require reinforcement. The staging areas for the SAFER Bay project that are within the Ravenswood PG&E substation (shown on Figure 2-26 in Chapter 2, *Project Description*) could be used as staging areas for reinforcement of the tower footings. It is assumed that the same fleet mix available for the Project would be used for the tower reinforcements (i.e., construction equipment would have Tier 4 rated engines where possible) and that Project proponents would be responsible for ensuring that any changes to PG&E towers would be implemented as part of restoration of Ponds R1 and R2.

PGE-3 Impact Analysis

The impact analysis presented below is generally organized by impact topic based on the CEQA Guidelines Appendix G checklist. Topics requiring only a brief discussion are addressed together in Section PGE-3.4. The discussions in this section identify potential impacts that could occur should PG&E require the tower reinforcements, and identify mitigation measures, as relevant, to address the potential impacts. Where relevant, the impact analysis references mitigation measures identified in Chapter 3 of this EIR.

PGE-3.1 Biological Resources

As discussed in EIR Section 3.4, Biological Resources, the Project would convert Ponds R1 and R2 to tidal marsh. Consequently, tower reinforcements could be required within these two ponds. Tower reinforcements would not change existing PG&E maintenance and operations activities or modify tower height or configuration; impacts related to tower reinforcements would therefore result primarily from construction activity. Ponds R1 and R2 are currently managed pond habitat, which support the following species: Congdon's tarplant; western snowy plover nesting; waterfowl and shorebird foraging and roosting; special-status fish; colonial nesting birds; other nesting birds; harbor seals; and sea lions. Tidal salt marsh and tidal open water in adjacent Ravenswood Slough and Mosely Tract may support special-status marsh birds; special-status fish; harbor seals; and sea lions. Temporary (construction) impacts of the PG&E tower reinforcements would be similar to construction impacts in Ponds R1 and R2 identified for other components, as discussed below. Refer to EIR Section 3.4 for the full text of mitigation measures mentioned below.

Special-status species – Congdon's tarplant. Ponds R1 and R2 are identified as habitat for Congdon's tarplant. Staging associated with reinforcement of PG&E towers may affect Congdon's tarplant through direct disturbance of plants; disturbance, modification, or destruction of habitat; and damage to underground root structures. In addition, equipment use, vehicular traffic, worker foot traffic, off-trail pedestrian foot traffic, mowing, and weed whacking may result in the injury, mortality, altered growth, or reduced seed set of individual Congdon's tarplants. Creation of access routes and staging areas may result

in the mechanical or physical removal of vegetation and modification of the seed bank due to grading. These potential impacts would be reduced with implementation of Mitigation Measure BIO-1 (Worker Environmental Awareness Training), Mitigation Measure BIO-2 (Preconstruction Survey), Mitigation Measure BIO-3 (Congdon's Tarplant Avoidance and Minimization), Mitigation Measure BIO-4 (Compensatory Mitigation for Congdon's Tarplant), and Mitigation Measure BIO-5 (Prevention of Spread or Mobilization of Plant Pathogens and Invasive Plants).

Special-status species – Fish. Installation of sheet pile walls associated with Ponds R1 and R2 restoration has the potential to result in the following impacts on special-status fish species: fish stranding if fish are trapped in excavated areas or within coffer dams around work areas; physiological stress, including injury or mortality, for some individual fish resulting from rescue and relocation efforts for stranded fish; and potential injury or mortality to fish in the area resulting from noise and vibration disturbance during use of heavy equipment in or near aquatic habitats. These potential impacts would be reduced with implementation of Mitigation Measure BIO-1 (Worker Environmental Awareness Training); Mitigation Measure BIO-7 (Minimize Underwater Noise Impacts); Mitigation Measure BIO-8 (Seasonal Restrictions); and Mitigation Measure BIO-9 (Fish Exclusion at Dewatering Sites).

Special-status species – Western snowy plover. Construction impacts on western snowy plovers associated with tower reinforcements would be considered significant due to the potential for direct injury or mortality of adults, eggs, or chicks, and increased disturbance that may lead to abandonment of eggs or chicks or increased predation. These potential impacts would be reduced with implementation of Mitigation Measure BIO-12 (Western Snowy Plover Weekly Surveys and Nest Avoidance Buffers); Mitigation Measure BIO-1 (Worker Environmental Awareness Training); Mitigation Measure BIO-13 (Western Snowy Plover Daily Preactivity Surveys and Monitoring): and Mitigation Measure BIO-14 (General Wildlife Impact Minimization Measures).

Special-status species – Marsh birds. Construction activities in Ponds R1 and R2 could adversely affect special-status marsh birds in adjacent tidal marsh along Ravenswood Slough and the Mosely Tract. These potential impacts would be reduced with implementation of Mitigation Measure BIO-1 (Worker Environmental Awareness Training); Mitigation Measure BIO-14 (General Wildlife Impact Minimization Measures); Mitigation Measure BIO-15 (Preconstruction Surveys for Special-Status March Birds); and Mitigation Measure BIO-16 (Breeding Season Habitat Buffers).

Colonial nesting birds. Use of heavy equipment during site preparation/mobilization, demolition, and shoreline protection construction could result in injury or mortality of adults, eggs, and/or chicks of colonial nesting birds. All construction activities could cause disruption of foraging behavior, and may also cause disturbance to breeding adults, potentially resulting in abandonment of active nests and/or chicks. Direct injury and increased disturbance around colonial nesting birds during construction could be potentially significant. These potential impacts would be reduced with implementation of Mitigation Mitigation Measure BIO-1 (Worker Environmental Awareness Training); Mitigation Measure BIO-14 (General Wildlife Impact Minimization Measures); Measure BIO-17 (Preconstruction Surveys); and Mitigation Measure BIO-18 (Breeding Season Colony Buffers for Colonial Nesting Birds).

Other nesting birds. Construction activity for the tower reinforcements would occur in an area used for foraging or nesting by other nesting birds. These potential impacts would be reduced with implementation

of Mitigation Measure BIO-1 (Worker Environmental Awareness Training); Mitigation Measure BIO-14 (General Wildlife Impact Minimization Measures); Mitigation Measure BIO-19 (Preconstruction Surveys for Other Nesting Birds); and Mitigation Measure BIO-20 (Breeding Season Nest Buffers for Other Nesting Birds).

Harbor seals and sea lions. In-water work such as installation of sheet piles associated with tower reinforcements could cause auditory injury in the absence of sound reduction measures. These potential impacts would be reduced with implementation of Mitigation Measure BIO-1 (Worker Environmental Awareness Training); Mitigation Measure BIO-7 (Minimize Underwater Noise Impacts); and Mitigation Measure BIO-14 (General Wildlife Impact Minimization Measures).

Cumulative Impacts. Construction of PG&E tower reinforcements along with other cumulative projects affecting the same habitats in the project vicinity could result in significant cumulative biological resources impacts; however, implementation of mitigation measures identified above would reduce the Project's contribution to the cumulative impacts. The tower reinforcements as described above would not have substantial permanent impacts on biological resources and therefore would not pose a cumulatively considerable contribution to significant permanent cumulative impacts.

PGE-3.2 Cultural Resources

Given that the PG&E tower reinforcements have a limited footprint and a shorter construction duration compared to SAFER Bay Project components, the potential impacts on cultural resources are expected to be the same as or reduced relative to the Project components detailed in EIR Chapter 2, *Project Description*. The PG&E tower reinforcements are in an area where evaluations have shown no significant built environment historical resources, and any known archaeological resources or human remains are either not eligible for listing or not present. Prior to any ground-disturbing activities, Mitigation Measure CUL-1 (Project-level Cultural Resources Assessment), Mitigation Measure CUL-2 (Monitoring Plan), described in Section 3.5, Cultural Resources, would be developed and implemented. If any cultural resources are inadvertently discovered during ground disturbance, Mitigation Measure CUL-3 (Inadvertent Discovery of Cultural Resources) must be implemented, which requires that work halt in the vicinity of a find and proper procedures are followed to document, evaluate, and mitigate any potential impacts to the resource. With the implementation of these mitigation measures, potential impacts to archaeological resources would be less than significant.

Additionally, while unlikely, the discovery of human remains during Project implementation cannot be entirely discounted. Impacts to previously undiscovered human remains would be potentially significant. This impact would be reduced to a less-than-significant level by implementing Mitigation Measure CUL-4 (Inadvertent Discovery of Human Remains), which requires that work halt in the vicinity of a find and proper procedures are followed to appropriately treat any potential impacts.

PGE-3.3 Hydrology and Water Quality

Water Quality. Placement of concrete on top of the existing concrete footings would require surrounding the foundations of each tower with a cofferdam and dewatering the excluded area prior to concrete work. Removing water from the work area prior to concrete work would reduce the risk of releasing pollutants into San Francisco Bay waters; however, the discharge from dewatering could contain contaminants from

construction equipment which, if released to San Francisco Bay waters, could degrade water quality. The Regional Water Quality Control Board issued a Clean Water Act Section 401 Water Quality Certification for the SBSPRP Phase 2 and included the following measure related to dewatering at the transmission towers:

> **Dewatering at Transmission Towers**
>
> During PG&E transmission tower reinforcements, water pumped from within cofferdams surrounding the tower footings should be handled consistent with specifications prepared by a qualified SWPPP developer to avoid the release of construction-related contaminants in non-stormwater discharges to San Francisco Bay. The specifications should include but not be limited to monitoring of water quality during dewatering operations and appropriate storage, handling, and disposal procedures should water quality be found to exceed the objectives specified in the San Francisco Bay Basin Plan during monitoring.

The RWQCB would be expected to include a similar measure in permits should improvements to the tower footings be needed. Implementation of this measure would avoid degrading water quality by testing and appropriately disposing of water pumped from around the transmission tower footings.

Groundwater. The PG&E towers are in San Francisco Bay, a location where groundwater recharge does not occur. The tower reinforcements would not substantially increase impervious area or require permanent use of groundwater such that groundwater supplies would be affected. There would be no impact related to groundwater supplies or sustainable groundwater management.

Erosion or Siltation Effects. The tower reinforcements are assumed to include placement of concrete on top of existing foundations within Ponds R1 and R2. The tower reinforcements are assumed to be designed prevent towers from damage once tidal action restored and thus not alter existing flow patterns around towers. Impacts associated with tower reinforcements would be less than significant.

Flooding or Redirecting Flood Flows. The tower reinforcements would not substantially increase impervious area or the proportion of San Francisco Bay filled by tower footings. The towers are not located in a floodway, would not impede or redirect flood flows, and are not connected to stormwater drainage systems. Furthermore, the Project includes levees that would protect developed areas from coastal flooding. Therefore, the tower reinforcements would have no impact related to flooding or redirecting flood flows.

Release of Pollutants due to Inundation. Tower reinforcement would not change existing maintenance activities or storage of potential water quality pollutants associated with maintenance activities. Tower reinforcements would avoid future damage to the towers by increasing the height of concrete coverings over metal structures, preventing damage and potential release of pollutants. Construction of the tower reinforcements would involve installing coffer dams and dewatering the area surrounding each tower footing, and work would occur during seasonal windows which are generally during the dry season. With implementation of Mitigation Measure BIO-10 described in EIR Section 3.4, impacts would be less than significant.

Conflict with or Obstruct Existing Plans. Operation of the reinforced towers would not conflict with or obstruct the San Francisco Bay Basin Plan or any sustainable groundwater management plans. During

construction, with implementation of Mitigation Measure BIO-10 described in EIR Section 3.4, tower reinforcement work would not conflict with the basin plan because the release of pollutants into San Francsico Bay would be avoided. As discussed previously, the tower reinforcements would not increase impervious area or pump groundwater and therefore would not obstruct implementation of a sustainable groundwater management plan.

PGE.3-4 Other topics

Table PGE-1 presents the impact analysis and rationale for other topics.

TABLE PGE-2
IMPACT ANALYSIS FOR OTHER TOPICS

Topic	Impact Analysis
Aesthetic Resources	The PG&E tower reinforcements would not substantially alter the appearance of existing towers. The dominant scenic features of the landscape, such as the expansive views of San Francisco Bay, the East Bay hills, and the marsh and salt ponds, would not be affected by the reinforcements. The tower reinforcements would not introduce additional lighting or glare. Impacts would be less than significant.
Air Quality	The PG&E tower reinforcements would likely require less than two months to complete. Therefore, it is unlikely that the PG&E tower reinforcements would generate construction emissions that would exceed applicable thresholds. Impacts would be less than significant.
Tribal Cultural Resources	The PG&E tower reinforcements are not anticipated to cause a substantial adverse change in the significance of tribal cultural resources, as no known culturally significant sites have been identified within the Project area. Prior to ground-disturbing activities, Mitigation Measure CUL-1 (Project-level Cultural Resources Assessment), Mitigation Measure CUL-2 (Monitoring Plan) would be developed and implemented. Any inadvertent discoveries during construction would be addressed through Mitigation Measures CUL-3 (Inadvertent Discovery of Cultural Resources) and CUL-4 (Inadvertent Discovery of Human Remains), as described in EIR Section 3.5. Impacts would be less than significant with mitigation.
Energy	During construction, the PG&E tower reinforcements equipment would employ fuel-efficient Tier 4 equipment where possible, ensuring that energy use remains modest and temporary relative to overall regional consumption. Routine operational maintenance for the PG&E towers is assumed to remain unchanged. Impacts would be less than significant.
Geology, Soils, and Paleontology	The existing PG&E towers are designed to withstand earthquake and wind loads, and the proposed reinforcements are designed to strengthen these towers. As such, there would be no impact related to geology and soils. Tower reinforcements would involve excavation in young bay mud which has low paleontological sensitivity. Impacts would be less than significant.
Greenhouse Gas Emissions	Construction of the PG&E tower reinforcements would generate greenhouse gas emissions for approximately two months and would not alter existing maintenance activities. Tower reinforcements would not alter existing land use. The Bay Area Air Quality Management District considers construction-phase emissions to have a less-than-significant impact; therefore, impacts would be less than significant.
Hazards, Hazardous Materials, and Wildfire	Ponds R1 and R2 are not on the Cortese list. Tower reinforcements would not increase the height of existing towers. There are no roadways used for emergency evacuation near the existing towers in Ponds R1 and R2, and Ponds R1 and R2 are not in or near a State Responsibility Area or very high fire hazard severity zone. Thus, impacts would be less than significant.
Land Use	The PG&E tower reinforcements would reinforce the existing towers and would not change existing land use in the area, nor would the reinforcements physically divide an established community. There would be no impact related to land use.
Noise and Vibration	The nearest sensitive receptors to the towers in Ponds R1 and R2 are workers at the Meta building, located approximately 3,000 feet southwest. Given the distance, construction activities at the towers would not alter ambient noise. Additionally, since there would be no change to operational activities, there would be no change in permanent ambient noise. Impacts would be less than significant.
Population and Housing	The PG&E tower reinforcements would involve a brief, temporary construction period, hiring a workforce primarily drawn from the local and regional labor pool. With no changes to ongoing

	operations, there is no anticipated increase in long-term population. Impacts would be less than significant.
Recreation	None of the PG&E tower reinforcement sites in Ponds R1 and R2 are located adjacent to established recreational trails. Access to tower reinforcement activities would continue to utilize the same routes currently used for operations and maintenance, and there would be no change in operations associated with the PG&E tower reinforcements. Impacts would be less than significant.
Transportation	During construction, the PG&E tower reinforcement work would occur in Ponds R1 and R2, where there is no designated vehicle, pedestrian, or bicycle access. Vehicles and equipment will access the area via the existing PG&E substation or nearby roadway, eliminating the need for temporary road closures or changes in circulation. There would be no change in operations associated with the PG&E tower reinforcements. Transportation impacts would be less than significant.

Appendix AIR

Air Quality, Greenhouse Gases, and Energy Calculations

SAFER Bay
Construction Emissions and Energy Calculations

CONSTRUCTION EMISSIONS SUMMARY

Source	Construction Year	CAP Emissions (pounds per year)				GHG Emission (MT/year)			
		ROG	NOx	Ex PM_{10}	Ex $PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e
South of Bay Road									
Construction Equipment	2030	63.4	661.8	11.8	11.8	280.9	0.0	0.0	281.9
	2031	62.4	483.8	11.9	11.9	286.7	0.0	0.0	287.7
Worker Trips	2030	46.8	25.8	0.5	0.4	45.8	0.0	0.0	46.3
	2031	28.0	15.2	0.3	0.3	28.3	0.0	0.0	28.6
Vendor Trips	2030	10.0	412.8	4.4	4.2	119.1	0.0	0.0	124.7
	2031	7.1	288.0	3.1	3.0	83.2	0.0	0.0	87.1
Haul Trips	2030	4.1	170.7	1.8	1.7	49.3	0.0	0.0	51.6
	2031	2.5	101.9	1.1	1.1	29.4	0.0	0.0	30.8
North of Bay Road									
Construction Equipment	2031	70.5	400.2	14.1	14.1	336.0	0.01	0.00	337.2
	2032	8.3	43.0	1.7	1.7	39.6	0.00	0.00	39.7
Worker Trips	2031	32.4	17.6	0.3	0.3	32.8	0.00	0.00	33.1
	2032	6.6	3.5	0.1	0.1	6.8	0.00	0.00	6.8
Vendor Trips	2031	4.0	161.3	1.7	1.7	46.6	0.00	0.01	48.8
	2032	1.0	42.2	0.5	0.4	12.2	0.00	0.00	12.8
Haul Trips	2031	56.1	2285.1	24.8	23.7	1740.4	0.00	0.27	1822.2
	2032	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.0
Dumbarton Approach (Railroad to SR 84)									
Construction Equipment	2029	4.7	24.7	0.9	0.9	22.7	0.00	0.00	22.8
	2030	70.0	364.2	14.0	14.0	335.5	0.01	0.00	336.6
Worker Trips	2029	4.6	2.2	0.0	0.0	4.4	0.00	0.00	4.4
	2030	50.6	27.9	0.5	0.5	49.6	0.00	0.00	50.1
Vendor Trips	2029	0.3	10.8	0.1	0.1	3.1	0.00	0.00	3.3
	2030	3.1	129.0	1.4	1.3	37.2	0.00	0.01	39.0
Haul Trips	2029	3.3	139.7	1.5	1.4	40.2	0.00	0.01	42.1
	2030	49.0	2019.6	21.6	20.6	582.8	0.00	0.09	610.2
Dumbarton Approach (SR 84 Crossing)									
Construction Equipment	2032	7.6	55.5	1.5	1.5	35.2	0.00	0.00	35.4
	2033	70.9	709.5	13.0	13.0	314.0	0.01	0.00	315.1
Worker Trips	2032	7.9	4.2	0.1	0.1	8.1	0.00	0.00	8.2
	2033	46.0	28.3	0.5	0.4	48.3	0.00	0.00	48.8
Vendor Trips	2032	0.4	15.2	0.2	0.2	4.4	0.00	0.00	4.6
	2033	5.6	224.3	2.5	2.4	64.9	0.00	0.01	67.9
Haul Trips	2032	1.2	49.8	0.5	0.5	14.4	0.00	0.00	15.1
	2033	10.3	408.6	4.5	4.3	118.2	0.00	0.02	123.7
Substation and Marsh Restoration									
Construction Equipment	2029	27.8	179.4	5.4	5.4	130.0	0.01	0.00	130.4
	2030	167.6	928.0	33.3	33.3	797.2	0.03	0.01	799.9
Worker Trips	2029	8.5	4.0	0.1	0.1	8.2	0.00	0.00	8.2
	2030	64.8	35.7	0.6	0.6	63.5	0.00	0.00	64.1
Vendor Trips	2029	0.6	26.9	0.3	0.3	7.7	0.00	0.00	8.1
	2030	3.2	133.3	1.4	1.4	38.5	0.00	0.01	40.3
Haul Trips	2029	9.1	381.2	4.0	3.8	109.8	0.00	0.02	114.9
	2030	102.1	4210.4	45.0	43.0	1215.0	0.00	0.19	1272.1

Construction Year	Unit	CAP Emissions				GHG Emission (MT/year)			
		ROG	NOx	Ex PM_{10}	Ex $PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e
South of Bay Road									
2030	pounds/year	124.3	1271.0	18.5	18.2	495.1	0.01	0.03	504
2031	pounds/year	100.0	889.0	16.4	16.2	427.6	0.01	0.02	434
2030	workdays	187							
2031	workdays	110							
2030	pounds/day	0.7	6.8	0.1	0.1				
2031	pounds/day	0.9	8.1	0.1	0.1				
North of Bay Road									
2031	pounds/year	163.0	2864.2	40.9	39.7	2155.8	0.02	0.29	2241
2032	pounds/year	15.9	88.7	2.2	2.2	58.5	0.00	0.00	59
2031	workdays	231							
2032	workdays	58							
2031	pounds/day	0.7	12.4	0.2	0.2				
2032	pounds/day	0.3	1.5	0.04	0.04				
Dumbarton Approach (Railroad to SR 84)									
2029	pounds/year	12.9	177.4	2.6	2.5	70.4	0.0	0.0	73
2030	pounds/year	172.7	2540.7	37.5	36.4	1005.1	0.0	0.1	1036
2029	workdays	64							
2030	workdays	199							
2029	pounds/day	0.2	2.8	0.0	0.0				
2030	pounds/day	0.9	12.8	0.2	0.2				
Dumbarton Approach (SR 84 Crossing)									
2032	pounds/year	17.1	124.7	2.3	2.2	62.2	0.0	0.0	63
2033	pounds/year	132.8	1370.8	20.5	20.1	545.3	0.0	0.0	555
2032	workdays	65	workdays						
2033	workdays	188	workdays						
2032	pounds/day	0.3	1.9	0.0	0.0				
2033	pounds/day	0.7	7.3	0.1	0.1				
Substation and Marsh Restoration									
2029	pounds/year	46.0	591.5	9.8	9.6	255.6	0.0	0.0	262
2030	pounds/year	337.6	5307.5	80.3	78.3	2114.1	0.0	0.2	2176
2029	workdays	64							
2030	workdays	190							
2029	pounds/day	0.7	9.2	0.2	0.2				
2030	pounds/day	1.8	27.9	0.4	0.4				

Tech Campus									
Construction Equipment	2031	86.2	512.9	17.1	17.1	407.8	0.02	0.00	409.2
	2032	9.6	211.4	1.4	1.4	32.5	0.00	0.00	32.6
Worker Trips	2031	68.5	35.3	0.6	0.6	69.2	0.00	0.00	69.8
	2032	13.9	8.3	0.1	0.1	14.3	0.00	0.00	14.5
Vendor Trips	2031	5.6	229.8	2.5	2.4	66.4	0.00	0.01	69.5
	2032	1.9	78.4	0.9	0.8	22.6	0.00	0.00	23.7
Haul Trips	2031	43.3	1765.2	19.1	18.3	509.7	0.00	0.08	533.7
	2032	1.1	43.2	0.5	0.5	12.5	0.00	0.00	13.1
Bayfront Expressway									
Construction Equipment	2032	93.0	211.4	1.4	1.4	32.5	0.00	0.00	32.6
	2033	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.0
Worker Trips	2032	35.4	18.9	0.3	0.3	36.6	0.00	0.00	37.0
	2033	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.0
Vendor Trips	2032	3.1	123.7	1.4	1.3	35.7	0.00	0.01	37.4
	2033	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.0
Haul Trips	2032	18.9	761.0	8.3	8.0	219.8	0.00	0.03	230.1
	2033	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.0
Bedwell Bayfront Park/Marsh Road									
Construction Equipment	2031	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2032	5.4	56.8	1.0	1.0	23.9	0.0	0.0	24.0
	2033	27.9	379.6	4.8	4.8	115.8	0.0	0.0	116.2
Worker Trips	2031	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2032	5.8	3.1	0.1	0.1	6.0	0.0	0.0	6.1
	2033	23.3	14.3	0.3	0.2	24.4	0.0	0.0	24.7
Vendor Trips	2031	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2032	1.0	39.3	0.4	0.4	11.4	0.0	0.0	11.9
	2033	3.3	133.0	1.5	1.4	38.5	0.0	0.0	40.3
Haul Trips	2031	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2032	3.6	143.1	1.6	1.5	41.3	0.0	0.0	43.3
	2033	0.6	22.2	0.2	0.2	6.4	0.0	0.0	6.7
Marsh Road									
Construction Equipment	2033	1.5	7.9	0.3	0.3	7.3	0.00	0.00	7.3
	2034	1.5	7.8	0.3	0.3	7.2	0.00	0.00	7.2
Worker Trips	2033	9.0	5.5	0.1	0.1	9.4	0.00	0.00	9.5
	2034	2.2	1.3	0.0	0.0	2.4	0.00	0.00	2.4
Vendor Trips	2033	1.2	48.9	0.5	0.5	14.2	0.00	0.00	14.8
	2034	0.4	16.8	0.2	0.2	4.9	0.00	0.00	5.1
Haul Trips	2033	5.5	218.8	2.4	2.3	63.3	0.00	0.01	66.2
	2034	1.8	70.9	0.8	0.8	20.5	0.00	0.00	21.5
Pond Restoration									
Construction Equipment	2029	142.8	1211.6	26.9	26.9	648.5	0.0	0.0	650.8
	2030	208.9	1086.3	41.8	41.8	1001.0	0.0	0.0	1004.5
	2031	359.1	1867.5	71.8	71.8	1721.3	0.1	0.0	1727.2
Worker Trips	2029	6.9	3.3	0.1	0.1	6.6	0.0	0.0	6.7
	2030	39.4	21.7	0.4	0.4	38.6	0.0	0.0	39.0
	2031	9.5	5.2	0.1	0.1	9.6	0.0	0.0	9.7
Vendor Trips	2029	0.8	31.8	0.3	0.3	9.1	0.0	0.0	9.6
	2030	4.5	185.4	2.0	1.9	53.5	0.0	0.0	56.0
	2031	1.1	46.4	0.5	0.5	13.4	0.0	0.0	14.0
Haul Trips	2029	13.8	577.7	6.1	5.8	166.4	0.0	0.0	174.2
	2030	20.4	840.3	9.0	8.6	242.5	0.0	0.0	253.9
	2031	3.1	125.0	1.4	1.3	36.1	0.0	0.0	37.8

Tech Campus									
2031	pounds/year	203.6	2543.2	39.3	38.4	1053.1	0.0	0.1	1082
2032	pounds/year	26.5	341.3	2.8	2.7	81.9	0.0	0.0	84
2031	workdays	219							
2032	workdays	9							
2031	pounds/day	0.9	11.6	0.2	0.2				
2032	pounds/day	2.9	37.9	0.3	0.3				
Bayfront Expressway									
2032	pounds/year	150.4	1115.0	11.4	10.9	324.6	0.0	0.0	337
2033	pounds/year	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
2032	workdays	240							
2033	workdays	0							
2032	pounds/day	0.6	4.6	0.0	0.0				
2033	pounds/day	0.0	0.0	0.0	0.0				
Bedwell Bayfront Park/Marsh Road									
2031	pounds/year	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
2032	pounds/year	15.8	242.4	3.0	3.0	82.7	0.0	0.0	85
2033	pounds/year	55.1	549.1	6.7	6.6	185.1	0.0	0.0	188
2031	workdays	65							
2032	workdays	72							
2033	workdays	199							
2031	pounds/day	0.0	0.0	0.0	0.0				
2032	pounds/day	0.2	3.4	0.0	0.0				
2033	pounds/day	0.3	2.8	0.0	0.0				
Marsh Road									
2033	pounds/year	17.2	281.2	3.4	3.2	94.1	0.0	0.0	98
2034	pounds/year	5.9	96.9	1.3	1.3	35.0	0.0	0.0	36
2033	workdays	114							
2034	workdays	25							
2033	pounds/day	0.2	2.5	0.0	0.0				
2034	pounds/day	0.0	0.0	0.0	0.0				
Pond Restoration									
2029	pounds/year	164.2	1824.3	33.4	33.1	830.7	0.0	0.0	841
2030	pounds/year	273.1	2133.8	53.1	52.6	1335.6	0.0	0.1	1353
2031	pounds/year	372.9	2044.1	73.8	73.7	1780.5	0.1	0.0	1789
2029	workdays	91							
2030	workdays	313							
2031	workdays	51							
2029	pounds/day	1.8	20.0	0.4	0.4				
2030	pounds/day	0.9	6.8	0.2	0.2				
2031	pounds/day	7.3	40.1	1.4	1.4				
		2407.0	26396.8	459.3	451.0	12993.0	0.3	1.0	13298.0

Construction Year	Unit	CAP Emissions				GHG Emission (MT/year)			
		ROG	NOx	Ex PM_{10}	Ex $PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e
All Reaches									
2029	pounds/year	58.9	768.9	12.4	12.1	326.1	0.0	0.0	334
2030	pounds/year	634.6	9119.3	136.3	132.9	3614.3	0.1	0.3	3717
2031	pounds/year	466.6	6296.4	96.7	94.3	3636.5	0.1	0.4	3758
2032	pounds/year	225.7	1912.2	21.7	21.0	609.9	0.0	0.1	629
2033	pounds/year	205.1	2201.1	30.6	29.9	824.5	0.0	0.1	841
2034	pounds/year	5.9	96.9	1.3	1.3	35.0	0.0	0.0	36
2029	workdays	64							
2030	workdays	313							
2031	workdays	313							
2032	workdays	314							
2033	workdays	313							
2034	workdays	25							
2029	pounds/day	0.9	12.0	0.2	0.2				
2030	pounds/day	2.0	29.1	0.4	0.4				
2031	pounds/day	1.5	20.1	0.3	0.3				
2032	pounds/day	0.7	6.1	0.1	0.1				
2033	pounds/day	0.7	7.0	0.1	0.1				
2034	pounds/day	0.2	3.9	0.1	0.1				
Pond Restoration									
2029	pounds/year	164.2	1824.3	33.4	33.1	830.7	0.0	0.0	841
2030	pounds/year	273.1	2133.8	53.1	52.6	1335.6	0.0	0.1	1353
2031	pounds/year	372.9	2044.1	73.8	73.7	1780.5	0.1	0.0	1789
2029	workdays	91							
2030	workdays	313							
2031	workdays	51							
2029	pounds/day	1.8	20.0	0.4	0.4				
2030	pounds/day	0.9	6.8	0.2	0.2				
2031	pounds/day	7.3	40.1	1.4	1.4				
		2407.0	26396.8	459.3	451.0	12993.0	0.3	1.0	13298.0

Construction Year	Unit	CAP Emissions				GHG Emission (MT/year)			
		ROG	NOx	Ex PM_{10}	Ex $PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e
All Project Components									
2029	pounds/year	223.1	2593.2	45.8	45.2	1156.7	0.0	0.1	1175
2030	pounds/year	907.7	11253.0	189.4	185.5	4949.9	0.1	0.4	5070
2031	pounds/year	839.5	8340.5	170.4	168.0	5417.0	0.1	0.4	5546
2032	pounds/year	225.7	1912.2	21.7	21.0	609.9	0.0	0.1	629
2033	pounds/year	205.1	2201.1	30.6	29.9	824.5	0.0	0.1	841
2034	pounds/year	5.9	96.9	1.3	1.3	35.0	0.0	0.0	36
2029	workdays	91							
2030	workdays	313							
2031	workdays	313							
2032	workdays	314							
2033	workdays	313							
2034	workdays	25							
2029	pounds/day	2.5	28.5	0.5	0.5				
2030	pounds/day	2.9	36.0	0.6	0.6				
2031	pounds/day	2.7	26.6	0.5	0.5				
2032	pounds/day	0.7	6.1	0.1	0.1				
2033	pounds/day	0.7	7.0	0.1	0.1				
2034	pounds/day	0.2	3.9	0.1	0.1				
		2407.0	26396.8	459.3	451.0	12993.0	0.3	1.0	13298.0

CONSTRUCTION EQUIPMENT EMISSIONS

Reach	Construction Year	CAP Emissions (pounds per year)				GHG Emission (MT/year)			
		ROG	NOx	Ex PM_{10}	Ex $PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e
South of Bay Road	2030	63.4	661.8	11.8	11.8	280.9	0.0	0.0	281.9
	2031	62.4	483.8	11.9	11.9	286.7	0.0	0.0	287.7
North of Bay Road	2031	70.5	400.2	14.1	14.1	336.0	0.0	0.0	337.2
	2032	8.3	43.0	1.7	1.7	39.6	0.0	0.0	39.7
Dumbarton Approach (Railroad to SR 84)	2029	4.7	24.7	0.9	0.9	22.7	0.0	0.0	22.8
	2030	70.0	364.2	14.0	14.0	335.5	0.0	0.0	336.6
Dumbarton Approach (SR 84 Crossing)	2032	7.6	55.5	1.5	1.5	35.2	0.0	0.0	35.4
	2033	70.9	709.5	13.0	13.0	314.0	0.0	0.0	315.1
Substation and Marsh Restoration	2029	27.8	179.4	5.4	5.4	130.0	0.0	0.0	130.4
	2030	167.6	928.0	33.3	33.3	797.2	0.0	0.0	799.9
Tech Campus	2031	86.2	512.9	17.1	17.1	407.8	0.0	0.0	409.2
	2032	9.6	211.4	1.4	1.4	32.5	0.0	0.0	32.6
Bayfront Expressway	2032	93.0	211.4	1.4	1.4	32.5	0.0	0.0	32.6
	2033	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bedwell Bayfront Park/Marsh Road	2031	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2032	5.4	56.8	1.0	1.0	23.9	0.0	0.0	24.0
	2033	27.9	379.6	4.8	4.8	115.8	0.0	0.0	116.2
Marsh Road	2033	1.5	7.9	0.3	0.3	7.3	0.0	0.0	7.3
	2034	1.5	7.8	0.3	0.3	7.2	0.0	0.0	7.2
Pond Restoration	2029	142.8	1211.6	26.9	26.9	648.5	0.0	0.0	650.8
	2030	208.9	1086.3	41.8	41.8	1001.0	0.0	0.0	1004.5
	2031	359.1	1867.5	71.8	71.8	1721.3	0.1	0.0	1727.2
		1489.1	9403.3	274.3	274.3	6575.7	0.3	0.1	6598.3

All Components	2029	175.3	1415.7	33.3	33.3	801.2	0.0	0.0	804.0
	2030	509.9	3040.3	100.9	100.9	2414.6	0.1	0.0	2422.9
	2031	578.2	3264.3	114.9	114.9	2751.9	0.1	0.0	2761.3
	2032	123.9	578.1	6.8	6.8	163.7	0.0	0.0	164.3
	2033	100.3	1097.1	18.0	18.0	437.0	0.0	0.0	438.5
	2034	1.5	7.8	0.3	0.3	7.2	0.0	0.0	7.2
		1489.1	9403.3	274.3	274.3	6575.7	0.3	0.1	6598.3

OFFROAD EMISSIONS USING TIER 4F EMISSION FACTORS

South of Bay Road Reach

Equipment Type	Fuel	Number of Equipment	Number of Days Used	Hours/Day Used	Horsepower	Load Factor	Construction Year	No. of Workdays in Year	Tier 4F OFFROAD Emission Factors (g/bhp-hr)							CAP Emissions (pounds)				GHG Emissions (MT)			
									ROG	NOx	PM10_EX	PM2.5_EX	CO2	CH4	N2O	ROG	NOx	PM10_EX	PM2.5_EX	CO2	CH4	N2O	CO2e
Demolition																							
Other Construction Equipment	Diesel	1	3	8	755	0.42	2030	3	0.05	2.24	0.02	0.02	527.6	0.021	0.004	0.84	37.58	0.34	0.34	4.02	0.00016	0.00003	4.03
Rough Terrain Forklifts	Diesel	1	5	8	134	0.4	2030	5	0.05	0.26	0.01	0.01	527.9	0.021	0.004	0.24	1.23	0.05	0.05	1.13	0.00005	0.00001	1.14
Site Preparation																							
Rough Terrain Forklifts	Diesel	1	10	8	134	0.4	2030	10	0.05	0.26	0.01	0.01	527.9	0.021	0.004	0.47	2.46	0.09	0.09	2.26	0.00009	0.00002	2.27
Rubber Tired Loaders	Diesel	1	6	8	249	0.36	2030	6	0.05	0.26	0.01	0.01	526.7	0.021	0.004	0.47	2.47	0.09	0.09	2.27	0.00009	0.00002	2.27
Grading																							
Excavators	Diesel	2	62	8	273	0.38	2030	40	0.05	0.26	0.01	0.01	528.1	0.021	0.004	7.40	38.48	1.48	1.48	35.45	0.00144	0.00029	35.57
Crawler Tractors	Diesel	2	162	8	140	0.43	2030	106	0.05	0.26	0.01	0.01	526.9	0.021	0.004	11.22	58.35	2.24	2.24	53.64	0.00218	0.00044	53.82
Graders	Diesel	2	62	8	140	0.41	2030	40	0.05	0.26	0.01	0.01	531.0	0.022	0.004	4.09	21.29	0.82	0.82	19.73	0.00080	0.00016	19.79
Rollers	Diesel	2	110	8	100	0.38	2030	72	0.05	0.26	0.01	0.01	527.5	0.021	0.004	4.81	25.01	0.96	0.96	23.01	0.00093	0.00019	23.09
Tractors/Loaders/Backhoes	Diesel	1	95	8	249	0.37	2030	62	0.05	0.26	0.01	0.01	527.3	0.021	0.004	5.04	26.18	1.01	1.01	24.09	0.00098	0.00020	24.17
Cranes	Diesel	1	66	8	247	0.29	2030	43	0.05	0.26	0.01	0.01	527.6	0.021	0.004	2.72	14.14	0.54	0.54	13.02	0.00053	0.00011	13.06
Generator Sets	Diesel	3	60	24	25	0.74	2030	39	0.09	2.75	0.01	0.01	568.3	0.023	0.005	10.34	316.09	1.15	1.15	29.63	0.00120	0.00024	29.73
Bore/Drill Rigs	Diesel	1	70	8	40	0.5	2030	46	0.09	2.75	0.01	0.01	596.2	0.024	0.005	1.45	44.30	0.16	0.16	4.36	0.00018	0.00004	4.37
Excavators	Diesel	2	62	8	273	0.38	2031	22	0.05	0.26	0.01	0.01	528.1	0.021	0.004	3.94	20.51	0.79	0.79	18.89	0.00077	0.00015	18.96
Crawler Tractors	Diesel	2	162	8	140	0.43	2031	56	0.05	0.26	0.01	0.01	526.9	0.021	0.004	5.98	31.09	1.20	1.20	28.58	0.00116	0.00023	28.68
Graders	Diesel	2	62	8	140	0.41	2031	22	0.05	0.26	0.01	0.01	531.0	0.022	0.004	2.18	11.35	0.44	0.44	10.51	0.00043	0.00009	10.55
Rollers	Diesel	2	110	8	100	0.38	2031	38	0.05	0.26	0.01	0.01	527.5	0.021	0.004	2.56	13.33	0.51	0.51	12.26	0.00050	0.00010	12.31
Tractors/Loaders/Backhoes	Diesel	1	95	8	249	0.37	2031	33	0.05	0.26	0.01	0.01	527.3	0.021	0.004	2.68	13.95	0.54	0.54	12.83	0.00052	0.00010	12.88
Cranes	Diesel	1	66	8	247	0.29	2031	23	0.05	0.26	0.01	0.01	527.6	0.021	0.004	1.45	7.54	0.29	0.29	6.94	0.00028	0.00006	6.96
Generator Sets	Diesel	3	60	24	25	0.74	2031	21	0.09	2.75	0.01	0.01	568.3	0.023	0.005	5.51	168.44	0.61	0.61	15.79	0.00064	0.00013	15.84
Bore/Drill Rigs	Diesel	1	70	8	40	0.5	2031	24	0.09	2.75	0.01	0.01	596.7	0.024	0.005	0.77	23.61	0.09	0.09	2.32	0.00009	0.00002	2.33
Floodwall Construction																							
Cranes	Diesel	2	64	8	247	0.29	2030	34	0.05	0.26	0.01	0.01	527.6	0.021	0.004	4.26	22.17	0.85	0.85	20.40	0.00083	0.00017	20.47
Rough Terrain Forklifts	Diesel	4	86	8	134	0.4	2030	45	0.05	0.26	0.01	0.01	527.9	0.021	0.004	8.57	44.58	1.71	1.71	41.06	0.00167	0.00033	41.20
Cranes	Diesel	2	64	8	247	0.29	2031	30	0.05	0.26	0.01	0.01	527.6	0.021	0.004	3.82	19.88	0.76	0.76	18.29	0.00074	0.00015	18.36
Rough Terrain Forklifts	Diesel	4	86	8	134	0.4	2031	41	0.05	0.26	0.01	0.01	527.9	0.021	0.004	7.69	39.97	1.54	1.54	36.81	0.00149	0.00030	36.94
Structural Section & Paving																							
Rollers	Diesel	2	15	8	142	0.38	2030	7	0.05	0.26	0.01	0.01	527.5	0.021	0.004	0.71	3.69	0.14	0.14	3.40	0.00014	0.00003	3.41
Graders	Diesel	1	26	8	140	0.41	2030	13	0.05	0.26	0.01	0.01	531.0	0.022	0.004	0.65	3.40	0.13	0.13	3.15	0.00013	0.00003	3.16
Pavers	Diesel	1	2	8	173	0.42	2030	1	0.05	0.26	0.01	0.01	528.3	0.021	0.004	0.06	0.33	0.01	0.01	0.31	0.00001	0.00000	0.31
Rollers	Diesel	2	15	8	142	0.38	2031	8	0.05	0.26	0.01	0.01	527.5	0.021	0.004	0.72	3.73	0.14	0.14	3.43	0.00014	0.00003	3.45
Graders	Diesel	1	26	8	140	0.41	2031	13	0.05	0.26	0.01	0.01	531.0	0.022	0.004	0.66	3.44	0.13	0.13	3.19	0.00013	0.00003	3.20
Pavers	Diesel	1	2	8	173	0.42	2031	1	0.05	0.26	0.01	0.01	528.3	0.021	0.004	0.06	0.33	0.01	0.01	0.31	0.00001	0.00000	0.31
Closeout																							
Cranes	Diesel	2	64	8	247	0.29	2031	64	0.05	0.26	0.01	0.01	527.6	0.021	0.004	8.09	42.04	1.62	1.62	38.70	0.00157	0.00031	38.83
Rough Terrain Forklifts	Diesel	4	86	8	134	0.4	2031	86	0.05	0.26	0.01	0.01	527.9	0.021	0.004	16.26	84.55	3.25	3.25	77.87	0.00316	0.00063	78.14

North of Bay Road Reach

Equipment Type	Fuel	Number of Equipment	Number of Days Used	Hours/Day Used	Horsepower	Load Factor	Construction Year	No. of Workdays in Year	Tier 4F OFFROAD Emission Factors (g/bhp-hr)							CAP Emissions (pounds)				GHG Emissions (MT)			
									ROG	NOx	PM10_EX	PM2.5_EX	CO2	CH4	N2O	ROG	NOx	PM10_EX	PM2.5_EX	CO2	CH4	N2O	CO2e
Site Preparation																							
Rough Terrain Forklifts	Diesel	1	10	8	134	0.4	2031	10	0.05	0.26	0.01	0.01	527.9	0.021	0.004	0.47	2.46	0.09	0.09	2.26	0.00009	0.00002	2.27
Tractors/Loaders/Backhoes	Diesel	1	5	8	249	0.37	2031	5	0.05	0.26	0.01	0.01	527.3	0.021	0.004	0.41	2.11	0.08	0.08	1.94	0.00008	0.00002	1.95
Demolition																							
Rough Terrain Forklifts	Diesel	1	5	8	134	0.4	2031	5	0.05	0.26	0.01	0.01	527.9	0.021	0.004	0.24	1.23	0.05	0.05	1.13	0.00005	0.00001	1.14
Tractors/Loaders/Backhoes	Diesel	1	2	8	249	0.37	2031	2	0.05	0.26	0.01	0.01	527.3	0.021	0.004	0.16	0.84	0.03	0.03	0.78	0.00003	0.00001	0.78
Generator Sets	Diesel	1	10	24	25	0.74	2031	10	0.09	2.75	0.01	0.01	568.3	0.023	0.005	0.88	26.92	0.10	0.10	2.52	0.00010	0.00002	2.53
Excavators	Diesel	1	20	8	273	0.38	2031	20	0.05	0.26	0.01	0.01	528.1	0.021	0.004	1.83	9.51	0.37	0.37	8.77	0.00036	0.00007	8.80
Cranes	Diesel	1	5	8	247	0.29	2031	5	0.05	0.26	0.01	0.01	527.6	0.021	0.004	0.32	1.64	0.06	0.06	1.51	0.00006	0.00001	1.52
Other Construction Equipment	Diesel	1	1	8	755	0.42	2031	1	0.05	2.24	0.02	0.02	527.6	0.021	0.004	0.28	12.53	0.11	0.11	1.34	0.00005	0.00001	1.34
Grading																							
Rough Terrain Forklifts	Diesel	1	40	8	134	0.4	2031	40	0.05	0.26	0.01	0.01	527.9	0.021	0.004	1.89	9.83	0.38	0.38	9.05	0.00037	0.00007	9.09
Tractors/Loaders/Backhoes	Diesel	1	58	8	249	0.37	2031	58	0.05	0.26	0.01	0.01	527.3	0.021	0.004	4.71	24.50	0.94	0.94	22.54	0.00091	0.00018	22.62
Crawler Tractors	Diesel	2	147	8	140	0.43	2031	147	0.05	0.26	0.01	0.01	526.9	0.021	0.004	15.61	81.16	3.12	3.12	74.61	0.00303	0.00061	74.87
Excavators	Diesel	2	113	8	273	0.38	2031	113	0.05	0.26	0.01	0.01	528.1	0.021	0.004	20.68	107.51	4.14	4.14	99.05	0.00402	0.00080	99.39
Rollers	Diesel	2	144	8	100	0.38	2031	144	0.05	0.26	0.01	0.01	527.5	0.021	0.004	9.65	50.18	1.93	1.93	46.18	0.00187	0.00037	46.34
Graders	Diesel	1	99	8	140	0.41	2031	99	0.05	0.26	0.01	0.01	531.0	0.022	0.004	5.01	26.06	1.00	1.00	24.14	0.00098	0.00020	24.22
Structures																							
Rough Terrain Forklifts	Diesel	1	24	8	134	0.4	2031	12	0.05	0.26	0.01	0.01	527.9	0.021	0.004	0.59	3.07	0.12	0.12	2.83	0.00011	0.00002	2.83
Tractors/Loaders/Backhoes	Diesel	1	81	8	249	0.37	2031	42	0.05	0.26	0.01	0.01	527.3	0.021	0.004	3.42	17.79	0.68	0.68	16.37	0.00066	0.00013	16.43
Excavators	Diesel	1	10	8	273	0.38	2031	5	0.05	0.26	0.01	0.01	528.1	0.021	0.004	0.48	2.47	0.10	0.10	2.28	0.00009	0.00002	2.29
Cranes	Diesel	2	45	8	247	0.29	2031	23	0.05	0.26	0.01	0.01	527.6	0.021	0.004	2.96	15.37	0.59	0.59	14.15	0.00057	0.00011	14.20
Rough Terrain Forklifts	Diesel	1	24	8	134	0.4	2032	12	0.05	0.26	0.01	0.01	527.9	0.021	0.004	0.54	2.83	0.11	0.11	2.61	0.00011	0.00002	2.62
Tractors/Loaders/Backhoes	Diesel	1	81	8	249	0.37	2032	39	0.05	0.26	0.01	0.01	527.3	0.021	0.004	3.16	16.43	0.63	0.63	15.11	0.00061	0.00012	15.16
Excavators	Diesel	1	10	8	273	0.38	2032	5	0.05	0.26	0.01	0.01	528.1	0.021	0.004	0.44	2.28	0.09	0.09	2.10	0.00009	0.00002	2.11
Cranes	Diesel	2	45	8	247	0.29	2032	22	0.05	0.26	0.01	0.01	527.6	0.021	0.004	2.73	14.19	0.55	0.55	13.06	0.00053	0.00011	13.11
Structural Section																							
Rollers	Diesel	1	11	8	100	0.38	2031	11	0.05	0.26	0.01	0.01	527.5	0.021	0.004	0.37	1.92	0.07	0.07	1.76	0.00007	0.00001	1.77
Graders	Diesel	1	9	8	140	0.41	2031	9	0.05	0.26	0.01	0.01	531.0	0.022	0.004	0.46	2.37	0.09	0.09	2.19	0.00009	0.00002	2.20
Paving Equipment	Diesel	1	1	8	173	0.36	2031	1	0.05	0.26	0.01	0.01	527.7	0.021	0.004	0.05	0.29	0.01	0.01	0.26	0.00001	0.00000	0.26
Closeout																							
Tractors/Loaders/Backhoes	Diesel	1	10	8	249	0.37	2031	0	0.05	0.26	0.01	0.01	527.3	0.021	0.004	0.04	0.21	0.01	0.01	0.19	0.00001	0.00000	0.19
Rough Terrain Forklifts	Diesel	1	14	8	134	0.4	2031	1	0.05	0.26	0.01	0.01	527.9	0.021	0.004	0.03	0.17	0.01	0.01	0.16	0.00001	0.00000	0.16
Tractors/Loaders/Backhoes	Diesel	1	10	8	249	0.37	2032	10	0.05	0.26	0.01	0.01	527.3	0.021	0.004	0.77	4.02	0.15	0.15	3.70	0.00015	0.00003	3.71
Rough Terrain Forklifts	Diesel	1	14	8	134	0.4	2032	13	0.05	0.26	0.01	0.01	527.9	0.021	0.004	0.63	3.27	0.13	0.13	3.01	0.00012	0.00002	3.02

Dumbarton Approach Reach (Railroad to SR 84)

Equipment Type	Fuel	Number of Equipment	Number of Days Used	Hours/Day Used	Horsepower	Load Factor	Construction Year	No. of Workdays in Year	Tier 4F OFFROAD Emission Factors (g/bhp-hr)							CAP Emissions (pounds)				GHG Emissions (MT)			
									ROG	NOx	PM10_EX	PM2.5_EX	CO2	CH4	N2O	ROG	NOx	PM10_EX	PM2.5_EX	CO2	CH4	N2O	CO2e
Site Preparation																							
Rough Terrain Forklifts	Diesel	1	10	0	134	0.4	2029	10	0.05	0.26	0.01	0.01	527.9	0.021	0.004	0.00	0.00	0.00	0.00	0.00	0.00000	0.00000	0.00
Tractors/Loaders/Backhoes	Diesel	1	5	0	249	0.37	2029	5	0.05	0.26	0.01	0.01	527.3	0.021	0.004	0.00	0.00	0.00	0.00	0.00	0.00000	0.00000	0.00
Generator Sets	Diesel	1	10	0	25	0.74	2029	10	0.09	2.75	0.01	0.01	568.3	0.023	0.005	0.00	0.00	0.00	0.00	0.00	0.00000	0.00000	0.00
Demolition																							
Rough Terrain Forklifts	Diesel	1	5	8	134	0.4	2029	5	0.05	0.26	0.01	0.01	527.9	0.021	0.004	0.24	1.23	0.05	0.05	1.13	0.00005	0.00001	1.14
Excavators	Diesel	1	6	8	273	0.38	2029	6	0.05	0.26	0.01	0.01	528.1	0.021	0.004	0.55	2.85	0.11	0.11	2.63	0.00011	0.00002	2.64
Grading																							
Crawler Tractors	Diesel	6	65	8	140	0.43	2029	4	0.05	0.26	0.01	0.01	526.9	0.021	0.004	1.18	6.15	0.24	0.24	5.66	0.00023	0.00005	5.67
Excavators	Diesel	6	49	8	273	0.38	2029	3	0.05	0.26	0.01	0.01	528.1	0.021	0.004	1.54	7.99	0.31	0.31	7.36	0.00030	0.00006	7.39
Rollers	Diesel	4	64	8	142	0.38	2029	4	0.05	0.26	0.01	0.01	527.5	0.021	0.004	0.70	3.62	0.14	0.14	3.33	0.00014	0.00003	3.34
Graders	Diesel	4	40	8	140	0.41	2029	2	0.05	0.26	0.01	0.01	531.0	0.022	0.004	0.46	2.41	0.09	0.09	2.23	0.00009	0.00002	2.24
Rough Terrain Forklifts	Diesel	1	30	8	134	0.4	2029	2	0.05	0.26	0.01	0.01	527.9	0.021	0.004	0.08	0.42	0.02	0.02	0.39	0.00002	0.00000	0.39
Crawler Tractors	Diesel	6	65	8	140	0.43	2030	61	0.05	0.26	0.01	0.01	526.9	0.021	0.004	19.52	101.51	3.90	3.90	93.32	0.00379	0.00076	93.64
Excavators	Diesel	6	49	8	273	0.38	2030	46	0.05	0.26	0.01	0.01	528.1	0.021	0.004	25.36	131.87	5.07	5.07	121.49	0.00493	0.00099	121.90
Rollers	Diesel	4	64	8	142	0.38	2030	60	0.05	0.26	0.01	0.01	527.5	0.021	0.004	11.49	59.72	2.30	2.30	54.96	0.00223	0.00045	55.15
Graders	Diesel	4	40	8	140	0.41	2030	38	0.05	0.26	0.01	0.01	531.0	0.022	0.004	7.64	39.71	1.53	1.53	36.79	0.00149	0.00030	36.91
Rough Terrain Forklifts	Diesel	1	30	8	134	0.4	2030	28	0.05	0.26	0.01	0.01	527.9	0.021	0.004	1.34	6.95	0.27	0.27	6.40	0.00026	0.00005	6.42
Structures																							
Rough Terrain Forklifts	Diesel	1	30	8	134	0.4	2030	30	0.05	0.26	0.01	0.01	527.9	0.021	0.004	1.42	7.37	0.28	0.28	6.79	0.00028	0.00006	6.81
Structural Section																							
Graders	Diesel	1	5	8	140	0.41	2030	5	0.05	0.26	0.01	0.01	531.0	0.022	0.004	0.25	1.32	0.05	0.05	1.22	0.00005	0.00001	1.22
Rollers	Diesel	1	9	8	142	0.38	2030	9	0.05	0.26	0.01	0.01	527.5	0.021	0.004	0.43	2.23	0.09	0.09	2.05	0.00008	0.00002	2.06
Pavers	Diesel	1	2	8	173	0.42	2030	2	0.05	0.26	0.01	0.01	528.3	0.021	0.004	0.13	0.67	0.03	0.03	0.61	0.00002	0.00000	0.62
Closeout																							
Rough Terrain Forklifts	Diesel	1	17	8	134	0.4	2030	17	0.05	0.26	0.01	0.01	527.9	0.021	0.004	0.80	4.18	0.16	0.16	3.85	0.00016	0.00003	3.86
Tractors/Loaders/Backhoes	Diesel	1	15	8	249	0.37	2030	15	0.05	0.26	0.01	0.01	527.3	0.021	0.004	1.22	6.34	0.24	0.24	5.83	0.00024	0.00005	5.85
Other Construction Equipment	Diesel	1	7	8	175	0.42	2030	7	0.05	0.26	0.01	0.01	529.1	0.021	0.004	0.45	2.36	0.09	0.09	2.18	0.00009	0.00002	2.19

Dumbarton Approach Reach (SR 84 Crossing)

Equipment Type	Fuel	Number of Equipment	Number of Days Used	Hours/Day Used	Horsepower	Load Factor	Construction Year	No. of Workdays in Year	Tier 4F OFFROAD Emission Factors (g/bhp-hr)							CAP Emissions (pounds)				GHG Emissions (MT)			
									ROG	NOx	PM10_EX	PM2.5_EX	CO2	CH4	N2O	ROG	NOx	PM10_EX	PM2.5_EX	CO2	CH4	N2O	CO2e
Site Preparation																							
Rough Terrain Forklifts	Diesel	1	10	8	73	0.4	2032	10	0.09	2.74	0.01	0.01	531.8	0.022	0.004	0.46	14.11	0.05	0.05	1.24	0.00005	0.00001	1.25
Tractors/Loaders/Backhoes	Diesel	1	8	8	249	0.37	2032	8	0.05	0.26	0.01	0.01	527.3	0.021	0.004	0.65	3.38	0.13	0.13	3.11	0.00013	0.00003	3.12
Excavators	Diesel	1	2	8	273	0.38	2032	2	0.05	0.26	0.01	0.01	528.1	0.021	0.004	0.18	0.95	0.04	0.04	0.88	0.00004	0.00001	0.88
Demolition																							
Tractors/Loaders/Backhoes	Diesel	1	10	8	249	0.37	2032	10	0.05	0.26	0.01	0.01	527.3	0.021	0.004	0.81	4.22	0.16	0.16	3.89	0.00016	0.00003	3.90
Excavators	Diesel	1	16	8	273	0.38	2032	16	0.05	0.26	0.01	0.01	528.1	0.021	0.004	1.46	7.61	0.29	0.29	7.01	0.00028	0.00006	7.04
Grading																							
Rough Terrain Forklifts	Diesel	1	51	8	134	0.4	2032	5	0.05	0.26	0.01	0.01	527.9	0.021	0.004	0.24	1.25	0.05	0.05	1.15	0.00005	0.00001	1.16
Tractors/Loaders/Backhoes	Diesel	1	66	8	249	0.37	2032	7	0.05	0.26	0.01	0.01	527.3	0.021	0.004	0.54	2.79	0.11	0.11	2.56	0.00010	0.00002	2.57
Crawler Tractors	Diesel	2	113	8	140	0.43	2032	11	0.05	0.26	0.01	0.01	526.9	0.021	0.004	1.20	6.24	0.24	0.24	5.74	0.00023	0.00005	5.75
Excavators	Diesel	1	68	8	273	0.38	2032	7	0.05	0.26	0.01	0.01	528.1	0.021	0.004	0.62	3.23	0.12	0.12	2.98	0.00012	0.00002	2.99
Rollers	Diesel	2	66	8	100	0.38	2032	7	0.05	0.26	0.01	0.01	527.5	0.021	0.004	0.44	2.30	0.09	0.09	2.12	0.00009	0.00002	2.12
Cranes	Diesel	1	51	8	247	0.29	2032	5	0.05	0.26	0.01	0.01	527.6	0.021	0.004	0.32	1.68	0.06	0.06	1.54	0.00006	0.00001	1.55
Graders	Diesel	2	52	8	140	0.41	2032	5	0.05	0.26	0.01	0.01	531.0	0.022	0.004	0.53	2.74	0.11	0.11	2.54	0.00010	0.00002	2.54
Bore/Drill Rigs	Diesel	1	51	8	40	0.5	2032	5	0.09	2.75	0.01	0.01	596.2	0.024	0.005	0.16	4.95	0.02	0.02	0.49	0.00002	0.00000	0.49
Rough Terrain Forklifts	Diesel	1	51	8	134	0.4	2033	46	0.05	0.26	0.01	0.01	527.9	0.021	0.004	2.17	11.28	0.43	0.43	10.39	0.00042	0.00008	10.43
Tractors/Loaders/Backhoes	Diesel	1	66	8	249	0.37	2033	59	0.05	0.26	0.01	0.01	527.3	0.021	0.004	4.83	25.09	0.97	0.97	23.08	0.00094	0.00019	23.16
Crawler Tractors	Diesel	2	113	8	140	0.43	2033	102	0.05	0.26	0.01	0.01	526.9	0.021	0.004	10.80	56.15	2.16	2.16	51.62	0.00209	0.00042	51.79
Excavators	Diesel	1	68	8	273	0.38	2033	61	0.05	0.26	0.01	0.01	528.1	0.021	0.004	5.60	29.11	1.12	1.12	26.82	0.00109	0.00022	26.91
Rollers	Diesel	2	66	8	100	0.38	2033	59	0.05	0.26	0.01	0.01	527.5	0.021	0.004	3.98	20.70	0.80	0.80	19.05	0.00077	0.00015	19.11
Cranes	Diesel	1	51	8	247	0.29	2033	46	0.05	0.26	0.01	0.01	527.6	0.021	0.004	2.90	15.08	0.58	0.58	13.88	0.00056	0.00011	13.92
Graders	Diesel	2	52	8	140	0.41	2033	47	0.05	0.26	0.01	0.01	531.0	0.022	0.004	4.74	24.64	0.95	0.95	22.82	0.00093	0.00019	22.90
Bore/Drill Rigs	Diesel	1	51	8	40	0.5	2033	46	0.09	2.75	0.01	0.01	596.2	0.024	0.005	1.46	44.52	0.16	0.16	4.38	0.00018	0.00004	4.39
Structures																							
Rough Terrain Forklifts	Diesel	3	102	8	134	0.4	2033	102	0.05	0.26	0.01	0.01	527.9	0.021	0.004	14.46	75.21	2.89	2.89	69.27	0.00281	0.00056	69.51
Tractors/Loaders/Backhoes	Diesel	1	14	8	249	0.37	2033	14	0.05	0.26	0.01	0.01	527.3	0.021	0.004	1.14	5.91	0.23	0.23	5.44	0.00022	0.00004	5.46
Crawler Tractors	Diesel	1	6	8	140	0.43	2033	6	0.05	0.26	0.01	0.01	526.9	0.021	0.004	0.32	1.66	0.06	0.06	1.52	0.00006	0.00001	1.53
Excavators	Diesel	1	4	8	273	0.38	2033	4	0.05	0.26	0.01	0.01	528.1	0.021	0.004	0.37	1.90	0.07	0.07	1.75	0.00007	0.00001	1.76
Rollers	Diesel	1	4	8	100	0.38	2033	4	0.05	0.26	0.01	0.01	527.5	0.021	0.004	0.13	0.70	0.03	0.03	0.64	0.00003	0.00001	0.64
Cranes	Diesel	1	62	8	247	0.29	2033	62	0.05	0.26	0.01	0.01	527.6	0.021	0.004	3.92	20.36	0.78	0.78	18.74	0.00076	0.00015	18.81
Generator Sets	Diesel	4	102	8	25	0.74	2033	102	0.09	2.75	0.01	0.01	568.3	0.023	0.005	11.98	366.09	1.33	1.33	34.32	0.00139	0.00028	34.43
Structural Section																							
Tractors/Loaders/Backhoes	Diesel	1	1	8	249	0.37	2033	1	0.05	0.26	0.01	0.01	527.3	0.021	0.004	0.08	0.42	0.02	0.02	0.39	0.00002	0.00000	0.39
Rollers	Diesel	1	8	8	100	0.38	2033	8	0.05	0.26	0.01	0.01	527.5	0.021	0.004	0.27	1.39	0.05	0.05	1.28	0.00005	0.00001	1.29
Graders	Diesel	1	6	8	140	0.41	2033	6	0.05	0.26	0.01	0.01	531.0	0.022	0.004	0.30	1.58	0.06	0.06	1.46	0.00006	0.00001	1.47
Pavers	Diesel	1	1	8	173	0.42	2033	1	0.05	0.26	0.01	0.01	528.3	0.021	0.004	0.06	0.33	0.01	0.01	0.31	0.00001	0.00000	0.31
Closeout																							
Rough Terrain Forklifts	Diesel	1	15	8	134	0.4	2033	15	0.05	0.26	0.01	0.01	527.9	0.021	0.004	0.71	3.69	0.14	0.14	3.40	0.00014	0.00003	3.41
Tractors/Loaders/Backhoes	Diesel	1	4	8	249	0.37	2033	4	0.05	0.26	0.01	0.01	527.3	0.021	0.004	0.32	1.69	0.06	0.06	1.55	0.00006	0.00001	1.56
Other Construction Equipment	Diesel	1	6	8	175	0.42	2033	6	0.05	0.26	0.01	0.01	529.1	0.021	0.004	0.39	2.02	0.08	0.08	1.87	0.00008	0.00002	1.87

Substation and Marsh Restoration Reach

Equipment Type	Fuel	Number of Equipment	Number of Days Used	Hours/Day Used	Horsepower	Load Factor	Construction Year	No. of Workdays in Year	Tier 4F OFFROAD Emission Factors (g/bhp-hr)							CAP Emissions (pounds)				GHG Emissions (MT)			
									ROG	NOx	PM10_EX	PM2.5_EX	CO2	CH4	N2O	ROG	NOx	PM10_EX	PM2.5_EX	CO2	CH4	N2O	CO2e
Site Preparation																							
Tractors/Loaders/Backhoes	Diesel	1	7	8	249	0.37	2029	7	0.05	0.26	0.01	0.01	527.3	0.021	0.004	0.57	2.96	0.11	0.11	2.72	0.00011	0.00002	2.73
Rough Terrain Forklifts	Diesel	1	10	8	73	0.4	2029	10	0.09	2.74	0.01	0.01	531.8	0.022	0.004	0.46	14.11	0.05	0.05	1.24	0.00005	0.00001	1.25
Demolition																							
Excavators	Diesel	6	23	8	273	0.38	2029	23	0.05	0.26	0.01	0.01	528.1	0.021	0.004	12.62	65.65	2.52	2.52	60.48	0.00245	0.00049	60.69
Rough Terrain Forklifts	Diesel	1	20	8	73	0.4	2029	20	0.09	2.74	0.01	0.01	531.8	0.022	0.004	0.93	28.22	0.10	0.10	2.48	0.00010	0.00002	2.49
Grading																							
Crawler Tractors	Diesel	12	81	8	165	0.43	2029	6	0.05	0.26	0.01	0.01	526.9	0.021	0.004	4.60	23.90	0.92	0.92	21.97	0.00089	0.00018	22.05
Excavators	Diesel	6	84	8	273	0.38	2029	6	0.05	0.26	0.01	0.01	528.1	0.021	0.004	3.48	18.12	0.70	0.70	16.69	0.00068	0.00014	16.75
Rollers	Diesel	12	69	8	100	0.38	2029	5	0.05	0.26	0.01	0.01	527.5	0.021	0.004	2.10	10.91	0.42	0.42	10.03	0.00041	0.00008	10.07
Graders	Diesel	6	78	8	234	0.41	2029	6	0.05	0.26	0.01	0.01	528.0	0.021	0.004	2.99	15.56	0.60	0.60	14.33	0.00058	0.00012	14.38
Crawler Tractors	Diesel	12	81	8	165	0.43	2030	75	0.05	0.26	0.01	0.01	526.9	0.021	0.004	56.22	292.34	11.24	11.24	268.74	0.01090	0.00218	269.67
Excavators	Diesel	6	84	8	273	0.38	2030	78	0.05	0.26	0.01	0.01	528.1	0.021	0.004	42.62	221.64	8.52	8.52	204.19	0.00828	0.00166	204.89
Rollers	Diesel	12	69	8	100	0.38	2030	64	0.05	0.26	0.01	0.01	527.5	0.021	0.004	25.65	133.38	5.13	5.13	122.73	0.00498	0.00100	123.15
Graders	Diesel	6	78	8	234	0.41	2030	72	0.05	0.26	0.01	0.01	528.0	0.021	0.004	36.60	190.33	7.32	7.32	175.31	0.00711	0.00142	175.91
Structure Construction																							
Tractors/Loaders/Backhoes	Diesel	1	15	8	249	0.37	2030	15	0.05	0.26	0.01	0.01	527.3	0.021	0.004	1.22	6.34	0.24	0.24	5.83	0.00024	0.00005	5.85
Rough Terrain Forklifts	Diesel	1	15	8	73	0.4	2030	15	0.09	2.74	0.01	0.01	531.8	0.022	0.004	0.70	21.17	0.08	0.08	1.86	0.00008	0.00002	1.87
Structural Section																							
Rubber Tired Loaders	Diesel	1	8	8	70	0.36	2030	8	0.09	2.74	0.01	0.01	535.6	0.022	0.004	0.32	9.74	0.04	0.04	0.86	0.00004	0.00001	0.87
Rollers	Diesel	2	8	8	100	0.38	2030	8	0.05	0.26	0.01	0.01	527.5	0.021	0.004	0.54	2.79	0.11	0.11	2.57	0.00010	0.00002	2.57
Graders	Diesel	1	8	8	234	0.41	2030	8	0.05	0.26	0.01	0.01	528.0	0.021	0.004	0.68	3.52	0.14	0.14	3.24	0.00013	0.00003	3.25
Closeout																							
Rough Terrain Forklifts	Diesel	1	22	8	74	0.4	2030	22	0.09	2.74	0.01	0.01	531.8	0.022	0.004	1.03	31.47	0.11	0.11	2.77	0.00011	0.00002	2.78
Rubber Tired Loaders	Diesel	1	5	8	70	0.36	2030	5	0.09	2.74	0.01	0.01	535.6	0.022	0.004	0.20	6.09	0.02	0.02	0.54	0.00002	0.00000	0.54
Other Construction Equipment	Diesel	1	12	8	400	0.42	2030	12	0.05	0.26	0.01	0.01	529.8	0.021	0.004	1.78	9.24	0.36	0.36	8.54	0.00035	0.00007	8.57

Tech Campus Reach

Equipment Type	Fuel	Number of Equipment	Number of Days Used	Hours/Day Used	Horsepower	Load Factor	Construction Year	No. of Workdays in Year	Tier 4F OFFROAD Emission Factors (g/bhp-hr)							CAP Emissions (pounds)				GHG Emissions (MT)			
									ROG	NOx	PM10_EX	PM2.5_EX	CO2	CH4	N2O	ROG	NOx	PM10_EX	PM2.5_EX	CO2	CH4	N2O	CO2e
Site Preparation																							
Tractors/Loaders/Backhoes	Diesel	1	5	8	249	0.37	2031	5	0.05	0.26	0.01	0.01	527.3	0.021	0.004	0.41	2.11	0.08	0.08	1.94	0.00008	0.00002	1.95
Rough Terrain Forklifts	Diesel	1	20	8	73	0.4	2031	20	0.09	2.74	0.01	0.01	531.8	0.022	0.004	0.93	28.22	0.10	0.10	2.48	0.00010	0.00002	2.49
Demolition																							
Other Construction Equipment	Diesel	1	1	8	755	0.42	2031	1	0.05	2.24	0.02	0.02	527.6	0.021	0.004	0.28	12.53	0.11	0.11	1.34	0.00005	0.00001	1.34
Grading																							
Rough Terrain Forklifts	Diesel	1	26	8	73	0.4	2031	26	0.09	2.74	0.01	0.01	531.8	0.022	0.004	1.21	36.69	0.13	0.13	3.23	0.00013	0.00003	3.24
Crawler Tractors	Diesel	4	131	8	165	0.43	2031	131	0.05	0.26	0.01	0.01	526.9	0.021	0.004	32.79	170.48	6.56	6.56	156.72	0.00636	0.00127	157.26
Excavators	Diesel	2	113	8	273	0.38	2031	113	0.05	0.26	0.01	0.01	528.1	0.021	0.004	20.68	107.51	4.14	4.14	99.05	0.00402	0.00080	99.39
Rollers	Diesel	4	84	8	100	0.38	2031	84	0.05	0.26	0.01	0.01	527.5	0.021	0.004	11.26	58.55	2.25	2.25	53.88	0.00219	0.00044	54.06
Cranes	Diesel	1	51	8	247	0.29	2031	51	0.05	0.26	0.01	0.01	527.6	0.021	0.004	3.22	16.75	0.64	0.64	15.42	0.00063	0.00013	15.47
Graders	Diesel	2	91	8	234	0.41	2031	91	0.05	0.26	0.01	0.01	528.0	0.021	0.004	15.40	80.07	3.08	3.08	73.75	0.00299	0.00060	74.00
Rough Terrain Forklifts	Diesel	1	26	8	73	0.4	2032	0	0.09	2.74	0.01	0.01	531.8	0.022	0.004	0.00	0.00	0.00	0.00	0.00	0.00000	0.00000	0.00
Crawler Tractors	Diesel	4	131	8	165	0.43	2032	0	0.05	0.26	0.01	0.01	526.9	0.021	0.004	0.00	0.00	0.00	0.00	0.00	0.00000	0.00000	0.00
Excavators	Diesel	2	113	8	273	0.38	2032	0	0.05	0.26	0.01	0.01	528.1	0.021	0.004	0.00	0.00	0.00	0.00	0.00	0.00000	0.00000	0.00
Rollers	Diesel	4	84	8	100	0.38	2032	0	0.05	0.26	0.01	0.01	527.5	0.021	0.004	0.00	0.00	0.00	0.00	0.00	0.00000	0.00000	0.00
Cranes	Diesel	1	51	8	247	0.29	2032	0	0.05	0.26	0.01	0.01	527.6	0.021	0.004	0.00	0.00	0.00	0.00	0.00	0.00000	0.00000	0.00
Graders	Diesel	2	91	8	234	0.41	2032	0	0.05	0.26	0.01	0.01	528.0	0.021	0.004	0.00	0.00	0.00	0.00	0.00	0.00000	0.00000	0.00
Structure Construction																							
Rough Terrain Forklifts	Diesel	2	54	8	73	0.4	2032	54	0.09	2.74	0.01	0.01	531.8	0.022	0.004	5.01	152.40	0.56	0.56	13.42	0.00054	0.00011	13.46
Structural Section																							
Rubber Tired Loaders	Diesel	1	4	8	70	0.36	2032	4	0.09	2.74	0.01	0.01	535.6	0.022	0.004	0.16	4.87	0.02	0.02	0.43	0.00002	0.00000	0.43
Rollers	Diesel	2	18	8	100	0.38	2032	18	0.05	0.26	0.01	0.01	527.5	0.021	0.004	1.21	6.27	0.24	0.24	5.77	0.00023	0.00005	5.79
Graders	Diesel	1	7	8	234	0.41	2032	7	0.05	0.26	0.01	0.01	528.0	0.021	0.004	0.59	3.08	0.12	0.12	2.84	0.00012	0.00002	2.85
Pavers	Diesel	1	1	8	173	0.42	2032	1	0.05	0.26	0.01	0.01	528.3	0.021	0.004	0.06	0.33	0.01	0.01	0.31	0.00001	0.00000	0.31
Closeout																							
Rough Terrain Forklifts	Diesel	1	22	8	74	0.4	2032	22	0.09	2.74	0.01	0.01	531.8	0.022	0.004	1.03	31.47	0.11	0.11	2.77	0.00011	0.00002	2.78
Rubber Tired Loaders	Diesel	1	5	8	70	0.36	2032	5	0.09	2.74	0.01	0.01	535.6	0.022	0.004	0.20	6.09	0.02	0.02	0.54	0.00002	0.00000	0.54
Other Construction Equipment	Diesel	1	9	8	400	0.42	2032	9	0.05	0.26	0.01	0.01	529.8	0.021	0.004	1.33	6.93	0.27	0.27	6.41	0.00026	0.00005	6.43

Bayfront Expressway Reach

Equipment Type	Fuel	Number of Equipment	Number of Days Used	Hours/Day Used	Horsepower	Load Factor	Construction Year	No. of Workdays in Year	Tier 4F OFFROAD Emission Factors (g/bhp-hr)							CAP Emissions (pounds)				GHG Emissions (MT)			
									ROG	NOx	PM10_EX	PM2.5_EX	CO2	CH4	N2O	ROG	NOx	PM10_EX	PM2.5_EX	CO2	CH4	N2O	CO2e
Site Preparation																							
Rubber Tired Loaders	Diesel	1	10	8	70	0.36	2032	10	0.09	2.74	0.01	0.01	535.6	0.022	0.004	0.40	12.18	0.04	0.04	1.08	0.00004	0.00001	1.08
Rough Terrain Forklifts	Diesel	1	17	8	73	0.4	2032	17	0.09	2.74	0.01	0.01	531.8	0.022	0.004	0.79	23.99	0.09	0.09	2.11	0.00009	0.00002	2.12
Demolition																							
Excavators	Diesel	1	14	8	273	0.38	2032	14	0.05	0.26	0.01	0.01	528.1	0.021	0.004	1.28	6.66	0.26	0.26	6.14	0.00025	0.00005	6.16
Grading																							
Crawler Tractors	Diesel	5	86	8	165	0.43	2032	86	0.05	0.26	0.01	0.01	526.9	0.021	0.004	26.90	139.90	5.38	5.38	128.61	0.00522	0.00104	129.05
Excavators	Diesel	2	108	8	273	0.38	2032	108	0.05	0.26	0.01	0.01	528.1	0.021	0.004	19.76	102.75	3.95	3.95	94.67	0.00384	0.00077	94.99
Rollers	Diesel	5	52	8	100	0.38	2032	52	0.05	0.26	0.01	0.01	527.5	0.021	0.004	8.71	45.31	1.74	1.74	41.69	0.00169	0.00034	41.83
Graders	Diesel	3	78	8	234	0.41	2032	78	0.05	0.26	0.01	0.01	528.0	0.021	0.004	19.80	102.95	3.96	3.96	94.82	0.00385	0.00077	95.15
Structure Construction																							
Rough Terrain Forklifts	Diesel	1	80	8	73	0.4	2032	80	0.09	2.74	0.01	0.01	531.8	0.022	0.004	3.71	112.89	0.41	0.41	9.94	0.00040	0.00008	9.97
Excavators	Diesel	1	80	8	273	0.38	2032	80	0.05	0.26	0.01	0.01	528.1	0.021	0.004	7.32	38.06	1.46	1.46	35.06	0.00142	0.00028	35.18
Rollers	Diesel	1	10	8	100	0.38	2032	10	0.05	0.26	0.01	0.01	527.5	0.021	0.004	0.34	1.74	0.07	0.07	1.60	0.00007	0.00001	1.61
Structural Section																							
Rubber Tired Loaders	Diesel	1	8	8	70	0.36	2032	8	0.09	2.74	0.01	0.01	535.6	0.022	0.004	0.32	9.74	0.04	0.04	0.86	0.00004	0.00001	0.87
Rollers	Diesel	1	8	8	100	0.38	2032	8	0.05	0.26	0.01	0.01	527.5	0.021	0.004	0.27	1.39	0.05	0.05	1.28	0.00005	0.00001	1.29
Graders	Diesel	1	8	8	234	0.41	2032	8	0.05	0.26	0.01	0.01	528.0	0.021	0.004	0.68	3.52	0.14	0.14	3.24	0.00013	0.00003	3.25
Closeout																							
Rough Terrain Forklifts	Diesel	1	18	8	73	0.4	2032	18	0.09	2.74	0.01	0.01	531.8	0.022	0.004	0.83	25.40	0.09	0.09	2.24	0.00009	0.00002	2.24
Rubber Tired Loaders	Diesel	1	17	8	70	0.36	2032	17	0.09	2.74	0.01	0.01	535.6	0.022	0.004	0.68	20.70	0.08	0.08	1.84	0.00007	0.00001	1.84
Other Construction Equipment	Diesel	1	8	8	400	0.42	2032	8	0.05	0.26	0.01	0.01	529.8	0.021	0.004	1.19	6.16	0.24	0.24	5.70	0.00023	0.00005	5.72

Bedwell Bayfront Park Reach

Equipment Type	Fuel	Number of Equipment	Number of Days Used	Hours/Day Used	Horsepower	Load Factor	Construction Year	No. of Workdays in Year	Tier 4F OFFROAD Emission Factors (g/bhp-hr)							CAP Emissions (pounds)				GHG Emissions (MT)			
									ROG	NOx	PM10_EX	PM2.5_EX	CO2	CH4	N2O	ROG	NOx	PM10_EX	PM2.5_EX	CO2	CH4	N2O	CO2e
Site Preparation																							
Rough Terrain Forklifts	Diesel	1	20	8	134	0.4	2031	0	0.05	0.26	0.01	0.01	527.9	0.021	0.004	0.00	0.00	0.00	0.00	0.00	0.00000	0.00000	0.00
Tractors/Loaders/Backhoes	Diesel	1	15	8	249	0.37	2031	0	0.05	0.26	0.01	0.01	527.3	0.021	0.004	0.00	0.00	0.00	0.00	0.00	0.00000	0.00000	0.00
Rough Terrain Forklifts	Diesel	1	20	8	134	0.4	2032	20	0.05	0.26	0.01	0.01	527.9	0.021	0.004	0.95	4.92	0.19	0.19	4.53	0.00018	0.00004	4.54
Tractors/Loaders/Backhoes	Diesel	1	15	8	249	0.37	2032	15	0.05	0.26	0.01	0.01	527.3	0.021	0.004	1.22	6.34	0.24	0.24	5.83	0.00024	0.00005	5.85
Demo																							
Rough Terrain Forklifts	Diesel	1	1	8	134	0.4	2032	1	0.05	0.26	0.01	0.01	527.9	0.021	0.004	0.05	0.25	0.01	0.01	0.23	0.00001	0.00000	0.23
Excavators	Diesel	1	10	0	273	0.38	2032	10	0.05	0.26	0.01	0.01	528.1	0.021	0.004	0.00	0.00	0.00	0.00	0.00	0.00000	0.00000	0.00
Grading																							
Crawler Tractors	Diesel	1	27	0	140	0.43	2032	27	0.05	0.26	0.01	0.01	526.9	0.021	0.004	0.00	0.00	0.00	0.00	0.00	0.00000	0.00000	0.00
Excavators	Diesel	1	29	0	273	0.38	2032	29	0.05	0.26	0.01	0.01	528.1	0.021	0.004	0.00	0.00	0.00	0.00	0.00	0.00000	0.00000	0.00
Rollers	Diesel	1	27	0	100	0.38	2032	27	0.05	0.26	0.01	0.01	527.5	0.021	0.004	0.00	0.00	0.00	0.00	0.00	0.00000	0.00000	0.00
Graders	Diesel	1	23	0	140	0.41	2032	23	0.05	0.26	0.01	0.01	531.0	0.022	0.004	0.00	0.00	0.00	0.00	0.00	0.00000	0.00000	0.00
Structures																							
Rough Terrain Forklifts	Diesel	1	154	8	134	0.4	2032	17	0.05	0.26	0.01	0.01	527.9	0.021	0.004	0.79	4.09	0.16	0.16	3.77	0.00015	0.00003	3.78
Tractors/Loaders/Backhoes	Diesel	1	16	8	249	0.37	2032	2	0.05	0.26	0.01	0.01	527.3	0.021	0.004	0.14	0.73	0.03	0.03	0.67	0.00003	0.00001	0.67
Excavators	Diesel	1	17	8	273	0.38	2032	2	0.05	0.26	0.01	0.01	528.1	0.021	0.004	0.17	0.87	0.03	0.03	0.81	0.00003	0.00001	0.81
Rollers	Diesel	1	10	8	100	0.38	2032	1	0.05	0.26	0.01	0.01	527.5	0.021	0.004	0.04	0.19	0.01	0.01	0.17	0.00001	0.00000	0.17
Cranes	Diesel	1	142	8	247	0.29	2032	15	0.05	0.26	0.01	0.01	527.6	0.021	0.004	0.97	5.04	0.19	0.19	4.64	0.00019	0.00004	4.66
Generator Sets	Diesel	3	112	8	25	0.74	2032	12	0.09	2.75	0.01	0.01	568.3	0.023	0.005	1.07	32.59	0.12	0.12	3.06	0.00012	0.00002	3.07
Bore/Drill Rigs	Diesel	1	16	8	40	0.5	2032	2	0.09	2.75	0.01	0.01	596.2	0.024	0.005	0.05	1.68	0.01	0.01	0.16	0.00001	0.00000	0.17
Rough Terrain Forklifts	Diesel	1	154	8	134	0.4	2033	137	0.05	0.26	0.01	0.01	527.9	0.021	0.004	6.49	33.76	1.30	1.30	31.09	0.00126	0.00025	31.20
Tractors/Loaders/Backhoes	Diesel	1	16	8	249	0.37	2033	14	0.05	0.26	0.01	0.01	527.3	0.021	0.004	1.16	6.03	0.23	0.23	5.55	0.00022	0.00004	5.56
Excavators	Diesel	1	17	8	273	0.38	2033	15	0.05	0.26	0.01	0.01	528.1	0.021	0.004	1.39	7.21	0.28	0.28	6.65	0.00027	0.00005	6.67
Rollers	Diesel	1	10	8	100	0.38	2033	9	0.05	0.26	0.01	0.01	527.5	0.021	0.004	0.30	1.55	0.06	0.06	1.43	0.00006	0.00001	1.44
Cranes	Diesel	1	142	8	247	0.29	2033	127	0.05	0.26	0.01	0.01	527.6	0.021	0.004	8.00	41.60	1.60	1.60	38.29	0.00155	0.00031	38.42
Generator Sets	Diesel	3	112	8	25	0.74	2033	100	0.09	2.75	0.01	0.01	568.3	0.023	0.005	8.80	268.89	0.98	0.98	25.21	0.00102	0.00020	25.29
Bore/Drill Rigs	Diesel	1	16	8	40	0.5	2033	14	0.09	2.75	0.01	0.01	596.2	0.024	0.005	0.45	13.84	0.05	0.05	1.36	0.00006	0.00001	1.37
Structural Section																							
Tractors/Loaders/Backhoes	Diesel	1	1	8	249	0.37	2032	0	0.05	0.26	0.01	0.01	527.3	0.021	0.004	0.00	0.01	0.00	0.00	0.01	0.00000	0.00000	0.01
Rollers	Diesel	1	5	8	100	0.38	2032	0	0.05	0.26	0.01	0.01	527.5	0.021	0.004	0.01	0.03	0.00	0.00	0.03	0.00000	0.00000	0.03
Graders	Diesel	1	3	8	140	0.41	2032	0	0.05	0.26	0.01	0.01	531.0	0.022	0.004	0.00	0.03	0.00	0.00	0.02	0.00000	0.00000	0.02
Pavers	Diesel	1	1	8	173	0.42	2032	0	0.05	0.26	0.01	0.01	528.3	0.021	0.004	0.00	0.01	0.00	0.00	0.01	0.00000	0.00000	0.01
Tractors/Loaders/Backhoes	Diesel	1	1	8	249	0.37	2033	1	0.05	0.26	0.01	0.01	527.3	0.021	0.004	0.08	0.41	0.02	0.02	0.38	0.00002	0.00000	0.38
Rollers	Diesel	1	5	8	100	0.38	2033	5	0.05	0.26	0.01	0.01	527.5	0.021	0.004	0.16	0.84	0.03	0.03	0.78	0.00003	0.00001	0.78
Graders	Diesel	1	3	8	140	0.41	2033	3	0.05	0.26	0.01	0.01	531.0	0.022	0.004	0.15	0.76	0.03	0.03	0.71	0.00003	0.00001	0.71
Pavers	Diesel	1	1	8	173	0.42	2033	1	0.05	0.26	0.01	0.01	528.3	0.021	0.004	0.06	0.32	0.01	0.01	0.30	0.00001	0.00000	0.30
Closeout																							
Rough Terrain Forklifts	Diesel	1	12	8	134	0.4	2032	0	0.05	0.26	0.01	0.01	527.9	0.021	0.004	0.00	0.00	0.00	0.00	0.00	0.00000	0.00000	0.00
Other Construction Equipment	Diesel	1	5	8	150	0.42	2032	0	0.05	0.26	0.01	0.01	527.0	0.021	0.004	0.00	0.00	0.00	0.00	0.00	0.00000	0.00000	0.00
Rough Terrain Forklifts	Diesel	1	12	8	134	0.4	2033	12	0.05	0.26	0.01	0.01	527.9	0.021	0.004	0.57	2.95	0.11	0.11	2.72	0.00011	0.00002	2.73
Other Construction Equipment	Diesel	1	5	8	150	0.42	2033	5	0.05	0.26	0.01	0.01	527.0	0.021	0.004	0.28	1.44	0.06	0.06	1.33	0.00005	0.00001	1.33

Reach 9: Marsh Road Reach

Equipment Type	Fuel	Number of Equipment	Number of Days Used	Hours/Day Used	Horsepower	Load Factor	Construction Year	No. of Workdays in Year	Tier 4F OFFROAD Emission Factors (g/bhp-hr)							CAP Emissions (pounds)				GHG Emissions (MT)			
									ROG	NOx	PM10_EX	PM2.5_EX	CO2	CH4	N2O	ROG	NOx	PM10_EX	PM2.5_EX	CO2	CH4	N2O	CO2e
Site Preparation																							
Rough Terrain Forklifts	Diesel	1	15	8	134	0.4	2033	15	0.05	0.26	0.01	0.01	527.9	0.021	0.004	0.71	3.69	0.14	0.14	3.40	0.00014	0.00003	3.41
Tractors/Loaders/Backhoes	Diesel	1	10	8	249	0.37	2033	10	0.05	0.26	0.01	0.01	527.3	0.021	0.004	0.81	4.22	0.16	0.16	3.89	0.00016	0.00003	3.90
Grading																							
Crawler Tractors	Diesel	1	68	0	140	0.43	2033	53	0.05	0.26	0.01	0.01	526.9	0.021	0.004	0.00	0.00	0.00	0.00	0.00	0.00000	0.00000	0.00
Excavators	Diesel	1	68	0	273	0.38	2033	53	0.05	0.26	0.01	0.01	528.1	0.021	0.004	0.00	0.00	0.00	0.00	0.00	0.00000	0.00000	0.00
Rollers	Diesel	1	68	0	100	0.38	2033	53	0.05	0.26	0.01	0.01	527.5	0.021	0.004	0.00	0.00	0.00	0.00	0.00	0.00000	0.00000	0.00
Graders	Diesel	1	68	0	140	0.41	2033	53	0.05	0.26	0.01	0.01	531.0	0.022	0.004	0.00	0.00	0.00	0.00	0.00	0.00000	0.00000	0.00
Crawler Tractors	Diesel	1	68	0	140	0.43	2034	15	0.05	0.26	0.01	0.01	526.9	0.021	0.004	0.00	0.00	0.00	0.00	0.00	0.00000	0.00000	0.00
Excavators	Diesel	1	68	0	273	0.38	2034	15	0.05	0.26	0.01	0.01	528.1	0.021	0.004	0.00	0.00	0.00	0.00	0.00	0.00000	0.00000	0.00
Rollers	Diesel	1	68	0	100	0.38	2034	15	0.05	0.26	0.01	0.01	527.5	0.021	0.004	0.00	0.00	0.00	0.00	0.00	0.00000	0.00000	0.00
Graders	Diesel	1	68	0	140	0.41	2034	15	0.05	0.26	0.01	0.01	531.0	0.022	0.004	0.00	0.00	0.00	0.00	0.00	0.00000	0.00000	0.00
Structural Section																							
Rollers	Diesel	2	6	8	100	0.38	2034	6	0.05	0.26	0.01	0.01	527.5	0.021	0.004	0.40	2.09	0.08	0.08	1.92	0.00008	0.00002	1.93
Graders	Diesel	1	6	8	140	0.41	2034	6	0.05	0.26	0.01	0.01	531.0	0.022	0.004	0.30	1.58	0.06	0.06	1.46	0.00006	0.00001	1.47
Closeout																							
Rough Terrain Forklifts	Diesel	1	12	8	134	0.4	2034	12	0.05	0.26	0.01	0.01	527.9	0.021	0.004	0.57	2.95	0.11	0.11	2.72	0.00011	0.00002	2.73
Other Construction Equipment	Diesel	1	4	8	150	0.42	2034	4	0.05	0.26	0.01	0.01	527.0	0.021	0.004	0.22	1.16	0.04	0.04	1.06	0.00004	0.00001	1.07

Habitat Restoration

Equipment Type	Fuel	Number of Equipment	Number of Days Used	Hours/Day Used	Horsepower	Load Factor	Construction Year	No. of Workdays in Year	Tier 4F OFFROAD Emission Factors (g/bhp-hr)							CAP Emissions (pounds)				GHG Emissions (MT)			
									ROG	NOx	PM10_EX	PM2.5_EX	CO2	CH4	N2O	ROG	NOx	PM10_EX	PM2.5_EX	CO2	CH4	N2O	CO2e
Site Preparation/Mobilization (would occur under adjacent levee work)																							
Tractors/Loaders/Backhoes	Diesel	1	35.5	8	249	0.37	2029	36	0.05	0.26	0.01	0.01	527.3	0.021	0.004	2.88	15.00	0.58	0.58	13.80	0.00056	0.00011	13.84
Crawler Tractors	Diesel	1	5	8	140	0.43	2029	5	0.05	0.26	0.01	0.01	526.9	0.021	0.004	0.27	1.38	0.05	0.05	1.27	0.00005	0.00001	1.27
Generator Sets	Diesel	4	32.5	24	25	0.74	2029	33	0.09	2.75	0.01	0.01	568.3	0.023	0.005	11.45	349.94	1.27	1.27	32.80	0.00133	0.00027	32.92
Excavators	Diesel	1	5	8	273	0.38	2029	5	0.05	0.26	0.01	0.01	528.1	0.021	0.004	0.46	2.38	0.09	0.09	2.19	0.00009	0.00002	2.20
Generator Sets	Diesel	4	20	24	25	0.74	2029	20	0.09	2.75	0.01	0.01	568.3	0.023	0.005	7.05	215.35	0.78	0.78	20.19	0.00082	0.00016	20.26
Construct new seabird islands in Pond R1 prior to dewatering Pond SF2, (Substation/Marsh Restoration Reach)																							
Tractors/Loaders/Backhoes	Diesel	1	44	8	249	0.37	2029	28	0.05	0.26	0.01	0.01	527.3	0.021	0.004	2.30	11.97	0.46	0.46	11.01	0.00045	0.00009	11.05
Crawler Tractors	Diesel	2	105	8	140	0.43	2029	68	0.05	0.26	0.01	0.01	526.9	0.021	0.004	7.18	37.34	1.44	1.44	34.32	0.00139	0.00028	34.44
Excavators	Diesel	4	125	8	273	0.38	2029	81	0.05	0.26	0.01	0.01	528.1	0.021	0.004	29.46	153.20	5.89	5.89	141.14	0.00573	0.00115	141.62
Rubber Tired Dozers	Diesel	6	237	8	253	0.4	2029	153	0.05	0.26	0.01	0.01	528.4	0.021	0.004	81.73	425.02	16.35	16.35	391.83	0.01589	0.00318	393.18
Tractors/Loaders/Backhoes	Diesel	1	44	8	249	0.37	2030	16	0.05	0.26	0.01	0.01	527.3	0.021	0.004	1.27	6.62	0.25	0.25	6.09	0.00025	0.00005	6.11
Crawler Tractors	Diesel	2	105	8	140	0.43	2030	37	0.05	0.26	0.01	0.01	526.9	0.021	0.004	3.97	20.63	0.79	0.79	18.97	0.00077	0.00015	19.03
Excavators	Diesel	4	125	8	273	0.38	2030	44	0.05	0.26	0.01	0.01	528.1	0.021	0.004	16.28	84.66	3.26	3.26	78.00	0.00316	0.00063	78.26
Rubber Tired Dozers	Diesel	6	237	8	253	0.4	2030	84	0.05	0.26	0.01	0.01	528.5	0.021	0.004	45.17	234.88	9.03	9.03	216.57	0.00878	0.00176	217.31
Grading, Drainage/Water Control, to Enhance WSP nesting habitat in SF2 (SF2 - Dumbarton Approach)																							
Tractors/Loaders/Backhoes	Diesel	1	50	8	249	0.37	2030	40	0.05	0.26	0.01	0.01	527.3	0.021	0.004	3.27	17.02	0.65	0.65	15.65	0.00063	0.00013	15.71
Crawler Tractors	Diesel	2	50	8	140	0.43	2030	40	0.05	0.26	0.01	0.01	526.9	0.021	0.004	4.28	22.24	0.86	0.86	20.44	0.00083	0.00017	20.51
Excavators	Diesel	4	125	8	273	0.38	2030	101	0.05	0.26	0.01	0.01	528.1	0.021	0.004	36.85	191.61	7.37	7.37	176.52	0.00716	0.00143	177.13
Rubber Tired Dozers	Diesel	6	237	8	253	0.4	2031	191	0.05	0.26	0.01	0.01	528.5	0.021	0.004	102.23	531.59	20.45	20.45	490.15	0.01988	0.00398	491.83
Tractors/Loaders/Backhoes	Diesel	1	50	8	249	0.37	2031	10	0.05	0.26	0.01	0.01	527.3	0.021	0.004	0.79	4.11	0.16	0.16	3.78	0.00015	0.00003	3.79
Crawler Tractors	Diesel	2	50	8	140	0.43	2031	50	0.05	0.26	0.01	0.01	526.9	0.021	0.004	5.31	27.61	1.06	1.06	25.38	0.00103	0.00021	25.46
Excavators	Diesel	4	125	8	273	0.38	2031	125	0.05	0.26	0.01	0.01	528.1	0.021	0.004	45.74	237.86	9.15	9.15	219.13	0.00889	0.00178	219.88
Rubber Tired Dozers	Diesel	6	237	8	253	0.4	2031	237	0.05	0.26	0.01	0.01	528.5	0.021	0.004	126.90	659.90	25.38	25.38	608.46	0.02468	0.00494	610.54
Grading (including beneficial reuse of bay mud), Drainage/Water Control to Restore Tidal Marsh in Ponds R1, R2 [no breach], (Substation/Marsh Restoration Reach)																							
Crawler Tractors	Diesel	1	118	8	140	0.43	2030	95	0.05	0.26	0.01	0.01	526.9	0.021	0.004	5.05	26.24	1.01	1.01	24.12	0.00098	0.00020	24.21
Excavators	Diesel	2	208	8	273	0.38	2030	168	0.05	0.26	0.01	0.01	528.1	0.021	0.004	30.66	159.42	6.13	6.13	146.87	0.00596	0.00119	147.37
Rubber Tired Dozers	Diesel	6	144	8	253	0.4	2030	116	0.05	0.26	0.01	0.01	528.5	0.021	0.004	62.11	322.99	12.42	12.42	297.81	0.01208	0.00242	298.83
Crawler Tractors	Diesel	1	118	8	140	0.43	2031	23	0.05	0.26	0.01	0.01	526.9	0.021	0.004	1.22	6.33	0.24	0.24	5.82	0.00024	0.00005	5.84
Excavators	Diesel	2	208	8	273	0.38	2031	40	0.05	0.26	0.01	0.01	528.1	0.021	0.004	7.40	38.48	1.48	1.48	35.45	0.00144	0.00029	35.57
Rubber Tired Dozers	Diesel	6	144	8	253	0.4	2031	28	0.05	0.26	0.01	0.01	528.5	0.021	0.004	14.99	77.96	3.00	3.00	71.89	0.00292	0.00058	72.13
Breach existing berms in R1/R2 only to restore tidal action, (Substation/Marsh Restoration Reach)																							
Tugboat	Diesel	1	109	4	2000		2031	109															
Cranes	Diesel	1	94	8	247	0.29	2031	94	0.05	0.26	0.01	0.01	527.6	0.021	0.004	5.94	30.88	1.19	1.19	28.42	0.00115	0.00023	28.52
Crawler Tractors	Diesel	2	104	8	140	0.43	2031	104	0.05	0.26	0.01	0.01	526.9	0.021	0.004	11.04	57.42	2.21	2.21	52.78	0.00214	0.00043	52.97
Excavators	Diesel	2	100	8	273	0.38	2031	100	0.05	0.26	0.01	0.01	528.1	0.021	0.004	18.30	95.14	3.66	3.66	87.65	0.00356	0.00071	87.95
Rubber Tired Dozers	Diesel	6	36	8	253	0.4	2031	36	0.05	0.26	0.01	0.01	528.5	0.021	0.004	19.28	100.24	3.86	3.86	92.42	0.00375	0.00075	92.74

WORKER TRIP EMISSIONS

1g = 0.002205 lbs 1 MT = 1000000 g

Reach	Construction Year	Worker VMT	EMFAC2021 Emission Factors (g/mile)							CAP Emissions (pounds per year)				GHG Emission (MT/year)			
		Miles/year	ROG	NOx	Ex PM_{10}	Ex $PM_{2.5}$	CO_2	CH_4	N_2O	ROG	NOx	Ex PM_{10}	Ex $PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e
South of Bay Road Reach	2030	162372.6	0.13	0.07	0.00	0.00	282.27	0.01	0.01	46.8	25.8	0.5	0.4	45.8	0.0	0.0	46.3
	2031	101626.2	0.12	0.07	0.00	0.00	278.41	0.01	0.01	28.0	15.2	0.3	0.3	28.3	0.0	0.0	28.6
North of Bay Road Reach	2031	117748.8	0.12	0.07	0.00	0.00	278.41	0.01	0.01	32.4	17.6	0.3	0.3	32.8	0.0	0.0	33.1
	2032	24663.6	0.12	0.06	0.00	0.00	274.52	0.01	0.01	6.6	3.5	0.1	0.1	6.8	0.0	0.0	6.8
Dumbarton Approach Reach (Railroad to SR 84)	2029	15210	0.14	0.06	0.00	0.00	286.93	0.01	0.01	4.6	2.2	0.0	0.0	4.4	0.0	0.0	4.4
	2030	175687.2	0.13	0.07	0.00	0.00	282.27	0.01	0.01	50.6	27.9	0.5	0.5	49.6	0.0	0.0	50.1
Dumbarton Approach Reach (SR 84 Crossing)	2032	29577.6	0.12	0.06	0.00	0.00	274.52	0.01	0.01	7.9	4.2	0.1	0.1	8.1	0.0	0.0	8.2
	2033	178261.2	0.12	0.07	0.00	0.00	271.02	0.01	0.01	46.0	28.3	0.5	0.4	48.3	0.0	0.0	48.8
Substation and Marsh Restoration Reach	2029	28407.6	0.14	0.06	0.00	0.00	286.93	0.01	0.01	8.5	4.0	0.1	0.1	8.2	0.0	0.0	8.2
	2030	224850.6	0.13	0.07	0.00	0.00	282.27	0.01	0.01	64.8	35.7	0.6	0.6	63.5	0.0	0.0	64.1
Tech Campus Reach	2031	248437.8	0.12	0.06	0.00	0.00	278.41	0.01	0.01	68.5	35.3	0.6	0.6	69.2	0.0	0.0	69.8
	2032	52205.4	0.12	0.07	0.00	0.00	274.52	0.01	0.01	13.9	8.3	0.1	0.1	14.3	0.0	0.0	14.5
Bayfront Expressway Reach	2032	133333.2	0.12	0.06	0.00	0.00	274.52	0.01	0.01	35.4	18.9	0.3	0.3	36.6	0.0	0.0	37.0
	2033	0	0.12	0.07	0.00	0.00	271.02	0.01	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bedwell Bayfront Park Reach	2031	0	0.12	0.07	0.00	0.00	278.41	0.01	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2032	21949.2	0.12	0.06	0.00	0.00	274.52	0.01	0.01	5.8	3.1	0.1	0.1	6.0	0.0	0.0	6.1
	2033	90183.6	0.12	0.07	0.00	0.00	271.02	0.01	0.01	23.3	14.3	0.3	0.2	24.4	0.0	0.0	24.7
Marsh Road Reach	2033	34725.6	0.12	0.07	0.00	0.00	271.02	0.01	0.01	9.0	5.5	0.1	0.1	9.4	0.0	0.0	9.5
	2034	8845.2	0.11	0.07	0.00	0.00	267.87	0.01	0.01	2.2	1.3	0.0	0.0	2.4	0.0	0.0	2.4
Pond Restoration	2029	23025.6	0.14	0.06	0.00	0.00	286.93	0.01	0.01	6.9	3.3	0.1	0.1	6.6	0.0	0.0	6.7
	2030	136656	0.13	0.07	0.00	0.00	282.27	0.01	0.01	39.4	21.7	0.4	0.4	38.6	0.0	0.0	39.0
	2031	34515	0.12	0.07	0.00	0.00	278.41	0.01	0.01	9.5	5.2	0.1	0.1	9.6	0.0	0.0	9.7
		1842282								509.9	281.4	5.1	4.6	512.8	0.0	0.0	517.8

All Components	2029	66643.2		20.0	9.5	0.2	0.2	19.1	0.00	0.00	19.3
	2030	699566.4		201.5	111.1	2.0	1.8	197.5	0.01	0.01	199.4
	2031	502327.8		138.4	73.3	1.3	1.3	139.9	0.00	0.00	141.2
	2032	261729		69.6	38.1	0.7	0.6	71.9	0.00	0.00	72.5
	2033	303170.4		78.2	48.1	0.9	0.7	82.2	0.00	0.00	82.9
	2034	8845.2		2.2	1.3	0.0	0.0	2.4	0.00	0.00	2.4
		1842282		509.9	281.4	5.1	4.6	512.8	0.0	0.0	517.8

HAUL TRIP EMISSIONS

1g = 0.002205 lbs 1 MT = 1000000 g

Reach	Construction Year	Haul VMT	EMFAC2021 Emission Factors (g/mile)							CAP Emissions (pounds per year)				GHG Emission (MT/year)			
		Miles/year	ROG	NOx	Ex PM_{10}	Ex $PM_{2.5}$	CO_2	CH_4	N_2O	ROG	NOx	Ex PM_{10}	Ex $PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e
South of Bay Road Reach	2030	31300.0	0.06	2.47	0.03	0.03	1573.59	0.00	0.25	4.1	170.7	1.8	1.7	49.3	0.00	0.01	51.6
	2031	19026.0	0.06	2.43	0.03	0.03	1547.22	0.00	0.24	2.5	101.9	1.1	1.1	29.4	0.00	0.00	30.8
North of Bay Road Reach	2031	1124880.0	0.06	2.43	0.03	0.03	1547.22	0.00	0.24	56.1	2285.1	24.8	23.7	1740.4	0.00	0.27	1822.2
	2032	0.0	0.06	2.39	0.03	0.03	1523.21	0.00	0.24	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.0
Dumbarton Approach Reach (Railroad to SR 84)	2029	25134.9	0.06	2.52	0.03	0.03	1600.66	0.00	0.25	3.3	139.7	1.5	1.4	40.2	0.00	0.01	42.1
	2030	370355.1	0.06	2.47	0.03	0.03	1573.59	0.00	0.25	49.0	2019.6	21.6	20.6	582.8	0.00	0.09	610.2
Dumbarton Approach Reach (SR 84 Crossing)	2032	9450.0	0.06	2.39	0.03	0.03	1523.21	0.00	0.24	1.2	49.8	0.5	0.5	14.4	0.00	0.00	15.1
	2033	78696.0	0.06	2.36	0.03	0.03	1501.48	0.00	0.24	10.3	408.6	4.5	4.3	118.2	0.00	0.02	123.7
Substation and Marsh Restoration Reach	2029	68571.3	0.06	2.52	0.03	0.03	1600.66	0.00	0.25	9.1	381.2	4.0	3.8	109.8	0.00	0.02	114.9
	2030	772098.7	0.06	2.47	0.03	0.03	1573.59	0.00	0.25	102.1	4210.4	45.0	43.0	1215.0	0.00	0.19	1272.1
Tech Campus Reach	2031	329450.0	0.06	2.43	0.03	0.03	1547.22	0.00	0.24	43.3	1765.2	19.1	18.3	509.7	0.00	0.08	533.7
	2032	8190.0	0.06	2.39	0.03	0.03	1523.21	0.00	0.24	1.1	43.2	0.5	0.5	12.5	0.00	0.00	13.1
Bayfront Expressway Reach	2032	144300.0	0.06	2.39	0.03	0.03	1523.21	0.00	0.24	18.9	761.0	8.3	8.0	219.8	0.00	0.03	230.1
	2033	0.0	0.06	2.36	0.03	0.03	1501.48	0.00	0.24	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.0
Bedwell Bayfront Park Reach	2031	0.0	0.06	2.43	0.03	0.03	1547.22	0.00	0.24	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.0
	2032	27141.3	0.06	2.39	0.03	0.03	1523.21	0.00	0.24	3.6	143.1	1.6	1.5	41.3	0.00	0.01	43.3
	2033	4268.7	0.06	2.36	0.03	0.03	1501.48	0.00	0.24	0.6	22.2	0.2	0.2	6.4	0.00	0.00	6.7
Marsh Road Reach	2033	42142.5	0.06	2.36	0.03	0.03	1501.48	0.00	0.24	5.5	218.8	2.4	2.3	63.3	0.00	0.01	66.2
	2034	13857.5	0.06	2.32	0.03	0.02	1482.10	0.00	0.23	1.8	70.9	0.8	0.8	20.5	0.00	0.00	21.5
Pond Restoration	2029	103926.8	0.06	2.52	0.03	0.03	1600.66	0.00	0.25	13.8	577.7	6.1	5.8	166.4	0.00	0.03	174.2
	2030	154099.9	0.06	2.47	0.03	0.03	1573.59	0.00	0.25	20.4	840.3	9.0	8.6	242.5	0.00	0.04	253.9
	2031	23333.3	0.06	2.43	0.03	0.03	1547.22	0.00	0.24	3.1	125.0	1.4	1.3	36.1	0.00	0.01	37.8
		3350222.0								349.6	14334.5	154.2	147.5	5217.9	0.0	0.8	5463.2
All Components	2029	197632.974								26.2	1098.5	11.6	11.1	316.3	0.00	0.05	331.2
	2030	1327853.69								175.5	7241.1	77.3	74.0	2089.5	0.00	0.33	2187.7
	2031	1496689.33								105.0	4277.2	46.3	44.3	2315.7	0.00	0.36	2424.5
	2032	189081.346								24.8	997.1	10.9	10.5	288.0	0.00	0.05	301.5
	2033	125107.184								16.3	649.6	7.2	6.9	187.8	0.00	0.03	196.7
	2034	13857.4699								1.8	70.9	0.8	0.8	20.5	0.00	0.00	21.5
		3350222								349.6	14334.5	154.2	147.5	5217.9	0.0	0.8	5463.2

Source: EMFAC2021 (v1.0.2) Emissions Inventory
Region Type: Air Basin
Region: San Francisco Bay Area
Calendar Year: 2027, 2028, 2029, 2030
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Units: miles/year for CVMT and EVMT, trips/year for Trips, kWh/year for Energy Consumption, tons/year for Emissions, 1000 gallons/year for Fuel Consumption

3947.2528

t ton = 907184.75 g

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61
												NOx				NOx_TOTEX				PM2.5_EX				PM2.5_TOTEX				PM2.5				PM2.5_TWBW				PM2.5_TOTEX				PM10_EX				PM10_TOTEX				PM10				PM10_TWBW				PM10_TOTEX				CO2				CO2_TOTEX				CH4				CH4_TOTEX				N2O				N2O_TOTEX				ROG								ROG_TOTAL	
Region	Calendar Year	icle Categ	Model Year	Speed	Fuel	Population	Total VMT	CVMT	Trips	RUNEX	IDLEX	STREX	tons/year	g/mile	RUNEX	IDLEX	STREX	tons/year	g/mile	RUNEX	IDLEX	STREX	tons/year	g/mile	RUNEX	IDLEX	STREX	tons/year	g/mile	RUNEX	IDLEX	STREX	tons/year	g/mile	RUNEX	IDLEX	STREX	tons/year	g/mile	RUNEX	IDLEX	STREX	tons/year	g/mile	RUNEX	IDLEX	STREX	tons/year	g/mile	RUNEX	IDLEX	STREX	tons/year	g/mile	RUNEX	IDLEX	STREX	tons/year	g/mile	RUNEX	IDLEX	STREX	tons/year	g/mile	RUNEX	IDLEX	STREX	tons/year	g/mile	RUNEX	IDLEX	STREX	tons/year	g/mile	RUNEX	IDLEX	STREX	tons/year	g/mile	RUNEX	IDLEX	STREX	TOTEX	DIURN	HOTSOAK	RUNLOSS	tons/year	g/mile	Fuel Consumption
San Francisco	2027	HHDT	Aggregate	Aggregate	Diesel	38306.74535	1355996519	1355996519	175608844	2603.16154	771.8424	572.2489	3947.2528	2.641363647	28.03654	2.367902	0	38.40444403	0.025698913	13.15644	41.62566	54.76709933	0.036656267	91.18654416	0.06233758	39.75639	0.384537	0	40.14092341	0.026980904	52.62575	118.9305	171.5562143	0.114799422	211.6971371	0.141660329	2329106.7	1496885.2	0	2477911.838	1658.185571	0.085333	3.1083222	0	4.190964453	0.002806525	366.7842	23.61447	0	390.4086222	0.261247812	23.36692	66.92153	0	90.28845	0	0	0	0	0	90.28844523	0.060417873	221358.0203
San Francisco	2027	LDA	Aggregate	Aggregate	Gasoline	2197108.395	27663299237	27663299237	35295680233	1013.08644	0	901.3139	1914.4004	0.062780467	22.64145	0	6.938481	39.5790319	0.001297976	60.98714	78.1487	139.1358337	0.004562783	178.7157656	0.005860769	35.50056	0	7.546232	43.04678725	0.001411668	243.9485	223.282	467.2306537	0.01532227	510.2773242	0.016733933	7942056	0	256149.5	8198205.547	268.8503263	55.4624	0	241.4743	296.9367216	0.009737368	124.3815	0	120.397	244.7784872	0.008027217	202.8762	0	1084.038	1286.914	1151.397	326.8393	886.226	3651.376175	0.119742056	864490.5315
San Francisco	2027	LDT1	Aggregate	Aggregate	Gasoline	202353.5794	2250002690	2250002690	2110089334	225.904718	0	115.3166	341.22136	0.135757975	3.604221	0	0.804161	4.408382206	0.001774728	4.960407	7.772789	12.73319581	0.005133932	17.14157814	0.00691306	3.919919	0	0.874599	4.794517895	0.001933115	19.84163	22.20792	42.04959061	0.01695409	46.84411402	0.018887207	740942.41	0	27954.66	802857.0792	323.7001456	10.82455	0	30.81281	41.63735211	0.016788768	18.1673	0	12.40483	30.58156037	0.012330263	46.72269	0	154.4246	201.1473	183.1155	50.59842	143.6911	578.7522668	0.233348712	84660.27586
San Francisco	2027	LDT2	Aggregate	Aggregate	Gasoline	131289.587	1451578804	1451578804	1366533055	792.116254	0	582.7993	1374.9196	0.089274115	17.73741	0	3.706984	21.44445056	0.00134027	32.00179	49.28969	81.29148723	0.005081767	101.7358863	0.006358137	19.29105	0	4.031694	23.32274439	0.00145798	129.0072	137.9705	267.9777411	0.01662268	289.3064557	0.018080207	5093336.9	0	156715.7	5260047.578	328.7458267	25.25548	0	145.9257	181.1811995	0.011320319	78.31098	0	70.54812	148.8591998	0.009303175	131.645	0	657.5018	789.1468	555.8591	150.4353	422.597	1918.038251	0.119870085	534665.4449
San Francisco	2027	MHDT	Aggregate	Aggregate	Diesel	48915.06097	620351142.8	620351142.8	182044767	641.719124	192.2202	328.3921	1162.3314	1.699769978	8.147161	0.267159	0	6.4143196	0.009388122	2.051462	10.98811	12.99599534	0.018951712	19.37388894	0.028331833	5.425108	0.279239	0	6.704346669	0.009802498	8.205848	31.16602	39.37166855	0.05757632	46.07621513	0.067380569	723314.08	36985.6	0	809299.682	1183.497226	0.649395	0.186132	0	0.815526777	0.001192651	121.6784	5.827096	0	127.5054945	0.186460947	13.98129	3.57678	0	17.55807	0	0	0	0	0	17.55806777	0.025676427	72294.42001
San Francisco	2028	HHDT	Aggregate	Aggregate	Gasoline	38743.94565	1359986093	1359986093	175982258	2625.31563	764.2145	576.2102	3965.7404	2.579859228	27.82639	2.356082	0	38.35442256	0.025539141	13.26197	41.9814	55.18326645	0.036810311	92.469812	0.062184452	39.64331	0.374273	0	40.0176562	0.026930908	52.38785	119.9469	172.7547127	0.115236881	212.7232022	0.141903211	2263198.9	1488862.2	0	2442085.862	1635.003669	0.083442	3.1414649	0	4.195963143	0.002796332	361.2944	23.45706	0	384.7514962	0.256604191	22.67968	67.63844	0	90.31812	0	0	0	0	0	90.31812214	0.060247271	218159.4913
San Francisco	2028	LDA	Aggregate	Aggregate	Gasoline	2193417.476	27597401453	27597401453	35236356116	984.214679	0	867.7326	1811.9473	0.059662526	20.75339	0	6.627545	37.38093522	0.00122879	60.84188	77.95622	138.7980729	0.004562585	176.1790681	0.005791375	33.44712	0	7.20806	40.65517772	0.001336421	243.3674	222.732	466.099472	0.01532187	506.7546494	0.016658093	7773735	0	250416.7	8024151.704	263.7707782	51.38966	0	228.5634	279.953112	0.009209082	119.73	0	117.5672	237.2972004	0.007800459	184.9278	0	1017.278	1202.206	1124.483	312.4348	852.5838	865.3678	3504.640301	0.115204913	846136.7712
San Francisco	2028	LDT1	Aggregate	Aggregate	Gasoline	198343.875	2198627793	2198627793	305070328	198.66744	0	167.2255	365.9229	0.126228091	3.301242	0	0.746392	4.047633571	0.001670111	4.847145	7.590135	12.43728	0.005131797	16.46491357	0.006801907	3.590402	0	0.811769	4.402170818	0.001815398	19.38858	21.6861	41.07467765	0.01694799	45.47685033	0.018764388	744311.46	0	26830.66	771142.1178	318.1840835	9.563907	0	28.36101	37.92492218	0.015648836	16.51052	0	11.83398	28.34449691	0.011695338	40.89127	0	140.643	181.5343	177.2664	47.68769	138.1926	544.6810424	0.224743059	81315.97528
San Francisco	2028	LDT2	Aggregate	Aggregate	Gasoline	117381.4965	1468133097	1468133097	1596282758	741.053697	0	569.1796	1310.2331	0.089061886	16.94267	0	3.60187	20.54453905	0.001269494	32.36675	48.8884	81.25530425	0.005200909	101.7957879	0.006290394	18.4267	0	3.917382	22.34408137	0.00138068	129.467	139.6814	269.1484419	0.01663117	291.4924803	0.019301185	5505802.3	0	166041.2	5216823.554	322.3446453	33.55133	0	141.6325	175.1834505	0.010812445	75.93635	0	70.37156	146.2879147	0.009039396	123.6013	0	633.0313	756.6326	550.9925	146.8018	418.7953	1673.314169	0.115755485	500086.4357
San Francisco	2028	MHDT	Aggregate	Aggregate	Diesel	49153.38842	615866247.8	615866247.8	183009886	585.703526	184.2324	324.5501	1094.4861	1.612202438	8.538315	0.223171	0	5.806985566	0.008259125	2.036629	10.82938	12.86460564	0.018951913	18.47299067	0.027211128	5.627247	0.233262	0	5.865058583	0.008632266	8.146516	30.94107	39.08759068	0.05715984	44.94809918	0.066009561	702405.27	36861.08	0	790266.3518	1157.337203	0.568296	0.161521	0	0.729817964	0.001017504	120.1173	5.807478	0	125.9247302	0.185489556	12.23526	3.477511	0	15.71277358	0	0	0	0	0	15.71277358	0.023145267	71398.1466
San Francisco	2028	MHDT	Aggregate	Aggregate	Diesel	39004.86195	1365111990	1365111990	179396187	2451.99031	755.9305	576.1965	3784.0063	2.521309259	97.76909	0.347815	0	38.11690066	0.025397552	13.22169	42.25522	55.47690449	0.036964642	93.59380715	0.062362194	39.47684	0.363542	0	39.84037776	0.026549516	52.88675	120.7292	173.6159471	0.115681492	213.4563248	0.142227409	2254755.1	147532	0	2402287.135	1600.660347	1.023679	3.165655	0	4.189333384	0.002793138	355.2376	23.24373	0	378.4831165	0.252184889	22.03952	68.15569	0	90.19521	0	0	0	0	0	90.1952087	0.060097684	214595.3582
San Francisco	2029	LDA	Aggregate	Aggregate	Gasoline	2180429.429	27550676381	27550676381	35183674644	897.771992	0	838.8338	1736.6057	0.056853428	28.92386	0	6.313853	35.23773206	0.001160302	60.73864	77.8172	138.5595456	0.004562394	173.7937689	0.005722956	31.45734	0	6.868891	38.32422822	0.001201935	242.9554	222.3349	465.2902038	0.01532101	503.6144865	0.016502945	7624265.6	0	245197.5	7869644.073	259.1249509	47.98494	0	216.8809	264.8658115	0.008721446	115.909	0	115.098	231.0069676	0.007606564	169.9535	0	957.396	1127.35	1084.127	297.0684	832.9266	3341.471792	0.110027507	829925.1538
San Francisco	2029	LDT1	Aggregate	Aggregate	Gasoline	194636.6011	2151630904	2151630904	2094793252	174.154988	0	99.89108	274.04607	0.115545104	3.019465	0	0.691593	3.711057861	0.001564681	4.743534	7.421094	12.16462864	0.005128931	15.8756865	0.006693611	3.283944	0	0.75217	4.036114024	0.001701733	18.97414	21.20133	40.17728237	0.01693398	44.21337775	0.018641563	712664.87	0	23784.64	742103.3085	302.4559839	10.02195	0	26.53221	36.55408019	0.015409151	15.02191	0	11.31516	26.33707657	0.011104431	45.57158	0	128.0763	163.3479	168.1832	44.33634	129.7703	506.0377862	0.213358974	78253.86663
San Francisco	2029	LDT2	Aggregate	Aggregate	Gasoline	119414.544	1482661686	1482661686	1552980737	696.766764	0	557.928	1254.6947	0.076770022	16.13297	0	3.485592	19.61856178	0.001200386	32.6871	49.41914	82.10624262	0.005023731	101.7248044	0.006224156	17.54668	0	3.7909	21.33697598	0.001305528	130.7484	141.1976	271.9459498	0.01663934	293.2829251	0.017944874	5008648.2	165370.3	0	5174018.487	316.5786328	32.06478	0	137.5802	169.6443313	0.010379901	73.82635	0	70.30823	144.1345762	0.008819601	116.5494	0	610.3838	726.7332	537.8952	142.5111	408.1633	1815.302905	0.111071522	545593.7847
San Francisco	2029	MHDT	Aggregate	Aggregate	Diesel	48433.91152	607681072.2	607681072.2	182636414	533.155458	176.118	317.4796	1026.7531	1.532802091	7.725754	0.185857	0	4.911650454	0.007332422	2.009561	10.68562	12.69516358	0.018952179	17.65063782	0.026184602	4.939473	0.19426	0	5.133733441	0.007603963	8.024843	30.33036	38.56809005	0.05757765	43.70233394	0.065241616	748014.71	36526.84	0	785431.5529	1171.213309	0.469752	0.156905	0	0.626657261	0.000978851	117.85	5.754818	0	123.6048112	0.184525147	10.738	3.378126	0	14.11612	0	0	0	0	0	14.11612103	0.021073441	70052.78614
San Francisco	2030	HHDT	Aggregate	Aggregate	Gasoline	39182.83501	1360926675	1360926675	180466698	2386.48878	748.6932	575.5507	3710.7327	2.473549632	97.57393	0.337256	0	37.91118421	0.025271345	13.22175	42.46223	55.68397642	0.03711807	93.59515864	0.062389918	39.27385	0.352605	0	39.62533976	0.026414004	52.88698	121.3207	174.2073636	0.116125668	213.8329969	0.142539665	2214639.3	146000	0	2390639.287	1573.585687	0.995117	3.182838	0	4.177942	0.002786748	347.9113	23.00236	0	371.9196811	0.247912098	21.42459	68.52562	0	89.95021	0	0	0	0	0	89.95020815	0.059960216	215874.9724
San Francisco	2030	LDA	Aggregate	Aggregate	Gasoline	2184608.226	27520737343	27520737343	35199703135	841.916821	0	813.3779	1655.2946	0.054564536	37.17924	0	5.999867	33.17919562	0.001093795	60.67288	77.72624	138.3901193	0.004562141	171.5782249	0.005605445	29.5599	0	6.525403	36.08530496	0.001189504	242.6915	222.075	464.766494	0.01532506	500.8517987	0.016509906	7482818.8	0	245460.2	7733270.966	254.9170748	45.14014	0	206.117	251.2570986	0.008283528	112.7899	0	112.9178	225.7076417	0.007440017	157.4363	0	902.1886	1059.617	1058.463	283.3262	812.8508	3234.256818	0.105953653	815464.3098
San Francisco	2030	LDT1	Aggregate	Aggregate	Gasoline	191101.8368	2108152704	2108152704	294216613	152.428842	0	93.18087	245.60973	0.116591293	2.758581	0	0.640088	3.398669	0.001462522	4.647681	7.263208	11.91088952	0.005125519	15.30955852	0.006588042	3.000208	0	0.696154	3.696362635	0.001590627	18.59027	20.75202	39.34274854	0.01693096	43.03911114	0.018520662	690634.66	0	24811.04	715445.6991	307.8723131	7.468754	0	24.0804	31.54951605	0.013576831	13.70938	0	10.83844	24.54781652	0.010563469	31.16457	0	116.6593	147.8239	159.7172	41.41851	122.5265	471.4861278	0.202809912	75442.85504
San Francisco	2030	LDT2	Aggregate	Aggregate	Gasoline	121330.33	1495494526	1495494526	1650455107	659.322815	0	548.8675	1208.1903	0.073902059	15.34023	0	3.364315	18.70453715	0.001134639	32.97001	49.8921	82.86218861	0.005062459	101.5657468	0.006169199	18.07683	0	3.658999	20.34289007	0.001234024	131.821	147.5443	279.4062377	0.01678893	295.7692175	0.017881805	5092402.3	0	153.8064	5129.208	327.1553	0.0	0	0.0	0.0	0.

			EMFAC2021 Emission Factors (g/mile)											
Year	Veh Cat	Fuel	ROG	NOx	PM10_EX	PM10TWBW	PM2.5_EX	PM2.5TWBW	PM10_TOT	PM2.5_TOT	CO2	CH4	N2O
2027	LDA	Gasoline	0.119743	0.06278	0.001412	0.015322266	0.001297976	0.004562793	0.01673393	0.00586077	268.8503	0.009738	0.0080272
2027	LDT1	Gasoline	0.233346	0.137578	0.001933	0.016954092	0.001777428	0.005133932	0.01888721	0.00691136	323.7061	0.016788	0.0123303
2027	LDT2	Gasoline	0.118671	0.085927	0.001458	0.016622677	0.0013402	0.005017937	0.01838027	0.00638514	328.7546	0.011323	0.0093032
2027	MHDT	Diesel	0.025676	1.698761	0.009804	0.05757632	0.009380122	0.018951712	0.06738057	0.02833183	1183.497	0.001183	0.1864605
2027	HHDT	Diesel	0.060418	2.641364	0.026861	0.114799425	0.025698913	0.036658267	0.14166033	0.06235718	1658.186	0.002806	0.2612478
2028	LDA	Gasoline	0.115209	0.059563	0.001336	0.015321672	0.001228759	0.004562585	0.01656809	0.00579138	263.7708	0.009203	0.0078005
2028	LDT1	Gasoline	0.224743	0.128228	0.001816	0.01694799	0.001670111	0.005131797	0.01878439	0.00680191	318.1841	0.015648	0.0116953
2028	LDT2	Gasoline	0.115756	0.080962	0.001381	0.01663117	0.001269484	0.005020909	0.01801185	0.00629039	322.3446	0.010825	0.0090394
2028	MHDT	Diesel	0.023145	1.612202	0.008633	0.057676895	0.008259215	0.018951913	0.06620955	0.02721113	1177.337	0.001075	0.18549
2028	HHDT	Diesel	0.060247	2.578659	0.026694	0.115236813	0.025539145	0.036810311	0.14193072	0.06234945	1629.004	0.002798	0.2596502
2029	LDA	Gasoline	0.110028	0.056853	0.001262	0.015321011	0.001160302	0.004562354	0.01658295	0.00572266	259.1248	0.008721	0.0076066
2029	LDT1	Gasoline	0.213358	0.115545	0.001702	0.016939802	0.001564681	0.00512851	0.01864153	0.00693061	312.8905	0.014572	0.0111044
2029	LDT2	Gasoline	0.111072	0.07677	0.001306	0.016639345	0.001200386	0.005023771	0.01794487	0.00622416	316.5786	0.01038	0.008819
2029	MHDT	Diesel	0.021073	1.532802	0.007664	0.057577653	0.007332423	0.018952179	0.06524162	0.0262646	1171.213	0.000979	0.1845251
2029	HHDT	Diesel	0.060098	2.521309	0.026546	0.115681493	0.025397552	0.036964642	0.14222741	0.06236219	1650.66	0.002791	0.2521847
2030	LDA	Gasoline	0.105954	0.054565	0.00119	0.015320402	0.001093705	0.004562143	0.01650991	0.00565585	254.9171	0.008282	0.00744
2030	LDT1	Gasoline	0.202891	0.105691	0.001591	0.016930055	0.001462522	0.005125519	0.01852068	0.00658804	307.8721	0.013576	0.0105635
2030	LDT2	Gasoline	0.107764	0.07329	0.001234	0.016647026	0.001134639	0.005026459	0.01788105	0.0061611	311.3695	0.009987	0.0086374
2030	MHDT	Diesel	0.019373	1.465034	0.006863	0.057578548	0.006566403	0.018952492	0.06444185	0.02551889	1165.003	0.0009	0.1835467
2030	HHDT	Diesel	0.059961	2.47355	0.026414	0.116125662	0.025271345	0.03711857	0.14253967	0.06238992	1573.587	0.002785	0.2479192
2031	LDA	Gasoline	0.101809	0.052658	0.00113	0.015479622	0.001033868	0.004617658	0.01660868	0.00565634	251.4852	0.007895	0.0073012
2031	LDT1	Gasoline	0.191098	0.098302	0.001495	0.017115452	0.001374655	0.005188658	0.01860551	0.00656331	303.9608	0.012654	0.0100582
2031	LDT2	Gasoline	0.105277	0.070287	0.001175	0.016840344	0.001080785	0.00509412	0.0180158	0.00617491	307.0903	0.009637	0.0084853
2031	MHDT	Diesel	0.017976	1.403483	0.006204	0.05757922	0.00593593	0.018952729	0.06378355	0.02488866	1158.374	0.000835	0.1825023
2031	HHDT	Diesel	0.059672	2.430343	0.026328	0.116537935	0.025188691	0.037260956	0.14286555	0.06244965	1547.219	0.002772	0.243765
2032	LDA	Gasoline	0.09898	0.050929	0.001062	0.016539904	0.000976082	0.005593496	0.01760148	0.00656958	248.0894	0.007525	0.0071728
2032	LDT1	Gasoline	0.180793	0.088277	0.001394	0.018491166	0.001281798	0.006465781	0.01988524	0.00774758	299.1167	0.011801	0.0096159
2032	LDT2	Gasoline	0.103391	0.067636	0.001109	0.017954074	0.001019285	0.006115213	0.01906264	0.0073345	302.8009	0.0093	0.0083482
2032	MHDT	Diesel	0.016853	1.350404	0.005678	0.063257107	0.005432089	0.02438488	0.06893481	0.02981697	1151.561	0.000783	0.1814288
2032	HHDT	Diesel	0.059414	2.39206	0.026245	0.143197147	0.025109598	0.062513528	0.16944209	0.08762313	1523.209	0.00276	0.2399821
2033	LDA	Gasoline	0.09625	0.049439	0.000998	0.016475329	0.000917304	0.005534489	0.01747297	0.00645179	245.0759	0.007392	0.0070607
2033	LDT1	Gasoline	0.173939	0.081493	0.001301	0.018384028	0.001196343	0.006373356	0.01968516	0.0075717	295.001	0.011036	0.0092335
2033	LDT2	Gasoline	0.101812	0.065302	0.001045	0.017893901	0.000960399	0.006057682	0.01893842	0.00701858	298.9402	0.008688	0.008228
2033	MHDT	Diesel	0.015896	1.302052	0.005231	0.062810053	0.005004975	0.023957547	0.06804133	0.02896252	1144.45	0.000738	0.1803085
2033	HHDT	Diesel	0.059129	2.355066	0.026155	0.143523508	0.025023916	0.062571247	0.16967889	0.08759516	1501.477	0.002746	0.2365583
2034	LDA	Gasoline	0.092951	0.048129	0.000938	0.016415348	0.000862691	0.005479677	0.0173536	0.00634238	242.4216	0.006888	0.0069021
2034	LDT1	Gasoline	0.163103	0.07549	0.001209	0.0182762	0.001111394	0.006285004	0.01948494	0.0073964	291.1463	0.010291	0.0088837
2034	LDT2	Gasoline	0.100113	0.063281	0.000984	0.017836746	0.000905167	0.00600347	0.0188212	0.00690864	295.4882	0.008705	0.0081244
2034	MHDT	Diesel	0.015103	1.258085	0.004858	0.062435277	0.004647816	0.023599871	0.06729324	0.02824769	1137.47	0.000701	0.1792089
2034	HHDT	Diesel	0.058868	2.320821	0.02608	0.14384478	0.024956216	0.062635805	0.16992517	0.08758796	1482.097	0.002734	0.2335049

			EMFAC2021 Emission Factors (g/mile)											
Year	Trip Type	Fuel	ROG	NOx	PM10_EX	PM10TWBW	PM2.5_EX	PM2.5TWBW	PM10_TOT	PM2.5_TOT	CO2	CH4	N2O
2027	Worker	Gasoline	0.148176	0.087267	0.001554	0.016055325	0.001426395	0.004819064	0.01760884	0.00624776	297.5303	0.011697	0.009422
2027	Vendor/Haul Trucks	Diesel	0.060418	2.641364	0.026861	0.114799425	0.025698913	0.036658267	0.14166033	0.06235718	1658.186	0.002806	0.2612478
2028	Worker	Gasoline	0.142727	0.081579	0.001467	0.016055626	0.001349294	0.004819469	0.01752311	0.00616876	292.0176	0.01122	0.0090839
2028	Vendor/Haul Trucks	Diesel	0.060247	2.578659	0.026694	0.115236813	0.025539145	0.036810311	0.14193072	0.06234945	1629.004	0.002798	0.2596502
2029	Worker	Gasoline	0.136121	0.076505	0.001383	0.016055292	0.001271418	0.004819352	0.01743807	0.00609077	286.9096	0.010599	0.0087841
2029	Vendor/Haul Trucks	Diesel	0.060098	2.521309	0.026546	0.115681493	0.025397552	0.036964642	0.14222741	0.06236219	1650.66	0.002791	0.2521847
2030	Worker	Gasoline	0.13064	0.072028	0.001301	0.016054472	0.001196143	0.004819065	0.01735539	0.00601521	282.2689	0.010032	0.0085202
2030	Vendor/Haul Trucks	Diesel	0.05996	2.47355	0.026414	0.116125662	0.025271345	0.03711857	0.14253967	0.06238992	1573.587	0.002785	0.2479192
2031	Worker	Gasoline	0.124998	0.067976	0.001232	0.01622721	0.0011332	0.004678523	0.01745967	0.00601272	278.4054	0.00962	0.0082864
2031	Vendor/Haul Trucks	Diesel	0.059672	2.430343	0.026328	0.116537935	0.025188691	0.037260956	0.14286555	0.06244965	1547.219	0.002772	0.243765
2032	Worker	Gasoline	0.120536	0.064443	0.001156	0.017381262	0.001063312	0.005941997	0.01853771	0.00700531	274.5241	0.009038	0.0080774
2032	Vendor/Haul Trucks	Diesel	0.059414	2.39206	0.026245	0.143197147	0.025109598	0.062513528	0.16944209	0.08762313	1523.209	0.00276	0.2399821
2033	Worker	Gasoline	0.117063	0.061417	0.001085	0.017307144	0.000997837	0.005875504	0.01839238	0.00687334	271.0231	0.008602	0.0078957
2033	Vendor/Haul Trucks	Diesel	0.059129	2.355066	0.026155	0.143523508	0.025022916	0.062571247	0.16967889	0.08759516	1501.477	0.002746	0.2365583
2034	Worker	Gasoline	0.11228	0.058757	0.001017	0.01723591	0.000935486	0.005811955	0.01825334	0.00674744	267.8694	0.008193	0.0077331
2034	Vendor/Haul Trucks	Diesel	0.058868	2.320821	0.02608	0.14384478	0.024956216	0.062635805	0.16992517	0.08758796	1482.097	0.002734	0.2335049

CONSTRUCTION ENTRAINED ROAD DUST CALCULATION

San Mateo County

Road Dust Equation

E [lb/VMT] = k*(sL)^0.91 * (W)^1.02 * (1-P/4N)

Where:
E = the particulate emission factor in units of pounds of particulate matter per VMT
k = the U.S. EPA AP-42 particle size multiplier (PM_{10} = 0.0022 lb/VMT),[1]
sL = the roadway-specific silt loading in grams/square meter (g/m^2),[2,3,4,5]
W = the average weight of vehicles traveling the road (California statewide default = 2.4 tons),[5]
P = number of "wet" days, when at least one site per county received at least 0.01 inch of precipitation during the annual averaging period,[9] and
N = the number of days in the annual averaging period (default = 365)

Source: California Air Resources Board (CARB), Miscellaneous Process Methodology 7.9 — Entrained Road Travel, Paved Road Dust. Revised and updated March

Silt Loading Factor

Source: CARB, 2021.

Table 3.a: California Default Statewide and Local Silt Loading Values

Silt Loadings (g/m2)			
Freeway	**Major**	**Collector**	**Local**
0.015	0.032	0.032	0.32

Table 2. 2017 Roadway Travel Fraction				
0.63	0.27	0.05	0.05	For San Mateo County

Re-entrained PAVED Road Dust Emission Factors

Methodology

Calculation Methodology: USEPA AP-42, Paved Roads, Section 13.2.1, Revised January 2011:
https://www.epa.gov/sites/default/files/2020-10/documents/13.2.1_paved_roads.pdf

K-value from CARB, 2021.

Pollutant	Variables					E_{ext} (g/mi)
	k	sL	W	P	N	
PM_{10}	1.00	0.03569	2.4	74	365	**0.11170**
$PM_{2.5}$	0.25	0.03569	2.4	74	365	**0.02792**

Where:	**Source**
E = particulate emission factor (grams of particulate matter/VMT)	*calculation*
k = particle size multiplier (g/VMT)	*Table 13.2.1-1 Particle Size Multipliers for Paved Road Equation*
sL = local roadway silt loading (g/m2)	*CARB, 2021.*
W = average weight of vehicles on the road (tons)	*CARB, 2021.*
P = number of wet days with at least 0.254mm of precipitation	*Table 5 of CARB, 2021.*
N = number of days in the averaging period	annual days (365)

ENERGY USE ESTIMATES FOR CONSTRUCTION

Source	Construction Year	CO_2 Emissions MT/year	Fuel Used	C Content of Fuel kg of CO_2/gallon of fuel[a]	Gallons of Fuel
South of Bay Road					
Construction Equipment	2030	280.9	Diesel	10.2	27,540
	2031	286.7	Diesel	10.2	28,112
Worker Trips	2030	45.8	Gasoline	8.8	5,208
	2031	28.3	Gasoline	8.8	3,215
Vendor Trips	2030	119.1	Diesel	10.2	11,679
	2031	83.2	Diesel	10.2	8,155
Haul Trips	2030	49.3	Diesel	10.2	4,829
	2031	29.4	Diesel	10.2	2,886
North of Bay Road					
Construction Equipment	2031	336.0	Diesel	10.2	32,943
	2032	39.6	Diesel	10.2	3,881
Worker Trips	2031	32.8	Gasoline	8.8	3,725
	2032	6.8	Gasoline	8.8	769
Vendor Trips	2031	46.6	Diesel	10.2	4,567
	2032	12.2	Diesel	10.2	1,194
Haul Trips	2031	1740.4	Diesel	10.2	170,631
	2032	0.0	Diesel	10.2	0
Dumbarton Approach (Railroad to SR 84)					
Construction Equipment	2029	22.7	Diesel	10.2	2,228
	2030	335.5	Diesel	10.2	32,890
Worker Trips	2029	4.4	Gasoline	8.8	496
	2030	49.6	Gasoline	8.8	5,635
Vendor Trips	2029	3.1	Diesel	10.2	306
	2030	37.2	Diesel	10.2	3,649
Haul Trips	2029	40.2	Diesel	10.2	3,944
	2030	582.8	Diesel	10.2	57,136
Dumbarton Approach (SR 84 Crossing)					
Construction Equipment	2032	35.2	Diesel	10.2	3,455
	2033	314.0	Diesel	10.2	30,783
Worker Trips	2032	8.1	Gasoline	8.8	923
	2033	48.3	Gasoline	8.8	5,490
Vendor Trips	2032	4.4	Diesel	10.2	432
	2033	64.9	Diesel	10.2	6,361
Haul Trips	2032	14.4	Diesel	10.2	1,411
	2033	118.2	Diesel	10.2	11,584

Fuel	Construction Year	Gallons of Fuel
South of Bay Road		
Diesel	2030	44048
Diesel	2031	39152
Gasoline	2030	5208
Gasoline	2031	3215
North of Bay Road		
Diesel	2031	208141
Diesel	2032	5076
Gasoline	2031	3725
Gasoline	2032	769
Dumbarton Approach (Railroad to SR 84)		
Diesel	2029	6478
Diesel	2030	93675
Gasoline	2029	496
Gasoline	2030	5635
Dumbarton Approach (SR 84 Crossing)		
Diesel	2032	5298
Diesel	2033	48728
Gasoline	2032	923
Gasoline	2033	5490

Substation and Marsh Restoration					
Construction Equipment	2029	130.0	Diesel	10.2	12,741
	2030	797.2	Diesel	10.2	78,156
Worker Trips	2029	8.2	Gasoline	8.8	926
	2030	63.5	Gasoline	8.8	7,212
Vendor Trips	2029	7.7	Diesel	10.2	759
	2030	38.5	Diesel	10.2	3,771
Haul Trips	2029	109.8	Diesel	10.2	10,761
	2030	1215.0	Diesel	10.2	119,114

Substation and Marsh Restoration		
Diesel	2029	24261
Diesel	2030	201041
Gasoline	2029	926
Gasoline	2030	7212

Tech Campus					
Construction Equipment	2031	407.8	Diesel	10.2	39,981
	2032	32.5	Diesel	10.2	3,185
Worker Trips	2031	69.2	Gasoline	8.8	7,860
	2032	14.3	Gasoline	8.8	1,629
Vendor Trips	2031	66.4	Diesel	10.2	6,506
	2032	22.6	Diesel	10.2	2,220
Haul Trips	2031	509.7	Diesel	10.2	49,974
	2032	12.5	Diesel	10.2	1,223

Tech Campus		
Diesel	2031	96461
Diesel	2032	6628
Gasoline	2031	7860
Gasoline	2032	1629

Bayfront Expressway					
Construction Equipment	2032	32.5	Diesel	10.2	3,185
	2033	0.0	Diesel	10.2	0
Worker Trips	2032	36.6	Gasoline	8.8	4,159
	2033	0.0	Gasoline	8.8	0
Vendor Trips	2032	35.7	Diesel	10.2	3,502
	2033	0.0	Diesel	10.2	0
Haul Trips	2032	219.8	Diesel	10.2	21,549
	2033	0.0	Diesel	10.2	0

Bayfront Expressway		
Diesel	2032	28236
Diesel	2033	0
Gasoline	2032	4159
Gasoline	2033	0

Bedwell Bayfront Park/Marsh Road					
Construction Equipment	2031	0.0	Diesel	10.2	0
	2032	23.9	Diesel	10.2	2,347
	2033	115.8	Diesel	10.2	11,350
Worker Trips	2031	0.0	Gasoline	8.8	0
	2032	6.0	Gasoline	8.8	685
	2033	24.4	Gasoline	8.8	2,777
Vendor Trips	2031	0.0	Diesel	10.2	0
	2032	11.4	Diesel	10.2	1,114
	2033	38.5	Diesel	10.2	3,771
Haul Trips	2031	0.0	Diesel	10.2	0
	2032	41.3	Diesel	10.2	4,053
	2033	6.4	Diesel	10.2	628

Bedwell Bayfront Park/Marsh Road		
Diesel	2031	0
Diesel	2032	7514
Diesel	2033	15750
Gasoline	2031	0
Gasoline	2032	685
Gasoline	2033	2777

Marsh Road					
Construction Equipment	2033	7.3	Diesel	10.2	714
	2034	7.2	Diesel	10.2	703
Worker Trips	2033	9.4	Gasoline	8.8	1,069
	2034	2.4	Gasoline	8.8	269
Vendor Trips	2033	14.2	Diesel	10.2	1,387
	2034	4.9	Diesel	10.2	478
Haul Trips	2033	63.3	Diesel	10.2	6,204
	2034	20.5	Diesel	10.2	2,014

Marsh Road		
Diesel	2033	8305
Diesel	2034	3195
Gasoline	2033	1069
Gasoline	2034	269

Pond Restoration					
Construction Equipment	2029	648.5	Diesel	10.2	63,583
	2030	1001.0	Diesel	10.2	98,141
	2031	1721.3	Diesel	10.2	168,758
Worker Trips	2029	6.6	Gasoline	8.8	751
	2030	38.6	Gasoline	8.8	4,383
	2031	9.6	Gasoline	8.8	1,092
Vendor Trips	2029	9.1	Diesel	10.2	896
	2030	53.5	Diesel	10.2	5,246
	2031	13.4	Diesel	10.2	1,315
Haul Trips	2029	166.4	Diesel	10.2	16,309
	2030	242.5	Diesel	10.2	23,773
	2031	36.1	Diesel	10.2	3,539
					1281823

Pond Restoration		
Diesel	2029	80,789
Diesel	2030	127,160
Diesel	2031	173,612
Gasoline	2029	751
Gasoline	2030	4,383
Gasoline	2031	1,092
		1281823

Notes:

[a] Emissions factors per The Climate Registry 2019 Default Emission Factors (Table 2.1 - US Default Factors for Calculating CO_2 Emissions from Combustion of Transport Fuels)

Conversion	1 MT =	1000	kg

Fuel	Construction Year	Gallons of Fuel
All Reaches		
Diesel	2029	30,740
Diesel	2030	338,764
Diesel	2031	343,754
Diesel	2032	52,751
Diesel	2033	72,783
Diesel	2034	3,195
Gasoline	2029	1,422
Gasoline	2030	18,056
Gasoline	2031	14,800
Gasoline	2032	8,165
Gasoline	2033	9,337
Gasoline	2034	269

Pond Restoration		
Diesel	2029	80789
Diesel	2030	127160
Diesel	2031	173612
Gasoline	2029	751
Gasoline	2030	4383
Gasoline	2031	1092

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Fuel	Construction Year	Gallons of Fuel
Total Project		
Diesel	2029	111,529
Diesel	2030	465,925
Diesel	2031	517,366
Diesel	2032	52,751
Diesel	2033	72,783
Diesel	2034	3,195
Gasoline	2029	2,173
Gasoline	2030	22,439
Gasoline	2031	15,892
Gasoline	2032	8,165
Gasoline	2033	9,337
Gasoline	2034	269

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SAFER Bay
Construction Health Risk Assessment

SAFER Bay
Summary of Health Risk Assessment Results

Construction

Receptor Type	Incremental Lifetime Cancer Risk			Hazard Index			Annual $PM_{2.5}$ Concentration		
	(# in one million)	UTM X	UTM Y	(unitless)	UTM X	UTM Y	($\mu g/m^3$)	UTM X	UTM Y
Resident - child	1.93	576201	4148655	0.01	576201	4148655	0.05	576201	4148655
School	0.17	577161	4147095	0.0007	577161	4147095	0.004	577161	4147095
Daycare	0.83	576121	4147895	0.0008	576121	4147895	0.004	576121	4147895

SAFER Bay

Construction Health Risk Calculations - Residential

Incremental Lifetime Cancer Risk & Hazard Index Calculations

					Exposure Duration (Days)					
				Start Date	9/16/2029	12/16/2029	12/17/2031			DPM
				Stop Date	12/15/2029	12/16/2031				Emission Rate (g/s)
Source	AERMOD Source	Year	Start Date	End Date	3rd Trimester	0<2	2<16	Exposure Duration	Calendar Days	Tier 4F
South of Bay Road - Construction	SLINE1	2030	4/14/2030	12/31/2030	0	262	0	261	261	0.001
	SLINE1	2031	1/1/2031	6/3/2031	0	154	0	153	153	0.002
North of Bay Road - Construction	SLINE2	2031	4/6/2031	12/31/2031	0	255	14	269	269	0.001
	SLINE2	2032	1/1/2032	3/8/2032	0	0	67	67	67	0.000
Dumbarton Approach (Railroad to SR 84) - Construction	SLINE3	2029	10/18/2029	12/31/2029	59	16	0	74	74	0.000
	SLINE3	2030	1/1/2030	8/20/2030	0	232	0	231	231	0.001
Pond Restoration - Construction	PAREA1	2029	9/16/2029	12/31/2029	91	16	0	106	106	0.004
	PAREA1	2030	1/1/2030	12/31/2030	0	365	0	364	364	0.002
	PAREA1	2031	1/1/2031	2/28/2031	0	59	0	58	58	0.017
South of Bay Road - Trucks	SLINE4	2030	4/14/2030	12/31/2030	0	262	0	261	261	0.000
	SLINE4	2031	1/1/2031	6/3/2031	0	154	0	153	153	0.000
North of Bay Road - Trucks	SLINE5	2031	4/6/2031	12/31/2031	0	255	14	269	269	0.000
	SLINE5	2032	1/1/2032	3/8/2032	0	0	67	67	67	0.000

Cancer Risk Factors

	Abbreviation	UOM	3rd Trimester	0<2	2<16	
Daily Breathing Rate	DBR	L/kg-day	361	1090	572	95th percentile DBR for all age groups
Fraction Of Time At Home	FAH	unitless	0.85	0.85	0.72	All school and daycare mitigated risk is less than 1
Exposure Frequency	EF	days/year	0.96	0.96	0.96	
Age Sensitivity Factor	ASF	unitless	10	10	3	
Inhalation Absorption Factor	A	unitless	1	1	1	
Conversion Factor	CF_1	m^3/L	0.001	0.001	0.001	
Conversion Factor	CF_2	$\mu g/m^3$	0.001	0.001	0.001	
Cancer Potency Factor (diesel exhaust)	CPF	$mg/kg\text{-}day^{-1}$	1.1	1.1	1.1	
Averaging Time (for residential exposure)	AT	years	70.00	70.00	70.00	

SOURCE: Office of Environmental Health Hazard Assessment, 2015. *Air Toxics Hot Spots Program Guidance Manual for the Preparation of Health Risk Assessments* . February 2015

Daily breathing rate for residential receptor is based on the OEHHA 95th percentile moderate intensity breathing rates (OEHHA Table 5.7).

Fraction of time at home is set to values per OEHHA Table 8.4 for residential since the nearest school has an unmitigated cancer risk of <1 per million.

Inhalation cancer potency factor from OEHHA Table 7.1

Hazard Index

Chronic Inhalation	REL	$\mu g/m^3$	5

Intake Factor for Inhalation, IF (m^3/kg-day) = DBR*FAH*EF*ED*ASF*A*CF/AT

AERMOD Source	3rd Trimester	0<2	2<16
SLINE1	0.000	0.091	0.000
SLINE1	0.000	0.054	0.000
SLINE2	0.000	0.089	0.001
SLINE2	0.000	0.000	0.003
SLINE3	0.007	0.006	0.000
SLINE3	0.000	0.081	0.000
PAREA1	0.010	0.006	0.000
PAREA1	0.000	0.127	0.000
PAREA1	0.000	0.021	0.000
SLINE4	0.000	0.091	0.000
SLINE4	0.000	0.054	0.000
SLINE5	0.000	0.089	0.001
SLINE5	0.000	0.000	0.003

Risk Calculation Part 1, R1 = IF*CPF*CF

3rd Trimester	0<2	2<16
0.00E+00	1.00E-04	0.00E+00
0.00E+00	5.89E-05	0.00E+00
0.00E+00	9.75E-05	7.14E-07
0.00E+00	0.00E+00	3.42E-06
7.47E-06	6.12E-06	0.00E+00
0.00E+00	8.87E-05	0.00E+00
1.15E-05	6.12E-06	0.00E+00
0.00E+00	1.40E-04	0.00E+00
0.00E+00	2.26E-05	0.00E+00
0.00E+00	1.00E-04	0.00E+00
0.00E+00	5.89E-05	0.00E+00
0.00E+00	9.75E-05	7.14E-07
0.00E+00	0.00E+00	3.42E-06

576540.72 4146602

	Cancer Risk	UTM X	UTM Y		HI	UTM X	UTM Y
MEIR - Resident Infant	1.93	576200.8	4148655.5	Residence	0.01	576200.8	4148655.5

SAFER Bay

Construction Health Risk Calculations - Residential

Annual Average $PM_{2.5}$ Concentration Calculations

Source	AERMOD Source	Year	Start Date	End Date	Workdays	$PM_{2.5}$ Emission Rate (g/s) Tier 4F
South of Bay Road - Construction	SLINE1	2030	4/14/2030	12/31/2030	187	0.001
	SLINE1	2031	1/1/2031	6/3/2031	110	0.002
North of Bay Road - Construction	SLINE2	2031	4/6/2031	12/31/2031	231	0.001
	SLINE2	2032	1/1/2032	3/8/2032	58	0.000
Dumbarton Approach (Railroad to SR 84) - Construction	SLINE3	2029	10/18/2029	12/31/2029	64	0.000
	SLINE3	2030	1/1/2030	8/20/2030	199	0.001
Pond Restoration - Construction	PAREA1	2029	9/16/2029	12/31/2029	91	0.004
	PAREA1	2030	1/1/2030	12/31/2030	313	0.002
	PAREA1	2031	1/1/2031	2/28/2031	51	0.017
South of Bay Road - Trucks	SLINE4	2030	4/14/2030	12/31/2030	187	0.000
	SLINE4	2031	1/1/2031	6/3/2031	110	0.000
North of Bay Road - Trucks	SLINE5	2031	4/6/2031	12/31/2031	231	0.000
	SLINE5	2032	1/1/2032	3/8/2032	58	0.000

		$PM_{2.5}$ Conc.	UTM X	UTM Y
MEIR - Resident Infant	Residence	0.05	576200.8	4148655.5

SAFER Bay
Construction Health Risk Calculations - School & Daycare
Incremental Lifetime Cancer Risk & Hazard Index Calculations

					Daycare		School				
					Exposure Duration (Days)						
				Start Date	9/16/2029	8/5/2031	4/14/2030				DPM
				Stop Date	8/4/2031	2/28/2031	2/28/2031				Emission Rate (g/s)
Source	AERMOD Source	Year	Start Date	End Date	0<2	2<16	2<16	Exposure Duration	Calendar Days	Workdays	Tier 4F
South of Bay Road - Construction	SLINE1	2030	4/14/2030	12/31/2030	261	0	261	261	261	187	0.001
	SLINE1	2031	1/1/2031	6/3/2031	153	0	58	153	153	110	0.002
North of Bay Road - Construction	SLINE2	2031	4/6/2031	12/31/2031	121	148	0	269	269	231	0.001
	SLINE2	2032	1/1/2032	3/8/2032	0	67	0	67	67	58	0.000
Dumbarton Approach (Railroad to SR 84) - Construction	SLINE3	2029	10/18/2029	12/31/2029	74	0	0	74	74	64	0.000
	SLINE3	2030	1/1/2030	8/20/2030	231	0	128	231	231	199	0.001
Pond Restoration - Construction	PAREA1	2029	9/16/2029	12/31/2029	106	0	0	106	106	91	0.004
	PAREA1	2030	1/1/2030	12/31/2030	364	0	261	364	364	313	0.002
	PAREA1	2031	1/1/2031	2/28/2031	58	0	58	58	58	51	0.017
South of Bay Road - Trucks	SLINE4	2030	4/14/2030	12/31/2030	261	0	261	261	261	187	0.000
	SLINE4	2031	1/1/2031	6/3/2031	153	0	58	153	153	110	0.000
North of Bay Road - Trucks	SLINE5	2031	4/6/2031	12/31/2031	121	148	0	269	269	231	0.000
	SLINE5	2032	1/1/2032	3/8/2032	0	67	0	67	67	58	0.000

Cancer Risk Factors

	Abbreviation	UOM	0<2	2<16	
Daily Breathing Rate (8 hour)	DBR	L/kg-day	1200	520	95th percentile for both age groups
Modeling Adjustment Factor	MAF	unitless	4.2	4.2	Worst case
Exposure Frequency	EF	days/year	0.68	0.68	
Age Sensitivity Factor	ASF	unitless	10	3	
Inhalation Absorption Factor	A	unitless	1	1	
Conversion Factor	CF_1	m^3/L	0.001	0.001	
Conversion Factor	CF_2	$\mu g/m^3$	0.001	0.001	
Cancer Potency Factor (diesel exhaust)	CPF	$mg/kg\text{-}day^{-1}$	1.1	1.1	
Averaging Time (for residential exposure)	AT	years	70.00	70.00	

SOURCE: Office of Environmental Health Hazard Assessment, 2015. *Air Toxics Hot Spots Program Guidance Manual for the Preparation of Health Risk Assessments* . February 2015
Daily breathing rate for residential receptor is based on the OEHHA 95th percentile moderate intensity breathing rates (OEHHA Table 5.7).
Fraction of time at home is set to values per OEHHA Table 8.4 for residential since the nearest school has an unmitigated cancer risk of <1 per million.
Inhalation cancer potency factor from OEHHA Table 7.1

Hazard Index

Chronic Inhalation	REL	$\mu g/m^3$	5

Intake Factor for Inhalation, IF (m^3/kg-day) = DBR*MAF*EF*ED*ASF*A*CF/AT

	Daycare		School
AERMOD Source	0<2	2<16	2<16
SLINE1	0.353	0.000	0.046
SLINE1	0.207	0.000	0.010
SLINE2	0.163	0.026	0.000
SLINE2	0.000	0.012	0.000
SLINE3	0.100	0.000	0.000
SLINE3	0.312	0.000	0.022
PAREA1	0.143	0.000	0.000
PAREA1	0.492	0.000	0.046
PAREA1	0.078	0.000	0.010
SLINE4	0.353	0.000	0.046
SLINE4	0.207	0.000	0.010
SLINE5	0.163	0.026	0.000
SLINE5	0.000	0.012	0.000

Risk Calculation Part 1, R1 = IF*CPF*CF

Daycare		School
0<2	2<16	2<16
3.88E-04	0.00E+00	5.04E-05
2.27E-04	0.00E+00	1.12E-05
1.80E-04	2.86E-05	0.00E+00
0.00E+00	1.29E-05	0.00E+00
1.10E-04	0.00E+00	0.00E+00
3.43E-04	0.00E+00	2.47E-05
1.58E-04	0.00E+00	0.00E+00
5.41E-04	0.00E+00	5.04E-05
8.62E-05	0.00E+00	1.12E-05
3.88E-04	0.00E+00	5.04E-05
2.27E-04	0.00E+00	1.12E-05
1.80E-04	2.86E-05	0.00E+00
0.00E+00	1.29E-05	0.00E+00

MEIR	Cancer Risk	UTM X	UTM Y
Daycare	0.83	576120.8	4147895.5
School	0.17	577160.8	4147095.5

HI	UTM X	UTM Y
0.001	576120.8	4147895.5
0.001	577160.8	4147095.5

Diesel Particulate Matter concentration, C_{DPM} (µg/m^3)

X (UTM)	Y (UTM)	Project Construction									Haul Trucks				Risk Calculation Part 2						
		SLINE1	SLINE1	SLINE2	SLINE2	SLINE3	SLINE3	PAREA1	PAREA1	PAREA1	SLINE4	SLINE4	SLINE5	SLINE5	Cancer Risk = ∑R1*C_{DPM}			HI			
		2030	2031	2031	2032	2029	2030	2029	2030	2031	2030	2031	2031	2032	0<2	2<16	Total	C_{DPM}/REL			
																		unitless			
576321	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	4.96E-07	2.54E-09	4.98E-01	0.001	Daycare	Kimmie's Childcare	
576321	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.04E-07	2.60E-09	5.07E-01	0.001	Daycare	Kimmie's Childcare	
576121	4147895	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.004	0.000	0.000	0.000	0.000	8.28E-07	6.52E-09	8.35E-01	0.001	Daycare	Edith's Daycare	
576921	4146222	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	4.19E-07	3.50E-09	4.22E-01	0.000	Daycare	Deidra's Daycare	
576581	4146282	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	4.30E-07	2.14E-09	4.32E-01	0.000	Daycare	Au P'tit Mode de East Palo Alto	
576601	4146282	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	4.30E-07	2.21E-09	4.32E-01	0.000	Daycare	Au P'tit Mode de East Palo Alto	
577181	4146442	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	6.12E-07	5.30E-09	6.17E-01	0.000	Daycare	Sweet Angels Daycare	
576541	4146602	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	5.10E-07	2.47E-09	5.12E-01	0.000	Residence	Primeros Cinco by Sister Daycare	
576941	4146762	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	5.41E-07	5.92E-09	5.47E-01	0.000	Daycare	Tiny Town Daycare	

Diesel Particulate Matter concentration, C_{DPM} (µg/m^3)

X (UTM)	Y (UTM)	Project Construction									Haul Trucks				Risk Calculation Part 2					
		SLINE1	SLINE1	SLINE2	SLINE2	SLINE3	SLINE3	PAREA1	PAREA1	PAREA1	SLINE4	SLINE4	SLINE5	SLINE5	Cancer Risk = ∑R1*C_{DPM}			HI		
		2030	2031	2031	2032	2029	2030	2029	2030	2031	2030	2031	2031	2032	2<16	Total	C_{DPM}/REL			
																	unitless			
576741	4147075	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.33E-08	5.33E-02	0.001	School	KIPP Esperanza High School	
576761	4147075	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.33E-08	5.33E-02	0.001	School	KIPP Esperanza High School	
576781	4147075	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.34E-08	5.34E-02	0.001	School	East Palo Alto Charter School	
576801	4147075	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.35E-08	5.35E-02	0.001	School	East Palo Alto Charter School	
576821	4147075	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.37E-08	5.37E-02	0.001	School	East Palo Alto Charter School	
576841	4147075	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.39E-08	5.39E-02	0.001	School	KIPP Esperanza High School	
576861	4147075	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.42E-08	5.42E-02	0.001	School	KIPP Esperanza High School	
576881	4147075	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.47E-08	5.47E-02	0.001	School	East Palo Alto Charter School	
576901	4147075	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.000	5.53E-08	5.53E-02	0.000	School	East Palo Alto Charter School	
576921	4147075	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.000	5.62E-08	5.62E-02	0.000	School	KIPP Esperanza High School	
576941	4147075	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	5.72E-08	5.72E-02	0.000	School	KIPP Esperanza High School	
576961	4147075	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	5.85E-08	5.85E-02	0.000	School	East Palo Alto Charter School	
576981	4147075	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	6.02E-08	6.02E-02	0.000	School	East Palo Alto Charter School	
577001	4147075	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	6.26E-08	6.26E-02	0.000	School	East Palo Alto Charter School	
577021	4147075	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	6.56E-08	6.56E-02	0.000	School	East Palo Alto Charter School	
577121	4147075	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	1.06E-07	1.06E-01	0.000	School	East Palo Alto Charter School	
577141	4147075	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	1.27E-07	1.27E-01	0.001	School	East Palo Alto Charter School	
577161	4147075	0.002	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	1.59E-07	1.59E-01	0.001	School	East Palo Alto Charter School	
576181	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	3.53E-08	3.53E-02	0.000	School	East Palo Alto Charter School	
576201	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	3.65E-08	3.65E-02	0.000	School	East Palo Alto Charter School	
576221	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	3.77E-08	3.77E-02	0.000	School	East Palo Alto Charter School	
576241	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	3.90E-08	3.90E-02	0.000	School	East Palo Alto Charter School	
576261	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	4.02E-08	4.02E-02	0.000	School	East Palo Alto Charter School	
576281	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	4.15E-08	4.15E-02	0.000	School	East Palo Alto Charter School	
576301	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.000	4.27E-08	4.27E-02	0.000	School	East Palo Alto Charter School	
576321	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	4.40E-08	4.40E-02	0.001	School	East Palo Alto Charter School	
576341	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	4.52E-08	4.52E-02	0.001	School	East Palo Alto Charter School	
576361	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	4.64E-08	4.64E-02	0.001	School	East Palo Alto Charter School	
576381	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	4.76E-08	4.76E-02	0.001	School	East Palo Alto Charter School	
576401	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	4.88E-08	4.88E-02	0.001	School	East Palo Alto Charter School	
576421	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.00E-08	5.00E-02	0.001	School	The Primary School	
576441	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.12E-08	5.12E-02	0.001	School	The Primary School	
576461	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.28E-08	5.28E-02	0.001	School	The Primary School	
576481	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.52E-08	5.52E-02	0.001	School	The Primary School	
576521	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	6.01E-08	6.01E-02	0.001	School	The Primary School	
576541	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.81E-08	5.81E-02	0.001	School	The Primary School	
576561	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.63E-08	5.63E-02	0.001	School	The Primary School	
576581	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.55E-08	5.55E-02	0.001	School	The Primary School	
576601	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.51E-08	5.51E-02	0.001	School	Los Robles Ronald McNair Academy	
576621	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.48E-08	5.48E-02	0.001	School	Los Robles Ronald McNair Academy	
576641	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.45E-08	5.45E-02	0.001	School	Los Robles Ronald McNair Academy	
576661	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.44E-08	5.44E-02	0.001	School	The Primary School	
576681	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.43E-08	5.43E-02	0.001	School	The Primary School	
576701	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.41E-08	5.41E-02	0.001	School	The Primary School	
576721	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.41E-08	5.41E-02	0.001	School	The Primary School	
576741	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.40E-08	5.40E-02	0.001	School	The Primary School	
576761	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.40E-08	5.40E-02	0.001	School	The Primary School	
576841	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.46E-08	5.46E-02	0.001	School	The Primary School	
576861	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.49E-08	5.49E-02	0.001	School	The Primary School	
576881	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.54E-08	5.54E-02	0.001	School	The Primary School	
576901	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.000	5.60E-08	5.60E-02	0.000	School	Los Robles Ronald McNair Academy	
576921	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.000	5.69E-08	5.69E-02	0.000	School	Los Robles Ronald McNair Academy	
576941	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.000	5.80E-08	5.80E-02	0.000	School	Los Robles Ronald McNair Academy	
576961	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	5.93E-08	5.93E-02	0.000	School	Los Robles Ronald McNair Academy	
576981	4147095	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	6.11E-08	6.11E-02	0.000	School	Los Robles Ronald McNair Academy	
577001	4147095	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	6.35E-08	6.35E-02	0.000	School	Los Robles Ronald McNair Academy	
577021	4147095	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	6.67E-08	6.67E-02	0.000	School	The Primary School	
577121	4147095	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	1.11E-07	1.11E-01	0.000	School	The Primary School	
577141	4147095	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	1.33E-07	1.33E-01	0.001	School	The Primary School	
577161	4147095	0.002	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	1.70E-07	1.70E-01	0.001	School	The Primary School	
576181	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	3.58E-08	3.58E-02	0.000	School	The Primary School	
576201	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	3.70E-08	3.70E-02	0.000	School	The Primary School	
576221	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	3.83E-08	3.83E-02	0.000	School	The Primary School	

576241	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	3.95E-08	3.95E-02	0.000	School	The Primary School
576261	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	4.08E-08	4.08E-02	0.000	School	The Primary School
576281	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.000	4.21E-08	4.21E-02	0.000	School	Los Robles Ronald McNair Academy
576301	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.000	4.34E-08	4.34E-02	0.000	School	Los Robles Ronald McNair Academy
576321	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	4.47E-08	4.47E-02	0.001	School	Los Robles Ronald McNair Academy
576341	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	4.59E-08	4.59E-02	0.001	School	Los Robles Ronald McNair Academy
576361	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	4.71E-08	4.71E-02	0.001	School	Los Robles Ronald McNair Academy
576381	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	4.84E-08	4.84E-02	0.001	School	The Primary School
576401	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	4.96E-08	4.96E-02	0.001	School	The Primary School
576421	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.07E-08	5.07E-02	0.001	School	The Primary School
576441	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.20E-08	5.20E-02	0.001	School	East Palo Alto Academy
576461	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.36E-08	5.36E-02	0.001	School	East Palo Alto Academy
576481	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.61E-08	5.61E-02	0.001	School	East Palo Alto Academy
576521	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	6.14E-08	6.14E-02	0.001	School	East Palo Alto Academy
576541	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.87E-08	5.87E-02	0.001	School	East Palo Alto Academy
576561	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.70E-08	5.70E-02	0.001	School	East Palo Alto Academy
576581	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.62E-08	5.62E-02	0.001	School	East Palo Alto Academy
576601	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.58E-08	5.58E-02	0.001	School	East Palo Alto Academy
576621	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.55E-08	5.55E-02	0.001	School	East Palo Alto Academy
576641	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.53E-08	5.53E-02	0.001	School	East Palo Alto Academy
576701	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.48E-08	5.48E-02	0.001	School	East Palo Alto Academy
576721	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.47E-08	5.47E-02	0.001	School	East Palo Alto Academy
576741	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.47E-08	5.47E-02	0.001	School	East Palo Alto Academy
576761	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.47E-08	5.47E-02	0.001	School	East Palo Alto Academy
576841	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.52E-08	5.52E-02	0.001	School	East Palo Alto Academy
576861	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.56E-08	5.56E-02	0.001	School	East Palo Alto Academy
576881	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.60E-08	5.60E-02	0.001	School	East Palo Alto Academy
576901	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.67E-08	5.67E-02	0.001	School	East Palo Alto Academy
576921	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.000	5.76E-08	5.76E-02	0.000	School	Eastside College Preparatory School
576941	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.000	5.88E-08	5.88E-02	0.000	School	Eastside College Preparatory School
576961	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	6.02E-08	6.02E-02	0.000	School	Eastside College Preparatory School
576981	4147115	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	6.20E-08	6.20E-02	0.000	School	Eastside College Preparatory School
577001	4147115	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	6.45E-08	6.45E-02	0.000	School	Eastside College Preparatory School
577021	4147115	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	6.79E-08	6.79E-02	0.000	School	Eastside College Preparatory School
577101	4147115	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	9.85E-08	9.85E-02	0.000	School	Eastside College Preparatory School
577121	4147115	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	1.15E-07	1.15E-01	0.000	School	Eastside College Preparatory School
576181	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	3.64E-08	3.64E-02	0.000	School	Eastside College Preparatory School
576201	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	3.76E-08	3.76E-02	0.000	School	Eastside College Preparatory School
576221	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	3.89E-08	3.89E-02	0.000	School	Eastside College Preparatory School
576241	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	4.02E-08	4.02E-02	0.000	School	Eastside College Preparatory School
576261	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	4.15E-08	4.15E-02	0.000	School	Eastside College Preparatory School
576281	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.000	4.28E-08	4.28E-02	0.000	School	Eastside College Preparatory School
576301	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	4.41E-08	4.41E-02	0.001	School	Eastside College Preparatory School
576321	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	4.54E-08	4.54E-02	0.001	School	Eastside College Preparatory School
576341	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	4.67E-08	4.67E-02	0.001	School	Eastside College Preparatory School
576361	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	4.79E-08	4.79E-02	0.001	School	Eastside College Preparatory School
576381	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	4.92E-08	4.92E-02	0.001	School	Eastside College Preparatory School
576401	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.04E-08	5.04E-02	0.001	School	Eastside College Preparatory School
576421	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.15E-08	5.15E-02	0.001	School	Eastside College Preparatory School
576441	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.29E-08	5.29E-02	0.001	School	Eastside College Preparatory School
576461	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.45E-08	5.45E-02	0.001	School	Eastside College Preparatory School
576481	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.71E-08	5.71E-02	0.001	School	Eastside College Preparatory School
576521	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	6.22E-08	6.22E-02	0.001	School	Eastside College Preparatory School
576541	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.94E-08	5.94E-02	0.001	School	Eastside College Preparatory School
576561	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.77E-08	5.77E-02	0.001	School	Eastside College Preparatory School
576581	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.70E-08	5.70E-02	0.001	School	Eastside College Preparatory School
576721	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.54E-08	5.54E-02	0.001	School	Eastside College Preparatory School
576881	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.67E-08	5.67E-02	0.001	School	Eastside College Preparatory School
576901	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	5.74E-08	5.74E-02	0.001	School	Eastside College Preparatory School
576921	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.000	5.83E-08	5.83E-02	0.000	School	Eastside College Preparatory School
576941	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.000	5.95E-08	5.95E-02	0.000	School	Eastside College Preparatory School
576961	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	6.11E-08	6.11E-02	0.000	School	Eastside College Preparatory School
576981	4147135	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	6.30E-08	6.30E-02	0.000	School	Eastside College Preparatory School
577001	4147135	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	6.56E-08	6.56E-02	0.000	School	Eastside College Preparatory School
577021	4147135	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	6.93E-08	6.93E-02	0.000	School	Eastside College Preparatory School
577041	4147135	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	7.40E-08	7.40E-02	0.000	School	Eastside College Preparatory School
577081	4147135	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	8.91E-08	8.91E-02	0.000	School	Eastside College Preparatory School
577101	4147135	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	1.02E-07	1.02E-01	0.000	School	Eastside College Preparatory School
577121	4147135	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	1.20E-07	1.20E-01	0.000	School	Eastside College Preparatory School
576181	4147155	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	3.70E-08	3.70E-02	0.000	School	Eastside College Preparatory School
576201	4147155	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	3.82E-08	3.82E-02	0.000	School	KIPP Esperanza High School
576221	4147155	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	3.96E-08	3.96E-02	0.000	School	KIPP Esperanza High School
576241	4147155	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	4.09E-08	4.09E-02	0.000	School	KIPP Esperanza High School
576261	4147155	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.000	4.22E-08	4.22E-02	0.000	School	KIPP Esperanza High School
576281	4147155	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.000	4.36E-08	4.36E-02	0.000	School	East Palo Alto Charter School
576301	4147155	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	4.49E-08	4.49E-02	0.001	School	East Palo Alto Charter School

SAFER Bay
Construction Health Risk Calculations - School & Daycare
Annual Average $PM_{2.5}$ Concentration Calculations

Source	AERMOD Source	Year	Start Date	End Date	Workdays	$PM_{2.5}$ Emission Rate (g/s) Tier 4F
South of Bay Road - Construction	SLINE1	2030	4/14/2030	12/31/2030	187	0.001
	SLINE1	2031	1/1/2031	6/3/2031	110	0.002
North of Bay Road - Construction	SLINE2	2031	4/6/2031	12/31/2031	231	0.001
	SLINE2	2032	1/1/2032	3/8/2032	58	0.000
Dumbarton Approach (Railroad to SR 84) - Construction	SLINE3	2029	10/18/2029	12/31/2029	64	0.000
	SLINE3	2030	1/1/2030	8/20/2030	199	0.001
Pond Restoration - Construction	PAREA1	2029	9/16/2029	12/31/2029	91	0.004
	PAREA1	2030	1/1/2030	12/31/2030	313	0.002
	PAREA1	2031	1/1/2031	2/28/2031	51	0.017
South of Bay Road - Trucks	SLINE4	2030	4/14/2030	12/31/2030	187	0.000
	SLINE4	2031	1/1/2031	6/3/2031	110	0.000
North of Bay Road - Trucks	SLINE5	2031	4/6/2031	12/31/2031	231	0.000
	SLINE5	2032	1/1/2032	3/8/2032	58	0.000

	$PM_{2.5}$ Conc.	UTM X	UTM Y
MEIR	0.004	576120.8	4147895.5
Daycare	0.004	577160.8	4147095.5
School	0.004	577160.8	4147095.5

Annual Average $PM_{2.5}$ concentration, $C_{PM2.5}$ ($\mu g/m^3$)

X (UTM)	Y (UTM)	Project Construction									Haul Trucks				$PM_{2.5}$		
		SLINE1	SLINE1	SLINE2	SLINE2	SLINE3	SLINE3	PAREA1	PAREA1	PAREA1	SLINE4	SLINE4	SLINE5	SLINE5	Annual Avg.		
		2030	2031	2031	2032	2029	2030	2029	2030	2031	2030	2031	2031	2032	$\mu g/m^3$		
	Index Lookup HIDE	1	2	3	4	5	6	7	8	9	10	11	12	13			
576321	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	Daycare	Kimmie's Childcare
576321	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	Daycare	Kimmie's Childcare
576121	4147895	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.004	0.000	0.000	0.001	0.000	0.004	Daycare	Edith's Daycare
576921	4146222	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	Daycare	Deidra's Daycare
576581	4146282	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	Daycare	Au P'tit Mode de East Palo Alto
576601	4146282	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	Daycare	Au P'tit Mode de East Palo Alto
577181	4146442	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.001	Daycare	Sweet Angels Daycare
576541	4146602	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.001	0.000	0.000	0.002	Residence	Primeros Cinco by Sister Daycare
576941	4146762	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	Daycare	Tiny Town Daycare

Annual Average $PM_{2.5}$ concentration, $C_{PM2.5}$ ($\mu g/m^3$)

X (UTM)	Y (UTM)	Project Construction									Haul Trucks				$PM_{2.5}$		
		SLINE1	SLINE1	SLINE2	SLINE2	SLINE3	SLINE3	PAREA1	PAREA1	PAREA1	SLINE4	SLINE4	SLINE5	SLINE5	Annual Avg.		
		2030	2031	2031	2032	2029	2030	2029	2030	2031	2030	2031	2031	2032	$\mu g/m^3$		
	Index Lookup HIDE	1	2	3	4	5	6	7	8	9	10	11	12	13			
576741	4147075	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	KIPP Esperanza High School
576761	4147075	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	KIPP Esperanza High School
576781	4147075	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	East Palo Alto Charter School
576801	4147075	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	East Palo Alto Charter School
576821	4147075	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	East Palo Alto Charter School
576841	4147075	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	KIPP Esperanza High School
576861	4147075	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	KIPP Esperanza High School
576881	4147075	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	East Palo Alto Charter School
576901	4147075	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	East Palo Alto Charter School
576921	4147075	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	KIPP Esperanza High School
576941	4147075	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	KIPP Esperanza High School
576961	4147075	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	East Palo Alto Charter School
576981	4147075	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	East Palo Alto Charter School
577001	4147075	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	East Palo Alto Charter School
577021	4147075	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	East Palo Alto Charter School
577121	4147075	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	East Palo Alto Charter School
577141	4147075	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.003	School	East Palo Alto Charter School
577161	4147075	0.002	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.003	School	East Palo Alto Charter School
576181	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	East Palo Alto Charter School
576201	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	East Palo Alto Charter School
576221	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	East Palo Alto Charter School
576241	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	East Palo Alto Charter School
576261	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	East Palo Alto Charter School
576281	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	East Palo Alto Charter School
576301	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	East Palo Alto Charter School
576321	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	East Palo Alto Charter School
576341	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	East Palo Alto Charter School
576361	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	East Palo Alto Charter School
576381	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	East Palo Alto Charter School
576401	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	East Palo Alto Charter School
576421	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	The Primary School
576441	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	The Primary School
576461	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	The Primary School
576481	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	The Primary School
576521	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.001	0.000	0.000	0.003	School	The Primary School
576541	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	The Primary School
576561	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	The Primary School
576581	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	The Primary School
576601	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	Los Robles Ronald McNair Academy
576621	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	Los Robles Ronald McNair Academy
576641	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	Los Robles Ronald McNair Academy
576661	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	The Primary School
576681	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	The Primary School
576701	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	The Primary School
576721	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	The Primary School
576741	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	The Primary School
576761	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	The Primary School
576841	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	The Primary School
576861	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	The Primary School
576881	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	The Primary School
576901	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	Los Robles Ronald McNair Academy
576921	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	Los Robles Ronald McNair Academy
576941	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	Los Robles Ronald McNair Academy
576961	4147095	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	Los Robles Ronald McNair Academy
576981	4147095	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	Los Robles Ronald McNair Academy
577001	4147095	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	Los Robles Ronald McNair Academy
577021	4147095	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	The Primary School
577121	4147095	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	The Primary School
577141	4147095	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.003	School	The Primary School
577161	4147095	0.002	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.004	School	The Primary School
576181	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	The Primary School
576201	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	The Primary School
576221	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	The Primary School
576241	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	The Primary School
576261	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	The Primary School
576281	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	Los Robles Ronald McNair Academy
576301	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	Los Robles Ronald McNair Academy

576321	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	Los Robles Ronald McNair Academy
576341	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	Los Robles Ronald McNair Academy
576361	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	Los Robles Ronald McNair Academy
576381	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	The Primary School
576401	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	The Primary School
576421	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	The Primary School
576441	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	East Palo Alto Academy
576461	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	East Palo Alto Academy
576481	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	East Palo Alto Academy
576521	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.001	0.000	0.000	0.003	School	East Palo Alto Academy
576541	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	East Palo Alto Academy
576561	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	East Palo Alto Academy
576581	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	East Palo Alto Academy
576601	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	East Palo Alto Academy
576621	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	East Palo Alto Academy
576641	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	East Palo Alto Academy
576701	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	East Palo Alto Academy
576721	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	East Palo Alto Academy
576741	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	East Palo Alto Academy
576761	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	East Palo Alto Academy
576841	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	East Palo Alto Academy
576861	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	East Palo Alto Academy
576881	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	East Palo Alto Academy
576901	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	East Palo Alto Academy
576921	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	Eastside College Preparatory School
576941	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	Eastside College Preparatory School
576961	4147115	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	Eastside College Preparatory School
576981	4147115	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	Eastside College Preparatory School
577001	4147115	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	Eastside College Preparatory School
577021	4147115	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	Eastside College Preparatory School
577101	4147115	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	Eastside College Preparatory School
577121	4147115	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	Eastside College Preparatory School
576181	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	Eastside College Preparatory School
576201	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	Eastside College Preparatory School
576221	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	Eastside College Preparatory School
576241	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	Eastside College Preparatory School
576261	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	Eastside College Preparatory School
576281	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	Eastside College Preparatory School
576301	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	Eastside College Preparatory School
576321	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	Eastside College Preparatory School
576341	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	Eastside College Preparatory School
576361	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	Eastside College Preparatory School
576381	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	Eastside College Preparatory School
576401	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	Eastside College Preparatory School
576421	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	Eastside College Preparatory School
576441	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	Eastside College Preparatory School
576461	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	Eastside College Preparatory School
576481	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	Eastside College Preparatory School
576521	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.001	0.000	0.000	0.003	School	Eastside College Preparatory School
576541	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	Eastside College Preparatory School
576561	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	Eastside College Preparatory School
576581	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	Eastside College Preparatory School
576721	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	Eastside College Preparatory School
576881	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	Eastside College Preparatory School
576901	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	Eastside College Preparatory School
576921	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	Eastside College Preparatory School
576941	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	Eastside College Preparatory School
576961	4147135	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	Eastside College Preparatory School
576981	4147135	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	Eastside College Preparatory School
577001	4147135	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	Eastside College Preparatory School
577021	4147135	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	Eastside College Preparatory School
577041	4147135	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	Eastside College Preparatory School
577081	4147135	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	Eastside College Preparatory School
577101	4147135	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	Eastside College Preparatory School
577121	4147135	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	Eastside College Preparatory School
576181	4147155	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	Eastside College Preparatory School
576201	4147155	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	KIPP Esperanza High School
576221	4147155	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	KIPP Esperanza High School
576241	4147155	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	KIPP Esperanza High School
576261	4147155	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	KIPP Esperanza High School
576281	4147155	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.002	0.000	0.000	0.000	0.000	0.002	School	East Palo Alto Charter School
576301	4147155	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.003	0.000	0.000	0.000	0.000	0.003	School	East Palo Alto Charter School

SAFER Bay
Cumulative Health Risks at Residential MEIR for Construction

BAAQMD Permitted Stationary Sources[1]									
Facility Name	**Address**	**Source Details**	**Health Risk at Source**			**Distance to Residential MEIR (feet)**	**Adjusted Health Risk at Residential MEIR**		
			Cancer Risk	**Chronic Hazard Index**	**$PM_{2.5}$**		**Cancer Risk**	**Chronic Hazard Index**	**$PM_{2.5}$**
There are no permitted stationary sources within 1,000 feet									
Background Risks from Mobile Sources[2]									
Onroad							4.6	0.02	0.1
Rail							0.00	0	0.00000
Project[3]									
Construction							1.93	0.01	0.05
TOTAL							6.6	0.0	0.2
BAAQMD Cumulative Thresholds							100	10	0.8

NOTES:
1. Stationary source health risk data from BAAQMD's Stationary Source Screening Map at https://baaqmd.maps.arcgis.com/apps/webappviewer/index.html?id=845658c19eae4594b9f4b805fb9d89a3.
2. Mobile source risks from data downloaded from BAAQMD's Mobile Source Screening Map at https://mtc.maps.arcgis.com/apps/instant/sidebar/index.html?appid=c5f9b1a40326409a89076bdc0d95e429.
3. From project HRA.

UTM		Onroad Cancer Risk	Onroad Hazard Index	Onroad PM2.5	Rail Cancer Risk	Rail Hazard Index	Rail PM2.5
576201	4147295.45	4.635901	0.016418	0.117609	NA	NA	NA

Source: Data downloaded from BAAQMD's Mobile Source Screening Map at https://mtc.maps.arcgis.com/apps/instant/sidebar/index.html?appid=c5f9b1a40326409a89076bdc0d95e429

SAFER Bay
AERMOD Results

SAFER Bay Project

Summary of AERMOD Area Source Outputs for All Offsite Receptors

			Construction Sources							
X	Y	X_Y	SLINE1	SLINE2	SLINE3	PAREA1	SLINE4	SLINE5		
576181	4147075	576180.75_4147075.45	0.02052	0.04308	0.038	0.11906	0.34501	0.42168	Residence	
576201	4147075	576200.75_4147075.45	0.02113	0.04451	0.03868	0.12303	0.36736	0.44674	Residence	
576221	4147075	576220.75_4147075.45	0.0218	0.04607	0.03947	0.12707	0.3887	0.46806	Residence	
576241	4147075	576240.75_4147075.45	0.02261	0.04784	0.04043	0.13123	0.40974	0.48562	Residence	
576261	4147075	576260.75_4147075.45	0.02345	0.04982	0.04157	0.13536	0.43022	0.49905	Residence	
576281	4147075	576280.75_4147075.45	0.02431	0.05204	0.04291	0.13945	0.45099	0.50875	Residence	
576301	4147075	576300.75_4147075.45	0.02529	0.05454	0.04449	0.14353	0.47355	0.5153	Residence	
576321	4147075	576320.75_4147075.45	0.02631	0.05731	0.0463	0.1475	0.49904	0.51899	Residence	
576341	4147075	576340.75_4147075.45	0.02743	0.06035	0.04834	0.15137	0.53	0.52036	Residence	
576361	4147075	576360.75_4147075.45	0.02862	0.06363	0.0506	0.15505	0.5695	0.51977	Residence	
576381	4147075	576380.75_4147075.45	0.0299	0.06712	0.05304	0.15852	0.62294	0.51762	Residence	
576401	4147075	576400.75_4147075.45	0.03131	0.07085	0.05566	0.16178	0.70134	0.51447	Residence	
576421	4147075	576420.75_4147075.45	0.03283	0.07474	0.0584	0.16474	0.82141	0.51035	Residence	
576441	4147075	576440.75_4147075.45	0.03445	0.07876	0.06119	0.16734	1.01894	0.50538	Residence	
576461	4147075	576460.75_4147075.45	0.03622	0.08294	0.064	0.16962	1.38922	0.49989	Residence	
576481	4147075	576480.75_4147075.45	0.03814	0.08723	0.06678	0.17151	2.2264	0.49382	Residence	
576521	4147075	576520.75_4147075.45	0.04254	0.09628	0.07208	0.17412	4.1035	0.48039	Residence	
576541	4147075	576540.75_4147075.45	0.04507	0.10116	0.07459	0.17487	3.02486	0.47319	Residence	
576561	4147075	576560.75_4147075.45	0.04784	0.10636	0.07699	0.17523	1.94078	0.46558	Residence	
576581	4147075	576580.75_4147075.45	0.05094	0.11202	0.07937	0.17529	1.39652	0.45785	Residence	
576601	4147075	576600.75_4147075.45	0.05441	0.1182	0.08178	0.17507	1.07222	0.44995	Residence	
576621	4147075	576620.75_4147075.45	0.05821	0.12485	0.08424	0.17454	0.8561	0.44171	Residence	
576641	4147075	576640.75_4147075.45	0.06229	0.13189	0.08681	0.17365	0.70053	0.43296	Residence	
576661	4147075	576660.75_4147075.45	0.06694	0.13953	0.08961	0.1726	0.58612	0.42431	Residence	
576681	4147075	576680.75_4147075.45	0.07207	0.14764	0.09267	0.17132	0.49743	0.41546	Residence	
576701	4147075	576700.75_4147075.45	0.07779	0.15626	0.09602	0.16984	0.42727	0.40655	Residence	
576721	4147075	576720.75_4147075.45	0.08411	0.16537	0.09966	0.16816	0.37071	0.39757	Residence	
576741	4147075	576740.75_4147075.45	0.09111	0.17495	0.10359	0.16627	0.32443	0.38853	School	KIPP Esperanza High School
576761	4147075	576760.75_4147075.45	0.09928	0.18525	0.10787	0.16436	0.28672	0.37999	School	KIPP Esperanza High School
576781	4147075	576780.75_4147075.45	0.10865	0.19612	0.11244	0.16236	0.25529	0.37174	Residence	
576801	4147075	576800.75_4147075.45	0.11871	0.20703	0.11711	0.16006	0.22852	0.36327	Residence	
576821	4147075	576820.75_4147075.45	0.1305	0.21836	0.12198	0.15771	0.20591	0.35526	Residence	
576841	4147075	576840.75_4147075.45	0.14395	0.22973	0.12694	0.1552	0.18651	0.34741	Residence	
576861	4147075	576860.75_4147075.45	0.15937	0.24098	0.13191	0.15252	0.16977	0.33973	Residence	
576881	4147075	576880.75_4147075.45	0.17759	0.25215	0.13692	0.14977	0.15532	0.33241	Residence	
576901	4147075	576900.75_4147075.45	0.19893	0.263	0.14189	0.14693	0.14277	0.32538	Residence	
576921	4147075	576920.75_4147075.45	0.22363	0.2733	0.14676	0.14399	0.13181	0.31857	Residence	
576941	4147075	576940.75_4147075.45	0.25225	0.28288	0.15148	0.14098	0.12221	0.312	Residence	
576961	4147075	576960.75_4147075.45	0.28512	0.29142	0.15595	0.13787	0.11372	0.3055	Residence	
576981	4147075	576980.75_4147075.45	0.32485	0.29913	0.16019	0.13479	0.10624	0.29932	Residence	
577001	4147075	577000.75_4147075.45	0.37524	0.30619	0.16424	0.13183	0.09971	0.2937	Residence	
577021	4147075	577020.75_4147075.45	0.43592	0.31197	0.16782	0.12879	0.0938	0.28794	Residence	
577121	4147075	577120.75_4147075.45	1.15274	0.33156	0.17889	0.11486	0.07198	0.26207	School	East Palo Alto Charter School
577141	4147075	577140.75_4147075.45	1.49581	0.3343	0.17946	0.11234	0.06868	0.2572	School	East Palo Alto Charter School
577161	4147075	577160.75_4147075.45	2.03048	0.33701	0.1795	0.10994	0.06563	0.25252	School	East Palo Alto Charter School
576181	4147095	576180.75_4147095.45	0.02069	0.04346	0.03839	0.12089	0.36162	0.44833	Residence	
576201	4147095	576200.75_4147095.45	0.02128	0.0449	0.03905	0.12491	0.38447	0.4746	Residence	
576221	4147095	576220.75_4147095.45	0.02197	0.04648	0.03984	0.12907	0.40636	0.49683	Residence	
576241	4147095	576240.75_4147095.45	0.02276	0.04825	0.04078	0.13331	0.42738	0.51464	Residence	
576261	4147095	576260.75_4147095.45	0.02364	0.05026	0.04191	0.13759	0.44814	0.5282	Residence	
576281	4147095	576280.75_4147095.45	0.02452	0.05248	0.04323	0.14176	0.46846	0.53748	Residence	
576301	4147095	576300.75_4147095.45	0.0255	0.055	0.04479	0.14592	0.49057	0.54345	Residence	
576321	4147095	576320.75_4147095.45	0.02655	0.05781	0.04659	0.14997	0.51541	0.54638	Residence	
576341	4147095	576340.75_4147095.45	0.02768	0.06089	0.04863	0.15389	0.54552	0.54688	Residence	
576361	4147095	576360.75_4147095.45	0.02892	0.06424	0.0509	0.15765	0.5847	0.5455	Residence	
576381	4147095	576380.75_4147095.45	0.03023	0.06782	0.05337	0.16116	0.63779	0.54251	Residence	
576401	4147095	576400.75_4147095.45	0.03169	0.07163	0.05602	0.16444	0.71565	0.53845	Residence	
576421	4147095	576420.75_4147095.45	0.03323	0.0756	0.05879	0.16739	0.83524	0.53339	Residence	
576441	4147095	576440.75_4147095.45	0.03488	0.07972	0.06164	0.16999	1.03397	0.52751	Residence	
576461	4147095	576460.75_4147095.45	0.0367	0.084	0.06451	0.17224	1.40859	0.52113	Residence	
576481	4147095	576480.75_4147095.45	0.03869	0.08843	0.06737	0.17413	2.27608	0.51433	Residence	
576521	4147095	576520.75_4147095.45	0.04325	0.0978	0.07285	0.17674	4.16464	0.49954	Residence	
576541	4147095	576540.75_4147095.45	0.04585	0.10285	0.07544	0.17746	2.96207	0.49166	Residence	
576561	4147095	576560.75_4147095.45	0.04867	0.10823	0.07792	0.17777	1.90835	0.48332	Residence	
576581	4147095	576580.75_4147095.45	0.0518	0.11407	0.08037	0.17777	1.3739	0.47482	Residence	
576601	4147095	576600.75_4147095.45	0.05536	0.12051	0.08287	0.17754	1.05617	0.46638	Residence	
576621	4147095	576620.75_4147095.45	0.05914	0.12735	0.08538	0.1769	0.84077	0.4573	Residence	
576641	4147095	576640.75_4147095.45	0.06329	0.13467	0.08802	0.17598	0.68716	0.44792	Residence	
576661	4147095	576660.75_4147095.45	0.06799	0.14262	0.09091	0.17489	0.5738	0.43865	Residence	
576681	4147095	576680.75_4147095.45	0.07322	0.15108	0.09405	0.17358	0.48606	0.42924	Residence	

576701	4147095	576700.75_4147095.45	0.07894	0.15998	0.09746	0.17201	0.41645	0.41963	Residence	
576721	4147095	576720.75_4147095.45	0.08547	0.16953	0.10122	0.17032	0.36087	0.4102	Residence	
576741	4147095	576740.75_4147095.45	0.09257	0.17946	0.10523	0.16835	0.31527	0.40056	School	KIPP Esperanza High School
576761	4147095	576760.75_4147095.45	0.10075	0.19005	0.10958	0.16631	0.27804	0.3913	School	KIPP Esperanza High School
576841	4147095	576840.75_4147095.45	0.14672	0.23637	0.12916	0.15687	0.18044	0.35717	Residence	
576861	4147095	576860.75_4147095.45	0.16252	0.24805	0.13427	0.15411	0.16424	0.34915	Residence	
576881	4147095	576880.75_4147095.45	0.18112	0.2596	0.13941	0.15126	0.15031	0.34149	Residence	
576901	4147095	576900.75_4147095.45	0.20323	0.2709	0.14454	0.14835	0.13828	0.33425	Residence	
576921	4147095	576920.75_4147095.45	0.22861	0.28148	0.14952	0.14531	0.12777	0.32714	Residence	
576941	4147095	576940.75_4147095.45	0.25844	0.29136	0.15438	0.14223	0.11861	0.32036	Residence	
576961	4147095	576960.75_4147095.45	0.29239	0.30004	0.15893	0.13903	0.11049	0.31355	Residence	
576981	4147095	576980.75_4147095.45	0.33305	0.30773	0.16322	0.13584	0.10332	0.30699	Residence	
577001	4147095	577000.75_4147095.45	0.38427	0.31469	0.16727	0.13277	0.09705	0.30099	Residence	
577021	4147095	577020.75_4147095.45	0.44846	0.3207	0.17094	0.12973	0.09146	0.29521	Residence	
577121	4147095	577120.75_4147095.45	1.22056	0.34097	0.18195	0.11569	0.07052	0.26853	Residence	
577141	4147095	577140.75_4147095.45	1.60014	0.34385	0.18243	0.11314	0.0673	0.26346	School	East Palo Alto Charter School
577161	4147095	577160.75_4147095.45	2.20922	0.34672	0.18237	0.11073	0.06434	0.25861	School	East Palo Alto Charter School
576181	4147115	576180.75_4147115.45	0.02085	0.04379	0.03876	0.12267	0.37955	0.47757	Residence	
576201	4147115	576200.75_4147115.45	0.0214	0.04523	0.03946	0.12674	0.40273	0.50487	Residence	
576221	4147115	576220.75_4147115.45	0.02211	0.04685	0.04021	0.13103	0.42516	0.52801	Residence	
576241	4147115	576240.75_4147115.45	0.02288	0.0486	0.04108	0.13532	0.44586	0.54585	Residence	
576261	4147115	576260.75_4147115.45	0.02371	0.05058	0.04214	0.13964	0.46583	0.559	Residence	
576281	4147115	576280.75_4147115.45	0.02462	0.05283	0.04342	0.14394	0.48584	0.5679	Residence	
576301	4147115	576300.75_4147115.45	0.02561	0.05536	0.04495	0.14819	0.50704	0.57311	Residence	
576321	4147115	576320.75_4147115.45	0.02669	0.05822	0.04678	0.15235	0.53128	0.57532	Daycare	Kimmie's Childcare
576341	4147115	576340.75_4147115.45	0.02786	0.06136	0.04886	0.15636	0.56053	0.57492	Residence	
576361	4147115	576360.75_4147115.45	0.0291	0.06477	0.0511	0.16015	0.59813	0.57243	Residence	
576381	4147115	576380.75_4147115.45	0.03054	0.06848	0.05368	0.16381	0.65196	0.56892	Residence	
576401	4147115	576400.75_4147115.45	0.03201	0.07237	0.05636	0.1671	0.72869	0.56383	Residence	
576421	4147115	576420.75_4147115.45	0.03356	0.07644	0.05917	0.17004	0.84666	0.55764	Residence	
576441	4147115	576440.75_4147115.45	0.03524	0.08066	0.06206	0.17263	1.04483	0.55072	Residence	
576461	4147115	576460.75_4147115.45	0.03719	0.08511	0.06504	0.17494	1.4295	0.54377	Residence	
576481	4147115	576480.75_4147115.45	0.03927	0.08968	0.06798	0.17684	2.32876	0.5362	Residence	
576521	4147115	576520.75_4147115.45	0.04397	0.09935	0.07363	0.1794	4.4604	0.51989	Residence	
576541	4147115	576540.75_4147115.45	0.04664	0.10459	0.0763	0.1801	2.89476	0.51131	Residence	
576561	4147115	576560.75_4147115.45	0.04949	0.11013	0.07886	0.18035	1.87244	0.50215	Residence	
576581	4147115	576580.75_4147115.45	0.05269	0.1162	0.0814	0.18032	1.35156	0.49303	Residence	
576601	4147115	576600.75_4147115.45	0.05625	0.12284	0.08396	0.18002	1.03743	0.4838	Residence	
576621	4147115	576620.75_4147115.45	0.06009	0.12995	0.08655	0.17934	0.82499	0.47403	Residence	
576641	4147115	576640.75_4147115.45	0.06428	0.13756	0.08927	0.17837	0.67296	0.46396	Residence	
576701	4147115	576700.75_4147115.45	0.08008	0.16385	0.09895	0.17423	0.40506	0.4336	Residence	
576721	4147115	576720.75_4147115.45	0.08673	0.1738	0.10281	0.17249	0.35046	0.42359	Residence	
576741	4147115	576740.75_4147115.45	0.09405	0.1842	0.10694	0.17049	0.30585	0.41345	School	KIPP Esperanza High School
576761	4147115	576760.75_4147115.45	0.10256	0.19533	0.11143	0.16843	0.26955	0.40381	School	KIPP Esperanza High School
576841	4147115	576840.75_4147115.45	0.1496	0.24339	0.13147	0.15859	0.17444	0.36766	Residence	
576861	4147115	576860.75_4147115.45	0.16567	0.25547	0.13671	0.15571	0.15882	0.3592	Residence	
576881	4147115	576880.75_4147115.45	0.18477	0.26747	0.142	0.15278	0.14546	0.35125	Residence	
576901	4147115	576900.75_4147115.45	0.20745	0.27916	0.14727	0.14979	0.13396	0.34372	Residence	
576921	4147115	576920.75_4147115.45	0.23352	0.29005	0.15238	0.14664	0.12392	0.33629	Residence	
576941	4147115	576940.75_4147115.45	0.26439	0.3002	0.15735	0.14348	0.1152	0.32924	Residence	
576961	4147115	576960.75_4147115.45	0.30027	0.30923	0.16206	0.14026	0.10751	0.32234	Residence	
576981	4147115	576980.75_4147115.45	0.3425	0.31702	0.16642	0.13699	0.10068	0.3155	Residence	
577001	4147115	577000.75_4147115.45	0.39511	0.32391	0.1705	0.13381	0.09465	0.30908	Residence	
577021	4147115	577020.75_4147115.45	0.46202	0.32995	0.17421	0.13072	0.08929	0.30305	Residence	
577101	4147115	577100.75_4147115.45	1.0064	0.34731	0.18402	0.11915	0.07246	0.28053	School	East Palo Alto Charter School
577121	4147115	577120.75_4147115.45	1.29082	0.35068	0.18504	0.1165	0.06909	0.27523	School	East Palo Alto Charter School
576181	4147135	576180.75_4147135.45	0.02107	0.04416	0.03915	0.12459	0.40003	0.51044	Residence	
576201	4147135	576200.75_4147135.45	0.0216	0.04559	0.03986	0.12859	0.42353	0.53876	Residence	
576221	4147135	576220.75_4147135.45	0.02238	0.0473	0.04062	0.13319	0.44704	0.56319	Residence	
576241	4147135	576240.75_4147135.45	0.02317	0.04908	0.0415	0.13761	0.46798	0.5813	Residence	
576261	4147135	576260.75_4147135.45	0.02399	0.05104	0.04253	0.142	0.48737	0.5939	Residence	
576281	4147135	576280.75_4147135.45	0.0249	0.05327	0.04377	0.14636	0.50646	0.60186	Residence	
576301	4147135	576300.75_4147135.45	0.02591	0.05583	0.04528	0.15071	0.52695	0.60617	Residence	
576321	4147135	576320.75_4147135.45	0.02701	0.05871	0.04709	0.15495	0.55016	0.60726	Daycare	Kimmie's Childcare
576341	4147135	576340.75_4147135.45	0.02818	0.06189	0.04908	0.159	0.57812	0.6056	Residence	
576361	4147135	576360.75_4147135.45	0.0294	0.06532	0.05131	0.16279	0.61354	0.60151	Residence	
576381	4147135	576380.75_4147135.45	0.03091	0.06918	0.05402	0.16656	0.66797	0.5975	Residence	
576401	4147135	576400.75_4147135.45	0.03241	0.07316	0.05669	0.16987	0.7435	0.59117	Residence	
576421	4147135	576420.75_4147135.45	0.03399	0.07731	0.05951	0.1728	0.86035	0.58371	Residence	
576441	4147135	576440.75_4147135.45	0.03593	0.08182	0.06259	0.17561	1.07355	0.57695	Residence	
576461	4147135	576460.75_4147135.45	0.03781	0.08632	0.0656	0.17781	1.46197	0.56844	Residence	
576481	4147135	576480.75_4147135.45	0.03995	0.09105	0.06862	0.1797	2.40587	0.56003	Residence	
576521	4147135	576520.75_4147135.45	0.04472	0.10099	0.07443	0.18216	4.45542	0.54181	Residence	
576541	4147135	576540.75_4147135.45	0.04742	0.10638	0.07719	0.18281	2.82749	0.53239	Residence	

576561	4147135	576560.75_4147135.45	0.05031	0.11209	0.07983	0.183	1.8367	0.52241	Residence	
576581	4147135	576580.75_4147135.45	0.0536	0.11844	0.08247	0.18298	1.33036	0.51276	Residence	
576721	4147135	576720.75_4147135.45	0.08778	0.17807	0.10437	0.17459	0.33912	0.43758	Residence	
576881	4147135	576880.75_4147135.45	0.18828	0.27569	0.14467	0.1543	0.14078	0.36164	Residence	
576901	4147135	576900.75_4147135.45	0.21156	0.28782	0.15009	0.15122	0.12984	0.35383	Residence	
576921	4147135	576920.75_4147135.45	0.23819	0.29898	0.15532	0.14797	0.12028	0.34603	Residence	
576941	4147135	576940.75_4147135.45	0.26943	0.30922	0.16036	0.14467	0.11194	0.33848	Residence	
576961	4147135	576960.75_4147135.45	0.30796	0.31882	0.16528	0.14149	0.10471	0.33168	Residence	
576981	4147135	576980.75_4147135.45	0.35153	0.32664	0.16971	0.13813	0.09818	0.32446	Residence	
577001	4147135	577000.75_4147135.45	0.407	0.33373	0.17388	0.13492	0.09245	0.31792	Residence	
577021	4147135	577020.75_4147135.45	0.47856	0.34005	0.17769	0.13184	0.08735	0.31185	Residence	
577041	4147135	577040.75_4147135.45	0.56859	0.34524	0.18094	0.12876	0.08269	0.30567	Residence	
577081	4147135	577080.75_4147135.45	0.83801	0.3534	0.18566	0.12276	0.0745	0.29335	School	East Palo Alto Charter School
577101	4147135	577100.75_4147135.45	1.05392	0.35717	0.18722	0.11998	0.07096	0.28769	School	East Palo Alto Charter School
577121	4147135	577120.75_4147135.45	1.36267	0.36059	0.18813	0.11728	0.06766	0.28204	School	East Palo Alto Charter School
576181	4147155	576180.75_4147155.45	0.02131	0.04452	0.03955	0.12655	0.42291	0.54715	Residence	
576201	4147155	576200.75_4147155.45	0.02186	0.04599	0.04027	0.13064	0.44716	0.57682	Residence	
576221	4147155	576220.75_4147155.45	0.02267	0.04774	0.04105	0.13538	0.4712	0.60205	Residence	
576241	4147155	576240.75_4147155.45	0.02342	0.0495	0.0419	0.13985	0.49148	0.61969	Residence	
576261	4147155	576260.75_4147155.45	0.02426	0.05147	0.0429	0.14435	0.51039	0.63169	Residence	
576281	4147155	576280.75_4147155.45	0.0252	0.05373	0.04413	0.14884	0.52892	0.63886	Residence	
576301	4147155	576300.75_4147155.45	0.02622	0.0563	0.04561	0.15328	0.5484	0.64201	Residence	
576321	4147155	576320.75_4147155.45	0.02735	0.05921	0.04737	0.15761	0.57064	0.64191	Residence	
576341	4147155	576340.75_4147155.45	0.02861	0.06248	0.0495	0.16182	0.59867	0.6395	Residence	
576361	4147155	576360.75_4147155.45	0.02981	0.06595	0.05163	0.16559	0.63222	0.63368	Residence	
576381	4147155	576380.75_4147155.45	0.03137	0.06991	0.05437	0.16944	0.686	0.62851	Residence	
576401	4147155	576400.75_4147155.45	0.03292	0.07402	0.05712	0.17281	0.76212	0.62113	Residence	
576421	4147155	576420.75_4147155.45	0.0346	0.07834	0.06003	0.17582	0.88236	0.61281	Residence	
576441	4147155	576440.75_4147155.45	0.0365	0.08292	0.06309	0.17855	1.09507	0.60443	Residence	
576461	4147155	576460.75_4147155.45	0.03847	0.08758	0.06617	0.18077	1.49652	0.59499	Residence	
576481	4147155	576480.75_4147155.45	0.04066	0.09246	0.06928	0.18266	2.48807	0.58566	Residence	
576521	4147155	576520.75_4147155.45	0.04549	0.10271	0.07526	0.18503	4.44801	0.5656	Residence	
576541	4147155	576540.75_4147155.45	0.04824	0.10828	0.07811	0.18563	2.77057	0.55538	Residence	
576561	4147155	576560.75_4147155.45	0.05123	0.11426	0.08086	0.18584	1.81237	0.54488	Residence	
576581	4147155	576580.75_4147155.45	0.05447	0.12073	0.08355	0.18567	1.30675	0.53402	Residence	
576721	4147155	576720.75_4147155.45	0.08903	0.18268	0.10604	0.17684	0.32781	0.45293	Residence	
576881	4147155	576880.75_4147155.45	0.19189	0.28438	0.14744	0.15585	0.13633	0.37286	Residence	
576901	4147155	576900.75_4147155.45	0.21569	0.29693	0.15302	0.15268	0.12595	0.36471	Residence	
576921	4147155	576920.75_4147155.45	0.24256	0.30828	0.15834	0.14929	0.11684	0.35637	Residence	
576941	4147155	576940.75_4147155.45	0.27431	0.31865	0.16347	0.14587	0.10887	0.34829	Residence	
576961	4147155	576960.75_4147155.45	0.31366	0.32835	0.16847	0.14258	0.10199	0.34113	Residence	
576981	4147155	576980.75_4147155.45	0.36099	0.3368	0.17312	0.1393	0.09587	0.33416	Residence	
577001	4147155	577000.75_4147155.45	0.41711	0.34364	0.17726	0.13595	0.09029	0.32692	Residence	
577021	4147155	577020.75_4147155.45	0.49429	0.35044	0.18123	0.13293	0.08547	0.32103	Residence	
577041	4147155	577040.75_4147155.45	0.58714	0.35544	0.18441	0.12974	0.08093	0.31431	Residence	
577081	4147155	577080.75_4147155.45	0.87519	0.36384	0.18909	0.12369	0.073	0.30145	School	East Palo Alto Charter School
577101	4147155	577100.75_4147155.45	1.10861	0.36769	0.19056	0.12086	0.06953	0.29543	School	East Palo Alto Charter School
577121	4147155	577120.75_4147155.45	1.45185	0.37133	0.19139	0.11814	0.06632	0.28956	School	East Palo Alto Charter School
577141	4147155	577140.75_4147155.45	1.99858	0.37482	0.1916	0.11554	0.06336	0.28389	School	East Palo Alto Charter School
577161	4147155	577160.75_4147155.45	2.9972	0.3783	0.19125	0.11309	0.06062	0.27857	School	East Palo Alto Charter School
576181	4147175	576180.75_4147175.45	0.02159	0.04484	0.03995	0.12854	0.44846	0.58822	Residence	
576201	4147175	576200.75_4147175.45	0.02216	0.04642	0.04073	0.13292	0.47399	0.61964	Residence	
576221	4147175	576220.75_4147175.45	0.02299	0.04819	0.04148	0.13765	0.49825	0.64534	Residence	
576241	4147175	576240.75_4147175.45	0.02371	0.04988	0.04224	0.14202	0.51753	0.66202	Residence	
576261	4147175	576260.75_4147175.45	0.02458	0.05187	0.0432	0.14665	0.53586	0.67327	Residence	
576281	4147175	576280.75_4147175.45	0.02554	0.05413	0.04439	0.15126	0.55338	0.67921	Residence	
576301	4147175	576300.75_4147175.45	0.02656	0.05669	0.04582	0.15579	0.57129	0.68069	Residence	
576321	4147175	576320.75_4147175.45	0.0277	0.05964	0.0476	0.16023	0.59212	0.67908	Residence	
576341	4147175	576340.75_4147175.45	0.02906	0.06307	0.04989	0.1647	0.62046	0.67609	Residence	
576361	4147175	576360.75_4147175.45	0.03028	0.06661	0.052	0.16855	0.65295	0.66873	Residence	
576381	4147175	576380.75_4147175.45	0.03183	0.07063	0.05469	0.17239	0.70509	0.66192	Residence	
576401	4147175	576400.75_4147175.45	0.03344	0.07487	0.05751	0.17581	0.78103	0.65324	Residence	
576421	4147175	576420.75_4147175.45	0.03507	0.07926	0.06039	0.17876	0.89822	0.64302	Residence	
576441	4147175	576440.75_4147175.45	0.03711	0.08408	0.0636	0.18162	1.12042	0.63425	Residence	
576461	4147175	576460.75_4147175.45	0.03915	0.08892	0.06677	0.18386	1.53875	0.62388	Residence	
576481	4147175	576480.75_4147175.45	0.04135	0.09393	0.06995	0.18568	2.57386	0.61331	Residence	
576521	4147175	576520.75_4147175.45	0.04626	0.1045	0.0761	0.18798	4.42963	0.59145	Residence	
576541	4147175	576540.75_4147175.45	0.04907	0.11028	0.07905	0.18855	2.7192	0.5805	Residence	
576561	4147175	576560.75_4147175.45	0.05206	0.11643	0.08189	0.18868	1.78031	0.56903	Residence	
576581	4147175	576580.75_4147175.45	0.05528	0.12307	0.08464	0.1884	1.28031	0.55704	Residence	
576601	4147175	576600.75_4147175.45	0.05897	0.13049	0.08745	0.18794	0.97884	0.54544	Residence	
576621	4147175	576620.75_4147175.45	0.06279	0.1383	0.09023	0.18698	0.77045	0.53262	Residence	
576641	4147175	576640.75_4147175.45	0.06723	0.14697	0.09324	0.18592	0.6249	0.52033	Residence	
576721	4147175	576720.75_4147175.45	0.09043	0.18763	0.1078	0.17919	0.3164	0.46979	Residence	

576881	4147175	576880.75_4147175.45	0.19553	0.29357	0.15033	0.15743	0.13215	0.38499	Residence	
576901	4147175	576900.75_4147175.45	0.21966	0.30647	0.15604	0.15414	0.1223	0.37637	Residence	
576921	4147175	576920.75_4147175.45	0.24725	0.31819	0.16151	0.15067	0.11366	0.36766	Residence	
576941	4147175	576940.75_4147175.45	0.27997	0.32885	0.16677	0.14717	0.10609	0.35921	Residence	
576961	4147175	576960.75_4147175.45	0.32015	0.3386	0.17183	0.14377	0.09949	0.35151	Residence	
576981	4147175	576980.75_4147175.45	0.36954	0.34727	0.1766	0.14045	0.09365	0.34432	Residence	
577001	4147175	577000.75_4147175.45	0.42799	0.35418	0.18079	0.13704	0.08829	0.33672	Residence	
577021	4147175	577020.75_4147175.45	0.50986	0.36127	0.18486	0.13402	0.08366	0.33078	Residence	
577041	4147175	577040.75_4147175.45	0.6076	0.3663	0.18804	0.13079	0.07927	0.32371	Residence	
577081	4147175	577080.75_4147175.45	0.91675	0.37494	0.19265	0.12466	0.07155	0.3102	School	East Palo Alto Charter School
577101	4147175	577100.75_4147175.45	1.17369	0.37901	0.19406	0.12181	0.06818	0.30392	School	East Palo Alto Charter School
577121	4147175	577120.75_4147175.45	1.5611	0.38288	0.19481	0.11907	0.06505	0.2978	School	East Palo Alto Charter School
577141	4147175	577140.75_4147175.45	2.19866	0.38647	0.19489	0.11643	0.06214	0.29177	School	East Palo Alto Charter School
577161	4147175	577160.75_4147175.45	3.42931	0.38979	0.19433	0.11389	0.05942	0.2859	School	East Palo Alto Charter School
577181	4147175	577180.75_4147175.45	4.31239	0.39279	0.19319	0.11146	0.0569	0.28024	School	East Palo Alto Charter School
576181	4147195	576180.75_4147195.45	0.0219	0.04519	0.04035	0.13064	0.47775	0.63485	Residence	
576201	4147195	576200.75_4147195.45	0.02257	0.04688	0.0411	0.13526	0.50498	0.66842	Residence	
576421	4147195	576420.75_4147195.45	0.0357	0.08032	0.06091	0.18193	0.92161	0.67674	Residence	
576461	4147195	576460.75_4147195.45	0.03978	0.09023	0.06735	0.18695	1.57138	0.6547	Residence	
576481	4147195	576480.75_4147195.45	0.04202	0.09541	0.07061	0.18876	2.65936	0.64322	Residence	
576521	4147195	576520.75_4147195.45	0.04701	0.10635	0.07697	0.19101	4.39695	0.61971	Residence	
576541	4147195	576540.75_4147195.45	0.04981	0.11228	0.08	0.19149	2.6586	0.60773	Residence	
576561	4147195	576560.75_4147195.45	0.05285	0.11866	0.08293	0.19158	1.74614	0.59545	Residence	
576581	4147195	576580.75_4147195.45	0.05611	0.12553	0.08577	0.19123	1.25449	0.58248	Residence	
576601	4147195	576600.75_4147195.45	0.0598	0.13318	0.08865	0.19067	0.95548	0.56971	Residence	
576621	4147195	576620.75_4147195.45	0.0637	0.14133	0.09154	0.18968	0.75029	0.55591	Residence	
576641	4147195	576640.75_4147195.45	0.06823	0.15038	0.09464	0.18858	0.60681	0.54266	Residence	
576661	4147195	576660.75_4147195.45	0.07323	0.16005	0.09794	0.1872	0.49976	0.52911	Residence	
576701	4147195	576700.75_4147195.45	0.08502	0.18131	0.10541	0.18374	0.35486	0.50188	Residence	
576721	4147195	576720.75_4147195.45	0.09188	0.19285	0.10962	0.18162	0.30469	0.48819	Residence	
576861	4147195	576860.75_4147195.45	0.17829	0.2894	0.14742	0.16237	0.13908	0.40769	Residence	
576881	4147195	576880.75_4147195.45	0.1988	0.30312	0.15329	0.15898	0.12818	0.3979	Residence	
576901	4147195	576900.75_4147195.45	0.22347	0.31647	0.15916	0.1556	0.11888	0.38889	Residence	
576921	4147195	576920.75_4147195.45	0.25203	0.32868	0.16482	0.15208	0.11072	0.3799	Residence	
576941	4147195	576940.75_4147195.45	0.28602	0.33972	0.17024	0.14853	0.10354	0.37119	Residence	
576961	4147195	576960.75_4147195.45	0.32702	0.34951	0.17536	0.14501	0.09718	0.36286	Residence	
576981	4147195	576980.75_4147195.45	0.37797	0.35824	0.1802	0.14161	0.09155	0.35521	Residence	
577001	4147195	577000.75_4147195.45	0.43941	0.36535	0.18448	0.13818	0.08639	0.34735	Residence	
577021	4147195	577020.75_4147195.45	0.52472	0.37248	0.18856	0.1351	0.08191	0.34107	Residence	
577041	4147195	577040.75_4147195.45	0.63069	0.37793	0.19184	0.1319	0.07769	0.33397	Residence	
577081	4147195	577080.75_4147195.45	0.96593	0.38689	0.19638	0.12572	0.07019	0.31985	School	East Palo Alto Charter School
577141	4147195	577140.75_4147195.45	2.44961	0.39889	0.1983	0.11736	0.06096	0.30032	School	East Palo Alto Charter School
577161	4147195	577160.75_4147195.45	3.9471	0.40224	0.19758	0.11477	0.05829	0.29404	School	East Palo Alto Charter School
576181	4147215	576180.75_4147215.45	0.0222	0.04548	0.04074	0.13273	0.51061	0.68734	Residence	
576201	4147215	576200.75_4147215.45	0.02293	0.04729	0.04154	0.13756	0.53918	0.72264	Residence	
576221	4147215	576220.75_4147215.45	0.02369	0.04907	0.04238	0.14236	0.5623	0.74748	Residence	
576261	4147215	576260.75_4147215.45	0.0255	0.05303	0.04426	0.15218	0.59866	0.77263	Residence	
576281	4147215	576280.75_4147215.45	0.0265	0.05531	0.04545	0.15702	0.6137	0.77517	Residence	
576341	4147215	576340.75_4147215.45	0.02995	0.06418	0.05045	0.17059	0.66815	0.75822	Residence	
576361	4147215	576360.75_4147215.45	0.03134	0.06795	0.05276	0.17473	0.70028	0.74833	Residence	
576421	4147215	576420.75_4147215.45	0.03636	0.08138	0.06138	0.18518	0.94559	0.71322	Residence	
576181	4147235	576180.75_4147235.45	0.02254	0.04579	0.04113	0.13495	0.5486	0.74753	Residence	
576201	4147235	576200.75_4147235.45	0.02328	0.04766	0.04201	0.13988	0.57773	0.78375	Residence	
576221	4147235	576220.75_4147235.45	0.02405	0.0495	0.04288	0.14481	0.60049	0.80804	Residence	
576241	4147235	576240.75_4147235.45	0.02498	0.05147	0.04372	0.14989	0.61937	0.82322	Residence	
576261	4147235	576260.75_4147235.45	0.02594	0.05356	0.04471	0.15493	0.63451	0.82988	Residence	
576281	4147235	576280.75_4147235.45	0.02696	0.05585	0.04586	0.15986	0.64751	0.82982	Residence	
576341	4147235	576340.75_4147235.45	0.03044	0.06473	0.05074	0.17364	0.69533	0.80483	Residence	
576361	4147235	576360.75_4147235.45	0.03186	0.06859	0.05311	0.17787	0.72562	0.79274	Residence	
576421	4147235	576420.75_4147235.45	0.0369	0.08238	0.06183	0.18843	0.96719	0.75237	Residence	
576441	4147235	576440.75_4147235.45	0.03887	0.08753	0.06511	0.1911	1.18705	0.73855	Residence	
576461	4147235	576460.75_4147235.45	0.04099	0.09291	0.06851	0.19333	1.63597	0.72507	Residence	
576481	4147235	576480.75_4147235.45	0.04326	0.09843	0.07194	0.19507	2.82509	0.71158	Residence	
576521	4147235	576520.75_4147235.45	0.04824	0.11003	0.07865	0.19706	4.54436	0.68416	Residence	
576541	4147235	576540.75_4147235.45	0.05122	0.11649	0.08193	0.19757	2.53687	0.6712	Residence	
576561	4147235	576560.75_4147235.45	0.05435	0.12334	0.08507	0.19756	1.67213	0.65702	Residence	
576581	4147235	576580.75_4147235.45	0.05776	0.13079	0.08813	0.19717	1.19994	0.64212	Residence	
576601	4147235	576600.75_4147235.45	0.0615	0.13895	0.09118	0.19643	0.90544	0.62652	Residence	
576621	4147235	576620.75_4147235.45	0.0656	0.14786	0.09428	0.19537	0.7065	0.61031	Residence	
576641	4147235	576640.75_4147235.45	0.07017	0.15755	0.09753	0.19405	0.56579	0.59389	Residence	
576661	4147235	576660.75_4147235.45	0.07522	0.16793	0.10098	0.19246	0.46231	0.57719	Residence	
576681	4147235	576680.75_4147235.45	0.08104	0.17924	0.10479	0.19076	0.38568	0.56131	Residence	
576701	4147235	576700.75_4147235.45	0.08741	0.19114	0.1089	0.18874	0.32618	0.54513	Residence	
576721	4147235	576720.75_4147235.45	0.09473	0.20398	0.11342	0.18658	0.28014	0.52982	Residence	

576741	4147235	576740.75_4147235.45	0.10309	0.21772	0.11833	0.18424	0.24378	0.51521	Residence
576761	4147235	576760.75_4147235.45	0.11239	0.23207	0.12356	0.18161	0.21446	0.50072	Residence
576781	4147235	576780.75_4147235.45	0.12302	0.24707	0.12911	0.17879	0.19078	0.48692	Residence
576801	4147235	576800.75_4147235.45	0.1351	0.26245	0.1349	0.17576	0.17139	0.47364	Residence
576821	4147235	576820.75_4147235.45	0.14911	0.27813	0.14093	0.17258	0.15544	0.46122	Residence
576841	4147235	576840.75_4147235.45	0.16511	0.2937	0.14708	0.16922	0.14208	0.44924	Residence
576861	4147235	576860.75_4147235.45	0.18405	0.30927	0.15338	0.16582	0.13085	0.43829	Residence
576881	4147235	576880.75_4147235.45	0.20531	0.32397	0.15958	0.1622	0.12113	0.42725	Residence
576921	4147235	576920.75_4147235.45	0.26057	0.3511	0.17173	0.1549	0.10534	0.40707	Residence
576941	4147235	576940.75_4147235.45	0.29651	0.36278	0.17744	0.15122	0.09877	0.39749	Residence
576961	4147235	576960.75_4147235.45	0.34148	0.37335	0.1829	0.14766	0.09296	0.38874	Residence
576981	4147235	576980.75_4147235.45	0.39604	0.38222	0.18786	0.14409	0.08767	0.37998	Residence
577001	4147235	577000.75_4147235.45	0.46599	0.39004	0.19239	0.14068	0.08292	0.37189	Residence
575841	4147255	575840.75_4147255.45	0.01452	0.02319	0.02377	0.07018	0.09916	0.11357	Residence
575861	4147255	575860.75_4147255.45	0.01487	0.02399	0.02406	0.07306	0.10769	0.12463	Residence
575881	4147255	575880.75_4147255.45	0.01523	0.02485	0.02451	0.07605	0.11743	0.13736	Residence
575901	4147255	575900.75_4147255.45	0.01558	0.02569	0.025	0.07915	0.12849	0.15204	Residence
575921	4147255	575920.75_4147255.45	0.01594	0.02654	0.02563	0.08234	0.14115	0.16908	Residence
575981	4147255	575980.75_4147255.45	0.01712	0.02941	0.02847	0.09268	0.19293	0.24096	Residence
576001	4147255	576000.75_4147255.45	0.01754	0.03049	0.0297	0.0964	0.21646	0.27446	Residence
576021	4147255	576020.75_4147255.45	0.01803	0.03178	0.03114	0.10043	0.2448	0.31514	Residence
576041	4147255	576040.75_4147255.45	0.01853	0.03316	0.03259	0.10452	0.27777	0.36279	Residence
576061	4147255	576060.75_4147255.45	0.01902	0.03467	0.03407	0.10875	0.31591	0.41813	Residence
576081	4147255	576080.75_4147255.45	0.01958	0.03635	0.03556	0.11316	0.35983	0.48197	Residence
576101	4147255	576100.75_4147255.45	0.02023	0.0382	0.03699	0.11781	0.40912	0.55375	Residence
576121	4147255	576120.75_4147255.45	0.02083	0.04011	0.0383	0.12248	0.46015	0.62847	Residence
576141	4147255	576140.75_4147255.45	0.02145	0.04207	0.03948	0.12727	0.50984	0.70102	Residence
576161	4147255	576160.75_4147255.45	0.02215	0.04408	0.04056	0.1322	0.55475	0.76526	Residence
576181	4147255	576180.75_4147255.45	0.02285	0.04604	0.04164	0.13716	0.59195	0.81616	Residence
576201	4147255	576200.75_4147255.45	0.02365	0.04802	0.04248	0.14228	0.62188	0.85338	Residence
576221	4147255	576220.75_4147255.45	0.02445	0.04995	0.04336	0.14737	0.6441	0.87673	Residence
576241	4147255	576240.75_4147255.45	0.02539	0.05197	0.04423	0.15257	0.66131	0.88962	Residence
576341	4147255	576340.75_4147255.45	0.03104	0.06539	0.05124	0.17695	0.72696	0.85696	Residence
576461	4147255	576460.75_4147255.45	0.0416	0.0943	0.06911	0.19666	1.67215	0.76617	Residence
576481	4147255	576480.75_4147255.45	0.04386	0.10002	0.07263	0.19837	2.9222	0.75181	Residence
576521	4147255	576520.75_4147255.45	0.04894	0.11209	0.07956	0.20034	4.43252	0.7231	Residence
576541	4147255	576540.75_4147255.45	0.05186	0.11865	0.0829	0.20067	2.46823	0.70838	Residence
576561	4147255	576560.75_4147255.45	0.05492	0.12563	0.08611	0.20052	1.62198	0.69238	Residence
576581	4147255	576580.75_4147255.45	0.05843	0.1334	0.08929	0.20011	1.1631	0.67637	Residence
576601	4147255	576600.75_4147255.45	0.06223	0.14189	0.09245	0.19932	0.87432	0.65921	Residence
576621	4147255	576620.75_4147255.45	0.06646	0.15121	0.09566	0.19824	0.67997	0.64153	Residence
576641	4147255	576640.75_4147255.45	0.07114	0.16137	0.09903	0.1969	0.54291	0.62358	Residence
576661	4147255	576660.75_4147255.45	0.07633	0.17227	0.10261	0.19527	0.44274	0.60541	Residence
576681	4147255	576680.75_4147255.45	0.08225	0.18409	0.10654	0.19349	0.36867	0.58796	Residence
576701	4147255	576700.75_4147255.45	0.08877	0.1966	0.11078	0.19142	0.31167	0.57046	Residence
576721	4147255	576720.75_4147255.45	0.09621	0.21004	0.11543	0.18917	0.26769	0.55382	Residence
576741	4147255	576740.75_4147255.45	0.10465	0.22439	0.12047	0.18671	0.23315	0.53791	Residence
576761	4147255	576760.75_4147255.45	0.11395	0.2393	0.12581	0.18393	0.20543	0.52204	Residence
576781	4147255	576780.75_4147255.45	0.1247	0.25501	0.13152	0.18099	0.18325	0.50726	Residence
576801	4147255	576800.75_4147255.45	0.13699	0.27116	0.1375	0.17786	0.16517	0.49321	Residence
576821	4147255	576820.75_4147255.45	0.15109	0.2875	0.14369	0.17454	0.15024	0.47986	Residence
576841	4147255	576840.75_4147255.45	0.16718	0.30367	0.15	0.17104	0.13768	0.46696	Residence
576861	4147255	576860.75_4147255.45	0.1866	0.32	0.15652	0.16756	0.12717	0.45557	Residence
576881	4147255	576880.75_4147255.45	0.20824	0.33524	0.16289	0.16383	0.11795	0.44382	Residence
576921	4147255	576920.75_4147255.45	0.2643	0.36309	0.17534	0.15631	0.10283	0.42216	Residence
576941	4147255	576940.75_4147255.45	0.30144	0.37519	0.18123	0.15258	0.09654	0.41219	Residence
576961	4147255	576960.75_4147255.45	0.34784	0.386	0.18681	0.14896	0.09092	0.40295	Residence
576981	4147255	576980.75_4147255.45	0.40488	0.3951	0.19188	0.14536	0.08581	0.39378	Residence
577001	4147255	577000.75_4147255.45	0.47826	0.40307	0.19647	0.1419	0.0812	0.38523	Residence
577101	4147255	577100.75_4147255.45	1.56269	0.4319	0.20937	0.12607	0.06316	0.34536	Residence
577121	4147255	577120.75_4147255.45	2.27252	0.43646	0.20963	0.12314	0.06029	0.33757	Residence
577141	4147255	577140.75_4147255.45	3.76197	0.44144	0.20934	0.12044	0.05765	0.33059	Residence
577181	4147255	577180.75_4147255.45	4.36497	0.44865	0.20649	0.11512	0.05283	0.31625	Residence
575841	4147275	575840.75_4147275.45	0.01456	0.02315	0.02402	0.07078	0.10054	0.11564	Residence
575861	4147275	575860.75_4147275.45	0.01487	0.02398	0.02428	0.0737	0.10924	0.12705	Residence
575881	4147275	575880.75_4147275.45	0.01522	0.02482	0.02461	0.07675	0.1193	0.14037	Residence
575901	4147275	575900.75_4147275.45	0.01565	0.02571	0.0251	0.07992	0.13094	0.15602	Residence
575921	4147275	575920.75_4147275.45	0.01605	0.02661	0.02573	0.08321	0.14438	0.17422	Residence
575941	4147275	575940.75_4147275.45	0.01645	0.02754	0.02648	0.08664	0.16002	0.19576	Residence
575981	4147275	575980.75_4147275.45	0.01728	0.02948	0.0284	0.09381	0.19962	0.25154	Residence
576001	4147275	576000.75_4147275.45	0.01773	0.03058	0.02961	0.09764	0.22527	0.28836	Residence
576021	4147275	576020.75_4147275.45	0.01821	0.03182	0.03102	0.10166	0.25607	0.33301	Residence
576041	4147275	576040.75_4147275.45	0.01877	0.03324	0.03258	0.10602	0.29337	0.38732	Residence
576061	4147275	576060.75_4147275.45	0.0193	0.03473	0.03408	0.11036	0.33629	0.45016	Residence

576081	4147275	576080.75_4147275.45	0.01985	0.03639	0.03558	0.11486	0.38578	0.5228	Residence
576101	4147275	576100.75_4147275.45	0.02048	0.03823	0.03708	0.11958	0.44143	0.60467	Residence
576121	4147275	576120.75_4147275.45	0.0211	0.04015	0.03849	0.12437	0.49906	0.68985	Residence
576141	4147275	576140.75_4147275.45	0.02178	0.0422	0.03975	0.12935	0.55484	0.77187	Residence
576161	4147275	576160.75_4147275.45	0.02249	0.04426	0.04095	0.13441	0.60355	0.8421	Residence
576181	4147275	576180.75_4147275.45	0.02317	0.04621	0.04213	0.1393	0.64187	0.89493	Residence
576201	4147275	576200.75_4147275.45	0.02399	0.0483	0.043	0.14456	0.67198	0.93234	Residence
576221	4147275	576220.75_4147275.45	0.02487	0.05035	0.04384	0.14985	0.69339	0.95425	Residence
576421	4147275	576420.75_4147275.45	0.03805	0.08439	0.06264	0.19517	1.01508	0.84328	Residence
576441	4147275	576440.75_4147275.45	0.04002	0.08993	0.06611	0.19786	1.23852	0.82745	Residence
576461	4147275	576460.75_4147275.45	0.04228	0.09578	0.06974	0.20016	1.71943	0.81304	Residence
576481	4147275	576480.75_4147275.45	0.04452	0.10169	0.07334	0.2018	3.03331	0.79763	Residence
576521	4147275	576520.75_4147275.45	0.04964	0.1142	0.08048	0.20368	4.314	0.76712	Residence
576541	4147275	576540.75_4147275.45	0.05253	0.12096	0.08392	0.20392	2.4079	0.75094	Residence
576561	4147275	576560.75_4147275.45	0.05559	0.12815	0.08722	0.20368	1.57783	0.73305	Residence
576581	4147275	576580.75_4147275.45	0.05912	0.13617	0.0905	0.20317	1.12504	0.715	Residence
576601	4147275	576600.75_4147275.45	0.06295	0.14496	0.09375	0.2023	0.84063	0.69565	Residence
576621	4147275	576620.75_4147275.45	0.0672	0.15463	0.09706	0.20114	0.65017	0.67573	Residence
576641	4147275	576640.75_4147275.45	0.07207	0.16531	0.10057	0.19979	0.51801	0.65629	Residence
576661	4147275	576660.75_4147275.45	0.0774	0.17677	0.10428	0.19813	0.42176	0.63642	Residence
576681	4147275	576680.75_4147275.45	0.0834	0.18912	0.10832	0.19627	0.35079	0.61719	Residence
576701	4147275	576700.75_4147275.45	0.09009	0.20229	0.11271	0.19414	0.2968	0.59829	Residence
576721	4147275	576720.75_4147275.45	0.09769	0.21643	0.11751	0.19182	0.2553	0.58033	Residence
576741	4147275	576740.75_4147275.45	0.10631	0.23152	0.12272	0.18928	0.2229	0.56319	Residence
576761	4147275	576760.75_4147275.45	0.11558	0.24702	0.12817	0.18632	0.19688	0.54569	Residence
576781	4147275	576780.75_4147275.45	0.1264	0.26345	0.13403	0.18325	0.17622	0.52973	Residence
576801	4147275	576800.75_4147275.45	0.13868	0.28026	0.14016	0.17995	0.15935	0.51444	Residence
576821	4147275	576820.75_4147275.45	0.15278	0.29727	0.14651	0.17649	0.14537	0.49997	Residence
576841	4147275	576840.75_4147275.45	0.16919	0.31426	0.15304	0.1729	0.13364	0.48644	Residence
576861	4147275	576860.75_4147275.45	0.18889	0.33128	0.15976	0.16931	0.12373	0.47437	Residence
576881	4147275	576880.75_4147275.45	0.21091	0.34712	0.16633	0.16547	0.11496	0.46181	Residence
576921	4147275	576920.75_4147275.45	0.2686	0.37603	0.17917	0.15781	0.10049	0.43901	Residence
576941	4147275	576940.75_4147275.45	0.30681	0.38844	0.1852	0.15402	0.09441	0.42842	Residence
577081	4147275	577080.75_4147275.45	1.21254	0.44101	0.21231	0.13007	0.06491	0.36517	Residence
577101	4147275	577100.75_4147275.45	1.68371	0.44643	0.21333	0.12708	0.06192	0.35713	Residence
577121	4147275	577120.75_4147275.45	2.52988	0.45102	0.21342	0.12408	0.05911	0.34867	Residence
577141	4147275	577140.75_4147275.45	4.56504	0.45675	0.21312	0.12142	0.05655	0.34174	Residence
575841	4147295	575840.75_4147295.45	0.01462	0.02311	0.02429	0.0714	0.10191	0.11767	Residence
575861	4147295	575860.75_4147295.45	0.01493	0.02394	0.02454	0.07436	0.11075	0.12935	Residence
575881	4147295	575880.75_4147295.45	0.01527	0.0248	0.02482	0.07745	0.12105	0.14317	Residence
575901	4147295	575900.75_4147295.45	0.01569	0.02572	0.02524	0.08072	0.13343	0.16004	Residence
575921	4147295	575920.75_4147295.45	0.01615	0.02666	0.02582	0.0841	0.14762	0.1795	Residence
575941	4147295	575940.75_4147295.45	0.01657	0.0276	0.02654	0.08758	0.16407	0.20235	Residence
576001	4147295	576000.75_4147295.45	0.01793	0.0307	0.02962	0.09894	0.23498	0.30371	Residence
576021	4147295	576020.75_4147295.45	0.01843	0.03193	0.03098	0.10307	0.26899	0.3534	Residence
576041	4147295	576040.75_4147295.45	0.01894	0.03323	0.03242	0.10733	0.30968	0.4133	Residence
576061	4147295	576060.75_4147295.45	0.01948	0.0347	0.03396	0.11178	0.35826	0.48503	Residence
576081	4147295	576080.75_4147295.45	0.02007	0.03639	0.03559	0.11644	0.41521	0.56929	Residence
576101	4147295	576100.75_4147295.45	0.02072	0.03824	0.03713	0.12138	0.47913	0.66411	Residence
576121	4147295	576120.75_4147295.45	0.02138	0.0402	0.03863	0.12633	0.54516	0.76241	Residence
576141	4147295	576140.75_4147295.45	0.02204	0.04219	0.04011	0.13125	0.60693	0.85414	Residence
576161	4147295	576160.75_4147295.45	0.02272	0.04422	0.04144	0.1363	0.65883	0.92952	Residence
576181	4147295	576180.75_4147295.45	0.02351	0.04638	0.04255	0.14159	0.69994	0.98603	Residence
576201	4147295	576200.75_4147295.45	0.02442	0.04862	0.04349	0.14715	0.73086	1.02422	Residence
576341	4147295	576340.75_4147295.45	0.03228	0.06672	0.05213	0.1838	0.80033	0.97772	Residence
576441	4147295	576440.75_4147295.45	0.04072	0.09123	0.06667	0.20149	1.27464	0.88182	Residence
576461	4147295	576460.75_4147295.45	0.04287	0.09721	0.07035	0.20365	1.75554	0.86558	Residence
576481	4147295	576480.75_4147295.45	0.04517	0.10337	0.07405	0.20529	3.13732	0.84968	Residence
576521	4147295	576520.75_4147295.45	0.0503	0.11633	0.08139	0.20705	4.18144	0.81705	Residence
576541	4147295	576540.75_4147295.45	0.05328	0.12338	0.08496	0.20729	2.34943	0.79986	Residence
576741	4147295	576740.75_4147295.45	0.10772	0.23885	0.12499	0.19181	0.2129	0.5906	Residence
576761	4147295	576760.75_4147295.45	0.11731	0.25532	0.13066	0.18881	0.189	0.57226	Residence
576781	4147295	576780.75_4147295.45	0.12806	0.27239	0.13665	0.18555	0.16975	0.55459	Residence
576801	4147295	576800.75_4147295.45	0.14044	0.29002	0.14296	0.18212	0.15406	0.53815	Residence
576821	4147295	576820.75_4147295.45	0.15383	0.30717	0.14933	0.17832	0.14064	0.52094	Residence
576841	4147295	576840.75_4147295.45	0.17043	0.32503	0.15609	0.17464	0.12969	0.50676	Residence
576861	4147295	576860.75_4147295.45	0.19059	0.34297	0.16306	0.17101	0.12042	0.49442	Residence
576881	4147295	576880.75_4147295.45	0.21343	0.3597	0.1699	0.16714	0.11212	0.48153	Residence
576921	4147295	576920.75_4147295.45	0.27237	0.38952	0.18309	0.1593	0.09819	0.45708	Residence
576941	4147295	576940.75_4147295.45	0.31165	0.40224	0.18928	0.15544	0.09232	0.44578	Residence
577081	4147295	577080.75_4147295.45	1.28339	0.45602	0.21647	0.13113	0.06362	0.37825	Residence
577101	4147295	577100.75_4147295.45	1.80189	0.46094	0.21721	0.12797	0.06065	0.36892	Residence
577121	4147295	577120.75_4147295.45	2.832	0.46647	0.21734	0.12505	0.05795	0.36067	Residence
577141	4147295	577140.75_4147295.45	5.17452	0.47282	0.21697	0.12238	0.05547	0.35368	Residence

577161	4147295	577160.75_4147295.45	6.62502	0.47743	0.21562	0.11963	0.0531	0.34572	Residence
575841	4147315	575840.75_4147315.45	0.01468	0.02305	0.02457	0.07201	0.10317	0.11968	Residence
575861	4147315	575860.75_4147315.45	0.01501	0.02392	0.02482	0.07506	0.11244	0.13202	Residence
575881	4147315	575880.75_4147315.45	0.01536	0.0248	0.02508	0.07821	0.12303	0.14638	Residence
575901	4147315	575900.75_4147315.45	0.01577	0.02574	0.02544	0.08154	0.13586	0.16401	Residence
575921	4147315	575920.75_4147315.45	0.0162	0.02667	0.02592	0.08498	0.15073	0.18464	Residence
575941	4147315	575940.75_4147315.45	0.01668	0.0276	0.02653	0.08854	0.16813	0.20907	Residence
575961	4147315	575960.75_4147315.45	0.01716	0.02867	0.02745	0.09231	0.18929	0.23906	Residence
576001	4147315	576000.75_4147315.45	0.01814	0.03085	0.02961	0.10027	0.24543	0.32032	Residence
576021	4147315	576020.75_4147315.45	0.01865	0.03202	0.03091	0.10448	0.28298	0.37559	Residence
576041	4147315	576040.75_4147315.45	0.01918	0.03331	0.03232	0.10885	0.32885	0.44362	Residence
576061	4147315	576060.75_4147315.45	0.01974	0.03477	0.03389	0.11342	0.38437	0.52625	Residence
576081	4147315	576080.75_4147315.45	0.02035	0.03641	0.03555	0.11819	0.45017	0.62432	Residence
576101	4147315	576100.75_4147315.45	0.02101	0.03826	0.03721	0.12317	0.52428	0.73511	Residence
576121	4147315	576120.75_4147315.45	0.0217	0.04025	0.03876	0.12829	0.60072	0.8496	Residence
576141	4147315	576140.75_4147315.45	0.02241	0.04229	0.04033	0.13347	0.67078	0.9541	Residence
576161	4147315	576160.75_4147315.45	0.02314	0.04443	0.04171	0.13875	0.72799	1.03736	Residence
576181	4147315	576180.75_4147315.45	0.02393	0.04663	0.04292	0.14414	0.7699	1.09481	Residence
576201	4147315	576200.75_4147315.45	0.02486	0.04892	0.04395	0.14979	0.79894	1.13017	Residence
576241	4147315	576240.75_4147315.45	0.02687	0.05353	0.04578	0.16129	0.82477	1.146	Residence
576261	4147315	576260.75_4147315.45	0.02792	0.0558	0.04676	0.16682	0.82736	1.13507	Residence
576321	4147315	576320.75_4147315.45	0.03153	0.0639	0.05066	0.18256	0.83312	1.07246	Residence
576341	4147315	576340.75_4147315.45	0.03289	0.06738	0.05253	0.18733	0.84317	1.04829	Residence
576421	4147315	576420.75_4147315.45	0.03946	0.08662	0.06372	0.20257	1.0856	0.96243	Residence
576441	4147315	576440.75_4147315.45	0.04141	0.09252	0.06724	0.20519	1.312	0.94414	Residence
576461	4147315	576460.75_4147315.45	0.04352	0.09869	0.07095	0.20728	1.8001	0.92671	Residence
576481	4147315	576480.75_4147315.45	0.04584	0.10511	0.07478	0.2089	2.84186	0.91018	Residence
576521	4147315	576520.75_4147315.45	0.05098	0.11852	0.08232	0.21052	4.04753	0.87473	Residence
576541	4147315	576540.75_4147315.45	0.05395	0.1258	0.086	0.21066	2.277	0.85537	Residence
576561	4147315	576560.75_4147315.45	0.0573	0.13374	0.08961	0.21047	1.49183	0.83489	Residence
576581	4147315	576580.75_4147315.45	0.06093	0.1424	0.09312	0.20984	1.04887	0.81179	Residence
576601	4147315	576600.75_4147315.45	0.0649	0.15196	0.09662	0.20886	0.77316	0.78704	Residence
576621	4147315	576620.75_4147315.45	0.06936	0.16257	0.10019	0.20761	0.59199	0.76187	Residence
576641	4147315	576640.75_4147315.45	0.07422	0.17408	0.10388	0.206	0.46655	0.73581	Residence
576661	4147315	576660.75_4147315.45	0.07975	0.18669	0.10785	0.20421	0.37881	0.71104	Residence
576681	4147315	576680.75_4147315.45	0.08586	0.20019	0.11213	0.20213	0.31484	0.68681	Residence
576701	4147315	576700.75_4147315.45	0.09278	0.21473	0.11681	0.19983	0.26748	0.66401	Residence
576721	4147315	576720.75_4147315.45	0.10052	0.23023	0.12189	0.19727	0.23148	0.6422	Residence
576741	4147315	576740.75_4147315.45	0.10877	0.24624	0.12724	0.19424	0.20325	0.61987	Residence
576761	4147315	576760.75_4147315.45	0.11825	0.26336	0.13304	0.19105	0.18117	0.59945	Residence
576781	4147315	576780.75_4147315.45	0.12913	0.28136	0.13923	0.1877	0.1635	0.58067	Residence
576801	4147315	576800.75_4147315.45	0.1414	0.29972	0.1457	0.18411	0.14886	0.56262	Residence
576821	4147315	576820.75_4147315.45	0.1557	0.3184	0.15246	0.18041	0.13665	0.54605	Residence
576841	4147315	576840.75_4147315.45	0.17211	0.33682	0.15936	0.17654	0.12615	0.5301	Residence
576861	4147315	576860.75_4147315.45	0.19254	0.35558	0.16656	0.1728	0.11733	0.51694	Residence
576881	4147315	576880.75_4147315.45	0.21584	0.37304	0.17362	0.16885	0.10939	0.50321	Residence
576921	4147315	576920.75_4147315.45	0.27577	0.40368	0.18714	0.1608	0.09592	0.47662	Residence
576941	4147315	576940.75_4147315.45	0.31627	0.41678	0.1935	0.15688	0.09025	0.46464	Residence
576961	4147315	576960.75_4147315.45	0.36626	0.42797	0.19937	0.15301	0.0851	0.45293	Residence
577081	4147315	577080.75_4147315.45	1.36827	0.47224	0.22084	0.13227	0.06238	0.39278	Residence
577101	4147315	577100.75_4147315.45	1.9743	0.4775	0.22149	0.12908	0.05948	0.38294	Residence
577121	4147315	577120.75_4147315.45	3.28087	0.48315	0.22145	0.12608	0.05682	0.37399	Residence
577141	4147315	577140.75_4147315.45	4.17383	0.48977	0.22092	0.12336	0.0544	0.36653	Residence
577161	4147315	577160.75_4147315.45	4.49793	0.49453	0.2194	0.12053	0.05208	0.35806	Residence
575841	4147335	575840.75_4147335.45	0.01473	0.02296	0.02485	0.07263	0.10434	0.12163	Residence
575861	4147335	575860.75_4147335.45	0.01509	0.02386	0.02512	0.07574	0.11387	0.13448	Residence
575881	4147335	575880.75_4147335.45	0.01548	0.0248	0.02538	0.07901	0.12516	0.14987	Residence
575901	4147335	575900.75_4147335.45	0.01589	0.02575	0.0257	0.08239	0.13841	0.1682	Residence
575921	4147335	575920.75_4147335.45	0.01633	0.02672	0.02612	0.08591	0.15403	0.19013	Residence
575941	4147335	575940.75_4147335.45	0.01683	0.02771	0.0267	0.08959	0.17271	0.21656	Residence
575961	4147335	575960.75_4147335.45	0.0173	0.02874	0.02749	0.09341	0.1951	0.24857	Residence
576021	4147335	576020.75_4147335.45	0.01885	0.0321	0.03078	0.10588	0.29797	0.39949	Residence
576041	4147335	576040.75_4147335.45	0.01941	0.03341	0.03223	0.1104	0.35037	0.47772	Residence
576061	4147335	576060.75_4147335.45	0.01999	0.03485	0.03381	0.1151	0.41467	0.57404	Residence
576081	4147335	576080.75_4147335.45	0.02063	0.03647	0.03549	0.12001	0.49174	0.6897	Residence
576101	4147335	576100.75_4147335.45	0.02132	0.03829	0.03721	0.12512	0.57902	0.82094	Residence
576121	4147335	576120.75_4147335.45	0.02203	0.04027	0.0389	0.13037	0.66822	0.9553	Residence
576141	4147335	576140.75_4147335.45	0.02279	0.0424	0.04049	0.13577	0.74841	1.0752	Residence
576161	4147335	576160.75_4147335.45	0.02359	0.04465	0.04195	0.1413	0.81136	1.16673	Residence
576181	4147335	576180.75_4147335.45	0.02438	0.04687	0.04327	0.1468	0.85319	1.22381	Residence
576201	4147335	576200.75_4147335.45	0.02533	0.04926	0.04439	0.15259	0.87931	1.25463	Residence
576241	4147335	576240.75_4147335.45	0.02742	0.05408	0.04632	0.16445	0.89587	1.25662	Residence
576261	4147335	576260.75_4147335.45	0.02847	0.05641	0.04732	0.17009	0.89294	1.23764	Residence
576301	4147335	576300.75_4147335.45	0.03082	0.06149	0.04958	0.18095	0.88487	1.1848	Residence

576321	4147335	576320.75_4147335.45	0.03212	0.06454	0.05109	0.18614	0.88553	1.15659	Residence
576341	4147335	576340.75_4147335.45	0.0335	0.06803	0.05293	0.19099	0.89234	1.12856	Residence
576361	4147335	576360.75_4147335.45	0.035	0.07215	0.05521	0.19554	0.91072	1.10289	Residence
576381	4147335	576380.75_4147335.45	0.03657	0.07679	0.05785	0.19959	0.9453	1.07848	Residence
576401	4147335	576400.75_4147335.45	0.03825	0.08198	0.06082	0.20319	1.00777	1.0557	Residence
576421	4147335	576420.75_4147335.45	0.04008	0.08768	0.06417	0.20633	1.12401	1.03532	Residence
576441	4147335	576440.75_4147335.45	0.04206	0.0938	0.06776	0.20895	1.35049	1.01641	Residence
576461	4147335	576460.75_4147335.45	0.04416	0.10019	0.07157	0.211	1.84431	0.99799	Residence
576481	4147335	576480.75_4147335.45	0.04648	0.10685	0.07548	0.21256	2.92753	0.98051	Residence
576521	4147335	576520.75_4147335.45	0.05163	0.12076	0.0833	0.21405	3.90623	0.94167	Residence
576541	4147335	576540.75_4147335.45	0.05466	0.12833	0.08714	0.21416	2.20268	0.9202	Residence
576561	4147335	576560.75_4147335.45	0.05809	0.13661	0.09081	0.21393	1.43496	0.89709	Residence
576581	4147335	576580.75_4147335.45	0.0617	0.14554	0.09443	0.21319	0.99796	0.86966	Residence
576601	4147335	576600.75_4147335.45	0.06574	0.15552	0.09805	0.21216	0.73034	0.84114	Residence
576621	4147335	576620.75_4147335.45	0.07021	0.16656	0.10174	0.21081	0.55581	0.81174	Residence
576641	4147335	576640.75_4147335.45	0.07516	0.17865	0.10557	0.20915	0.43757	0.78235	Residence
576661	4147335	576660.75_4147335.45	0.08083	0.19192	0.10969	0.2073	0.35588	0.75477	Residence
576681	4147335	576680.75_4147335.45	0.08699	0.20605	0.1141	0.2051	0.29664	0.72753	Residence
576701	4147335	576700.75_4147335.45	0.09405	0.2214	0.11895	0.20274	0.2535	0.70269	Residence
576721	4147335	576720.75_4147335.45	0.10176	0.23757	0.12415	0.2	0.2205	0.67821	Residence
576741	4147335	576740.75_4147335.45	0.10998	0.25429	0.12964	0.1968	0.19456	0.65329	Residence
576761	4147335	576760.75_4147335.45	0.11956	0.27233	0.13563	0.19351	0.17435	0.63126	Residence
576781	4147335	576780.75_4147335.45	0.13061	0.29135	0.14204	0.19006	0.15809	0.61123	Residence
576801	4147335	576800.75_4147335.45	0.14307	0.31072	0.14874	0.18637	0.14444	0.59192	Residence
576821	4147335	576820.75_4147335.45	0.15761	0.33042	0.15573	0.18256	0.13294	0.57424	Residence
576841	4147335	576840.75_4147335.45	0.17374	0.34935	0.16276	0.17847	0.12278	0.556	Residence
576861	4147335	576860.75_4147335.45	0.19453	0.36904	0.17021	0.17465	0.11439	0.54202	Residence
576881	4147335	576880.75_4147335.45	0.21823	0.38724	0.1775	0.1706	0.10676	0.52722	Residence
576921	4147335	576920.75_4147335.45	0.27922	0.41875	0.19138	0.16235	0.09372	0.49824	Residence
576941	4147335	576940.75_4147335.45	0.32108	0.43226	0.19791	0.15838	0.08825	0.48551	Residence
576961	4147335	576960.75_4147335.45	0.37304	0.44377	0.20393	0.15447	0.08327	0.4731	Residence
575841	4147355	575840.75_4147355.45	0.01481	0.02287	0.02513	0.07327	0.10557	0.12367	Residence
575861	4147355	575860.75_4147355.45	0.01516	0.02377	0.02542	0.07643	0.11529	0.13687	Residence
575881	4147355	575880.75_4147355.45	0.01555	0.02473	0.02567	0.07975	0.12689	0.15283	Residence
575901	4147355	575900.75_4147355.45	0.01599	0.02573	0.02596	0.08323	0.14074	0.17215	Residence
575921	4147355	575920.75_4147355.45	0.01642	0.02671	0.02631	0.0868	0.15687	0.19497	Residence
575941	4147355	575940.75_4147355.45	0.01693	0.02776	0.02686	0.09061	0.17699	0.22369	Residence
575961	4147355	575960.75_4147355.45	0.01742	0.02877	0.02751	0.09451	0.20084	0.25805	Residence
575981	4147355	575980.75_4147355.45	0.01802	0.02994	0.02852	0.09868	0.2311	0.30214	Residence
576021	4147355	576020.75_4147355.45	0.01909	0.03225	0.03077	0.10739	0.31526	0.42691	Residence
576041	4147355	576040.75_4147355.45	0.0197	0.03355	0.03219	0.11207	0.37552	0.51741	Residence
576061	4147355	576060.75_4147355.45	0.02028	0.03496	0.03373	0.11687	0.45047	0.63041	Residence
576081	4147355	576080.75_4147355.45	0.02093	0.03657	0.03543	0.12191	0.54219	0.76882	Residence
576101	4147355	576100.75_4147355.45	0.02164	0.03835	0.03719	0.12715	0.64652	0.92653	Residence
576121	4147355	576120.75_4147355.45	0.02239	0.04033	0.03895	0.13256	0.75217	1.08624	Residence
576141	4147355	576140.75_4147355.45	0.02317	0.04249	0.04063	0.13812	0.84382	1.22351	Residence
576161	4147355	576160.75_4147355.45	0.02403	0.04485	0.04211	0.1439	0.9122	1.32266	Residence
576181	4147355	576180.75_4147355.45	0.02493	0.04726	0.04346	0.14986	0.95464	1.37993	Residence
576201	4147355	576200.75_4147355.45	0.02582	0.04958	0.04482	0.1555	0.97402	1.40089	Residence
576241	4147355	576240.75_4147355.45	0.02796	0.0546	0.04686	0.16769	0.97753	1.38338	Residence
576261	4147355	576260.75_4147355.45	0.02905	0.05703	0.0479	0.17351	0.96872	1.35542	Residence
576281	4147355	576280.75_4147355.45	0.03019	0.05952	0.04897	0.1791	0.95837	1.32193	Residence
576301	4147355	576300.75_4147355.45	0.03141	0.0622	0.05015	0.1846	0.95017	1.28735	Residence
576321	4147355	576320.75_4147355.45	0.03273	0.06527	0.05164	0.18988	0.94709	1.25418	Residence
576341	4147355	576340.75_4147355.45	0.03414	0.06882	0.05349	0.19486	0.95144	1.22314	Residence
576361	4147355	576360.75_4147355.45	0.03562	0.0729	0.05569	0.19941	0.96619	1.19407	Residence
576381	4147355	576380.75_4147355.45	0.03718	0.07753	0.05822	0.20348	0.99668	1.1667	Residence
576401	4147355	576400.75_4147355.45	0.03889	0.08285	0.06127	0.20712	1.05688	1.14301	Residence
576421	4147355	576420.75_4147355.45	0.04072	0.08875	0.06464	0.21026	1.16973	1.12153	Residence
576441	4147355	576440.75_4147355.45	0.04271	0.09507	0.06831	0.2128	1.39309	1.10169	Residence
576461	4147355	576460.75_4147355.45	0.04484	0.10172	0.07217	0.21483	1.89176	1.08259	Residence
576481	4147355	576480.75_4147355.45	0.04719	0.10866	0.07619	0.21636	3.02404	1.06435	Residence
576521	4147355	576520.75_4147355.45	0.0524	0.12313	0.08427	0.21774	3.77241	1.02167	Residence
576541	4147355	576540.75_4147355.45	0.05549	0.13103	0.08826	0.21781	2.12784	0.99754	Residence
576561	4147355	576560.75_4147355.45	0.05889	0.13959	0.09208	0.21749	1.37019	0.96993	Residence
576581	4147355	576580.75_4147355.45	0.06253	0.14887	0.09592	0.21668	0.9423	0.93736	Residence
576601	4147355	576600.75_4147355.45	0.06658	0.15924	0.09968	0.21555	0.68341	0.90334	Residence
576621	4147355	576620.75_4147355.45	0.07116	0.17081	0.10335	0.21414	0.51845	0.86941	Residence
576641	4147355	576640.75_4147355.45	0.07625	0.18359	0.10736	0.21247	0.409	0.83655	Residence
576661	4147355	576660.75_4147355.45	0.08203	0.1976	0.11164	0.21056	0.33408	0.80563	Residence
576681	4147355	576680.75_4147355.45	0.0883	0.21251	0.11621	0.20829	0.28012	0.77516	Residence
576701	4147355	576700.75_4147355.45	0.09534	0.22853	0.12119	0.20575	0.24062	0.7468	Residence
576721	4147355	576720.75_4147355.45	0.10311	0.24552	0.12655	0.20288	0.2107	0.71968	Residence
576741	4147355	576740.75_4147355.45	0.11163	0.2634	0.13229	0.19965	0.18728	0.6934	Residence

576761	4147355	576760.75_4147355.45	0.12107	0.28212	0.13839	0.19611	0.16841	0.66813	Residence
576781	4147355	576780.75_4147355.45	0.13213	0.30205	0.14499	0.19249	0.15316	0.6459	Residence
576801	4147355	576800.75_4147355.45	0.14456	0.32229	0.15186	0.18862	0.14022	0.62437	Residence
576821	4147355	576820.75_4147355.45	0.15915	0.3429	0.15907	0.18467	0.12928	0.6049	Residence
576841	4147355	576840.75_4147355.45	0.17578	0.36302	0.1664	0.18053	0.11969	0.58579	Residence
576861	4147355	576860.75_4147355.45	0.19636	0.38326	0.174	0.17651	0.1115	0.56966	Residence
576881	4147355	576880.75_4147355.45	0.22024	0.40212	0.18149	0.17235	0.10414	0.55338	Residence
576921	4147355	576920.75_4147355.45	0.28285	0.43489	0.19582	0.16397	0.09159	0.5224	Residence
576941	4147355	576940.75_4147355.45	0.32643	0.44893	0.20256	0.15997	0.08632	0.50899	Residence
576961	4147355	576960.75_4147355.45	0.38079	0.46084	0.20874	0.15603	0.08151	0.49584	Residence
575841	4147375	575840.75_4147375.45	0.01493	0.02281	0.02537	0.074	0.10726	0.12632	Residence
575861	4147375	575860.75_4147375.45	0.01531	0.02374	0.02571	0.07725	0.11743	0.14022	Residence
575881	4147375	575880.75_4147375.45	0.0157	0.0247	0.026	0.0806	0.12919	0.15659	Residence
575901	4147375	575900.75_4147375.45	0.01613	0.02572	0.02628	0.08414	0.14346	0.17667	Residence
575921	4147375	575920.75_4147375.45	0.01658	0.02674	0.02661	0.0878	0.16046	0.20092	Residence
575941	4147375	575940.75_4147375.45	0.01707	0.02779	0.02705	0.09165	0.18135	0.23092	Residence
575961	4147375	575960.75_4147375.45	0.01762	0.02888	0.0277	0.09573	0.20751	0.26894	Residence
575981	4147375	575980.75_4147375.45	0.01811	0.02993	0.02842	0.09984	0.23879	0.31484	Residence
576041	4147375	576040.75_4147375.45	0.01995	0.03368	0.03213	0.11373	0.40371	0.56196	Residence
576061	4147375	576060.75_4147375.45	0.02058	0.03509	0.03366	0.11869	0.49285	0.69705	Residence
576081	4147375	576080.75_4147375.45	0.02126	0.03669	0.03537	0.1239	0.60432	0.86607	Residence
576101	4147375	576100.75_4147375.45	0.02199	0.03846	0.03716	0.12928	0.73163	1.05923	Residence
576121	4147375	576120.75_4147375.45	0.02277	0.04044	0.03898	0.13487	0.85868	1.25166	Residence
576141	4147375	576140.75_4147375.45	0.02359	0.04262	0.04074	0.14063	0.96417	1.40952	Residence
576161	4147375	576160.75_4147375.45	0.02447	0.04502	0.04232	0.14656	1.03621	1.51358	Residence
576181	4147375	576180.75_4147375.45	0.02541	0.0475	0.04377	0.15274	1.07517	1.56522	Residence
576201	4147375	576200.75_4147375.45	0.02641	0.05004	0.04507	0.15886	1.08838	1.57652	Residence
576521	4147375	576520.75_4147375.45	0.05329	0.12569	0.08529	0.22163	3.65711	1.11988	Residence
576541	4147375	576540.75_4147375.45	0.05639	0.13388	0.08941	0.22163	2.04706	1.09097	Residence
576561	4147375	576560.75_4147375.45	0.0598	0.14275	0.09342	0.22121	1.29791	1.05712	Residence
576581	4147375	576580.75_4147375.45	0.06346	0.15239	0.09738	0.22031	0.8806	1.01736	Residence
576601	4147375	576600.75_4147375.45	0.06764	0.16332	0.10117	0.21917	0.63562	0.97791	Residence
576621	4147375	576620.75_4147375.45	0.07228	0.17547	0.10509	0.21771	0.48167	0.93818	Residence
576641	4147375	576640.75_4147375.45	0.0775	0.18893	0.10924	0.21596	0.38135	0.90015	Residence
576661	4147375	576660.75_4147375.45	0.08324	0.2036	0.11366	0.21392	0.3132	0.86409	Residence
576681	4147375	576680.75_4147375.45	0.08955	0.21926	0.11838	0.21151	0.26459	0.82937	Residence
576701	4147375	576700.75_4147375.45	0.09658	0.23603	0.12349	0.2088	0.22896	0.79707	Residence
576721	4147375	576720.75_4147375.45	0.10434	0.25385	0.12901	0.20576	0.2018	0.76648	Residence
576741	4147375	576740.75_4147375.45	0.1129	0.27266	0.13493	0.20238	0.18032	0.73726	Residence
576761	4147375	576760.75_4147375.45	0.12242	0.29242	0.14124	0.19871	0.16282	0.70944	Residence
576781	4147375	576780.75_4147375.45	0.13367	0.31351	0.14807	0.19499	0.14854	0.6853	Residence
576801	4147375	576800.75_4147375.45	0.14653	0.33511	0.15525	0.19107	0.13641	0.66259	Residence
576821	4147375	576820.75_4147375.45	0.16067	0.3562	0.16255	0.18682	0.12575	0.6393	Residence
576841	4147375	576840.75_4147375.45	0.17724	0.37712	0.17008	0.18251	0.1165	0.61784	Residence
576861	4147375	576860.75_4147375.45	0.19816	0.39839	0.17795	0.17841	0.10868	0.60051	Residence
576881	4147375	576880.75_4147375.45	0.22224	0.41798	0.18567	0.17414	0.10157	0.58258	Residence
576921	4147375	576920.75_4147375.45	0.28665	0.45218	0.20048	0.16566	0.08951	0.54951	Residence
576941	4147375	576940.75_4147375.45	0.33152	0.46658	0.2074	0.1616	0.0844	0.53491	Residence
576961	4147375	576960.75_4147375.45	0.38754	0.47866	0.21368	0.15758	0.07971	0.52048	Residence
576981	4147375	576980.75_4147375.45	0.46101	0.48913	0.21933	0.15371	0.07546	0.507	Residence
575841	4147395	575840.75_4147395.45	0.01508	0.02277	0.02557	0.07475	0.10911	0.1292	Residence
575861	4147395	575860.75_4147395.45	0.01545	0.02368	0.02599	0.07804	0.11933	0.14335	Residence
575881	4147395	575880.75_4147395.45	0.01585	0.02466	0.02632	0.08148	0.13162	0.16055	Residence
575901	4147395	575900.75_4147395.45	0.01627	0.02567	0.02661	0.08504	0.1461	0.1811	Residence
575921	4147395	575920.75_4147395.45	0.01671	0.0267	0.02689	0.08874	0.16346	0.20601	Residence
575941	4147395	575940.75_4147395.45	0.0172	0.02777	0.02726	0.09266	0.18528	0.23767	Residence
575961	4147395	575960.75_4147395.45	0.01778	0.02894	0.02787	0.0969	0.21366	0.27912	Residence
575981	4147395	575980.75_4147395.45	0.01832	0.03004	0.02857	0.10119	0.24825	0.33024	Residence
576001	4147395	576000.75_4147395.45	0.01898	0.03123	0.02955	0.10577	0.29444	0.39907	Residence
576041	4147395	576040.75_4147395.45	0.02023	0.03382	0.03209	0.11544	0.43605	0.61298	Residence
576061	4147395	576060.75_4147395.45	0.02085	0.03518	0.03359	0.12053	0.54305	0.77594	Residence
576081	4147395	576080.75_4147395.45	0.02158	0.03679	0.03529	0.12591	0.6813	0.98641	Residence
576101	4147395	576100.75_4147395.45	0.02232	0.03857	0.0371	0.13145	0.84052	1.22848	Residence
576121	4147395	576120.75_4147395.45	0.02304	0.04039	0.039	0.13709	0.99403	1.46098	Residence
576141	4147395	576140.75_4147395.45	0.02393	0.04264	0.04082	0.14304	1.11575	1.64269	Residence
576161	4147395	576160.75_4147395.45	0.02485	0.04505	0.04258	0.14917	1.18947	1.74864	Residence
576181	4147395	576180.75_4147395.45	0.0258	0.04758	0.04418	0.15538	1.21992	1.78747	Residence
576201	4147395	576200.75_4147395.45	0.02683	0.05028	0.04549	0.16189	1.22193	1.7819	Residence
576241	4147395	576240.75_4147395.45	0.02898	0.05559	0.04796	0.17448	1.1838	1.7017	Residence
576281	4147395	576280.75_4147395.45	0.03131	0.06093	0.0502	0.18656	1.13782	1.59955	Residence
576301	4147395	576300.75_4147395.45	0.03259	0.06382	0.05145	0.19239	1.12172	1.55341	Residence
576321	4147395	576320.75_4147395.45	0.03384	0.06681	0.05279	0.19771	1.1085	1.50737	Residence
576341	4147395	576340.75_4147395.45	0.03532	0.07043	0.05457	0.20289	1.10784	1.4709	Residence
576421	4147395	576420.75_4147395.45	0.04203	0.09088	0.06562	0.21837	1.29538	1.35292	Residence

576441	4147395	576440.75_4147395.45	0.0441	0.09773	0.06949	0.22098	1.51281	1.33302	Residence
576461	4147395	576460.75_4147395.45	0.0463	0.1049	0.0735	0.22294	2.01039	1.31191	Residence
576481	4147395	576480.75_4147395.45	0.04869	0.11243	0.07772	0.22432	3.22638	1.2906	Residence
576521	4147395	576520.75_4147395.45	0.05417	0.1283	0.08633	0.22561	3.52868	1.2396	Residence
576541	4147395	576540.75_4147395.45	0.05734	0.13688	0.09058	0.22558	1.95223	1.20517	Residence
575841	4147415	575840.75_4147415.45	0.01523	0.02272	0.02572	0.07553	0.1111	0.13229	Residence
575861	4147415	575860.75_4147415.45	0.01561	0.02364	0.02623	0.07889	0.12164	0.147	Residence
575881	4147415	575880.75_4147415.45	0.01603	0.02463	0.02662	0.08241	0.13436	0.16495	Residence
575901	4147415	575900.75_4147415.45	0.01648	0.02567	0.02695	0.08607	0.14954	0.18668	Residence
575921	4147415	575920.75_4147415.45	0.0169	0.0267	0.02724	0.08982	0.16748	0.21262	Residence
575941	4147415	575940.75_4147415.45	0.01741	0.02781	0.02759	0.09384	0.19052	0.24628	Residence
575961	4147415	575960.75_4147415.45	0.01801	0.02902	0.02815	0.0982	0.22101	0.29115	Residence
575981	4147415	575980.75_4147415.45	0.01856	0.03015	0.02877	0.10258	0.25836	0.34667	Residence
576001	4147415	576000.75_4147415.45	0.01915	0.03132	0.0296	0.1072	0.3082	0.42131	Residence
576021	4147415	576020.75_4147415.45	0.01984	0.0326	0.03072	0.11212	0.37765	0.52621	Residence
576061	4147415	576060.75_4147415.45	0.02113	0.03519	0.03346	0.1224	0.60255	0.86942	Residence
576081	4147415	576080.75_4147415.45	0.02186	0.03675	0.03518	0.12791	0.77746	1.13654	Residence
576101	4147415	576100.75_4147415.45	0.02265	0.0386	0.03706	0.13368	0.9843	1.4511	Residence
576121	4147415	576120.75_4147415.45	0.02343	0.04047	0.03901	0.13952	1.17648	1.7413	Residence
576141	4147415	576140.75_4147415.45	0.02431	0.04272	0.04092	0.14565	1.31503	1.94697	Residence
576161	4147415	576160.75_4147415.45	0.02524	0.04513	0.04273	0.15191	1.38327	2.0441	Residence
576181	4147415	576180.75_4147415.45	0.0262	0.04771	0.04445	0.15832	1.39821	2.05982	Residence
576201	4147415	576200.75_4147415.45	0.02725	0.05041	0.046	0.16484	1.3819	2.027	Residence
576281	4147415	576280.75_4147415.45	0.03182	0.06156	0.05082	0.19044	1.25783	1.78387	Residence
576301	4147415	576300.75_4147415.45	0.03315	0.06465	0.05213	0.19652	1.23929	1.73408	Residence
576321	4147415	576320.75_4147415.45	0.03441	0.06766	0.05343	0.20189	1.22182	1.68237	Residence
576341	4147415	576340.75_4147415.45	0.03586	0.07128	0.05515	0.20709	1.21691	1.64112	Residence
576421	4147415	576420.75_4147415.45	0.04267	0.09202	0.06616	0.22264	1.38632	1.51389	Residence
576441	4147415	576440.75_4147415.45	0.04473	0.09893	0.06999	0.22513	1.58856	1.49008	Residence
576461	4147415	576460.75_4147415.45	0.04707	0.10659	0.07423	0.22719	2.08896	1.47224	Residence
576481	4147415	576480.75_4147415.45	0.04949	0.11438	0.07856	0.22851	2.69163	1.4485	Residence
576521	4147415	576520.75_4147415.45	0.05504	0.13098	0.08737	0.22968	3.37588	1.38863	Residence
576541	4147415	576540.75_4147415.45	0.05838	0.14008	0.09177	0.22972	1.83998	1.34846	Residence
576741	4147415	576740.75_4147415.45	0.1156	0.29327	0.1406	0.20811	0.16796	0.84689	Residence
576781	4147415	576780.75_4147415.45	0.1368	0.33883	0.15465	0.20014	0.13977	0.78176	Residence
576801	4147415	576800.75_4147415.45	0.14934	0.36221	0.16217	0.19577	0.12859	0.75112	Residence
576821	4147415	576820.75_4147415.45	0.16422	0.38604	0.17008	0.19139	0.119	0.72399	Residence
576841	4147415	576840.75_4147415.45	0.18119	0.40913	0.17814	0.18684	0.11053	0.69767	Residence
576861	4147415	576860.75_4147415.45	0.20188	0.43187	0.18641	0.18239	0.10315	0.67464	Residence
575841	4147435	575840.75_4147435.45	0.01546	0.02276	0.0258	0.07642	0.11376	0.13637	Residence
575861	4147435	575860.75_4147435.45	0.01585	0.02368	0.0264	0.07987	0.12478	0.15187	Residence
575881	4147435	575880.75_4147435.45	0.01627	0.02465	0.02689	0.08344	0.13782	0.17045	Residence
575901	4147435	575900.75_4147435.45	0.01671	0.02569	0.02728	0.08718	0.15353	0.19309	Residence
575921	4147435	575920.75_4147435.45	0.01717	0.02675	0.02763	0.09105	0.17262	0.22088	Residence
575941	4147435	575940.75_4147435.45	0.01766	0.02786	0.02797	0.09512	0.19654	0.25607	Residence
575961	4147435	575960.75_4147435.45	0.0182	0.02902	0.02839	0.09942	0.2275	0.30196	Residence
575981	4147435	575980.75_4147435.45	0.01876	0.03019	0.02895	0.10393	0.26801	0.36245	Residence
576001	4147435	576000.75_4147435.45	0.01938	0.03143	0.02972	0.10871	0.32342	0.44584	Residence
576021	4147435	576020.75_4147435.45	0.02005	0.03271	0.03076	0.11377	0.40215	0.56529	Residence
576061	4147435	576060.75_4147435.45	0.0214	0.03536	0.03339	0.12437	0.67696	0.98619	Residence
576081	4147435	576080.75_4147435.45	0.0222	0.03691	0.03511	0.13008	0.90721	1.33871	Residence
576101	4147435	576100.75_4147435.45	0.023	0.03863	0.03698	0.13597	1.18123	1.75475	Residence
576121	4147435	576120.75_4147435.45	0.02377	0.04051	0.03895	0.14201	1.42729	2.12366	Residence
576141	4147435	576140.75_4147435.45	0.02461	0.04265	0.04098	0.14824	1.5779	2.34527	Residence
576161	4147435	576160.75_4147435.45	0.02551	0.04505	0.04296	0.15465	1.62842	2.41587	Residence
576181	4147435	576180.75_4147435.45	0.0265	0.04769	0.0448	0.16123	1.6154	2.39036	Residence
576201	4147435	576200.75_4147435.45	0.02766	0.05063	0.04635	0.16811	1.57919	2.32752	Residence
576221	4147435	576220.75_4147435.45	0.0288	0.05356	0.04781	0.17497	1.5334	2.24757	Residence
576281	4147435	576280.75_4147435.45	0.03231	0.06225	0.05148	0.19448	1.4128	2.02015	Residence
576301	4147435	576300.75_4147435.45	0.03366	0.06543	0.05273	0.20067	1.39098	1.96574	Residence
576321	4147435	576320.75_4147435.45	0.03496	0.06855	0.0541	0.20622	1.36992	1.909	Residence
576341	4147435	576340.75_4147435.45	0.03641	0.07218	0.05578	0.21146	1.3606	1.86243	Residence
576361	4147435	576360.75_4147435.45	0.03796	0.07632	0.05783	0.21619	1.36166	1.8206	Residence
576421	4147435	576420.75_4147435.45	0.04332	0.0932	0.06673	0.22706	1.50831	1.72267	Residence
576441	4147435	576440.75_4147435.45	0.0455	0.10044	0.07065	0.2296	1.70523	1.70028	Residence
576461	4147435	576460.75_4147435.45	0.04786	0.10835	0.07494	0.23161	2.19385	1.68123	Residence
576481	4147435	576480.75_4147435.45	0.0504	0.11662	0.07938	0.23301	2.80592	1.65938	Residence
576521	4147435	576520.75_4147435.45	0.05608	0.13399	0.0885	0.23409	3.22657	1.5867	Residence
576541	4147435	576540.75_4147435.45	0.05941	0.14344	0.09305	0.234	1.69502	1.53077	Residence
576761	4147435	576760.75_4147435.45	0.12679	0.32793	0.15059	0.20694	0.1476	0.87561	Residence
576781	4147435	576780.75_4147435.45	0.13797	0.35227	0.15802	0.20264	0.1353	0.83902	Residence
576801	4147435	576800.75_4147435.45	0.15075	0.37711	0.16584	0.19818	0.12472	0.80513	Residence
576841	4147435	576840.75_4147435.45	0.18263	0.42628	0.18232	0.18896	0.10741	0.7444	Residence
576861	4147435	576860.75_4147435.45	0.20314	0.44985	0.19081	0.18434	0.10028	0.71793	Residence

575841	4147455	575840.75_4147455.45	0.01564	0.02274	0.02586	0.07726	0.11608	0.14005	Residence
575861	4147455	575860.75_4147455.45	0.01604	0.02363	0.02655	0.08075	0.12735	0.15598	Residence
575881	4147455	575880.75_4147455.45	0.01643	0.02455	0.02714	0.08434	0.14042	0.17469	Residence
575901	4147455	575900.75_4147455.45	0.01686	0.02557	0.0276	0.08811	0.15643	0.19788	Residence
575921	4147455	575920.75_4147455.45	0.01733	0.02666	0.02797	0.09209	0.17635	0.22704	Residence
575941	4147455	575940.75_4147455.45	0.01785	0.02781	0.02831	0.09628	0.20165	0.26445	Residence
575961	4147455	575960.75_4147455.45	0.01839	0.02899	0.02868	0.10066	0.23415	0.31294	Residence
575981	4147455	575980.75_4147455.45	0.01896	0.0302	0.02914	0.10526	0.27731	0.37785	Residence
576001	4147455	576000.75_4147455.45	0.0196	0.03147	0.02984	0.11019	0.33831	0.47005	Residence
576021	4147455	576020.75_4147455.45	0.02031	0.03282	0.03083	0.11545	0.42825	0.60695	Residence
576041	4147455	576040.75_4147455.45	0.021	0.03415	0.03197	0.12083	0.56183	0.81172	Residence
576081	4147455	576080.75_4147455.45	0.02247	0.03704	0.035	0.13225	1.08042	1.60884	Residence
576101	4147455	576100.75_4147455.45	0.02326	0.03869	0.03684	0.13828	1.46281	2.18653	Residence
576121	4147455	576120.75_4147455.45	0.02408	0.04055	0.03886	0.14451	1.78317	2.6607	Residence
576141	4147455	576140.75_4147455.45	0.02496	0.04268	0.04096	0.15096	1.9355	2.88259	Residence
576161	4147455	576160.75_4147455.45	0.02589	0.04508	0.04304	0.15758	1.94584	2.89479	Residence
576181	4147455	576180.75_4147455.45	0.0269	0.04781	0.045	0.16444	1.89367	2.81169	Residence
576201	4147455	576200.75_4147455.45	0.02809	0.05082	0.0467	0.17153	1.82966	2.70687	Residence
576221	4147455	576220.75_4147455.45	0.0292	0.05384	0.04827	0.17854	1.76466	2.59753	Residence
576281	4147455	576280.75_4147455.45	0.03277	0.06294	0.05216	0.19867	1.62134	2.33554	Residence
576301	4147455	576300.75_4147455.45	0.03411	0.06613	0.05341	0.20492	1.59367	2.27279	Residence
576321	4147455	576320.75_4147455.45	0.03547	0.06943	0.05479	0.21066	1.56958	2.21171	Residence
576341	4147455	576340.75_4147455.45	0.03693	0.07309	0.05644	0.21596	1.55516	2.15855	Residence
576361	4147455	576360.75_4147455.45	0.0385	0.07723	0.0584	0.22072	1.55048	2.1101	Residence
576381	4147455	576380.75_4147455.45	0.04019	0.08215	0.06088	0.22496	1.56235	2.06933	Residence
576401	4147455	576400.75_4147455.45	0.04203	0.08789	0.06388	0.22862	1.59889	2.03467	Residence
576421	4147455	576420.75_4147455.45	0.04411	0.09465	0.06743	0.23181	1.68688	2.01092	Residence
576441	4147455	576440.75_4147455.45	0.04628	0.10204	0.07136	0.23428	1.87043	1.98465	Residence
576461	4147455	576460.75_4147455.45	0.04867	0.11021	0.07571	0.23621	2.34313	1.96282	Residence
576481	4147455	576480.75_4147455.45	0.05126	0.11879	0.08024	0.23755	2.93782	1.93826	Residence
576521	4147455	576520.75_4147455.45	0.05708	0.13703	0.08966	0.23855	2.99493	1.84681	Residence
576601	4147455	576600.75_4147455.45	0.07209	0.18178	0.10793	0.23481	0.43475	1.45644	Residence
576621	4147455	576620.75_4147455.45	0.07677	0.19631	0.1125	0.23284	0.34574	1.36656	Residence
576641	4147455	576640.75_4147455.45	0.08189	0.21246	0.11722	0.23046	0.28746	1.28587	Residence
576661	4147455	576660.75_4147455.45	0.08757	0.23019	0.12223	0.22775	0.2463	1.21411	Residence
576681	4147455	576680.75_4147455.45	0.09399	0.24959	0.12765	0.22478	0.2158	1.15158	Residence
576701	4147455	576700.75_4147455.45	0.10117	0.27045	0.13351	0.22149	0.19183	1.09489	Residence
576741	4147455	576740.75_4147455.45	0.11787	0.31599	0.14657	0.21381	0.15602	0.99215	Residence
576761	4147455	576760.75_4147455.45	0.12805	0.34109	0.15389	0.20968	0.14251	0.94854	Residence
576781	4147455	576780.75_4147455.45	0.13919	0.36665	0.16154	0.20519	0.13083	0.90571	Residence
576801	4147455	576800.75_4147455.45	0.15207	0.39291	0.16964	0.2006	0.12078	0.86711	Residence
576821	4147455	576820.75_4147455.45	0.16694	0.41914	0.17807	0.19591	0.11201	0.83154	Residence
576841	4147455	576840.75_4147455.45	0.1843	0.44482	0.18672	0.19116	0.10428	0.79875	Residence
575841	4147475	575840.75_4147475.45	0.01585	0.02276	0.02586	0.07815	0.11879	0.14426	Residence
575861	4147475	575860.75_4147475.45	0.01625	0.02362	0.02665	0.0817	0.13035	0.16075	Residence
575881	4147475	575880.75_4147475.45	0.01665	0.02454	0.02733	0.08538	0.14402	0.18039	Residence
575901	4147475	575900.75_4147475.45	0.01708	0.02553	0.02789	0.08921	0.16057	0.20449	Residence
575921	4147475	575920.75_4147475.45	0.01756	0.02661	0.02832	0.09326	0.18129	0.23494	Residence
575941	4147475	575940.75_4147475.45	0.01808	0.02778	0.02868	0.09754	0.2078	0.27435	Residence
575961	4147475	575960.75_4147475.45	0.01866	0.02902	0.02905	0.10208	0.24283	0.32685	Residence
575981	4147475	575980.75_4147475.45	0.01924	0.03026	0.02949	0.10681	0.28941	0.39725	Residence
576001	4147475	576000.75_4147475.45	0.01983	0.03149	0.03001	0.1117	0.3536	0.49492	Residence
576021	4147475	576020.75_4147475.45	0.02056	0.03288	0.03091	0.11713	0.45509	0.64997	Residence
576041	4147475	576040.75_4147475.45	0.02126	0.03422	0.03194	0.12264	0.61229	0.89176	Residence
576101	4147475	576100.75_4147475.45	0.02356	0.03874	0.03667	0.1406	1.88934	2.83614	Residence
576121	4147475	576120.75_4147475.45	0.02439	0.04055	0.0387	0.147	2.30417	3.43713	Residence
576181	4147475	576180.75_4147475.45	0.02737	0.04803	0.04516	0.16788	2.26172	3.36622	Residence
576201	4147475	576200.75_4147475.45	0.02842	0.05093	0.04707	0.17499	2.15793	3.20075	Residence
576221	4147475	576220.75_4147475.45	0.02953	0.054	0.04877	0.18212	2.0723	3.05977	Residence
576241	4147475	576240.75_4147475.45	0.03061	0.05714	0.05026	0.18916	2.00124	2.93915	Residence
576261	4147475	576260.75_4147475.45	0.03189	0.06032	0.05156	0.19613	1.94862	2.84447	Residence
576281	4147475	576280.75_4147475.45	0.03321	0.06358	0.05281	0.20295	1.91159	2.7705	Residence
576301	4147475	576300.75_4147475.45	0.03455	0.06686	0.05406	0.20931	1.87702	2.69777	Residence
576321	4147475	576320.75_4147475.45	0.03597	0.07031	0.05545	0.21524	1.85067	2.63327	Residence
576341	4147475	576340.75_4147475.45	0.03743	0.07397	0.05699	0.22059	1.8277	2.56849	Residence
576361	4147475	576360.75_4147475.45	0.03908	0.07832	0.05909	0.22551	1.82298	2.52055	Residence
576381	4147475	576380.75_4147475.45	0.04083	0.08335	0.06157	0.22981	1.8309	2.4762	Residence
576401	4147475	576400.75_4147475.45	0.04272	0.08921	0.06457	0.23348	1.86015	2.43616	Residence
576421	4147475	576420.75_4147475.45	0.04483	0.09607	0.06812	0.23664	1.93893	2.40992	Residence
576461	4147475	576460.75_4147475.45	0.04946	0.11208	0.07649	0.24094	2.56043	2.35421	Residence
576481	4147475	576480.75_4147475.45	0.05209	0.12101	0.08111	0.24222	3.13393	2.32652	Residence
576521	4147475	576520.75_4147475.45	0.05798	0.14009	0.09079	0.24306	2.62132	2.19969	Residence
576601	4147475	576600.75_4147475.45	0.07285	0.18646	0.10976	0.23868	0.39188	1.64383	Residence
576621	4147475	576620.75_4147475.45	0.07782	0.2021	0.11447	0.23681	0.32067	1.54091	Residence

576641	4147475	576640.75_4147475.45	0.08307	0.21925	0.11941	0.23437	0.27055	1.44353	Residence
576661	4147475	576660.75_4147475.45	0.08877	0.23799	0.12461	0.23149	0.23367	1.35545	Residence
576681	4147475	576680.75_4147475.45	0.09506	0.25822	0.13015	0.22823	0.20535	1.27588	Residence
576701	4147475	576700.75_4147475.45	0.10191	0.27969	0.13608	0.22453	0.18264	1.202	Residence
576721	4147475	576720.75_4147475.45	0.11	0.30338	0.14267	0.2208	0.16496	1.14169	Residence
576741	4147475	576740.75_4147475.45	0.11886	0.32824	0.14967	0.21666	0.1499	1.08379	Residence
576761	4147475	576760.75_4147475.45	0.12927	0.35508	0.15732	0.21246	0.13735	1.03444	Residence
576781	4147475	576780.75_4147475.45	0.14047	0.3821	0.16523	0.2078	0.12631	0.98441	Residence
576801	4147475	576800.75_4147475.45	0.15343	0.40985	0.17361	0.20307	0.11679	0.93974	Residence
575841	4147495	575840.75_4147495.45	0.01608	0.02277	0.02583	0.07904	0.12169	0.14892	Residence
575861	4147495	575860.75_4147495.45	0.01647	0.02362	0.0267	0.08266	0.1337	0.166	Residence
575881	4147495	575880.75_4147495.45	0.0169	0.02455	0.02747	0.08647	0.1482	0.18698	Residence
575901	4147495	575900.75_4147495.45	0.01737	0.02557	0.02811	0.09045	0.166	0.213	Residence
575921	4147495	575920.75_4147495.45	0.01785	0.02664	0.02864	0.09458	0.1878	0.24514	Residence
575941	4147495	575940.75_4147495.45	0.01838	0.02781	0.02907	0.09897	0.21598	0.28717	Residence
575961	4147495	575960.75_4147495.45	0.01894	0.02903	0.02945	0.10355	0.25265	0.34238	Residence
575981	4147495	575980.75_4147495.45	0.01955	0.03031	0.02987	0.10842	0.30315	0.41886	Residence
576041	4147495	576040.75_4147495.45	0.02155	0.03433	0.032	0.12457	0.66907	0.98181	Residence
576101	4147495	576100.75_4147495.45	0.02392	0.03894	0.03657	0.14317	2.60574	3.91444	Residence
576121	4147495	576120.75_4147495.45	0.02475	0.04071	0.03857	0.14975	3.10441	4.61319	Residence
576181	4147495	576180.75_4147495.45	0.02779	0.04823	0.04529	0.17143	2.76913	4.12679	Residence
576201	4147495	576200.75_4147495.45	0.02879	0.05114	0.04733	0.17872	2.63177	3.9085	Residence
576221	4147495	576220.75_4147495.45	0.02987	0.05427	0.04917	0.18605	2.52742	3.7379	Residence
576241	4147495	576240.75_4147495.45	0.03103	0.05755	0.05078	0.19335	2.44834	3.60403	Residence
576261	4147495	576260.75_4147495.45	0.03225	0.06088	0.05219	0.20048	2.38461	3.49197	Residence
576281	4147495	576280.75_4147495.45	0.03366	0.06429	0.05351	0.20749	2.34507	3.41334	Residence
576301	4147495	576300.75_4147495.45	0.03498	0.06767	0.05475	0.21396	2.29873	3.32318	Residence
576321	4147495	576320.75_4147495.45	0.03645	0.07124	0.0562	0.22003	2.26673	3.25036	Residence
576341	4147495	576340.75_4147495.45	0.03798	0.07507	0.05776	0.22552	2.23911	3.17895	Residence
576361	4147495	576360.75_4147495.45	0.03963	0.07944	0.0598	0.23044	2.22328	3.11641	Residence
576381	4147495	576380.75_4147495.45	0.04141	0.0845	0.06225	0.23475	2.22178	3.06115	Residence
576401	4147495	576400.75_4147495.45	0.04332	0.0904	0.06521	0.2384	2.24026	3.01124	Residence
576421	4147495	576420.75_4147495.45	0.04551	0.09748	0.0688	0.24159	2.31226	2.98661	Residence
576461	4147495	576460.75_4147495.45	0.05025	0.11403	0.0773	0.24585	2.90019	2.92539	Residence
576481	4147495	576480.75_4147495.45	0.0529	0.12329	0.082	0.24703	3.49552	2.89092	Residence
576521	4147495	576520.75_4147495.45	0.05889	0.14329	0.09197	0.24774	2.06985	2.7025	Residence
576601	4147495	576600.75_4147495.45	0.074	0.19196	0.11156	0.243	0.35947	1.9038	Residence
576621	4147495	576620.75_4147495.45	0.07888	0.2082	0.1165	0.24088	0.29793	1.76566	Residence
576641	4147495	576640.75_4147495.45	0.08416	0.22627	0.12164	0.23829	0.25395	1.64179	Residence
576661	4147495	576660.75_4147495.45	0.08989	0.24606	0.12703	0.23524	0.22086	1.5307	Residence
576681	4147495	576680.75_4147495.45	0.09633	0.26775	0.13284	0.2319	0.19548	1.435	Residence
576701	4147495	576700.75_4147495.45	0.10329	0.29065	0.13902	0.22806	0.17468	1.34509	Residence
576721	4147495	576720.75_4147495.45	0.11103	0.31507	0.14568	0.2239	0.15765	1.26444	Residence
576741	4147495	576740.75_4147495.45	0.11967	0.34105	0.15285	0.21948	0.14344	1.19195	Residence
576761	4147495	576760.75_4147495.45	0.13015	0.36954	0.16077	0.21514	0.13196	1.13416	Residence
576781	4147495	576780.75_4147495.45	0.14166	0.39857	0.16906	0.21045	0.12172	1.07769	Residence
575841	4147515	575840.75_4147515.45	0.01636	0.02292	0.02575	0.08	0.12523	0.15451	Residence
575861	4147515	575860.75_4147515.45	0.01681	0.02384	0.02666	0.08379	0.13837	0.1734	Residence
575881	4147515	575880.75_4147515.45	0.01724	0.02469	0.02752	0.0877	0.15379	0.19578	Residence
576121	4147515	576120.75_4147515.45	0.0251	0.04089	0.03845	0.15261	4.26733	6.31472	Residence
576141	4147515	576140.75_4147515.45	0.0261	0.04315	0.04077	0.16001	3.98631	5.95863	Residence
576181	4147515	576180.75_4147515.45	0.02814	0.04835	0.04539	0.17503	3.49301	5.20996	Residence
576201	4147515	576200.75_4147515.45	0.02916	0.0513	0.04756	0.18258	3.32985	4.94967	Residence
576221	4147515	576220.75_4147515.45	0.03028	0.05455	0.04953	0.1902	3.21527	4.76061	Residence
576241	4147515	576240.75_4147515.45	0.03146	0.05795	0.05128	0.19774	3.12459	4.60675	Residence
576261	4147515	576260.75_4147515.45	0.03264	0.06141	0.05282	0.20502	3.04017	4.46215	Residence
576281	4147515	576280.75_4147515.45	0.03405	0.06495	0.05419	0.21218	2.99264	4.37026	Residence
576301	4147515	576300.75_4147515.45	0.03543	0.06851	0.05552	0.21884	2.9403	4.26995	Residence
576321	4147515	576320.75_4147515.45	0.03691	0.07223	0.05693	0.22502	2.89785	4.18125	Residence
576341	4147515	576340.75_4147515.45	0.03846	0.07615	0.05853	0.23057	2.85463	4.08735	Residence
576361	4147515	576360.75_4147515.45	0.04015	0.08061	0.0605	0.23556	2.82937	4.01234	Residence
576381	4147515	576380.75_4147515.45	0.04197	0.08572	0.06291	0.23987	2.81226	3.93746	Residence
576401	4147515	576400.75_4147515.45	0.04394	0.09179	0.06592	0.24355	2.82228	3.88027	Residence
576421	4147515	576420.75_4147515.45	0.04612	0.09891	0.06947	0.24663	2.87412	3.84059	Residence
576461	4147515	576460.75_4147515.45	0.05097	0.11597	0.07809	0.25085	3.41805	3.77369	Residence
576481	4147515	576480.75_4147515.45	0.05369	0.12566	0.08291	0.25201	3.94037	3.74283	Residence
576621	4147515	576620.75_4147515.45	0.07996	0.21473	0.11862	0.24511	0.27633	2.06629	Residence
576641	4147515	576640.75_4147515.45	0.08503	0.2334	0.12386	0.24215	0.23675	1.8928	Residence
576661	4147515	576660.75_4147515.45	0.09085	0.25443	0.12948	0.23898	0.20765	1.75217	Residence
576681	4147515	576680.75_4147515.45	0.09732	0.27737	0.13551	0.23544	0.1848	1.62975	Residence
576701	4147515	576700.75_4147515.45	0.10471	0.30245	0.1421	0.23169	0.16666	1.52693	Residence
576721	4147515	576720.75_4147515.45	0.11223	0.3279	0.14889	0.22717	0.15057	1.42021	Residence
576741	4147515	576740.75_4147515.45	0.12108	0.35574	0.15638	0.22264	0.13758	1.33341	Residence
576761	4147515	576760.75_4147515.45	0.13125	0.38541	0.16446	0.21798	0.12663	1.2582	Residence

576801	4147515	576800.75_4147515.45	0.15585	0.44718	0.18202	0.20811	0.10866	1.12728	Residence
575841	4147535	575840.75_4147535.45	0.01651	0.02282	0.02566	0.08085	0.1281	0.15921	Residence
575861	4147535	575860.75_4147535.45	0.01696	0.02368	0.02666	0.08471	0.14166	0.17876	Residence
575881	4147535	575880.75_4147535.45	0.01751	0.02475	0.02756	0.08881	0.15865	0.2036	Residence
575901	4147535	575900.75_4147535.45	0.01796	0.02566	0.02841	0.09298	0.17841	0.23263	Residence
575921	4147535	575920.75_4147535.45	0.01849	0.02675	0.02913	0.0974	0.20378	0.27032	Residence
576121	4147535	576120.75_4147535.45	0.02553	0.04127	0.03846	0.15585	4.02778	6.85475	Residence
576141	4147535	576140.75_4147535.45	0.02648	0.04341	0.04071	0.16334	2.57888	5.72321	Residence
576181	4147535	576180.75_4147535.45	0.02847	0.04851	0.04545	0.17878	1.91846	4.48781	Residence
576201	4147535	576200.75_4147535.45	0.02954	0.05151	0.04774	0.18664	3.10302	6.49567	Residence
576321	4147535	576320.75_4147535.45	0.0374	0.07328	0.0578	0.23026	3.8604	5.58524	Residence
576341	4147535	576340.75_4147535.45	0.039	0.07736	0.05943	0.23591	3.80217	5.47211	Residence
576361	4147535	576360.75_4147535.45	0.04075	0.08198	0.06146	0.24098	3.76574	5.38836	Residence
576381	4147535	576380.75_4147535.45	0.04262	0.08722	0.06383	0.2453	3.73055	5.29327	Residence
576401	4147535	576400.75_4147535.45	0.04461	0.09331	0.06674	0.24894	3.7164	5.20938	Residence
576421	4147535	576420.75_4147535.45	0.04683	0.10054	0.07027	0.252	3.75332	5.16301	Residence
576501	4147535	576500.75_4147535.45	0.0574	0.13882	0.08905	0.25763	1.79375	4.92993	Residence
576621	4147535	576620.75_4147535.45	0.08117	0.22195	0.12089	0.24959	0.25586	2.49036	Residence
576641	4147535	576640.75_4147535.45	0.08641	0.24185	0.12639	0.24653	0.22178	2.25731	Residence
576661	4147535	576660.75_4147535.45	0.09216	0.26393	0.13218	0.24306	0.19557	2.05969	Residence
576681	4147535	576680.75_4147535.45	0.09867	0.28835	0.13846	0.23933	0.17512	1.89763	Residence
576701	4147535	576700.75_4147535.45	0.10595	0.31473	0.14523	0.23528	0.15838	1.75793	Residence
576721	4147535	576720.75_4147535.45	0.11378	0.34236	0.1524	0.23074	0.14407	1.62806	Residence
576741	4147535	576740.75_4147535.45	0.12245	0.37152	0.16006	0.22588	0.13183	1.51224	Residence
576761	4147535	576760.75_4147535.45	0.13251	0.40275	0.16838	0.22097	0.12154	1.41521	Residence
576781	4147535	576780.75_4147535.45	0.14394	0.43513	0.17721	0.2159	0.11258	1.32909	Residence
575841	4147555	575840.75_4147555.45	0.01678	0.02293	0.02554	0.08182	0.13118	0.16453	Residence
575861	4147555	575860.75_4147555.45	0.01724	0.02375	0.02658	0.08577	0.14536	0.18511	Residence
575881	4147555	575880.75_4147555.45	0.01778	0.02483	0.02754	0.08997	0.16313	0.21116	Residence
575901	4147555	575900.75_4147555.45	0.01821	0.02564	0.02852	0.0942	0.18344	0.24118	Residence
575921	4147555	575920.75_4147555.45	0.01876	0.02672	0.02933	0.09874	0.21024	0.28114	Residence
575941	4147555	575940.75_4147555.45	0.0193	0.02783	0.03004	0.10342	0.24383	0.33152	Residence
575961	4147555	575960.75_4147555.45	0.0199	0.02908	0.03061	0.10842	0.29007	0.40148	Residence
576561	4147555	576560.75_4147555.45	0.06882	0.17969	0.10671	0.26088	0.40362	4.51915	Residence
576621	4147555	576620.75_4147555.45	0.0823	0.22956	0.12322	0.25415	0.23598	3.09472	Residence
576641	4147555	576640.75_4147555.45	0.08763	0.25072	0.12897	0.25094	0.20699	2.76623	Residence
576661	4147555	576660.75_4147555.45	0.09343	0.27417	0.13501	0.24726	0.18405	2.48818	Residence
576681	4147555	576680.75_4147555.45	0.10004	0.30025	0.14156	0.24336	0.16584	2.26613	Residence
576701	4147555	576700.75_4147555.45	0.10691	0.32735	0.14837	0.23877	0.15015	2.05584	Residence
576721	4147555	576720.75_4147555.45	0.11483	0.3569	0.15585	0.23408	0.13727	1.88754	Residence
576741	4147555	576740.75_4147555.45	0.1238	0.38851	0.16392	0.2292	0.12632	1.74453	Residence
576761	4147555	576760.75_4147555.45	0.13364	0.42123	0.17243	0.22398	0.11662	1.61372	Residence
576781	4147555	576780.75_4147555.45	0.14523	0.45586	0.18164	0.2188	0.10836	1.50685	Residence
576801	4147555	576800.75_4147555.45	0.15849	0.49089	0.19131	0.2135	0.101	1.41232	Residence
575841	4147575	575840.75_4147575.45	0.01705	0.02309	0.02538	0.08283	0.13361	0.16913	Residence
575861	4147575	575860.75_4147575.45	0.01751	0.0239	0.02647	0.08686	0.14815	0.19036	Residence
575881	4147575	575880.75_4147575.45	0.01809	0.02496	0.02749	0.09122	0.16689	0.21802	Residence
575901	4147575	575900.75_4147575.45	0.0185	0.02568	0.02856	0.09549	0.18762	0.24885	Residence
575921	4147575	575920.75_4147575.45	0.01905	0.02676	0.02947	0.10016	0.21573	0.29103	Residence
575941	4147575	575940.75_4147575.45	0.01964	0.02791	0.03026	0.10506	0.25224	0.34622	Residence
575961	4147575	575960.75_4147575.45	0.02025	0.02914	0.03094	0.1102	0.30152	0.42123	Residence
576281	4147575	576280.75_4147575.45	0.03527	0.067	0.05631	0.22761	1.71542	2.79562	Residence
576301	4147575	576300.75_4147575.45	0.0368	0.07119	0.05793	0.23484	1.71042	2.79227	Residence
576321	4147575	576320.75_4147575.45	0.03831	0.07535	0.05945	0.24126	1.68927	2.10728	Residence
576341	4147575	576340.75_4147575.45	0.03995	0.0797	0.0611	0.24705	1.68184	2.06727	Residence
576361	4147575	576360.75_4147575.45	0.04185	0.08467	0.0632	0.25227	1.69858	2.05914	Residence
576381	4147575	576380.75_4147575.45	0.04385	0.09032	0.06562	0.25681	1.73142	2.07193	Residence
576401	4147575	576400.75_4147575.45	0.04583	0.09653	0.06843	0.2603	1.7415	2.05403	Residence
576421	4147575	576420.75_4147575.45	0.0481	0.10398	0.07192	0.26324	1.39464	2.07616	Residence
576441	4147575	576440.75_4147575.45	0.05051	0.11265	0.07606	0.26549	1.43566	2.11182	Residence
576461	4147575	576460.75_4147575.45	0.0531	0.12243	0.08073	0.26708	1.32291	1.49625	Residence
576481	4147575	576480.75_4147575.45	0.05586	0.13321	0.08577	0.26793	1.1893	1.48574	Residence
576581	4147575	576580.75_4147575.45	0.07386	0.20037	0.11409	0.26409	0.2896	5.20167	Residence
576621	4147575	576620.75_4147575.45	0.08328	0.23742	0.12557	0.25871	0.21721	3.95862	Residence
576641	4147575	576640.75_4147575.45	0.08859	0.25968	0.13153	0.25524	0.19256	3.4759	Residence
576661	4147575	576660.75_4147575.45	0.09443	0.28456	0.13781	0.25135	0.17274	3.07813	Residence
576681	4147575	576680.75_4147575.45	0.10105	0.31228	0.14462	0.24722	0.15673	2.7647	Residence
576701	4147575	576700.75_4147575.45	0.10798	0.34125	0.15172	0.24245	0.14271	2.47294	Residence
576721	4147575	576720.75_4147575.45	0.11596	0.37283	0.1595	0.23758	0.13107	2.24376	Residence
576741	4147575	576740.75_4147575.45	0.12488	0.40632	0.16784	0.23246	0.12097	2.04752	Residence
576761	4147575	576760.75_4147575.45	0.13497	0.44162	0.17677	0.22717	0.11215	1.8803	Residence
576781	4147575	576780.75_4147575.45	0.14676	0.47874	0.18637	0.22188	0.10448	1.74299	Residence
576801	4147575	576800.75_4147575.45	0.15993	0.51572	0.19635	0.21637	0.09753	1.61825	Residence
575841	4147595	575840.75_4147595.45	0.01732	0.02322	0.02526	0.08388	0.13554	0.17302	Residence

575861	4147595	575860.75_4147595.45	0.01783	0.0241	0.02633	0.08807	0.15091	0.19562	Residence
575881	4147595	575880.75_4147595.45	0.01837	0.02506	0.02739	0.09249	0.16983	0.22368	Residence
575901	4147595	575900.75_4147595.45	0.01884	0.02589	0.02849	0.0969	0.19188	0.25676	Residence
575921	4147595	575920.75_4147595.45	0.01938	0.02685	0.02955	0.10165	0.22087	0.30053	Residence
575941	4147595	575940.75_4147595.45	0.01996	0.02796	0.03045	0.10668	0.25945	0.35917	Residence
575961	4147595	575960.75_4147595.45	0.0206	0.02921	0.03123	0.11201	0.31266	0.44058	Residence
576261	4147595	576260.75_4147595.45	0.03417	0.06327	0.05513	0.22512	1.23677	1.93223	Residence
576281	4147595	576280.75_4147595.45	0.03574	0.06766	0.05699	0.23325	1.21476	1.89678	Residence
576301	4147595	576300.75_4147595.45	0.03733	0.07209	0.05875	0.24066	1.19384	1.86033	Residence
576321	4147595	576320.75_4147595.45	0.03877	0.07635	0.06033	0.2471	1.16104	1.80023	Residence
576341	4147595	576340.75_4147595.45	0.04042	0.08087	0.062	0.25292	1.14227	1.76107	Residence
576361	4147595	576360.75_4147595.45	0.04237	0.08607	0.06412	0.25825	1.14541	1.75573	Residence
576381	4147595	576380.75_4147595.45	0.04441	0.09189	0.06654	0.26283	1.15678	1.7604	Residence
576401	4147595	576400.75_4147595.45	0.04638	0.09814	0.06929	0.2662	1.14595	1.72413	Residence
576421	4147595	576420.75_4147595.45	0.04862	0.10568	0.07272	0.26903	1.14253	1.71537	Residence
576441	4147595	576440.75_4147595.45	0.05115	0.1147	0.07698	0.27137	1.09942	1.73211	Residence
576461	4147595	576460.75_4147595.45	0.05378	0.12482	0.0817	0.27294	0.91897	1.73881	Residence
576481	4147595	576480.75_4147595.45	0.05652	0.13585	0.08675	0.27351	0.6917	1.74648	Residence
576621	4147595	576620.75_4147595.45	0.08423	0.24587	0.12802	0.26342	0.20065	5.22668	Residence
576641	4147595	576640.75_4147595.45	0.08954	0.26934	0.13421	0.25968	0.17967	4.51277	Residence
576661	4147595	576660.75_4147595.45	0.09539	0.29576	0.14075	0.25555	0.1625	3.9359	Residence
576681	4147595	576680.75_4147595.45	0.10193	0.32504	0.14778	0.25113	0.14825	3.47357	Residence
576701	4147595	576700.75_4147595.45	0.10908	0.35644	0.15527	0.24628	0.13593	3.07522	Residence
576721	4147595	576720.75_4147595.45	0.11725	0.39054	0.16343	0.24131	0.12546	2.75938	Residence
576741	4147595	576740.75_4147595.45	0.12602	0.42584	0.172	0.23587	0.11605	2.47056	Residence
576761	4147595	576760.75_4147595.45	0.13615	0.46351	0.18128	0.2304	0.10789	2.24024	Residence
576781	4147595	576780.75_4147595.45	0.14796	0.50306	0.19124	0.22494	0.10072	2.05418	Residence
575841	4147615	575840.75_4147615.45	0.01754	0.02321	0.0251	0.08484	0.13675	0.1758	Residence
575861	4147615	575860.75_4147615.45	0.01804	0.02407	0.0262	0.08911	0.15247	0.19907	Residence
575881	4147615	575880.75_4147615.45	0.01863	0.02511	0.0273	0.09373	0.1727	0.2292	Residence
575901	4147615	575900.75_4147615.45	0.01913	0.02595	0.02845	0.09826	0.19576	0.26399	Residence
575921	4147615	575920.75_4147615.45	0.01972	0.02704	0.02953	0.10323	0.22722	0.31174	Residence
575941	4147615	575940.75_4147615.45	0.02029	0.02808	0.03059	0.10837	0.26817	0.37434	Residence
575961	4147615	575960.75_4147615.45	0.02095	0.0294	0.03143	0.11392	0.3271	0.46483	Residence
576261	4147615	576260.75_4147615.45	0.03463	0.06381	0.05562	0.23089	1.00829	1.5407	Residence
576281	4147615	576280.75_4147615.45	0.03616	0.06833	0.05765	0.23912	0.97021	1.47645	Residence
576301	4147615	576300.75_4147615.45	0.03779	0.07299	0.05953	0.24674	0.94246	1.42756	Residence
576321	4147615	576320.75_4147615.45	0.03926	0.07748	0.06126	0.25325	0.90905	1.36718	Residence
576341	4147615	576340.75_4147615.45	0.04095	0.08225	0.06303	0.25917	0.8877	1.32511	Residence
576361	4147615	576360.75_4147615.45	0.0429	0.08758	0.06511	0.26452	0.87868	1.30295	Residence
576381	4147615	576380.75_4147615.45	0.04495	0.09356	0.06752	0.26909	0.87227	1.28763	Residence
576401	4147615	576400.75_4147615.45	0.04694	0.09988	0.07023	0.27238	0.84611	1.25148	Residence
576421	4147615	576420.75_4147615.45	0.04928	0.1077	0.0737	0.27528	0.80953	1.23951	Residence
576441	4147615	576440.75_4147615.45	0.05178	0.11693	0.07801	0.27759	0.72714	1.23607	Residence
576461	4147615	576460.75_4147615.45	0.05444	0.12731	0.0827	0.279	0.6039	1.23571	Residence
576481	4147615	576480.75_4147615.45	0.05715	0.13857	0.08774	0.27936	0.49231	1.24518	Residence
576661	4147615	576660.75_4147615.45	0.09635	0.30801	0.14385	0.25994	0.15332	5.20802	Residence
576681	4147615	576680.75_4147615.45	0.10289	0.3392	0.15116	0.25526	0.14063	4.52958	Residence
576701	4147615	576700.75_4147615.45	0.11012	0.37293	0.15899	0.25024	0.12961	3.96094	Residence
576721	4147615	576720.75_4147615.45	0.11828	0.4093	0.16746	0.24502	0.12002	3.49673	Residence
576741	4147615	576740.75_4147615.45	0.12728	0.44752	0.17647	0.2395	0.11148	3.09232	Residence
576761	4147615	576760.75_4147615.45	0.13757	0.48803	0.18615	0.23389	0.10394	2.76514	Residence
576781	4147615	576780.75_4147615.45	0.14906	0.52945	0.19634	0.22809	0.09713	2.48546	Residence
575841	4147635	575840.75_4147635.45	0.01779	0.0233	0.02496	0.08587	0.13871	0.17957	Residence
575861	4147635	575860.75_4147635.45	0.01831	0.02416	0.02606	0.09027	0.15514	0.20405	Residence
575881	4147635	575880.75_4147635.45	0.0189	0.02517	0.02721	0.095	0.17624	0.2357	Residence
575901	4147635	575900.75_4147635.45	0.01941	0.02604	0.02838	0.09968	0.20076	0.27289	Residence
575921	4147635	575920.75_4147635.45	0.02003	0.02714	0.02953	0.10483	0.23479	0.32475	Residence
575941	4147635	575940.75_4147635.45	0.02064	0.02831	0.03061	0.1102	0.28027	0.3944	Residence
575961	4147635	575960.75_4147635.45	0.02129	0.02955	0.0316	0.11587	0.34439	0.49295	Residence
576261	4147635	576260.75_4147635.45	0.03515	0.06444	0.05606	0.23699	0.87787	1.32232	Residence
576281	4147635	576280.75_4147635.45	0.03668	0.0691	0.05824	0.24535	0.83275	1.24671	Residence
576301	4147635	576300.75_4147635.45	0.03824	0.07389	0.06029	0.25305	0.79793	1.18684	Residence
576321	4147635	576320.75_4147635.45	0.03972	0.07855	0.06215	0.25962	0.76224	1.12495	Residence
576341	4147635	576340.75_4147635.45	0.04144	0.08355	0.064	0.26563	0.73731	1.08111	Residence
576361	4147635	576360.75_4147635.45	0.04341	0.0891	0.06611	0.27102	0.71883	1.05127	Residence
576381	4147635	576380.75_4147635.45	0.04548	0.09526	0.06859	0.27559	0.69837	1.02768	Residence
576401	4147635	576400.75_4147635.45	0.04748	0.10171	0.07122	0.2788	0.65827	0.99234	Residence
576421	4147635	576420.75_4147635.45	0.04985	0.10972	0.07469	0.28169	0.60586	0.97564	Residence
576441	4147635	576440.75_4147635.45	0.0524	0.11923	0.07902	0.28398	0.53299	0.96823	Residence
576461	4147635	576460.75_4147635.45	0.05507	0.12993	0.08375	0.2853	0.45587	0.9681	Residence
576481	4147635	576480.75_4147635.45	0.05782	0.14172	0.08891	0.28559	0.39108	0.9793	Residence
576701	4147635	576700.75_4147635.45	0.11104	0.39072	0.16288	0.25428	0.12364	5.26631	Residence
576721	4147635	576720.75_4147635.45	0.11908	0.42929	0.17162	0.24875	0.11482	4.55547	Residence

576741	4147635	576740.75_4147635.45	0.12823	0.47056	0.18105	0.2431	0.10702	3.9867	Residence
576761	4147635	576760.75_4147635.45	0.13851	0.51384	0.1911	0.23729	0.10002	3.50701	Residence
576781	4147635	576780.75_4147635.45	0.15029	0.55878	0.20181	0.23143	0.09372	3.12019	Residence
575841	4147655	575840.75_4147655.45	0.01807	0.02348	0.02491	0.08703	0.14166	0.18479	Residence
575861	4147655	575860.75_4147655.45	0.0186	0.02433	0.02596	0.09155	0.15898	0.21075	Residence
575881	4147655	575880.75_4147655.45	0.01919	0.02527	0.02712	0.09637	0.18105	0.24407	Residence
575901	4147655	575900.75_4147655.45	0.01973	0.02622	0.02826	0.10125	0.20799	0.28501	Residence
575921	4147655	575920.75_4147655.45	0.02032	0.02724	0.02948	0.10647	0.2441	0.34015	Residence
575941	4147655	575940.75_4147655.45	0.02094	0.02838	0.03065	0.11199	0.29326	0.41548	Residence
575961	4147655	575960.75_4147655.45	0.02159	0.02965	0.03173	0.11787	0.36346	0.52345	Residence
576261	4147655	576260.75_4147655.45	0.03557	0.06508	0.05642	0.24322	0.79233	1.18304	Residence
576281	4147655	576280.75_4147655.45	0.03709	0.06982	0.05882	0.25177	0.74359	1.1026	Residence
576301	4147655	576300.75_4147655.45	0.0387	0.07478	0.06103	0.25964	0.70502	1.03858	Residence
576321	4147655	576320.75_4147655.45	0.04023	0.07963	0.06308	0.26629	0.66724	0.97693	Residence
576341	4147655	576340.75_4147655.45	0.04198	0.08493	0.06506	0.2724	0.63785	0.93178	Residence
576361	4147655	576360.75_4147655.45	0.04392	0.09062	0.06715	0.27776	0.61029	0.89622	Residence
576381	4147655	576380.75_4147655.45	0.046	0.09705	0.06968	0.28238	0.58007	0.86883	Residence
576401	4147655	576400.75_4147655.45	0.04807	0.1037	0.0723	0.28559	0.5347	0.83635	Residence
576421	4147655	576420.75_4147655.45	0.05042	0.11187	0.07578	0.28837	0.48211	0.81664	Residence
576441	4147655	576440.75_4147655.45	0.05297	0.12157	0.08005	0.29055	0.42537	0.80664	Residence
576461	4147655	576460.75_4147655.45	0.0557	0.13269	0.08491	0.29187	0.37454	0.80726	Residence
576481	4147655	576480.75_4147655.45	0.05847	0.14499	0.09012	0.29212	0.33056	0.81388	Residence
576721	4147655	576720.75_4147655.45	0.11996	0.45157	0.17608	0.25271	0.11003	1.70656	Residence
576741	4147655	576740.75_4147655.45	0.12905	0.49565	0.18585	0.24681	0.10279	5.29068	Residence
576761	4147655	576760.75_4147655.45	0.13928	0.54188	0.19628	0.24077	0.09626	4.58436	Residence
575841	4147675	575840.75_4147675.45	0.01839	0.02362	0.02491	0.08824	0.14518	0.19091	Residence
575861	4147675	575860.75_4147675.45	0.01892	0.02447	0.02593	0.09288	0.1636	0.21863	Residence
575881	4147675	575880.75_4147675.45	0.01951	0.02541	0.02706	0.09783	0.18719	0.25432	Residence
575901	4147675	575900.75_4147675.45	0.02006	0.02637	0.0282	0.10292	0.2167	0.29921	Residence
575921	4147675	575920.75_4147675.45	0.02067	0.02745	0.0294	0.10837	0.25627	0.35964	Residence
575941	4147675	575940.75_4147675.45	0.02128	0.0286	0.03059	0.11409	0.30959	0.44151	Residence
575961	4147675	575960.75_4147675.45	0.02192	0.02985	0.03173	0.12016	0.38409	0.55648	Residence
576261	4147675	576260.75_4147675.45	0.03602	0.06572	0.05677	0.24976	0.73339	1.0903	Residence
576281	4147675	576280.75_4147675.45	0.0375	0.07051	0.05938	0.25847	0.68118	1.0062	Residence
576301	4147675	576300.75_4147675.45	0.03912	0.07566	0.06172	0.2665	0.63926	0.93973	Residence
576321	4147675	576320.75_4147675.45	0.04069	0.08077	0.06396	0.27331	0.5994	0.879	Residence
576341	4147675	576340.75_4147675.45	0.04245	0.08628	0.06605	0.27944	0.56495	0.83149	Residence
576361	4147675	576360.75_4147675.45	0.0444	0.09221	0.06821	0.28479	0.53158	0.79348	Residence
576381	4147675	576380.75_4147675.45	0.04651	0.09885	0.07075	0.28942	0.49597	0.76386	Residence
576401	4147675	576400.75_4147675.45	0.04859	0.10567	0.07339	0.29254	0.45041	0.73202	Residence
576421	4147675	576420.75_4147675.45	0.05092	0.11395	0.07678	0.29516	0.40372	0.71083	Residence
576441	4147675	576440.75_4147675.45	0.05354	0.12405	0.08115	0.29742	0.36108	0.70186	Residence
576461	4147675	576460.75_4147675.45	0.05629	0.13554	0.08604	0.29865	0.32383	0.69963	Residence
576481	4147675	576480.75_4147675.45	0.05907	0.14828	0.09132	0.29874	0.2904	0.7006	Residence
575841	4147695	575840.75_4147695.45	0.01867	0.02377	0.02486	0.08946	0.14925	0.19779	Residence
575861	4147695	575860.75_4147695.45	0.01922	0.02462	0.02586	0.09424	0.16899	0.22754	Residence
575881	4147695	575880.75_4147695.45	0.01979	0.02555	0.02697	0.09932	0.19414	0.26563	Residence
575901	4147695	575900.75_4147695.45	0.02037	0.02652	0.02813	0.10458	0.22587	0.31396	Residence
575921	4147695	575920.75_4147695.45	0.02097	0.02758	0.02935	0.11019	0.26785	0.37825	Residence
575941	4147695	575940.75_4147695.45	0.02159	0.02874	0.03058	0.11611	0.32421	0.46508	Residence
575961	4147695	575960.75_4147695.45	0.02223	0.02999	0.03179	0.12239	0.40167	0.58517	Residence
575981	4147695	575980.75_4147695.45	0.0229	0.03135	0.03294	0.12903	0.51113	0.75601	Residence
576001	4147695	576000.75_4147695.45	0.02359	0.03283	0.03401	0.13609	0.67211	1.00863	Residence
576021	4147695	576020.75_4147695.45	0.02433	0.03445	0.03502	0.14362	0.92781	1.41129	Residence
576041	4147695	576040.75_4147695.45	0.02508	0.03618	0.03597	0.15155	1.38095	2.12612	Residence
576061	4147695	576060.75_4147695.45	0.02585	0.03802	0.03691	0.15984	2.39658	3.72638	Residence
576261	4147695	576260.75_4147695.45	0.03643	0.06642	0.05713	0.25665	0.6897	1.02484	Residence
576281	4147695	576280.75_4147695.45	0.03794	0.07125	0.05991	0.26552	0.63454	0.9384	Residence
576301	4147695	576300.75_4147695.45	0.03954	0.07659	0.06239	0.27365	0.58925	0.86965	Residence
576321	4147695	576320.75_4147695.45	0.04116	0.08185	0.06483	0.28057	0.54677	0.80852	Residence
576341	4147695	576340.75_4147695.45	0.04292	0.08761	0.06706	0.28673	0.50895	0.75995	Residence
576361	4147695	576360.75_4147695.45	0.04488	0.09381	0.0693	0.29212	0.47255	0.72116	Residence
576381	4147695	576380.75_4147695.45	0.047	0.1007	0.07187	0.29675	0.4353	0.69043	Residence
576401	4147695	576400.75_4147695.45	0.04909	0.1077	0.07453	0.29975	0.3927	0.65922	Residence
576421	4147695	576420.75_4147695.45	0.0515	0.11645	0.07807	0.30249	0.35391	0.64006	Residence
576441	4147695	576440.75_4147695.45	0.0541	0.12668	0.08235	0.30459	0.31939	0.62864	Residence
576461	4147695	576460.75_4147695.45	0.05685	0.13851	0.08729	0.30567	0.28958	0.62291	Residence
576481	4147695	576480.75_4147695.45	0.05968	0.15184	0.09261	0.30571	0.26268	0.62093	Residence
575841	4147715	575840.75_4147715.45	0.0189	0.02387	0.02479	0.09057	0.15321	0.20444	Residence
575861	4147715	575860.75_4147715.45	0.01947	0.02475	0.02577	0.09555	0.17445	0.23648	Residence
575881	4147715	575880.75_4147715.45	0.02005	0.02568	0.02686	0.10078	0.20108	0.27687	Residence
575901	4147715	575900.75_4147715.45	0.02063	0.02666	0.02804	0.10626	0.23482	0.32841	Residence
575921	4147715	575920.75_4147715.45	0.02124	0.02773	0.02928	0.11206	0.27887	0.39613	Residence
575941	4147715	575940.75_4147715.45	0.02187	0.02889	0.03057	0.11821	0.33741	0.48669	Residence

575961	4147715	575960.75_4147715.45	0.02252	0.03015	0.03185	0.12471	0.41656	0.60995	Residence
575981	4147715	575980.75_4147715.45	0.02318	0.0315	0.03308	0.13157	0.52646	0.78207	Residence
576001	4147715	576000.75_4147715.45	0.02386	0.03297	0.03424	0.13885	0.68651	1.03387	Residence
576021	4147715	576020.75_4147715.45	0.02458	0.03458	0.03533	0.14661	0.94028	1.43393	Residence
576041	4147715	576040.75_4147715.45	0.02536	0.03634	0.03636	0.15487	1.40137	2.16164	Residence
576061	4147715	576060.75_4147715.45	0.02611	0.03818	0.03733	0.16343	2.44361	3.80403	Residence
576261	4147715	576260.75_4147715.45	0.03682	0.06704	0.05746	0.26375	0.6539	0.97417	Residence
576281	4147715	576280.75_4147715.45	0.03833	0.07194	0.0604	0.27282	0.59669	0.8867	Residence
576301	4147715	576300.75_4147715.45	0.03995	0.07745	0.06302	0.28113	0.54934	0.81725	Residence
576321	4147715	576320.75_4147715.45	0.04159	0.08295	0.06569	0.28815	0.50511	0.7562	Residence
576341	4147715	576340.75_4147715.45	0.04335	0.08891	0.06806	0.29429	0.46495	0.7066	Residence
576361	4147715	576360.75_4147715.45	0.04535	0.09552	0.07038	0.29977	0.42772	0.66799	Residence
576381	4147715	576380.75_4147715.45	0.04749	0.10262	0.07299	0.30441	0.39117	0.63687	Residence
576401	4147715	576400.75_4147715.45	0.04963	0.11003	0.07584	0.30746	0.35303	0.60741	Residence
576421	4147715	576420.75_4147715.45	0.05203	0.11889	0.07934	0.31012	0.31919	0.58696	Residence
576441	4147715	576440.75_4147715.45	0.05465	0.12942	0.08356	0.31204	0.29032	0.57413	Residence
576461	4147715	576460.75_4147715.45	0.05742	0.14166	0.08858	0.31302	0.26513	0.56593	Residence
576481	4147715	576480.75_4147715.45	0.06026	0.15556	0.09402	0.31294	0.24212	0.56099	Residence
575841	4147735	575840.75_4147735.45	0.01914	0.02398	0.02474	0.09173	0.15766	0.21173	Residence
575861	4147735	575860.75_4147735.45	0.01971	0.02487	0.0257	0.09686	0.18003	0.24556	Residence
575881	4147735	575880.75_4147735.45	0.02029	0.0258	0.02676	0.10226	0.20785	0.28792	Residence
575901	4147735	575900.75_4147735.45	0.02085	0.02675	0.0279	0.10781	0.24218	0.34057	Residence
575921	4147735	575920.75_4147735.45	0.02145	0.02781	0.02915	0.11378	0.28703	0.4098	Residence
575941	4147735	575940.75_4147735.45	0.02208	0.02897	0.03047	0.12014	0.34632	0.50189	Residence
575961	4147735	575960.75_4147735.45	0.02276	0.0303	0.03185	0.12706	0.4279	0.62933	Residence
575981	4147735	575980.75_4147735.45	0.02342	0.03163	0.03314	0.1341	0.53656	0.80001	Residence
576001	4147735	576000.75_4147735.45	0.02412	0.03313	0.03442	0.14171	0.69741	1.05324	Residence
576021	4147735	576020.75_4147735.45	0.02485	0.03475	0.03561	0.14979	0.95356	1.45721	Residence
576041	4147735	576040.75_4147735.45	0.02562	0.03653	0.03673	0.15837	1.42433	2.20092	Residence
576061	4147735	576060.75_4147735.45	0.02636	0.03834	0.03774	0.16714	2.48848	3.87922	Residence
576121	4147735	576120.75_4147735.45	0.02899	0.04489	0.04119	0.19671	2.7119	4.20302	Residence
576141	4147735	576140.75_4147735.45	0.02999	0.04743	0.04272	0.20739	1.83356	2.8283	Residence
576161	4147735	576160.75_4147735.45	0.03104	0.05014	0.04455	0.21834	1.37807	2.1142	Residence
576181	4147735	576180.75_4147735.45	0.03214	0.05304	0.04671	0.22937	1.10365	1.68345	Residence
576201	4147735	576200.75_4147735.45	0.0333	0.05617	0.04907	0.24034	0.92229	1.39873	Residence
576221	4147735	576220.75_4147735.45	0.03455	0.05966	0.05183	0.25119	0.79519	1.19951	Residence
576241	4147735	576240.75_4147735.45	0.03585	0.06351	0.05471	0.26154	0.69963	1.05057	Residence
576261	4147735	576260.75_4147735.45	0.0372	0.0677	0.05778	0.27121	0.62454	0.93495	Residence
576281	4147735	576280.75_4147735.45	0.03871	0.07272	0.06085	0.28047	0.56571	0.84673	Residence
576301	4147735	576300.75_4147735.45	0.04037	0.07832	0.06369	0.28896	0.5168	0.77677	Residence
576321	4147735	576320.75_4147735.45	0.04202	0.0841	0.06647	0.29608	0.47148	0.71591	Residence
576341	4147735	576340.75_4147735.45	0.04383	0.09032	0.06907	0.30233	0.43083	0.66677	Residence
576361	4147735	576360.75_4147735.45	0.04581	0.09721	0.07153	0.30779	0.39343	0.62743	Residence
576381	4147735	576380.75_4147735.45	0.04797	0.10456	0.07417	0.31235	0.3583	0.59568	Residence
576401	4147735	576400.75_4147735.45	0.05012	0.11226	0.07708	0.31541	0.32372	0.56657	Residence
576421	4147735	576420.75_4147735.45	0.05257	0.12151	0.08064	0.31808	0.29451	0.54682	Residence
576441	4147735	576440.75_4147735.45	0.05519	0.13229	0.08491	0.31982	0.26899	0.53194	Residence
576461	4147735	576460.75_4147735.45	0.05793	0.14491	0.08988	0.32061	0.24659	0.52133	Residence
576481	4147735	576480.75_4147735.45	0.06077	0.15936	0.09539	0.32036	0.22604	0.51374	Residence
575841	4147755	575840.75_4147755.45	0.01937	0.0241	0.02471	0.09293	0.16231	0.21932	Residence
575861	4147755	575860.75_4147755.45	0.01994	0.025	0.02565	0.09824	0.18566	0.25477	Residence
575881	4147755	575880.75_4147755.45	0.02052	0.02593	0.02668	0.10378	0.2143	0.29855	Residence
575901	4147755	575900.75_4147755.45	0.02108	0.02688	0.02779	0.1095	0.24937	0.35256	Residence
575921	4147755	575920.75_4147755.45	0.02167	0.02794	0.02903	0.11566	0.29486	0.42307	Residence
575941	4147755	575940.75_4147755.45	0.02231	0.02912	0.03038	0.12229	0.35488	0.51664	Residence
575961	4147755	575960.75_4147755.45	0.02299	0.03044	0.0318	0.12943	0.43608	0.64383	Residence
575981	4147755	575980.75_4147755.45	0.02363	0.03175	0.03315	0.13666	0.5426	0.81132	Residence
576001	4147755	576000.75_4147755.45	0.0243	0.03321	0.03449	0.14444	0.69899	1.05774	Residence
576021	4147755	576020.75_4147755.45	0.02505	0.03486	0.0358	0.15287	0.9551	1.46186	Residence
576041	4147755	576040.75_4147755.45	0.02585	0.03668	0.03704	0.16189	1.4373	2.22433	Residence
576061	4147755	576060.75_4147755.45	0.02661	0.03851	0.03813	0.17103	2.5395	3.96642	Residence
576261	4147755	576260.75_4147755.45	0.03763	0.06858	0.05809	0.27925	0.60107	0.90551	Residence
576281	4147755	576280.75_4147755.45	0.03914	0.07357	0.06125	0.28861	0.54052	0.81599	Residence
576301	4147755	576300.75_4147755.45	0.04077	0.07919	0.06432	0.29715	0.48978	0.74448	Residence
576321	4147755	576320.75_4147755.45	0.04244	0.0852	0.06726	0.30434	0.44394	0.68378	Residence
576341	4147755	576340.75_4147755.45	0.04429	0.09182	0.06997	0.31076	0.40369	0.63533	Residence
576361	4147755	576360.75_4147755.45	0.04629	0.09893	0.07266	0.31621	0.36706	0.59572	Residence
576381	4147755	576380.75_4147755.45	0.04845	0.10657	0.0754	0.32067	0.33353	0.56332	Residence
576401	4147755	576400.75_4147755.45	0.05063	0.11465	0.07843	0.32373	0.30211	0.53477	Residence
576421	4147755	576420.75_4147755.45	0.05307	0.12415	0.08195	0.32626	0.27559	0.51397	Residence
576441	4147755	576440.75_4147755.45	0.05568	0.13528	0.08624	0.32789	0.25256	0.49796	Residence
576461	4147755	576460.75_4147755.45	0.05842	0.14833	0.09124	0.32852	0.23209	0.48566	Residence
576481	4147755	576480.75_4147755.45	0.06124	0.16335	0.09682	0.32806	0.21323	0.47602	Residence
575841	4147775	575840.75_4147775.45	0.0196	0.02422	0.0247	0.09418	0.16691	0.2269	Residence

575861	4147775	575860.75_4147775.45	0.02017	0.02514	0.02562	0.09967	0.19106	0.2637	Residence
575881	4147775	575880.75_4147775.45	0.02074	0.02608	0.02663	0.10539	0.22035	0.30866	Residence
575901	4147775	575900.75_4147775.45	0.0213	0.02703	0.02771	0.1113	0.25601	0.36381	Residence
575921	4147775	575920.75_4147775.45	0.0219	0.0281	0.02893	0.11768	0.30187	0.43515	Residence
575941	4147775	575940.75_4147775.45	0.02254	0.02928	0.03027	0.12453	0.36177	0.52879	Residence
575961	4147775	575960.75_4147775.45	0.02321	0.03059	0.03172	0.13189	0.44226	0.65507	Residence
575981	4147775	575980.75_4147775.45	0.02385	0.0319	0.03312	0.13937	0.54763	0.82091	Residence
576001	4147775	576000.75_4147775.45	0.02454	0.03337	0.03456	0.14749	0.70498	1.06895	Residence
576021	4147775	576020.75_4147775.45	0.0253	0.03504	0.03597	0.15629	0.96581	1.48084	Residence
576041	4147775	576040.75_4147775.45	0.02609	0.03685	0.03731	0.16559	1.45233	2.25098	Residence
576061	4147775	576060.75_4147775.45	0.02686	0.0387	0.0385	0.1751	2.59495	4.06626	Residence
576121	4147775	576120.75_4147775.45	0.02957	0.04548	0.04211	0.20724	2.61053	4.0422	Residence
576141	4147775	576140.75_4147775.45	0.03062	0.04818	0.04358	0.21897	1.77731	2.74197	Residence
576161	4147775	576160.75_4147775.45	0.03167	0.05097	0.04525	0.23067	1.32773	2.03941	Residence
576181	4147775	576180.75_4147775.45	0.03278	0.05398	0.04725	0.24249	1.05674	1.61599	Residence
576201	4147775	576200.75_4147775.45	0.03399	0.0573	0.04964	0.25439	0.87851	1.33809	Residence
576221	4147775	576220.75_4147775.45	0.03528	0.06092	0.05238	0.26605	0.75151	1.14109	Residence
576241	4147775	576240.75_4147775.45	0.03658	0.06485	0.0553	0.27703	0.65468	0.99237	Residence
576261	4147775	576260.75_4147775.45	0.03801	0.0693	0.05844	0.28741	0.57936	0.87878	Residence
576321	4147775	576320.75_4147775.45	0.04287	0.08629	0.068	0.31303	0.42134	0.65764	Residence
576341	4147775	576340.75_4147775.45	0.04474	0.09319	0.07095	0.31952	0.38168	0.60936	Residence
576361	4147775	576360.75_4147775.45	0.04676	0.10063	0.07375	0.32495	0.34614	0.56959	Residence
576381	4147775	576380.75_4147775.45	0.04889	0.10858	0.0766	0.32929	0.31416	0.5366	Residence
576401	4147775	576400.75_4147775.45	0.05117	0.11725	0.07972	0.33261	0.28584	0.50957	Residence
576421	4147775	576420.75_4147775.45	0.0536	0.12704	0.08336	0.33495	0.26111	0.48764	Residence
576441	4147775	576440.75_4147775.45	0.05619	0.13851	0.08766	0.33641	0.23967	0.47042	Residence
576461	4147775	576460.75_4147775.45	0.05886	0.15188	0.09266	0.33673	0.22034	0.45624	Residence
576481	4147775	576480.75_4147775.45	0.06166	0.16753	0.0984	0.33606	0.20273	0.44513	Residence
575841	4147795	575840.75_4147795.45	0.01981	0.02435	0.02469	0.09547	0.17133	0.23425	Residence
575861	4147795	575860.75_4147795.45	0.02038	0.02527	0.02561	0.10113	0.19597	0.27196	Residence
575881	4147795	575880.75_4147795.45	0.02095	0.02622	0.02658	0.10703	0.22568	0.31774	Residence
575901	4147795	575900.75_4147795.45	0.02151	0.02718	0.02763	0.11311	0.26141	0.37321	Residence
575921	4147795	575920.75_4147795.45	0.02211	0.02825	0.02883	0.11971	0.30725	0.44473	Residence
575941	4147795	575940.75_4147795.45	0.02274	0.02944	0.03016	0.12681	0.36688	0.53813	Residence
575961	4147795	575960.75_4147795.45	0.02341	0.03075	0.03161	0.13443	0.44672	0.66353	Residence
575981	4147795	575980.75_4147795.45	0.02407	0.03207	0.03307	0.14224	0.5524	0.82994	Residence
576001	4147795	576000.75_4147795.45	0.02475	0.03353	0.03456	0.15061	0.70843	1.07611	Residence
576021	4147795	576020.75_4147795.45	0.02553	0.03522	0.03608	0.15979	0.97328	1.49476	Residence
576041	4147795	576040.75_4147795.45	0.02632	0.03703	0.03752	0.16943	1.46663	2.2767	Residence
576061	4147795	576060.75_4147795.45	0.02711	0.0389	0.03883	0.17938	2.65393	4.17806	Residence
576121	4147795	576120.75_4147795.45	0.02984	0.04576	0.04261	0.21283	2.55754	3.95927	Residence
576141	4147795	576140.75_4147795.45	0.03091	0.04852	0.04405	0.22509	1.74668	2.69573	Residence
576161	4147795	576160.75_4147795.45	0.03195	0.05133	0.04565	0.23715	1.30169	2.00151	Residence
576181	4147795	576180.75_4147795.45	0.03309	0.05442	0.04758	0.24945	1.03494	1.58561	Residence
576201	4147795	576200.75_4147795.45	0.03429	0.05781	0.0499	0.26178	0.85808	1.31066	Residence
576221	4147795	576220.75_4147795.45	0.03561	0.06156	0.05262	0.27398	0.7328	1.11713	Residence
576241	4147795	576240.75_4147795.45	0.03691	0.06551	0.05548	0.28519	0.63524	0.96807	Residence
576261	4147795	576260.75_4147795.45	0.03833	0.06997	0.05865	0.29576	0.55931	0.85428	Residence
576281	4147795	576280.75_4147795.45	0.03989	0.07514	0.06212	0.30571	0.49869	0.76632	Residence
576321	4147795	576320.75_4147795.45	0.04324	0.08721	0.06879	0.32181	0.40162	0.63412	Residence
576341	4147795	576340.75_4147795.45	0.04512	0.09436	0.07194	0.32833	0.36279	0.58596	Residence
576361	4147795	576360.75_4147795.45	0.04711	0.10209	0.07491	0.33369	0.32841	0.54599	Residence
576381	4147795	576380.75_4147795.45	0.04926	0.11044	0.07793	0.33804	0.29822	0.51321	Residence
576401	4147795	576400.75_4147795.45	0.05153	0.11946	0.08112	0.34125	0.2716	0.4858	Residence
576421	4147795	576420.75_4147795.45	0.05397	0.12972	0.08472	0.34362	0.24873	0.46392	Residence
576441	4147795	576440.75_4147795.45	0.05657	0.14166	0.08908	0.34503	0.22869	0.44627	Residence
576461	4147795	576460.75_4147795.45	0.05926	0.15561	0.09416	0.34528	0.21057	0.43156	Residence
576481	4147795	576480.75_4147795.45	0.06206	0.17193	0.10003	0.34438	0.19393	0.41939	Residence
575841	4147815	575840.75_4147815.45	0.02002	0.02449	0.02469	0.09684	0.17555	0.24135	Residence
575861	4147815	575860.75_4147815.45	0.02058	0.02541	0.0256	0.10264	0.20039	0.27951	Residence
575881	4147815	575880.75_4147815.45	0.02115	0.02638	0.02656	0.10874	0.23039	0.32594	Residence
575901	4147815	575900.75_4147815.45	0.0217	0.02733	0.02758	0.115	0.26592	0.38127	Residence
575921	4147815	575920.75_4147815.45	0.0223	0.02842	0.02875	0.12184	0.31163	0.45276	Residence
575941	4147815	575940.75_4147815.45	0.02294	0.02962	0.03006	0.12919	0.37086	0.54566	Residence
575961	4147815	575960.75_4147815.45	0.02361	0.03093	0.0315	0.13706	0.44993	0.66996	Residence
575981	4147815	575980.75_4147815.45	0.02426	0.03226	0.03298	0.14518	0.55532	0.83606	Residence
576001	4147815	576000.75_4147815.45	0.02497	0.03374	0.03454	0.15395	0.71388	1.08645	Residence
576021	4147815	576020.75_4147815.45	0.02574	0.03543	0.03614	0.16345	0.98073	1.50874	Residence
576041	4147815	576040.75_4147815.45	0.02654	0.03724	0.03769	0.17348	1.48449	2.30836	Residence
576061	4147815	576060.75_4147815.45	0.02735	0.03912	0.03911	0.18384	2.71317	4.29474	Residence
576121	4147815	576120.75_4147815.45	0.03012	0.04605	0.04312	0.21871	2.50721	3.88093	Residence
576141	4147815	576140.75_4147815.45	0.03119	0.04887	0.04456	0.2315	1.71674	2.65094	Residence
576161	4147815	576160.75_4147815.45	0.03226	0.05177	0.04613	0.24414	1.28101	1.97226	Residence
576181	4147815	576180.75_4147815.45	0.03337	0.05488	0.04797	0.2568	1.0149	1.55815	Residence

576201	4147815	576200.75_4147815.45	0.03462	0.05837	0.05023	0.26966	0.84054	1.28778	Residence
576221	4147815	576220.75_4147815.45	0.03594	0.06223	0.05291	0.2823	0.71589	1.0959	Residence
576241	4147815	576240.75_4147815.45	0.03726	0.06626	0.05581	0.29388	0.61857	0.94783	Residence
576261	4147815	576260.75_4147815.45	0.03869	0.0708	0.05902	0.30477	0.54279	0.83481	Residence
576281	4147815	576280.75_4147815.45	0.04028	0.07604	0.06254	0.31494	0.48213	0.74705	Residence
576421	4147815	576420.75_4147815.45	0.05437	0.13271	0.0862	0.3529	0.2388	0.4444	Residence
576441	4147815	576440.75_4147815.45	0.05696	0.14509	0.09061	0.35415	0.21964	0.42605	Residence
576461	4147815	576460.75_4147815.45	0.05962	0.15951	0.09573	0.35414	0.20223	0.4104	Residence
576481	4147815	576480.75_4147815.45	0.06241	0.17655	0.10169	0.35302	0.18638	0.39748	Residence
575841	4147835	575840.75_4147835.45	0.02019	0.02463	0.02467	0.09821	0.17926	0.24773	Residence
575861	4147835	575860.75_4147835.45	0.02075	0.02556	0.02558	0.10417	0.20419	0.28619	Residence
575881	4147835	575880.75_4147835.45	0.02133	0.02655	0.02655	0.11051	0.23448	0.33322	Residence
575901	4147835	575900.75_4147835.45	0.02188	0.02752	0.02755	0.11699	0.26989	0.38852	Residence
575921	4147835	575920.75_4147835.45	0.02248	0.02862	0.02869	0.12407	0.31528	0.45962	Residence
575941	4147835	575940.75_4147835.45	0.02312	0.02983	0.02997	0.13169	0.37418	0.55211	Residence
575961	4147835	575960.75_4147835.45	0.02379	0.03114	0.0314	0.13985	0.45307	0.67627	Residence
575981	4147835	575980.75_4147835.45	0.02445	0.03246	0.03288	0.14824	0.55769	0.84134	Residence
576001	4147835	576000.75_4147835.45	0.02517	0.03396	0.03447	0.15736	0.7172	1.09352	Residence
576021	4147835	576020.75_4147835.45	0.02595	0.03565	0.03615	0.16726	0.9876	1.52201	Residence
576041	4147835	576040.75_4147835.45	0.02675	0.03747	0.03779	0.17771	1.50168	2.3393	Residence
576061	4147835	576060.75_4147835.45	0.02757	0.03937	0.03934	0.18853	2.78207	4.42287	Residence
576121	4147835	576120.75_4147835.45	0.03038	0.0464	0.04364	0.22497	2.46404	3.81414	Residence
576141	4147835	576140.75_4147835.45	0.03145	0.04926	0.04511	0.23828	1.68882	2.60955	Residence
576161	4147835	576160.75_4147835.45	0.03253	0.0522	0.04665	0.25142	1.25983	1.94233	Residence
576181	4147835	576180.75_4147835.45	0.03367	0.05539	0.04844	0.26463	0.99767	1.53507	Residence
576201	4147835	576200.75_4147835.45	0.03492	0.05898	0.05063	0.278	0.82471	1.26747	Residence
576221	4147835	576220.75_4147835.45	0.03627	0.06293	0.05324	0.29109	0.70067	1.07706	Residence
576241	4147835	576240.75_4147835.45	0.03762	0.06708	0.05618	0.30308	0.60393	0.93035	Residence
576261	4147835	576260.75_4147835.45	0.03902	0.07164	0.05926	0.31411	0.5276	0.81672	Residence
576281	4147835	576280.75_4147835.45	0.04064	0.077	0.06297	0.32461	0.46762	0.72998	Residence
576421	4147835	576420.75_4147835.45	0.05473	0.13583	0.08774	0.36258	0.23032	0.42732	Residence
576441	4147835	576440.75_4147835.45	0.05731	0.14872	0.09222	0.36367	0.21185	0.40846	Residence
576461	4147835	576460.75_4147835.45	0.05994	0.16363	0.09738	0.36337	0.195	0.39206	Residence
576481	4147835	576480.75_4147835.45	0.0627	0.18136	0.10342	0.36195	0.17972	0.37841	Residence
575841	4147855	575840.75_4147855.45	0.02035	0.0248	0.02464	0.09963	0.1826	0.2536	Residence
575861	4147855	575860.75_4147855.45	0.0209	0.02573	0.02557	0.10577	0.20753	0.29221	Residence
575881	4147855	575880.75_4147855.45	0.02148	0.02674	0.02655	0.11235	0.23786	0.33945	Residence
575901	4147855	575900.75_4147855.45	0.02204	0.02773	0.02754	0.11906	0.27315	0.39468	Residence
575921	4147855	575920.75_4147855.45	0.02264	0.02883	0.02864	0.12635	0.31792	0.46493	Residence
575941	4147855	575940.75_4147855.45	0.02328	0.03005	0.0299	0.13428	0.37675	0.55742	Residence
575961	4147855	575960.75_4147855.45	0.02396	0.03137	0.0313	0.14274	0.4552	0.68107	Residence
575981	4147855	575980.75_4147855.45	0.02463	0.03271	0.03277	0.15149	0.56058	0.84754	Residence
576001	4147855	576000.75_4147855.45	0.02534	0.0342	0.03438	0.16092	0.72007	1.10005	Residence
576021	4147855	576020.75_4147855.45	0.02614	0.03591	0.03611	0.17128	0.99578	1.53757	Residence
576041	4147855	576040.75_4147855.45	0.02695	0.03772	0.03784	0.18212	1.51752	2.36833	Residence
576061	4147855	576060.75_4147855.45	0.02778	0.03966	0.03951	0.19346	2.85635	4.55519	Residence
576121	4147855	576120.75_4147855.45	0.03062	0.04678	0.04415	0.23154	2.41997	3.7461	Residence
576141	4147855	576140.75_4147855.45	0.0317	0.04967	0.04566	0.24542	1.66175	2.56955	Residence
576161	4147855	576160.75_4147855.45	0.03278	0.05266	0.0472	0.2591	1.2396	1.91385	Residence
576181	4147855	576180.75_4147855.45	0.03394	0.05592	0.04895	0.27284	0.98079	1.51245	Residence
576201	4147855	576200.75_4147855.45	0.0352	0.05962	0.05108	0.28679	0.81015	1.24897	Residence
576221	4147855	576220.75_4147855.45	0.03655	0.06366	0.05362	0.3003	0.68646	1.05948	Residence
576241	4147855	576240.75_4147855.45	0.03793	0.06793	0.05651	0.3127	0.59039	0.91405	Residence
576261	4147855	576260.75_4147855.45	0.03936	0.07262	0.05967	0.32409	0.51473	0.80151	Residence
576421	4147855	576420.75_4147855.45	0.05504	0.13914	0.08935	0.3727	0.22294	0.41221	Residence
576441	4147855	576440.75_4147855.45	0.05758	0.15252	0.09389	0.37354	0.20494	0.39277	Residence
576461	4147855	576460.75_4147855.45	0.06018	0.16796	0.09911	0.37293	0.18856	0.37581	Residence
576481	4147855	576480.75_4147855.45	0.06293	0.18647	0.10524	0.37122	0.17381	0.36173	Residence
575841	4147875	575840.75_4147875.45	0.02048	0.02498	0.02458	0.10107	0.18536	0.25864	Residence
575861	4147875	575860.75_4147875.45	0.02103	0.02593	0.02554	0.10742	0.2103	0.29741	Residence
575881	4147875	575880.75_4147875.45	0.02162	0.02695	0.02653	0.11423	0.24053	0.34463	Residence
575901	4147875	575900.75_4147875.45	0.02217	0.02794	0.02752	0.12117	0.27547	0.39939	Residence
575921	4147875	575920.75_4147875.45	0.02277	0.02906	0.02862	0.12873	0.31994	0.46928	Residence
575941	4147875	575940.75_4147875.45	0.02342	0.03029	0.02984	0.13693	0.37824	0.5611	Residence
575961	4147875	575960.75_4147875.45	0.02411	0.03164	0.03122	0.14576	0.45712	0.6856	Residence
575981	4147875	575980.75_4147875.45	0.02478	0.03298	0.03267	0.15484	0.5624	0.85219	Residence
576001	4147875	576000.75_4147875.45	0.02551	0.03448	0.03428	0.16469	0.72385	1.10816	Residence
576021	4147875	576020.75_4147875.45	0.02631	0.03622	0.03605	0.17553	1.00568	1.55602	Residence
576041	4147875	576040.75_4147875.45	0.02712	0.03803	0.03784	0.18681	1.53792	2.40495	Residence
576061	4147875	576060.75_4147875.45	0.02796	0.03998	0.03961	0.19866	2.93869	4.68225	Residence
576121	4147875	576120.75_4147875.45	0.03083	0.04718	0.04462	0.23843	2.37426	3.67566	Residence
576141	4147875	576140.75_4147875.45	0.03192	0.05013	0.04622	0.25296	1.63577	2.53123	Residence
576161	4147875	576160.75_4147875.45	0.03302	0.05321	0.0478	0.26731	1.22243	1.89009	Residence
576181	4147875	576180.75_4147875.45	0.03418	0.05651	0.04952	0.28155	0.96552	1.49217	Residence

576201	4147875	576200.75_4147875.45	0.03547	0.06032	0.05161	0.2961	0.79678	1.23203	Residence	
576221	4147875	576220.75_4147875.45	0.03682	0.06447	0.05407	0.31007	0.6737	1.04376	Residence	
576241	4147875	576240.75_4147875.45	0.0382	0.06883	0.05689	0.3228	0.57791	0.89884	Residence	
576261	4147875	576260.75_4147875.45	0.03966	0.07365	0.06016	0.33453	0.50293	0.78721	Residence	
576421	4147875	576420.75_4147875.45	0.05525	0.14256	0.091	0.38319	0.21628	0.39844	Residence	
576441	4147875	576440.75_4147875.45	0.05778	0.15657	0.09564	0.38382	0.19876	0.37873	Residence	
576461	4147875	576460.75_4147875.45	0.06035	0.17256	0.10092	0.38284	0.18274	0.36128	Residence	
576481	4147875	576480.75_4147875.45	0.06309	0.19191	0.10715	0.38083	0.16847	0.3469	Residence	
575841	4147895	575840.75_4147895.45	0.0206	0.02521	0.02452	0.1026	0.18791	0.26342	Residence	
575861	4147895	575860.75_4147895.45	0.02115	0.02617	0.02549	0.10915	0.21269	0.30207	Residence	
575881	4147895	575880.75_4147895.45	0.02173	0.0272	0.02651	0.11618	0.24268	0.34902	Residence	
575901	4147895	575900.75_4147895.45	0.02229	0.02819	0.0275	0.12335	0.2772	0.40324	Residence	
575921	4147895	575920.75_4147895.45	0.02289	0.02931	0.0286	0.13119	0.32136	0.47277	Residence	
575941	4147895	575940.75_4147895.45	0.02355	0.03058	0.02982	0.13976	0.38003	0.56533	Residence	
575961	4147895	575960.75_4147895.45	0.02424	0.03193	0.03115	0.14889	0.45841	0.68928	Residence	
575981	4147895	575980.75_4147895.45	0.02492	0.03328	0.03257	0.15835	0.56426	0.85703	Residence	
576001	4147895	576000.75_4147895.45	0.02565	0.0348	0.03417	0.16861	0.72734	1.11597	Residence	
576021	4147895	576020.75_4147895.45	0.02646	0.03656	0.03597	0.17996	1.01477	1.57338	Residence	
576041	4147895	576040.75_4147895.45	0.02728	0.03839	0.0378	0.19173	1.55914	2.44304	Residence	
576061	4147895	576060.75_4147895.45	0.02813	0.04035	0.03966	0.20412	3.02854	4.15044	Residence	
576121	4147895	576120.75_4147895.45	0.03102	0.04763	0.04506	0.24574	2.33245	3.61131	Daycare	Edith's Daycare
576141	4147895	576140.75_4147895.45	0.03212	0.05064	0.04677	0.26094	1.61117	2.49502	Residence	
576161	4147895	576160.75_4147895.45	0.03323	0.05377	0.04841	0.27593	1.20498	1.86574	Residence	
576181	4147895	576180.75_4147895.45	0.0344	0.05715	0.05014	0.29077	0.95119	1.47316	Residence	
576201	4147895	576200.75_4147895.45	0.0357	0.06107	0.05219	0.30591	0.78417	1.21597	Residence	
576221	4147895	576220.75_4147895.45	0.03705	0.0653	0.05457	0.32031	0.66148	1.02843	Residence	
576241	4147895	576240.75_4147895.45	0.03845	0.06981	0.05734	0.33351	0.56677	0.88511	Residence	
576261	4147895	576260.75_4147895.45	0.03991	0.07477	0.06056	0.34554	0.49233	0.77406	Residence	
576421	4147895	576420.75_4147895.45	0.05541	0.14617	0.0927	0.39414	0.21024	0.3859	Residence	
576441	4147895	576440.75_4147895.45	0.05791	0.16092	0.09747	0.39456	0.19315	0.36605	Residence	
576461	4147895	576460.75_4147895.45	0.06044	0.17754	0.10282	0.39318	0.17747	0.34826	Residence	
576481	4147895	576480.75_4147895.45	0.06316	0.19774	0.10916	0.39078	0.16357	0.33356	Residence	
575841	4147915	575840.75_4147915.45	0.02069	0.02547	0.02442	0.10415	0.18988	0.26736	Residence	
575861	4147915	575860.75_4147915.45	0.02125	0.02643	0.02542	0.11092	0.21455	0.30594	Residence	
575881	4147915	575880.75_4147915.45	0.02183	0.02747	0.02646	0.11818	0.24428	0.3526	Residence	
575901	4147915	575900.75_4147915.45	0.02239	0.02848	0.02748	0.12565	0.27872	0.40682	Residence	
575921	4147915	575920.75_4147915.45	0.023	0.02961	0.02858	0.13377	0.32261	0.47607	Residence	
575941	4147915	575940.75_4147915.45	0.02367	0.03089	0.02979	0.14269	0.38117	0.56864	Residence	
575961	4147915	575960.75_4147915.45	0.02435	0.03224	0.0311	0.15215	0.45925	0.69233	Residence	
575981	4147915	575980.75_4147915.45	0.02504	0.03362	0.0325	0.16202	0.56605	0.86185	Residence	
576001	4147915	576000.75_4147915.45	0.02578	0.03516	0.03408	0.17277	0.73192	1.12561	Residence	
576021	4147915	576020.75_4147915.45	0.0266	0.03694	0.03587	0.18461	1.02422	1.59143	Residence	
576041	4147915	576040.75_4147915.45	0.02742	0.03877	0.03773	0.19687	1.57884	2.47894	Residence	
576061	4147915	576060.75_4147915.45	0.02828	0.04077	0.03967	0.20991	3.13329	4.27596	Residence	
576121	4147915	576120.75_4147915.45	0.03119	0.04815	0.04546	0.25356	2.29686	3.55673	Residence	
576141	4147915	576140.75_4147915.45	0.0323	0.05118	0.04729	0.26938	1.58752	2.46024	Residence	
576161	4147915	576160.75_4147915.45	0.03342	0.05438	0.04902	0.28506	1.18825	1.84236	Residence	
576181	4147915	576180.75_4147915.45	0.03459	0.05783	0.05078	0.30052	0.93745	1.45479	Residence	
576201	4147915	576200.75_4147915.45	0.03591	0.06186	0.05282	0.3163	0.77231	1.20072	Residence	
576221	4147915	576220.75_4147915.45	0.03727	0.0662	0.05515	0.3312	0.65051	1.01455	Residence	
576241	4147915	576240.75_4147915.45	0.03866	0.07082	0.05784	0.34473	0.55622	0.8717	Residence	
576261	4147915	576260.75_4147915.45	0.04013	0.07596	0.06102	0.35713	0.48264	0.76166	Residence	
576421	4147915	576420.75_4147915.45	0.05549	0.15002	0.09446	0.4056	0.20472	0.37442	Residence	
576441	4147915	576440.75_4147915.45	0.05796	0.16555	0.09938	0.40573	0.18798	0.35441	Residence	
576461	4147915	576460.75_4147915.45	0.06045	0.18283	0.10481	0.40387	0.17257	0.3363	Residence	
576481	4147915	576480.75_4147915.45	0.06315	0.20397	0.11127	0.40108	0.15902	0.32142	Residence	
575841	4147935	575840.75_4147935.45	0.02078	0.02576	0.02433	0.10579	0.1916	0.27098	Residence	
575861	4147935	575860.75_4147935.45	0.02134	0.02673	0.02534	0.11278	0.21607	0.30936	Residence	
575881	4147935	575880.75_4147935.45	0.02192	0.02777	0.0264	0.12027	0.24551	0.35567	Residence	
575901	4147935	575900.75_4147935.45	0.02249	0.02879	0.02745	0.12804	0.27987	0.40989	Residence	
575921	4147935	575920.75_4147935.45	0.02311	0.02993	0.02857	0.13648	0.32362	0.47908	Residence	
575941	4147935	575940.75_4147935.45	0.02377	0.03122	0.02978	0.14572	0.38196	0.57149	Residence	
575961	4147935	575960.75_4147935.45	0.02447	0.03259	0.03107	0.15559	0.46048	0.6961	Residence	
575981	4147935	575980.75_4147935.45	0.02516	0.03398	0.03244	0.16587	0.56793	0.86692	Residence	
576001	4147935	576000.75_4147935.45	0.0259	0.03554	0.034	0.17711	0.73601	1.13453	Residence	
576021	4147935	576020.75_4147935.45	0.02673	0.03735	0.03577	0.1895	1.03378	1.60968	Residence	
576041	4147935	576040.75_4147935.45	0.02756	0.03919	0.03764	0.20234	1.60304	2.52209	Residence	
576061	4147935	576060.75_4147935.45	0.02842	0.0412	0.03963	0.21598	3.23844	4.40802	Residence	
576101	4147935	576100.75_4147935.45	0.03032	0.04592	0.04376	0.24581	3.83314	5.92592	Residence	
576121	4147935	576120.75_4147935.45	0.03136	0.04868	0.0458	0.2618	2.26052	3.50098	Residence	
576141	4147935	576140.75_4147935.45	0.03247	0.05175	0.04776	0.27832	1.5644	2.42612	Residence	
576161	4147935	576160.75_4147935.45	0.0336	0.05499	0.0496	0.29468	1.17125	1.81836	Residence	
576181	4147935	576180.75_4147935.45	0.03478	0.05854	0.05144	0.31087	0.92458	1.43749	Residence	
576201	4147935	576200.75_4147935.45	0.0361	0.06266	0.0535	0.32724	0.76077	1.18556	Residence	

576221	4147935	576220.75_4147935.45	0.03746	0.06711	0.05579	0.34266	0.64	1.00088	Residence
576241	4147935	576240.75_4147935.45	0.03885	0.07187	0.05841	0.3566	0.54649	0.85902	Residence
576261	4147935	576260.75_4147935.45	0.04034	0.07722	0.06154	0.36944	0.47398	0.75032	Residence
576421	4147935	576420.75_4147935.45	0.05553	0.15409	0.09628	0.41757	0.19958	0.36376	Residence
576441	4147935	576440.75_4147935.45	0.05797	0.17042	0.10135	0.41731	0.18312	0.34358	Residence
576461	4147935	576460.75_4147935.45	0.06043	0.18857	0.10691	0.41503	0.16804	0.32538	Residence
576481	4147935	576480.75_4147935.45	0.06308	0.21058	0.11347	0.41171	0.15474	0.31021	Residence
575841	4147955	575840.75_4147955.45	0.0209	0.02612	0.02427	0.10761	0.19353	0.27497	Residence
575861	4147955	575860.75_4147955.45	0.02145	0.02707	0.02526	0.11477	0.21757	0.3128	Residence
575881	4147955	575880.75_4147955.45	0.02202	0.02809	0.02632	0.12246	0.24649	0.35843	Residence
575901	4147955	575900.75_4147955.45	0.02261	0.02915	0.02741	0.13061	0.28124	0.4134	Residence
575921	4147955	575920.75_4147955.45	0.02323	0.03031	0.02855	0.13941	0.32524	0.48313	Residence
575941	4147955	575940.75_4147955.45	0.02389	0.03159	0.02977	0.14897	0.38327	0.57523	Residence
575961	4147955	575960.75_4147955.45	0.02458	0.03297	0.03106	0.15922	0.46197	0.70033	Residence
575981	4147955	575980.75_4147955.45	0.0253	0.03442	0.03244	0.17012	0.57315	0.87729	Residence
576001	4147955	576000.75_4147955.45	0.02605	0.03599	0.03396	0.18182	0.7438	1.14934	Residence
576021	4147955	576020.75_4147955.45	0.02686	0.03777	0.03568	0.19463	1.0432	1.62775	Residence
576041	4147955	576040.75_4147955.45	0.02768	0.03961	0.03754	0.20802	1.62255	2.55783	Residence
576061	4147955	576060.75_4147955.45	0.02857	0.04167	0.03956	0.22241	2.78659	4.56436	Residence
576101	4147955	576100.75_4147955.45	0.03048	0.04643	0.04387	0.25371	3.74701	5.78497	Residence
576121	4147955	576120.75_4147955.45	0.03153	0.04923	0.04606	0.27052	2.22439	3.4455	Residence
576141	4147955	576140.75_4147955.45	0.03264	0.05234	0.04818	0.28782	1.54258	2.3939	Residence
576161	4147955	576160.75_4147955.45	0.03378	0.05563	0.05016	0.30492	1.15559	1.7962	Residence
576181	4147955	576180.75_4147955.45	0.03497	0.05925	0.05211	0.32182	0.91216	1.42058	Residence
576201	4147955	576200.75_4147955.45	0.03629	0.06348	0.05422	0.33889	0.75017	1.17146	Residence
576221	4147955	576220.75_4147955.45	0.03765	0.06804	0.05649	0.35482	0.63024	0.98793	Residence
576241	4147955	576240.75_4147955.45	0.03905	0.07294	0.05906	0.36918	0.53755	0.84708	Residence
576261	4147955	576260.75_4147955.45	0.04052	0.07845	0.06212	0.38233	0.46563	0.73893	Residence
576321	4147955	576320.75_4147955.45	0.04546	0.09935	0.07436	0.41238	0.32125	0.5274	Residence
576341	4147955	576340.75_4147955.45	0.0473	0.10828	0.0791	0.41915	0.28798	0.48027	Residence
576361	4147955	576360.75_4147955.45	0.04924	0.11865	0.08395	0.4245	0.25979	0.44109	Residence
576381	4147955	576380.75_4147955.45	0.05123	0.13024	0.08866	0.42782	0.23497	0.40705	Residence
576401	4147955	576400.75_4147955.45	0.05329	0.14324	0.09329	0.42942	0.21326	0.37782	Residence
576421	4147955	576420.75_4147955.45	0.05554	0.15832	0.09814	0.43004	0.19472	0.35374	Residence
576441	4147955	576440.75_4147955.45	0.05795	0.17557	0.10339	0.42938	0.17854	0.33347	Residence
576461	4147955	576460.75_4147955.45	0.06038	0.19462	0.10909	0.42659	0.16373	0.31517	Residence
576481	4147955	576480.75_4147955.45	0.06296	0.21751	0.11574	0.42262	0.15063	0.29969	Residence
575841	4147975	575840.75_4147975.45	0.02097	0.02638	0.02416	0.10922	0.19397	0.27671	Residence
575861	4147975	575860.75_4147975.45	0.02153	0.02733	0.02514	0.11661	0.21772	0.3142	Residence
575881	4147975	575880.75_4147975.45	0.02211	0.02837	0.02621	0.12459	0.24643	0.35961	Residence
575901	4147975	575900.75_4147975.45	0.02271	0.02946	0.02732	0.13311	0.2813	0.41488	Residence
575921	4147975	575920.75_4147975.45	0.02334	0.03065	0.0285	0.14231	0.32552	0.4851	Residence
575941	4147975	575940.75_4147975.45	0.02401	0.03194	0.02973	0.15226	0.38365	0.57753	Residence
575961	4147975	575960.75_4147975.45	0.0247	0.03333	0.03103	0.16296	0.46277	0.70346	Residence
575981	4147975	575980.75_4147975.45	0.02543	0.03482	0.03242	0.17444	0.57644	0.88459	Residence
576001	4147975	576000.75_4147975.45	0.0262	0.03645	0.03394	0.18681	0.75279	1.16607	Residence
576021	4147975	576020.75_4147975.45	0.027	0.03819	0.03561	0.20002	1.05286	1.64622	Residence
576041	4147975	576040.75_4147975.45	0.02785	0.04011	0.03747	0.21426	1.65959	2.62183	Residence
576061	4147975	576060.75_4147975.45	0.02875	0.04222	0.03951	0.22947	2.88499	4.78292	Residence
576101	4147975	576100.75_4147975.45	0.03066	0.04698	0.04393	0.26217	3.66986	5.65908	Residence
576121	4147975	576120.75_4147975.45	0.03172	0.0498	0.04625	0.2798	2.1904	3.39325	Residence
576141	4147975	576140.75_4147975.45	0.03283	0.05291	0.04852	0.29787	1.52032	2.3609	Residence
576161	4147975	576160.75_4147975.45	0.03397	0.05626	0.05067	0.31578	1.14014	1.77415	Residence
576181	4147975	576180.75_4147975.45	0.03517	0.05995	0.05274	0.33342	0.89991	1.40358	Residence
576201	4147975	576200.75_4147975.45	0.0365	0.06429	0.05495	0.35126	0.74017	1.15789	Residence
576221	4147975	576220.75_4147975.45	0.03785	0.06895	0.05724	0.36769	0.62094	0.97526	Residence
576241	4147975	576240.75_4147975.45	0.03924	0.07398	0.05977	0.38248	0.52904	0.83536	Residence
576261	4147975	576260.75_4147975.45	0.04071	0.07968	0.06278	0.396	0.45791	0.72811	Residence
576321	4147975	576320.75_4147975.45	0.0456	0.10126	0.07501	0.42638	0.31487	0.51733	Residence
576341	4147975	576340.75_4147975.45	0.0474	0.11046	0.07991	0.43308	0.28197	0.4703	Residence
576361	4147975	576360.75_4147975.45	0.04932	0.12116	0.085	0.43831	0.25412	0.4312	Residence
576381	4147975	576380.75_4147975.45	0.05127	0.13308	0.08996	0.44131	0.22954	0.39709	Residence
576401	4147975	576400.75_4147975.45	0.05333	0.14675	0.0949	0.44271	0.20826	0.36815	Residence
576421	4147975	576420.75_4147975.45	0.05556	0.16271	0.10003	0.44302	0.19009	0.34423	Residence
576441	4147975	576440.75_4147975.45	0.05793	0.18094	0.1055	0.4419	0.17416	0.32391	Residence
576461	4147975	576460.75_4147975.45	0.06031	0.20094	0.11134	0.4385	0.15958	0.30549	Residence
576481	4147975	576480.75_4147975.45	0.06289	0.22533	0.11822	0.43423	0.14688	0.29024	Residence
575841	4147995	575840.75_4147995.45	0.02108	0.02668	0.02411	0.11104	0.19475	0.27903	Residence
575861	4147995	575860.75_4147995.45	0.02164	0.02765	0.02507	0.11868	0.21837	0.31641	Residence
575881	4147995	575880.75_4147995.45	0.02222	0.02868	0.02611	0.12692	0.24681	0.36152	Residence
575901	4147995	575900.75_4147995.45	0.02282	0.02977	0.02722	0.13573	0.28134	0.41639	Residence
575921	4147995	575920.75_4147995.45	0.02346	0.03095	0.02841	0.14526	0.3252	0.48617	Residence
575941	4147995	575940.75_4147995.45	0.02413	0.03224	0.02966	0.15559	0.383	0.5782	Residence
575961	4147995	575960.75_4147995.45	0.02482	0.03362	0.03097	0.16669	0.46159	0.70347	Residence

575981	4147995	575980.75_4147995.45	0.02556	0.03513	0.03237	0.17868	0.57532	0.88491	Residence
576001	4147995	576000.75_4147995.45	0.02633	0.03676	0.03387	0.19159	0.75171	1.16677	Residence
576021	4147995	576020.75_4147995.45	0.02712	0.03849	0.0355	0.20531	1.04948	1.64388	Residence
576041	4147995	576040.75_4147995.45	0.02798	0.04044	0.03734	0.22028	1.66159	2.62978	Residence
576061	4147995	576060.75_4147995.45	0.0289	0.04261	0.03939	0.23642	2.93878	3.89107	Residence
576101	4147995	576100.75_4147995.45	0.03085	0.04748	0.04393	0.27104	3.58551	5.52467	Residence
576121	4147995	576120.75_4147995.45	0.03192	0.05033	0.04635	0.28956	2.15336	3.33634	Residence
576141	4147995	576140.75_4147995.45	0.03305	0.05351	0.04879	0.30863	1.50053	2.33153	Residence
576161	4147995	576160.75_4147995.45	0.03419	0.0569	0.05111	0.32737	1.12591	1.75373	Residence
576181	4147995	576180.75_4147995.45	0.0354	0.06066	0.05336	0.34586	0.88916	1.38861	Residence
576201	4147995	576200.75_4147995.45	0.03672	0.06507	0.05568	0.36436	0.73043	1.14436	Residence
576221	4147995	576220.75_4147995.45	0.03807	0.06982	0.05803	0.38136	0.61214	0.96297	Residence
576241	4147995	576240.75_4147995.45	0.03944	0.07498	0.06055	0.39657	0.52101	0.824	Residence
576261	4147995	576260.75_4147995.45	0.0409	0.08082	0.0635	0.41034	0.45028	0.71705	Residence
576321	4147995	576320.75_4147995.45	0.04575	0.10322	0.07571	0.44123	0.30892	0.50775	Residence
576341	4147995	576340.75_4147995.45	0.04753	0.11268	0.08072	0.44776	0.27623	0.46064	Residence
576361	4147995	576360.75_4147995.45	0.04944	0.12383	0.08605	0.45296	0.24883	0.42188	Residence
576381	4147995	576380.75_4147995.45	0.05136	0.13615	0.0913	0.45563	0.2245	0.3878	Residence
576401	4147995	576400.75_4147995.45	0.05339	0.15042	0.09654	0.45666	0.20352	0.35899	Residence
576421	4147995	576420.75_4147995.45	0.05559	0.16725	0.10197	0.45657	0.18563	0.33516	Residence
576441	4147995	576440.75_4147995.45	0.05793	0.18658	0.10768	0.45496	0.16998	0.31489	Residence
576461	4147995	576460.75_4147995.45	0.06028	0.20786	0.11375	0.45106	0.1557	0.29657	Residence
576481	4147995	576480.75_4147995.45	0.06281	0.23354	0.12079	0.44618	0.14322	0.28122	Residence
576101	4148015	576100.75_4148015.45	0.03108	0.04801	0.0439	0.28061	3.51555	5.41506	Residence
576121	4148015	576120.75_4148015.45	0.03216	0.05091	0.04643	0.30017	2.12573	3.29385	Residence
576141	4148015	576140.75_4148015.45	0.03329	0.05411	0.049	0.32014	1.48243	2.30462	Residence
576161	4148015	576160.75_4148015.45	0.03446	0.05758	0.05152	0.33996	1.11483	1.73795	Residence
576181	4148015	576180.75_4148015.45	0.03568	0.06147	0.05398	0.35951	0.88176	1.37853	Residence
576201	4148015	576200.75_4148015.45	0.03697	0.06586	0.05641	0.37843	0.72171	1.13208	Residence
576221	4148015	576220.75_4148015.45	0.03832	0.07073	0.05886	0.39607	0.60444	0.95207	Residence
576241	4148015	576240.75_4148015.45	0.03971	0.07613	0.06146	0.41205	0.51489	0.81533	Residence
576261	4148015	576260.75_4148015.45	0.04115	0.08211	0.06437	0.42606	0.44425	0.70823	Residence
576281	4148015	576280.75_4148015.45	0.04269	0.08899	0.06783	0.43853	0.3883	0.62424	Residence
576301	4148015	576300.75_4148015.45	0.04429	0.09667	0.07187	0.4489	0.34214	0.55568	Residence
576321	4148015	576320.75_4148015.45	0.04594	0.1052	0.07646	0.45702	0.30335	0.49864	Residence
576341	4148015	576340.75_4148015.45	0.04769	0.11507	0.0816	0.46351	0.27101	0.45178	Residence
576361	4148015	576360.75_4148015.45	0.04957	0.12659	0.08712	0.46842	0.24377	0.41294	Residence
576381	4148015	576380.75_4148015.45	0.05148	0.13948	0.09267	0.47088	0.21981	0.37918	Residence
576401	4148015	576400.75_4148015.45	0.0535	0.15447	0.09825	0.47158	0.19916	0.35061	Residence
576421	4148015	576420.75_4148015.45	0.05565	0.17204	0.10395	0.4708	0.18139	0.3266	Residence
576441	4148015	576440.75_4148015.45	0.05794	0.19247	0.10993	0.46857	0.16594	0.30629	Residence
576461	4148015	576460.75_4148015.45	0.06021	0.21479	0.11616	0.46384	0.15181	0.28777	Residence
576481	4148015	576480.75_4148015.45	0.06268	0.24196	0.1234	0.45835	0.13957	0.27241	Residence
576101	4148035	576100.75_4148035.45	0.03129	0.04834	0.04377	0.29019	3.40254	5.24024	Residence
576121	4148035	576120.75_4148035.45	0.03237	0.05123	0.04634	0.31067	2.07066	3.20921	Residence
576141	4148035	576140.75_4148035.45	0.0335	0.05447	0.04904	0.33171	1.45188	2.25824	Residence
576161	4148035	576160.75_4148035.45	0.03469	0.05806	0.05175	0.35276	1.0974	1.71201	Residence
576181	4148035	576180.75_4148035.45	0.03592	0.062	0.05441	0.37321	0.86848	1.35898	Residence
576201	4148035	576200.75_4148035.45	0.03721	0.06646	0.05702	0.39292	0.71089	1.1162	Residence
576221	4148035	576220.75_4148035.45	0.03853	0.07137	0.0596	0.41107	0.5947	0.93766	Residence
576241	4148035	576240.75_4148035.45	0.03993	0.07692	0.06228	0.42763	0.50656	0.80287	Residence
576261	4148035	576260.75_4148035.45	0.04136	0.0831	0.06522	0.44211	0.43702	0.69723	Residence
576281	4148035	576280.75_4148035.45	0.0429	0.09027	0.06867	0.45502	0.38197	0.6144	Residence
576301	4148035	576300.75_4148035.45	0.04447	0.09815	0.07264	0.46534	0.336	0.54583	Residence
576321	4148035	576320.75_4148035.45	0.04611	0.10706	0.07725	0.47356	0.29774	0.48937	Residence
576341	4148035	576340.75_4148035.45	0.04785	0.11736	0.08247	0.47997	0.26577	0.44281	Residence
576361	4148035	576360.75_4148035.45	0.0497	0.1293	0.08816	0.48457	0.23872	0.40403	Residence
576381	4148035	576380.75_4148035.45	0.05159	0.14277	0.09399	0.48669	0.21509	0.37053	Residence
576401	4148035	576400.75_4148035.45	0.05358	0.15847	0.09992	0.48695	0.19475	0.3422	Residence
576421	4148035	576420.75_4148035.45	0.05571	0.17707	0.10598	0.48571	0.1773	0.31843	Residence
576441	4148035	576440.75_4148035.45	0.05793	0.19854	0.11223	0.48268	0.16199	0.29797	Residence
576461	4148035	576460.75_4148035.45	0.06017	0.22251	0.11875	0.47742	0.14817	0.27967	Residence
576101	4148055	576100.75_4148055.45	0.03157	0.04881	0.04372	0.30108	3.34171	5.14599	Residence
576121	4148055	576120.75_4148055.45	0.03265	0.05172	0.04631	0.32258	2.04123	3.16391	Residence
576141	4148055	576140.75_4148055.45	0.03378	0.05497	0.04909	0.34462	1.43229	2.22864	Residence
576161	4148055	576160.75_4148055.45	0.03496	0.05858	0.05194	0.36665	1.0827	1.69008	Residence
576181	4148055	576180.75_4148055.45	0.03617	0.06255	0.05477	0.38795	0.85654	1.34124	Residence
576201	4148055	576200.75_4148055.45	0.03745	0.06703	0.05757	0.40836	0.70043	1.1006	Residence
576221	4148055	576220.75_4148055.45	0.03877	0.07203	0.06032	0.42717	0.58571	0.92415	Residence
576241	4148055	576240.75_4148055.45	0.04014	0.07765	0.06312	0.44414	0.49835	0.79037	Residence
576261	4148055	576260.75_4148055.45	0.04158	0.08404	0.06612	0.45913	0.42992	0.68625	Residence
576281	4148055	576280.75_4148055.45	0.04312	0.09153	0.06961	0.47257	0.37591	0.60483	Residence
576301	4148055	576300.75_4148055.45	0.04465	0.09955	0.07349	0.48272	0.32995	0.53601	Residence
576321	4148055	576320.75_4148055.45	0.04626	0.10868	0.07804	0.49069	0.29181	0.47952	Residence

576341	4148055	576340.75_4148055.45	0.04797	0.11935	0.08331	0.49689	0.26015	0.43323	Residence
576361	4148055	576360.75_4148055.45	0.04982	0.13201	0.08921	0.50154	0.23374	0.39525	Residence
576381	4148055	576380.75_4148055.45	0.05165	0.14582	0.09524	0.50288	0.21016	0.36158	Residence
576401	4148055	576400.75_4148055.45	0.05358	0.16209	0.10145	0.50245	0.19005	0.33333	Residence
576421	4148055	576420.75_4148055.45	0.05567	0.18165	0.10789	0.50066	0.17294	0.30983	Residence
576441	4148055	576440.75_4148055.45	0.05788	0.20482	0.11457	0.49737	0.15811	0.28992	Residence
576461	4148055	576460.75_4148055.45	0.06006	0.23043	0.1214	0.49142	0.14454	0.27173	Residence
576261	4148075	576260.75_4148075.45	0.0418	0.08504	0.0671	0.47748	0.42349	0.67615	Residence
576281	4148075	576280.75_4148075.45	0.04333	0.09271	0.0706	0.49109	0.36974	0.59495	Residence
576301	4148075	576300.75_4148075.45	0.04484	0.101	0.07447	0.50135	0.32425	0.5267	Residence
576321	4148075	576320.75_4148075.45	0.04642	0.11045	0.07898	0.5092	0.28639	0.47047	Residence
576341	4148075	576340.75_4148075.45	0.04811	0.12154	0.08427	0.51516	0.25501	0.42445	Residence
576361	4148075	576360.75_4148075.45	0.04992	0.13477	0.09031	0.51947	0.22888	0.38674	Residence
576381	4148075	576380.75_4148075.45	0.05171	0.14914	0.09655	0.52019	0.20554	0.35323	Residence
576401	4148075	576400.75_4148075.45	0.05359	0.16608	0.10306	0.51899	0.18564	0.32508	Residence
576421	4148075	576420.75_4148075.45	0.05564	0.18688	0.10993	0.51676	0.16894	0.30201	Residence
576441	4148075	576440.75_4148075.45	0.0578	0.21148	0.117	0.51278	0.15435	0.28222	Residence
576461	4148075	576460.75_4148075.45	0.05991	0.23879	0.12414	0.50603	0.14098	0.26407	Residence
576261	4148095	576260.75_4148095.45	0.04201	0.0861	0.06809	0.497	0.41705	0.66593	Residence
576281	4148095	576280.75_4148095.45	0.04351	0.09395	0.07166	0.51083	0.36369	0.58519	Residence
576301	4148095	576300.75_4148095.45	0.04501	0.1025	0.07553	0.52114	0.31858	0.5174	Residence
576321	4148095	576320.75_4148095.45	0.04657	0.1123	0.08003	0.52892	0.2811	0.46165	Residence
576341	4148095	576340.75_4148095.45	0.04821	0.12375	0.08531	0.53444	0.24988	0.41572	Residence
576361	4148095	576360.75_4148095.45	0.05	0.13761	0.09146	0.5384	0.2241	0.37841	Residence
576381	4148095	576380.75_4148095.45	0.05172	0.15254	0.09787	0.53832	0.20095	0.34501	Residence
576401	4148095	576400.75_4148095.45	0.05356	0.17041	0.10473	0.53653	0.18142	0.31725	Residence
576421	4148095	576420.75_4148095.45	0.05555	0.19221	0.11196	0.53346	0.16491	0.29424	Residence
576441	4148095	576440.75_4148095.45	0.05764	0.21831	0.11944	0.52876	0.15058	0.27461	Residence
576461	4148095	576460.75_4148095.45	0.05969	0.24754	0.12696	0.52124	0.13745	0.2566	Residence
576261	4148115	576260.75_4148115.45	0.04219	0.08731	0.06907	0.51775	0.41053	0.65549	Residence
576281	4148115	576280.75_4148115.45	0.04367	0.09535	0.07276	0.53181	0.35757	0.57529	Residence
576301	4148115	576300.75_4148115.45	0.04514	0.10412	0.07667	0.54206	0.31277	0.50788	Residence
576321	4148115	576320.75_4148115.45	0.04667	0.11428	0.08117	0.54972	0.27572	0.45269	Residence
576341	4148115	576340.75_4148115.45	0.04828	0.12624	0.08647	0.55501	0.24492	0.40732	Residence
576361	4148115	576360.75_4148115.45	0.05001	0.14058	0.09266	0.55827	0.21928	0.37008	Residence
576381	4148115	576380.75_4148115.45	0.05168	0.15607	0.09921	0.55727	0.19634	0.33681	Residence
576401	4148115	576400.75_4148115.45	0.05348	0.17501	0.10642	0.55491	0.17723	0.30955	Residence
576421	4148115	576420.75_4148115.45	0.05541	0.19801	0.11404	0.55105	0.16098	0.28675	Residence
576441	4148115	576440.75_4148115.45	0.05743	0.22561	0.12194	0.54548	0.14685	0.26719	Residence
576461	4148115	576460.75_4148115.45	0.05942	0.25687	0.12987	0.53712	0.13394	0.24932	Residence
576261	4148135	576260.75_4148135.45	0.04234	0.08885	0.07002	0.53996	0.40407	0.64508	Residence
576281	4148135	576280.75_4148135.45	0.04379	0.09705	0.07387	0.5541	0.35133	0.56515	Residence
576301	4148135	576300.75_4148135.45	0.04522	0.10605	0.07786	0.56428	0.30689	0.49826	Residence
576321	4148135	576320.75_4148135.45	0.04672	0.11655	0.08239	0.57169	0.27021	0.44358	Residence
576341	4148135	576340.75_4148135.45	0.0483	0.129	0.08771	0.57661	0.23982	0.39876	Residence
576361	4148135	576360.75_4148135.45	0.04998	0.14388	0.09394	0.57915	0.21444	0.36177	Residence
576381	4148135	576380.75_4148135.45	0.05159	0.16011	0.10064	0.57735	0.19184	0.32889	Residence
576401	4148135	576400.75_4148135.45	0.05334	0.18	0.10811	0.57409	0.17301	0.30187	Residence
576421	4148135	576420.75_4148135.45	0.0552	0.20419	0.11611	0.56929	0.15698	0.27921	Residence
576441	4148135	576440.75_4148135.45	0.05717	0.23351	0.12447	0.5629	0.1431	0.25984	Residence
576461	4148135	576460.75_4148135.45	0.05909	0.26694	0.13284	0.55365	0.13042	0.24213	Residence
576261	4148155	576260.75_4148155.45	0.04247	0.09075	0.07092	0.56388	0.39774	0.63486	Residence
576281	4148155	576280.75_4148155.45	0.04387	0.09911	0.07498	0.57796	0.34509	0.55504	Residence
576301	4148155	576300.75_4148155.45	0.04527	0.10833	0.07911	0.58789	0.30091	0.48852	Residence
576321	4148155	576320.75_4148155.45	0.04672	0.11912	0.08369	0.59485	0.26454	0.43425	Residence
576341	4148155	576340.75_4148155.45	0.04826	0.132	0.08902	0.59918	0.23452	0.3899	Residence
576361	4148155	576360.75_4148155.45	0.04989	0.14756	0.0953	0.60109	0.20954	0.35342	Residence
576381	4148155	576380.75_4148155.45	0.05145	0.16449	0.10211	0.5983	0.18726	0.32088	Residence
576401	4148155	576400.75_4148155.45	0.05314	0.18545	0.10984	0.59416	0.16875	0.29421	Residence
576421	4148155	576420.75_4148155.45	0.05496	0.21115	0.11824	0.58854	0.15304	0.27186	Residence
576441	4148155	576440.75_4148155.45	0.05685	0.24217	0.12704	0.5811	0.13934	0.25257	Residence
576461	4148155	576460.75_4148155.45	0.05871	0.27786	0.13587	0.57082	0.12686	0.235	Residence
576261	4148175	576260.75_4148175.45	0.04254	0.09262	0.07169	0.58914	0.39081	0.62368	Residence
576281	4148175	576280.75_4148175.45	0.04391	0.10127	0.07605	0.60348	0.33875	0.54481	Residence
576301	4148175	576300.75_4148175.45	0.04527	0.11079	0.08039	0.61322	0.295	0.47893	Residence
576321	4148175	576320.75_4148175.45	0.04667	0.12181	0.08506	0.61944	0.25882	0.42488	Residence
576341	4148175	576340.75_4148175.45	0.04816	0.13508	0.09043	0.62297	0.22912	0.38095	Residence
576361	4148175	576360.75_4148175.45	0.04975	0.15131	0.09677	0.62416	0.20459	0.34502	Residence
576381	4148175	576380.75_4148175.45	0.05127	0.16912	0.1037	0.62052	0.18275	0.31305	Residence
576401	4148175	576400.75_4148175.45	0.05289	0.19084	0.11158	0.61502	0.16439	0.28642	Residence
576421	4148175	576420.75_4148175.45	0.05467	0.21814	0.12037	0.60855	0.14901	0.26442	Residence
576441	4148175	576440.75_4148175.45	0.05651	0.25122	0.12966	0.60019	0.13557	0.24537	Residence
576461	4148175	576460.75_4148175.45	0.05829	0.28896	0.13892	0.58855	0.12322	0.22782	Residence
576161	4148195	576160.75_4148195.45	0.03661	0.0651	0.05205	0.49755	0.99333	1.55171	Residence

576181	4148195	576180.75_4148195.45	0.03774	0.06959	0.05554	0.52732	0.7861	1.23172	Residence
576201	4148195	576200.75_4148195.45	0.03887	0.07448	0.05932	0.55386	0.63844	1.00353	Residence
576221	4148195	576220.75_4148195.45	0.04008	0.0803	0.06351	0.57841	0.53181	0.83909	Residence
576241	4148195	576240.75_4148195.45	0.04131	0.08677	0.06787	0.59906	0.44897	0.71186	Residence
576261	4148195	576260.75_4148195.45	0.04257	0.09421	0.07237	0.61628	0.38379	0.61237	Residence
576281	4148195	576280.75_4148195.45	0.04391	0.10309	0.07704	0.6307	0.33221	0.53427	Residence
576301	4148195	576300.75_4148195.45	0.04524	0.11285	0.08165	0.64009	0.28887	0.46903	Residence
576321	4148195	576320.75_4148195.45	0.0466	0.12422	0.08652	0.64575	0.25317	0.41569	Residence
576341	4148195	576340.75_4148195.45	0.04803	0.13781	0.09196	0.64826	0.22376	0.37208	Residence
576361	4148195	576360.75_4148195.45	0.04956	0.15453	0.09835	0.64842	0.19955	0.33654	Residence
576381	4148195	576380.75_4148195.45	0.05105	0.17314	0.10538	0.64381	0.17815	0.30512	Residence
576401	4148195	576400.75_4148195.45	0.05263	0.19588	0.11345	0.63722	0.16012	0.27884	Residence
576421	4148195	576420.75_4148195.45	0.05433	0.22413	0.12249	0.62924	0.14484	0.25681	Residence
576441	4148195	576440.75_4148195.45	0.05614	0.25946	0.13231	0.62004	0.13173	0.23814	Residence
576461	4148195	576460.75_4148195.45	0.05789	0.30034	0.1422	0.60759	0.11972	0.22101	Residence
576161	4148215	576160.75_4148215.45	0.03672	0.06565	0.05199	0.52196	0.97788	1.52706	Residence
576181	4148215	576180.75_4148215.45	0.03783	0.07016	0.05548	0.55313	0.77355	1.21154	Residence
576201	4148215	576200.75_4148215.45	0.03896	0.07522	0.05933	0.58132	0.62916	0.98845	Residence
576221	4148215	576220.75_4148215.45	0.04013	0.08107	0.06361	0.60659	0.52312	0.82501	Residence
576241	4148215	576240.75_4148215.45	0.04132	0.0876	0.06814	0.6277	0.44086	0.69878	Residence
576261	4148215	576260.75_4148215.45	0.04256	0.09519	0.07291	0.64529	0.37641	0.60052	Residence
576281	4148215	576280.75_4148215.45	0.04387	0.10422	0.07791	0.65961	0.32527	0.52314	Residence
576301	4148215	576300.75_4148215.45	0.04516	0.11429	0.08288	0.66881	0.28267	0.45906	Residence
576321	4148215	576320.75_4148215.45	0.04647	0.1258	0.08797	0.67347	0.24728	0.40612	Residence
576341	4148215	576340.75_4148215.45	0.04785	0.13965	0.09356	0.67489	0.21824	0.363	Residence
576361	4148215	576360.75_4148215.45	0.04934	0.15668	0.10001	0.67377	0.19433	0.32777	Residence
576381	4148215	576380.75_4148215.45	0.05083	0.17644	0.10726	0.66871	0.17365	0.29738	Residence
576401	4148215	576400.75_4148215.45	0.05235	0.19984	0.11545	0.66064	0.15581	0.27125	Residence
576101	4148235	576100.75_4148235.45	0.03378	0.05509	0.04337	0.44097	2.79965	4.30183	Residence
576121	4148235	576120.75_4148235.45	0.03476	0.05826	0.04595	0.47727	1.78189	2.7593	Residence
576141	4148235	576140.75_4148235.45	0.03579	0.06192	0.04883	0.51397	1.2721	1.979	Residence
576161	4148235	576160.75_4148235.45	0.03682	0.06586	0.05195	0.54864	0.96355	1.50398	Residence
576181	4148235	576180.75_4148235.45	0.03791	0.07046	0.05547	0.58166	0.76283	1.19406	Residence
576201	4148235	576200.75_4148235.45	0.03901	0.07556	0.05935	0.61109	0.61982	0.97321	Residence
576221	4148235	576220.75_4148235.45	0.04016	0.08143	0.06368	0.63718	0.51446	0.81095	Residence
576241	4148235	576240.75_4148235.45	0.04132	0.08804	0.06836	0.65889	0.43293	0.686	Residence
576261	4148235	576260.75_4148235.45	0.04252	0.09567	0.07336	0.67648	0.36882	0.58838	Residence
576281	4148235	576280.75_4148235.45	0.04376	0.10458	0.07859	0.68997	0.31764	0.51096	Residence
576301	4148235	576300.75_4148235.45	0.04505	0.11511	0.08402	0.69937	0.27626	0.44879	Residence
576321	4148235	576320.75_4148235.45	0.04632	0.12674	0.0894	0.7029	0.24125	0.39639	Residence
576341	4148235	576340.75_4148235.45	0.04766	0.14081	0.09521	0.70309	0.21264	0.35381	Residence
576361	4148235	576360.75_4148235.45	0.0491	0.15819	0.1018	0.70071	0.18911	0.31904	Residence
576441	4148235	576440.75_4148235.45	0.05527	0.27124	0.13764	0.66186	0.12375	0.22337	Residence
576461	4148235	576460.75_4148235.45	0.057	0.31965	0.14904	0.64818	0.11263	0.2075	Residence
576481	4148235	576480.75_4148235.45	0.05864	0.37806	0.16072	0.6315	0.10249	0.19304	Residence
576101	4148255	576100.75_4148255.45	0.03391	0.05503	0.0433	0.46297	2.73495	4.20087	Residence
576121	4148255	576120.75_4148255.45	0.03488	0.05829	0.04591	0.50217	1.75506	2.71667	Residence
576141	4148255	576140.75_4148255.45	0.03588	0.06192	0.04879	0.54101	1.25318	1.94865	Residence
576161	4148255	576160.75_4148255.45	0.03689	0.06591	0.05193	0.57779	0.94994	1.48184	Residence
576181	4148255	576180.75_4148255.45	0.03796	0.07056	0.05547	0.61261	0.75183	1.17602	Residence
576201	4148255	576200.75_4148255.45	0.03903	0.07565	0.05935	0.64312	0.6097	0.95668	Residence
576221	4148255	576220.75_4148255.45	0.04014	0.08157	0.06372	0.6701	0.5052	0.79595	Residence
576241	4148255	576240.75_4148255.45	0.04127	0.08823	0.0685	0.69226	0.42431	0.67219	Residence
576261	4148255	576260.75_4148255.45	0.04243	0.0959	0.07367	0.70978	0.3607	0.57544	Residence
576281	4148255	576280.75_4148255.45	0.04363	0.10491	0.0792	0.72288	0.31013	0.49901	Residence
576301	4148255	576300.75_4148255.45	0.0449	0.11574	0.08504	0.73187	0.26959	0.43813	Residence
576321	4148255	576320.75_4148255.45	0.04616	0.12783	0.09086	0.73476	0.23543	0.38698	Residence
576381	4148255	576380.75_4148255.45	0.05027	0.18064	0.11123	0.72163	0.16398	0.28086	Residence
576401	4148255	576400.75_4148255.45	0.05169	0.20536	0.11967	0.71047	0.14675	0.25542	Residence
576421	4148255	576420.75_4148255.45	0.05318	0.23606	0.12932	0.69742	0.13204	0.23384	Residence
576441	4148255	576440.75_4148255.45	0.05476	0.27555	0.14023	0.68343	0.11954	0.21569	Residence
576461	4148255	576460.75_4148255.45	0.05645	0.32757	0.15237	0.66888	0.10885	0.20044	Residence
576481	4148255	576480.75_4148255.45	0.05807	0.39212	0.16499	0.65151	0.09918	0.18668	Residence
576501	4148255	576500.75_4148255.45	0.05968	0.47719	0.17868	0.6328	0.09063	0.1747	Residence
576101	4148275	576100.75_4148275.45	0.03402	0.05502	0.04328	0.4872	2.67912	4.1136	Residence
576121	4148275	576120.75_4148275.45	0.03497	0.05831	0.04587	0.52923	1.72755	2.67286	Residence
576141	4148275	576140.75_4148275.45	0.03595	0.06197	0.04874	0.57054	1.23471	1.9188	Residence
576161	4148275	576160.75_4148275.45	0.03694	0.06602	0.0519	0.60957	0.93624	1.45938	Residence
576181	4148275	576180.75_4148275.45	0.03797	0.07069	0.05546	0.64601	0.73979	1.15625	Residence
576201	4148275	576200.75_4148275.45	0.03901	0.07583	0.05935	0.67778	0.59894	0.9391	Residence
576321	4148275	576320.75_4148275.45	0.04593	0.12873	0.09205	0.7673	0.2287	0.37614	Residence
576341	4148275	576340.75_4148275.45	0.04713	0.14241	0.09826	0.76275	0.20023	0.3335	Residence
576361	4148275	576360.75_4148275.45	0.04851	0.16074	0.10541	0.75793	0.17785	0.30027	Residence
576381	4148275	576380.75_4148275.45	0.0499	0.18241	0.11319	0.74906	0.15859	0.27173	Residence

576401	4148275	576400.75_4148275.45	0.05134	0.20882	0.122	0.73736	0.14212	0.24741	Residence
576421	4148275	576420.75_4148275.45	0.05276	0.24052	0.13184	0.72246	0.12771	0.22618	Residence
576441	4148275	576440.75_4148275.45	0.05426	0.28152	0.1431	0.70655	0.11547	0.20834	Residence
576461	4148275	576460.75_4148275.45	0.05583	0.33558	0.15566	0.68987	0.10499	0.19328	Residence
576481	4148275	576480.75_4148275.45	0.05743	0.40723	0.16934	0.67197	0.09584	0.18034	Residence
576501	4148275	576500.75_4148275.45	0.05894	0.5003	0.18379	0.6515	0.08755	0.1687	Residence
576101	4148295	576100.75_4148295.45	0.03411	0.05521	0.04332	0.51373	2.62665	4.03138	Residence
576121	4148295	576120.75_4148295.45	0.03504	0.05855	0.04586	0.55874	1.69965	2.6283	Residence
576141	4148295	576140.75_4148295.45	0.03599	0.06229	0.04872	0.60295	1.217	1.88989	Residence
576161	4148295	576160.75_4148295.45	0.03696	0.06641	0.05188	0.6443	0.92234	1.43642	Residence
576181	4148295	576180.75_4148295.45	0.03795	0.07108	0.05542	0.68216	0.72672	1.13476	Residence
576301	4148295	576300.75_4148295.45	0.04448	0.11754	0.08643	0.80144	0.25439	0.41392	Residence
576321	4148295	576320.75_4148295.45	0.0457	0.13048	0.09317	0.80228	0.22199	0.36535	Residence
576341	4148295	576340.75_4148295.45	0.04688	0.14475	0.09986	0.79639	0.1943	0.32382	Residence
576361	4148295	576360.75_4148295.45	0.04818	0.16284	0.10719	0.78858	0.17191	0.29042	Residence
576381	4148295	576380.75_4148295.45	0.04953	0.18502	0.11522	0.77792	0.15313	0.26251	Residence
576401	4148295	576400.75_4148295.45	0.05095	0.21303	0.12442	0.76537	0.13735	0.2392	Residence
576421	4148295	576420.75_4148295.45	0.05231	0.24583	0.13448	0.74847	0.12331	0.21845	Residence
576441	4148295	576440.75_4148295.45	0.05373	0.2885	0.14608	0.73059	0.1114	0.20104	Residence
576461	4148295	576460.75_4148295.45	0.05521	0.34535	0.15917	0.71197	0.10122	0.18639	Residence
576481	4148295	576480.75_4148295.45	0.05672	0.42253	0.17365	0.69248	0.09242	0.17393	Residence
576501	4148295	576500.75_4148295.45	0.05816	0.52606	0.18914	0.67073	0.08453	0.16287	Residence
576521	4148295	576520.75_4148295.45	0.05957	0.67585	0.2065	0.64813	0.07761	0.15335	Residence
576101	4148315	576100.75_4148315.45	0.03419	0.05578	0.04346	0.54324	2.58446	3.96456	Residence
576121	4148315	576120.75_4148315.45	0.0351	0.05923	0.04594	0.59178	1.67855	2.5939	Residence
576141	4148315	576140.75_4148315.45	0.03602	0.06301	0.04874	0.63872	1.20032	1.8623	Residence
576161	4148315	576160.75_4148315.45	0.03696	0.06727	0.0519	0.68277	0.90942	1.41477	Residence
576181	4148315	576180.75_4148315.45	0.03793	0.07214	0.05547	0.72295	0.71591	1.11672	Residence
576241	4148315	576240.75_4148315.45	0.041	0.09114	0.06887	0.81075	0.39704	0.62881	Residence
576261	4148315	576260.75_4148315.45	0.04205	0.09917	0.07432	0.82663	0.33497	0.53476	Residence
576281	4148315	576280.75_4148315.45	0.04312	0.10837	0.08032	0.8358	0.28563	0.46027	Residence
576301	4148315	576300.75_4148315.45	0.04424	0.1193	0.0869	0.83946	0.24632	0.40109	Residence
576321	4148315	576320.75_4148315.45	0.04544	0.13263	0.09405	0.83878	0.21477	0.35373	Residence
576341	4148315	576340.75_4148315.45	0.04661	0.14763	0.10129	0.83168	0.18804	0.31361	Residence
576361	4148315	576360.75_4148315.45	0.04783	0.16571	0.10891	0.82093	0.16587	0.28043	Residence
576381	4148315	576380.75_4148315.45	0.04914	0.18875	0.11737	0.80864	0.14771	0.25338	Residence
576401	4148315	576400.75_4148315.45	0.05049	0.21728	0.12677	0.7937	0.13228	0.23052	Residence
576421	4148315	576420.75_4148315.45	0.05184	0.25263	0.13736	0.77602	0.11898	0.2109	Residence
576441	4148315	576440.75_4148315.45	0.05316	0.29659	0.14921	0.75554	0.10734	0.19383	Residence
576461	4148315	576460.75_4148315.45	0.05453	0.35603	0.16278	0.73465	0.09748	0.17958	Residence
576481	4148315	576480.75_4148315.45	0.05594	0.43846	0.17802	0.71322	0.08902	0.16759	Residence
576501	4148315	576500.75_4148315.45	0.05734	0.55569	0.19488	0.6908	0.08163	0.15733	Residence
576521	4148315	576520.75_4148315.45	0.0586	0.72343	0.21311	0.66589	0.07492	0.14807	Residence
576101	4148335	576100.75_4148335.45	0.03426	0.05681	0.04371	0.57648	2.55654	3.91916	Residence
576121	4148335	576120.75_4148335.45	0.03514	0.06032	0.04613	0.62856	1.6605	2.56379	Residence
576201	4148335	576200.75_4148335.45	0.03888	0.07941	0.05959	0.80478	0.56773	0.8881	Residence
576221	4148335	576220.75_4148335.45	0.03985	0.08574	0.064	0.83405	0.46475	0.73102	Residence
576241	4148335	576240.75_4148335.45	0.04085	0.093	0.06895	0.85657	0.38646	0.61215	Residence
576261	4148335	576260.75_4148335.45	0.04189	0.10141	0.07452	0.87215	0.32578	0.52034	Residence
576281	4148335	576280.75_4148335.45	0.04296	0.11114	0.08072	0.88061	0.27774	0.44785	Residence
576301	4148335	576300.75_4148335.45	0.04405	0.12244	0.08753	0.8824	0.23911	0.38965	Residence
576321	4148335	576320.75_4148335.45	0.04516	0.13545	0.0948	0.87778	0.20741	0.34192	Residence
576341	4148335	576340.75_4148335.45	0.04632	0.15127	0.1026	0.86925	0.18164	0.30322	Residence
576361	4148335	576360.75_4148335.45	0.04748	0.16972	0.11066	0.8558	0.15995	0.27065	Residence
576381	4148335	576380.75_4148335.45	0.04872	0.19317	0.11948	0.84073	0.14218	0.24411	Residence
576401	4148335	576400.75_4148335.45	0.04999	0.22249	0.12921	0.82331	0.12721	0.22187	Residence
576421	4148335	576420.75_4148335.45	0.05132	0.26042	0.14036	0.80451	0.11461	0.20331	Residence
576441	4148335	576440.75_4148335.45	0.05255	0.30646	0.15257	0.78167	0.10338	0.18683	Residence
576461	4148335	576460.75_4148335.45	0.05381	0.36842	0.16658	0.7581	0.09382	0.17298	Residence
576481	4148335	576480.75_4148335.45	0.05512	0.45651	0.18261	0.73463	0.08571	0.1615	Residence
576501	4148335	576500.75_4148335.45	0.05642	0.58627	0.20068	0.71078	0.07872	0.15183	Residence
576521	4148335	576520.75_4148335.45	0.05758	0.77675	0.22012	0.6841	0.07233	0.14304	Residence
576541	4148335	576540.75_4148335.45	0.05868	1.10045	0.24262	0.65718	0.06676	0.13556	Residence
576141	4148355	576140.75_4148355.45	0.03603	0.06573	0.04908	0.72329	1.17269	1.81487	Residence
576161	4148355	576160.75_4148355.45	0.03692	0.07027	0.05216	0.77307	0.88486	1.37282	Residence
576181	4148355	576180.75_4148355.45	0.03784	0.07542	0.05568	0.81728	0.69203	1.07698	Residence
576201	4148355	576200.75_4148355.45	0.03878	0.08125	0.05965	0.85485	0.55481	0.8673	Residence
576221	4148355	576220.75_4148355.45	0.03974	0.08795	0.06415	0.88546	0.45369	0.71349	Residence
576241	4148355	576240.75_4148355.45	0.04074	0.09559	0.06918	0.90806	0.37666	0.59679	Residence
576261	4148355	576260.75_4148355.45	0.04173	0.10414	0.07475	0.9218	0.31639	0.50567	Residence
576321	4148355	576320.75_4148355.45	0.04482	0.13808	0.09519	0.91747	0.1992	0.32878	Residence
576341	4148355	576340.75_4148355.45	0.04598	0.15511	0.10364	0.90825	0.17483	0.29217	Residence
576361	4148355	576360.75_4148355.45	0.04712	0.17469	0.11234	0.89302	0.15404	0.26093	Residence
576381	4148355	576380.75_4148355.45	0.04827	0.19851	0.12156	0.87445	0.13664	0.23486	Residence

576401	4148355	576400.75_4148355.45	0.04948	0.22907	0.13176	0.85456	0.12224	0.21343	Residence
576421	4148355	576420.75_4148355.45	0.05072	0.2685	0.14328	0.83313	0.11009	0.19552	Residence
576441	4148355	576440.75_4148355.45	0.05192	0.31874	0.15623	0.80915	0.09955	0.18011	Residence
576461	4148355	576460.75_4148355.45	0.05307	0.3837	0.17069	0.78267	0.09031	0.1667	Residence
576481	4148355	576480.75_4148355.45	0.05425	0.47739	0.18748	0.75674	0.08253	0.15567	Residence
576501	4148355	576500.75_4148355.45	0.05539	0.61536	0.20631	0.73006	0.07576	0.14628	Residence
576521	4148355	576520.75_4148355.45	0.0565	0.83695	0.22765	0.70292	0.06986	0.13829	Residence
576541	4148355	576540.75_4148355.45	0.05742	1.21927	0.25108	0.67315	0.06444	0.13094	Residence
576101	4148375	576100.75_4148375.45	0.03429	0.05922	0.04418	0.65217	2.47499	3.78897	Residence
576121	4148375	576120.75_4148375.45	0.03513	0.06297	0.0466	0.71328	1.61562	2.48876	Residence
576141	4148375	576140.75_4148375.45	0.03598	0.06716	0.04929	0.77157	1.15392	1.78288	Residence
576161	4148375	576160.75_4148375.45	0.03687	0.07194	0.05237	0.82518	0.86995	1.3475	Residence
576181	4148375	576180.75_4148375.45	0.03777	0.07736	0.05589	0.87237	0.67908	1.05555	Residence
576201	4148375	576200.75_4148375.45	0.03868	0.08334	0.05982	0.91095	0.54207	0.84689	Residence
576221	4148375	576220.75_4148375.45	0.03959	0.08989	0.06418	0.93993	0.44008	0.69213	Residence
576241	4148375	576240.75_4148375.45	0.04056	0.09782	0.06926	0.96212	0.36469	0.57813	Residence
576261	4148375	576260.75_4148375.45	0.04151	0.10645	0.07479	0.97334	0.30521	0.48823	Residence
576281	4148375	576280.75_4148375.45	0.04251	0.11665	0.08108	0.97706	0.25894	0.41837	Residence
576321	4148375	576320.75_4148375.45	0.04451	0.14179	0.09571	0.96183	0.19157	0.31658	Residence
576341	4148375	576340.75_4148375.45	0.0456	0.15907	0.10443	0.94891	0.16774	0.28067	Residence
576361	4148375	576360.75_4148375.45	0.04673	0.18031	0.1139	0.93244	0.14812	0.2512	Residence
576381	4148375	576380.75_4148375.45	0.04779	0.20465	0.12355	0.90993	0.13116	0.22572	Residence
576401	4148375	576400.75_4148375.45	0.04893	0.23652	0.1343	0.88705	0.11731	0.20509	Residence
576421	4148375	576420.75_4148375.45	0.05007	0.27774	0.14631	0.86274	0.10566	0.18791	Residence
576441	4148375	576440.75_4148375.45	0.05124	0.33286	0.16012	0.83763	0.09582	0.17359	Residence
576461	4148375	576460.75_4148375.45	0.05228	0.402	0.17517	0.80842	0.08696	0.16076	Residence
576481	4148375	576480.75_4148375.45	0.05329	0.49877	0.19236	0.7787	0.07936	0.14993	Residence
576501	4148375	576500.75_4148375.45	0.05435	0.64992	0.21255	0.75052	0.073	0.14116	Residence
576521	4148375	576520.75_4148375.45	0.05533	0.89805	0.23534	0.7215	0.06741	0.13362	Residence
576541	4148375	576540.75_4148375.45	0.05613	1.36951	0.26047	0.69006	0.06229	0.12671	Residence
576561	4148375	576560.75_4148375.45	0.05687	2.5333	0.29019	0.65888	0.05782	0.12083	Residence
576101	4148395	576100.75_4148395.45	0.03428	0.06033	0.04437	0.69672	2.43874	3.72987	Residence
576121	4148395	576120.75_4148395.45	0.03511	0.06429	0.04692	0.76402	1.5985	2.45813	Residence
576141	4148395	576140.75_4148395.45	0.03595	0.06864	0.04965	0.82701	1.13939	1.75684	Residence
576161	4148395	576160.75_4148395.45	0.03679	0.07342	0.05266	0.88318	0.85368	1.31993	Residence
576181	4148395	576180.75_4148395.45	0.03765	0.07876	0.05603	0.93116	0.66131	1.02677	Residence
576201	4148395	576200.75_4148395.45	0.0385	0.08462	0.0598	0.96926	0.52422	0.81872	Residence
576221	4148395	576220.75_4148395.45	0.03938	0.0913	0.06411	0.99779	0.42412	0.66728	Residence
576241	4148395	576240.75_4148395.45	0.04034	0.09953	0.06922	1.01934	0.35097	0.55686	Residence
576261	4148395	576260.75_4148395.45	0.04131	0.10896	0.07497	1.03069	0.29436	0.4714	Residence
576281	4148395	576280.75_4148395.45	0.04225	0.11927	0.08122	1.03061	0.24888	0.40263	Residence
576341	4148395	576340.75_4148395.45	0.0452	0.16313	0.1051	0.99209	0.16066	0.26921	Residence
576361	4148395	576360.75_4148395.45	0.04629	0.18568	0.11518	0.97325	0.14204	0.24121	Residence
576381	4148395	576380.75_4148395.45	0.04731	0.21189	0.12563	0.94841	0.12598	0.21711	Residence
576401	4148395	576400.75_4148395.45	0.04834	0.24481	0.1369	0.92142	0.11257	0.1971	Residence
576421	4148395	576420.75_4148395.45	0.04941	0.28833	0.14956	0.89414	0.10145	0.18071	Residence
576441	4148395	576440.75_4148395.45	0.05047	0.34615	0.16391	0.86586	0.09202	0.16701	Residence
576461	4148395	576460.75_4148395.45	0.05145	0.42178	0.17995	0.83504	0.08374	0.15508	Residence
576481	4148395	576480.75_4148395.45	0.05233	0.52448	0.1979	0.8023	0.07644	0.14469	Residence
576501	4148395	576500.75_4148395.45	0.05322	0.68402	0.21893	0.77093	0.0703	0.13619	Residence
576521	4148395	576520.75_4148395.45	0.05407	0.95522	0.24303	0.73958	0.06498	0.12899	Residence
576541	4148395	576540.75_4148395.45	0.05481	1.55491	0.27069	0.70764	0.06026	0.12275	Residence
576561	4148395	576560.75_4148395.45	0.05538	3.35307	0.30203	0.67391	0.05595	0.11703	Residence
576101	4148415	576100.75_4148415.45	0.03427	0.06127	0.04449	0.74753	2.41278	3.68487	Residence
576121	4148415	576120.75_4148415.45	0.03503	0.06501	0.04703	0.81815	1.56663	2.40376	Residence
576141	4148415	576140.75_4148415.45	0.03582	0.06921	0.04974	0.88418	1.109	1.70579	Residence
576161	4148415	576160.75_4148415.45	0.03664	0.07409	0.05277	0.9441	0.82839	1.2784	Residence
576181	4148415	576180.75_4148415.45	0.03752	0.07987	0.05626	0.99676	0.64232	0.99632	Residence
576201	4148415	576200.75_4148415.45	0.03834	0.08582	0.05996	1.03521	0.50674	0.79141	Residence
576221	4148415	576220.75_4148415.45	0.0392	0.09269	0.06422	1.06315	0.40874	0.64354	Residence
576241	4148415	576240.75_4148415.45	0.04011	0.10094	0.06922	1.08188	0.33676	0.53496	Residence
576261	4148415	576260.75_4148415.45	0.04107	0.11093	0.07508	1.09198	0.28255	0.45313	Residence
576281	4148415	576280.75_4148415.45	0.04198	0.12176	0.08142	1.08915	0.23879	0.38689	Residence
576301	4148415	576300.75_4148415.45	0.04292	0.13468	0.08868	1.07919	0.20442	0.33482	Residence
576341	4148415	576340.75_4148415.45	0.04479	0.16753	0.10583	1.03923	0.15394	0.25833	Residence
576361	4148415	576360.75_4148415.45	0.04578	0.19046	0.11619	1.01539	0.13587	0.23111	Residence
576381	4148415	576380.75_4148415.45	0.04679	0.21919	0.1276	0.98897	0.12093	0.20873	Residence
576401	4148415	576400.75_4148415.45	0.04773	0.25334	0.13949	0.95758	0.108	0.18943	Residence
576421	4148415	576420.75_4148415.45	0.04868	0.29864	0.1528	0.92641	0.09733	0.17372	Residence
576441	4148415	576440.75_4148415.45	0.04963	0.35865	0.16773	0.89441	0.08828	0.16057	Residence
576461	4148415	576460.75_4148415.45	0.05055	0.4417	0.18497	0.86232	0.08061	0.14961	Residence
576481	4148415	576480.75_4148415.45	0.05131	0.55078	0.20374	0.82649	0.07363	0.13968	Residence
576501	4148415	576500.75_4148415.45	0.05204	0.71811	0.22554	0.79152	0.06769	0.13141	Residence
576521	4148415	576520.75_4148415.45	0.05275	1.01293	0.25113	0.75796	0.06264	0.1246	Residence

576541	4148415	576540.75_4148415.45	0.0534	1.66846	0.28099	0.72466	0.05824	0.11881	Residence
576561	4148415	576560.75_4148415.45	0.05385	1.98143	0.31467	0.68921	0.05416	0.11342	Residence
576581	4148415	576580.75_4148415.45	0.0542	3.85141	0.35494	0.65429	0.05058	0.10878	Residence
576101	4148435	576100.75_4148435.45	0.03419	0.0617	0.04434	0.80221	2.36438	3.60379	Residence
576121	4148435	576120.75_4148435.45	0.03494	0.06551	0.04703	0.87931	1.53493	2.34786	Residence
576141	4148435	576140.75_4148435.45	0.03571	0.06981	0.04988	0.95071	1.08284	1.66069	Residence
576161	4148435	576160.75_4148435.45	0.0365	0.07469	0.05295	1.01355	0.80322	1.23729	Residence
576181	4148435	576180.75_4148435.45	0.03736	0.08063	0.05648	1.06898	0.62032	0.96168	Residence
576201	4148435	576200.75_4148435.45	0.03817	0.08681	0.06018	1.10823	0.48782	0.76226	Residence
576221	4148435	576220.75_4148435.45	0.039	0.09394	0.06441	1.13526	0.39249	0.6187	Residence
576241	4148435	576240.75_4148435.45	0.03986	0.10223	0.06929	1.15033	0.32202	0.51235	Residence
576261	4148435	576260.75_4148435.45	0.04077	0.11233	0.07506	1.15645	0.26945	0.43287	Residence
576281	4148435	576280.75_4148435.45	0.04169	0.12415	0.08164	1.15242	0.22847	0.37076	Residence
576301	4148435	576300.75_4148435.45	0.04256	0.13726	0.08886	1.13692	0.19518	0.32018	Residence
576361	4148435	576360.75_4148435.45	0.04526	0.19561	0.11715	1.06026	0.12996	0.22141	Residence
576381	4148435	576380.75_4148435.45	0.0462	0.22604	0.12926	1.03039	0.11584	0.20031	Residence
576401	4148435	576400.75_4148435.45	0.04706	0.26229	0.142	0.99542	0.10359	0.18208	Residence
576421	4148435	576420.75_4148435.45	0.04791	0.30906	0.15597	0.9596	0.09333	0.16696	Residence
576441	4148435	576440.75_4148435.45	0.04875	0.3723	0.17177	0.92433	0.08475	0.15453	Residence
576461	4148435	576460.75_4148435.45	0.04955	0.45929	0.18978	0.8888	0.07743	0.14408	Residence
576481	4148435	576480.75_4148435.45	0.05024	0.57954	0.20995	0.85141	0.07095	0.13493	Residence
576501	4148435	576500.75_4148435.45	0.05084	0.7607	0.23289	0.81347	0.06527	0.12702	Residence
576521	4148435	576520.75_4148435.45	0.05142	1.08332	0.26003	0.7774	0.06047	0.12053	Residence
576541	4148435	576540.75_4148435.45	0.05192	1.77006	0.29145	0.7413	0.05624	0.11492	Residence
576561	4148435	576560.75_4148435.45	0.05232	2.45841	0.32853	0.70526	0.0525	0.11005	Residence
576581	4148435	576580.75_4148435.45	0.05254	2.10944	0.37152	0.66805	0.04906	0.10555	Residence
576101	4148455	576100.75_4148455.45	0.03409	0.06198	0.04396	0.86305	2.30924	3.50815	Residence
576121	4148455	576120.75_4148455.45	0.03485	0.06606	0.0469	0.94933	1.50403	2.29095	Residence
576141	4148455	576140.75_4148455.45	0.03559	0.07041	0.04989	1.02575	1.05332	1.61028	Residence
576161	4148455	576160.75_4148455.45	0.03636	0.07535	0.05305	1.09168	0.77535	1.19272	Residence
576181	4148455	576180.75_4148455.45	0.03717	0.08133	0.05663	1.14837	0.59475	0.92224	Residence
576201	4148455	576200.75_4148455.45	0.03799	0.08802	0.06049	1.18996	0.46788	0.73198	Residence
576221	4148455	576220.75_4148455.45	0.03879	0.09539	0.06469	1.21495	0.37534	0.59266	Residence
576241	4148455	576240.75_4148455.45	0.03961	0.10391	0.06949	1.22625	0.30719	0.48966	Residence
576261	4148455	576260.75_4148455.45	0.04046	0.11416	0.07513	1.22711	0.25638	0.41262	Residence
576281	4148455	576280.75_4148455.45	0.04135	0.12672	0.08182	1.21997	0.21779	0.354	Residence
576301	4148455	576300.75_4148455.45	0.04218	0.14053	0.08912	1.19979	0.18623	0.30597	Residence
576321	4148455	576320.75_4148455.45	0.04302	0.15713	0.09753	1.17348	0.16114	0.26785	Residence
576361	4148455	576360.75_4148455.45	0.04469	0.2016	0.11802	1.10748	0.12422	0.21204	Residence
576381	4148455	576380.75_4148455.45	0.04554	0.23317	0.1306	1.07254	0.11075	0.19193	Residence
576401	4148455	576400.75_4148455.45	0.04636	0.27272	0.14444	1.03519	0.09939	0.17511	Residence
576421	4148455	576420.75_4148455.45	0.04708	0.32103	0.15909	0.99406	0.08949	0.16053	Residence
576441	4148455	576440.75_4148455.45	0.04781	0.38734	0.17576	0.95473	0.08132	0.14869	Residence
576461	4148455	576460.75_4148455.45	0.0485	0.47984	0.19473	0.91593	0.07438	0.13881	Residence
576481	4148455	576480.75_4148455.45	0.04913	0.61457	0.21656	0.87726	0.0684	0.13044	Residence
576501	4148455	576500.75_4148455.45	0.0496	0.81189	0.24064	0.83601	0.06296	0.12285	Residence
576521	4148455	576520.75_4148455.45	0.05006	1.15903	0.26938	0.79723	0.05839	0.11665	Residence
576541	4148455	576540.75_4148455.45	0.05047	1.85669	0.30326	0.7594	0.05442	0.1114	Residence
576561	4148455	576560.75_4148455.45	0.05076	3.65694	0.34305	0.72132	0.05088	0.10676	Residence
576581	4148455	576580.75_4148455.45	0.05088	2.35702	0.38942	0.68218	0.04762	0.10247	Residence
576101	4148475	576100.75_4148475.45	0.03399	0.06246	0.04345	0.9323	2.2537	3.40476	Residence
576121	4148475	576120.75_4148475.45	0.03475	0.06683	0.04659	1.02877	1.46781	2.22392	Residence
576141	4148475	576140.75_4148475.45	0.03546	0.07129	0.04971	1.11078	1.01913	1.55353	Residence
576161	4148475	576160.75_4148475.45	0.0362	0.07641	0.05305	1.18064	0.74504	1.14564	Residence
576181	4148475	576180.75_4148475.45	0.03698	0.08249	0.05671	1.23801	0.56752	0.88108	Residence
576201	4148475	576200.75_4148475.45	0.03779	0.08969	0.06078	1.28125	0.44652	0.6999	Residence
576221	4148475	576220.75_4148475.45	0.03856	0.09732	0.065	1.30302	0.35726	0.56529	Residence
576241	4148475	576240.75_4148475.45	0.03934	0.10624	0.06979	1.31021	0.2922	0.46667	Residence
576261	4148475	576260.75_4148475.45	0.04013	0.11682	0.07537	1.30533	0.24366	0.39283	Residence
576281	4148475	576280.75_4148475.45	0.04096	0.12962	0.08193	1.29119	0.20672	0.33655	Residence
576301	4148475	576300.75_4148475.45	0.04177	0.14469	0.08946	1.26759	0.17749	0.29205	Residence
576321	4148475	576320.75_4148475.45	0.04255	0.16199	0.0979	1.23458	0.15363	0.25578	Residence
576381	4148475	576380.75_4148475.45	0.04483	0.24145	0.13175	1.11611	0.1058	0.18384	Residence
576401	4148475	576400.75_4148475.45	0.04559	0.28396	0.14653	1.07539	0.0952	0.1682	Residence
576421	4148475	576420.75_4148475.45	0.04623	0.33585	0.16221	1.03037	0.08588	0.15451	Residence
576441	4148475	576440.75_4148475.45	0.04682	0.40533	0.17966	0.98592	0.07801	0.14311	Residence
576461	4148475	576460.75_4148475.45	0.04742	0.50556	0.19988	0.94411	0.07148	0.13383	Residence
576481	4148475	576480.75_4148475.45	0.04795	0.65262	0.22308	0.9028	0.06586	0.12599	Residence
576501	4148475	576500.75_4148475.45	0.04838	0.87322	0.24931	0.86037	0.06086	0.11905	Residence
576521	4148475	576520.75_4148475.45	0.04874	1.23595	0.27998	0.81893	0.05651	0.11314	Residence
576541	4148475	576540.75_4148475.45	0.04898	1.86651	0.31523	0.77715	0.05263	0.1079	Residence
576561	4148475	576560.75_4148475.45	0.04916	3.17104	0.35772	0.7368	0.04926	0.10346	Residence
576581	4148475	576580.75_4148475.45	0.04921	3.55994	0.40803	0.69604	0.04619	0.09942	Residence
576601	4148475	576600.75_4148475.45	0.04917	3.08218	0.46944	0.65649	0.04349	0.09594	Residence

576101	4148495	576100.75_4148495.45	0.03387	0.06331	0.04286	1.01225	2.19781	3.29149	Residence
576121	4148495	576120.75_4148495.45	0.03462	0.06785	0.04608	1.11843	1.42086	2.1407	Residence
576141	4148495	576140.75_4148495.45	0.03533	0.07262	0.04938	1.2084	0.98015	1.49171	Residence
576161	4148495	576160.75_4148495.45	0.03604	0.07796	0.05287	1.28211	0.71128	1.09491	Residence
576181	4148495	576180.75_4148495.45	0.03677	0.0841	0.05663	1.33865	0.53774	0.83678	Residence
576201	4148495	576200.75_4148495.45	0.03755	0.09161	0.06087	1.38106	0.42244	0.66379	Residence
576221	4148495	576220.75_4148495.45	0.03829	0.09976	0.06528	1.40057	0.3385	0.53678	Residence
576241	4148495	576240.75_4148495.45	0.03903	0.10914	0.07015	1.40272	0.27708	0.44332	Residence
576261	4148495	576260.75_4148495.45	0.03977	0.11999	0.07563	1.38983	0.23085	0.37276	Residence
576281	4148495	576280.75_4148495.45	0.04053	0.13324	0.08212	1.36818	0.19593	0.31949	Residence
576301	4148495	576300.75_4148495.45	0.04132	0.14945	0.08981	1.33955	0.16882	0.27825	Residence
576321	4148495	576320.75_4148495.45	0.04204	0.16773	0.09832	1.29962	0.14635	0.24412	Residence
576341	4148495	576340.75_4148495.45	0.04273	0.18971	0.10814	1.25504	0.12811	0.21656	Residence
576381	4148495	576380.75_4148495.45	0.04409	0.25153	0.1329	1.1622	0.10113	0.17623	Residence
576401	4148495	576400.75_4148495.45	0.04474	0.29586	0.14814	1.11543	0.091	0.16131	Residence
576421	4148495	576420.75_4148495.45	0.04534	0.35365	0.16525	1.0684	0.08244	0.14883	Residence
576441	4148495	576440.75_4148495.45	0.04583	0.4285	0.18378	1.01948	0.07497	0.13799	Residence
576461	4148495	576460.75_4148495.45	0.04634	0.5383	0.20556	0.97484	0.06886	0.12934	Residence
576481	4148495	576480.75_4148495.45	0.04676	0.69324	0.22985	0.92926	0.06346	0.12175	Residence
576501	4148495	576500.75_4148495.45	0.04706	0.91888	0.25736	0.88323	0.05867	0.11508	Residence
576521	4148495	576520.75_4148495.45	0.0473	1.26473	0.28946	0.8383	0.0545	0.10935	Residence
576541	4148495	576540.75_4148495.45	0.04748	1.82104	0.32747	0.79479	0.05087	0.10446	Residence
576561	4148495	576560.75_4148495.45	0.04759	2.82763	0.37329	0.75263	0.04771	0.10028	Residence
576581	4148495	576580.75_4148495.45	0.04759	3.60218	0.42868	0.71082	0.04487	0.09656	Residence
576601	4148495	576600.75_4148495.45	0.04745	2.73442	0.49486	0.66873	0.04226	0.09313	Residence
576101	4148515	576100.75_4148515.45	0.03376	0.06456	0.0423	1.10544	2.1374	3.16634	Residence
576121	4148515	576120.75_4148515.45	0.03446	0.06918	0.04546	1.22095	1.36177	2.04326	Residence
576141	4148515	576140.75_4148515.45	0.03518	0.07436	0.04892	1.32116	0.93485	1.42368	Residence
576161	4148515	576160.75_4148515.45	0.03586	0.07998	0.05256	1.39908	0.67442	1.041	Residence
576181	4148515	576180.75_4148515.45	0.03654	0.08623	0.05641	1.45397	0.50701	0.79139	Residence
576201	4148515	576200.75_4148515.45	0.03727	0.09385	0.06076	1.49214	0.39717	0.62572	Residence
576221	4148515	576220.75_4148515.45	0.038	0.10271	0.06549	1.50995	0.31985	0.50818	Residence
576241	4148515	576240.75_4148515.45	0.03868	0.11232	0.0704	1.50326	0.26166	0.4193	Residence
576261	4148515	576260.75_4148515.45	0.03937	0.12375	0.07597	1.48263	0.21847	0.35329	Residence
576281	4148515	576280.75_4148515.45	0.04008	0.13763	0.08247	1.45235	0.1857	0.30328	Residence
576301	4148515	576300.75_4148515.45	0.0408	0.15446	0.09009	1.41451	0.1601	0.26436	Residence
576321	4148515	576320.75_4148515.45	0.04149	0.17448	0.09888	1.36931	0.13941	0.23303	Residence
576341	4148515	576340.75_4148515.45	0.04212	0.19782	0.1088	1.31707	0.12221	0.2071	Residence
576401	4148515	576400.75_4148515.45	0.04385	0.3098	0.14958	1.1569	0.08699	0.15475	Residence
576421	4148515	576420.75_4148515.45	0.04439	0.37319	0.16792	1.10703	0.07908	0.14327	Residence
576441	4148515	576440.75_4148515.45	0.04483	0.45584	0.18809	1.05559	0.07216	0.1333	Residence
576461	4148515	576460.75_4148515.45	0.04518	0.56672	0.21032	1.00385	0.06613	0.12465	Residence
576481	4148515	576480.75_4148515.45	0.04549	0.72355	0.23586	0.95437	0.061	0.11741	Residence
576501	4148515	576500.75_4148515.45	0.04574	0.94711	0.26546	0.90638	0.05655	0.11123	Residence
576521	4148515	576520.75_4148515.45	0.0459	1.26487	0.29974	0.85895	0.05263	0.10582	Residence
576541	4148515	576540.75_4148515.45	0.046	1.73124	0.34055	0.81318	0.04921	0.10119	Residence
576561	4148515	576560.75_4148515.45	0.04603	2.46788	0.38963	0.76859	0.0462	0.09717	Residence
576581	4148515	576580.75_4148515.45	0.046	2.75117	0.45057	0.72566	0.04357	0.09374	Residence
576601	4148515	576600.75_4148515.45	0.04576	3.92183	0.52231	0.68117	0.04106	0.09039	Residence
576101	4148535	576100.75_4148535.45	0.03364	0.06611	0.04185	1.21502	2.06471	3.02879	Residence
576121	4148535	576120.75_4148535.45	0.03431	0.07086	0.04491	1.3419	1.2931	1.93935	Residence
576141	4148535	576140.75_4148535.45	0.035	0.07635	0.0484	1.45169	0.88127	1.34684	Residence
576161	4148535	576160.75_4148535.45	0.03565	0.08212	0.05204	1.53163	0.63208	0.97963	Residence
576181	4148535	576180.75_4148535.45	0.0363	0.0887	0.05603	1.58605	0.47551	0.74455	Residence
576201	4148535	576200.75_4148535.45	0.03696	0.09637	0.06042	1.61684	0.37173	0.58693	Residence
576221	4148535	576220.75_4148535.45	0.03765	0.1056	0.06536	1.62822	0.30016	0.47766	Residence
576241	4148535	576240.75_4148535.45	0.03832	0.11619	0.07067	1.61688	0.24727	0.39677	Residence
576261	4148535	576260.75_4148535.45	0.03896	0.1283	0.07641	1.58612	0.20691	0.33505	Residence
576281	4148535	576280.75_4148535.45	0.0396	0.14271	0.0829	1.54359	0.17588	0.28775	Residence
576301	4148535	576300.75_4148535.45	0.04025	0.16028	0.09048	1.49474	0.15174	0.25109	Residence
576321	4148535	576320.75_4148535.45	0.0409	0.18192	0.09946	1.4423	0.13259	0.22219	Residence
576341	4148535	576340.75_4148535.45	0.04146	0.20674	0.10943	1.38138	0.1164	0.19785	Residence
576361	4148535	576360.75_4148535.45	0.04199	0.23743	0.12113	1.31996	0.10317	0.17808	Residence
576401	4148535	576400.75_4148535.45	0.04294	0.32571	0.15092	1.20033	0.08317	0.14855	Residence
576421	4148535	576420.75_4148535.45	0.04338	0.39188	0.16984	1.14473	0.07567	0.13765	Residence
576441	4148535	576440.75_4148535.45	0.04375	0.47847	0.19122	1.08953	0.06921	0.12833	Residence
576461	4148535	576460.75_4148535.45	0.04401	0.59057	0.21471	1.03344	0.0635	0.12013	Residence
576481	4148535	576480.75_4148535.45	0.04425	0.74525	0.24211	0.98113	0.05871	0.11336	Residence
576501	4148535	576500.75_4148535.45	0.04443	0.95472	0.27383	0.9305	0.05455	0.10755	Residence
576521	4148535	576520.75_4148535.45	0.04455	1.23673	0.31095	0.88115	0.0509	0.10252	Residence
576541	4148535	576540.75_4148535.45	0.0446	1.62278	0.35521	0.83333	0.0477	0.09817	Residence
576561	4148535	576560.75_4148535.45	0.04455	2.18583	0.40818	0.78622	0.04483	0.09432	Residence
576581	4148535	576580.75_4148535.45	0.04444	3.25378	0.4742	0.74091	0.04232	0.091	Residence
576601	4148535	576600.75_4148535.45	0.04413	3.91241	0.55308	0.69445	0.03994	0.08779	Residence

576621	4148535	576620.75_4148535.45	0.04374	2.66922	0.65109	0.64986	0.03782	0.085	Residence
576101	4148555	576100.75_4148555.45	0.03349	0.06774	0.04153	1.34299	1.95873	2.8621	Residence
576121	4148555	576120.75_4148555.45	0.03414	0.07275	0.0445	1.48501	1.20923	1.82268	Residence
576141	4148555	576140.75_4148555.45	0.0348	0.07842	0.04788	1.60273	0.81861	1.25864	Residence
576161	4148555	576160.75_4148555.45	0.03542	0.08451	0.05151	1.68574	0.58821	0.91545	Residence
576181	4148555	576180.75_4148555.45	0.036	0.09118	0.05541	1.73389	0.44223	0.69417	Residence
576201	4148555	576200.75_4148555.45	0.03662	0.09916	0.05989	1.75755	0.34681	0.54847	Residence
576221	4148555	576220.75_4148555.45	0.03726	0.10882	0.06499	1.75972	0.28095	0.4477	Residence
576241	4148555	576240.75_4148555.45	0.03788	0.11997	0.07051	1.73702	0.23217	0.37307	Residence
576261	4148555	576260.75_4148555.45	0.0385	0.13309	0.07659	1.69626	0.19522	0.31666	Residence
576281	4148555	576280.75_4148555.45	0.0391	0.14864	0.08337	1.64296	0.16656	0.27304	Residence
576301	4148555	576300.75_4148555.45	0.03968	0.1672	0.09103	1.58179	0.14388	0.23868	Residence
576321	4148555	576320.75_4148555.45	0.04025	0.18975	0.09993	1.51718	0.12575	0.21137	Residence
576341	4148555	576340.75_4148555.45	0.04077	0.21688	0.11019	1.44944	0.11085	0.18905	Residence
576361	4148555	576360.75_4148555.45	0.04123	0.24977	0.12203	1.3802	0.09846	0.17059	Residence
576421	4148555	576420.75_4148555.45	0.04236	0.41009	0.17157	1.18423	0.07245	0.13233	Residence
576441	4148555	576440.75_4148555.45	0.04268	0.4993	0.19442	1.12629	0.0665	0.12377	Residence
576461	4148555	576460.75_4148555.45	0.04288	0.61051	0.21959	1.06672	0.06116	0.11609	Residence
576481	4148555	576480.75_4148555.45	0.04304	0.75497	0.24854	1.00984	0.05659	0.10958	Residence
576501	4148555	576500.75_4148555.45	0.04316	0.94363	0.28261	0.95624	0.05268	0.1041	Residence
576521	4148555	576520.75_4148555.45	0.04324	1.18928	0.32317	0.90516	0.0493	0.09945	Residence
576541	4148555	576540.75_4148555.45	0.04323	1.50766	0.3711	0.85473	0.04627	0.0953	Residence
576561	4148555	576560.75_4148555.45	0.0431	1.94922	0.42815	0.80457	0.04351	0.09155	Residence
576581	4148555	576580.75_4148555.45	0.04287	2.70435	0.49839	0.75559	0.04105	0.08821	Residence
576601	4148555	576600.75_4148555.45	0.04254	2.94896	0.5869	0.70818	0.03884	0.08527	Residence
576621	4148555	576620.75_4148555.45	0.04206	2.89792	0.69498	0.661	0.03679	0.0825	Residence
576121	4148575	576120.75_4148575.45	0.03396	0.07487	0.04434	1.65718	1.11228	1.69367	Residence
576141	4148575	576140.75_4148575.45	0.03456	0.08062	0.04747	1.77945	0.75093	1.16188	Residence
576161	4148575	576160.75_4148575.45	0.03515	0.08707	0.05102	1.86422	0.54359	0.8486	Residence
576181	4148575	576180.75_4148575.45	0.03573	0.09452	0.05507	1.91386	0.41368	0.65037	Residence
576201	4148575	576200.75_4148575.45	0.03629	0.10288	0.05951	1.92603	0.32516	0.51485	Residence
576221	4148575	576220.75_4148575.45	0.03685	0.11264	0.0645	1.90858	0.26286	0.41946	Residence
576241	4148575	576240.75_4148575.45	0.03741	0.12428	0.07013	1.86889	0.21758	0.35022	Residence
576261	4148575	576260.75_4148575.45	0.03797	0.13804	0.07639	1.8117	0.18333	0.298	Residence
576281	4148575	576280.75_4148575.45	0.03851	0.15438	0.08335	1.74323	0.15674	0.25761	Residence
576301	4148575	576300.75_4148575.45	0.03903	0.17398	0.09119	1.66907	0.13573	0.22586	Residence
576321	4148575	576320.75_4148575.45	0.03955	0.19793	0.10025	1.59404	0.11898	0.20069	Residence
576341	4148575	576340.75_4148575.45	0.04004	0.22774	0.11099	1.52081	0.10549	0.18059	Residence
576361	4148575	576360.75_4148575.45	0.04043	0.26217	0.12281	1.44183	0.09382	0.16322	Residence
576381	4148575	576380.75_4148575.45	0.04076	0.3045	0.13667	1.3652	0.08411	0.14884	Residence
576421	4148575	576420.75_4148575.45	0.04134	0.42583	0.17321	1.2262	0.06943	0.12733	Residence
576441	4148575	576440.75_4148575.45	0.04159	0.51244	0.19686	1.16303	0.06381	0.11922	Residence
576461	4148575	576460.75_4148575.45	0.04177	0.62049	0.22415	1.1015	0.05893	0.11222	Residence
576481	4148575	576480.75_4148575.45	0.04185	0.75115	0.25481	1.04	0.05457	0.10596	Residence
576501	4148575	576500.75_4148575.45	0.04192	0.91619	0.29136	0.98302	0.05088	0.10076	Residence
576521	4148575	576520.75_4148575.45	0.04194	1.12404	0.33512	0.92908	0.0477	0.09635	Residence
576541	4148575	576540.75_4148575.45	0.04185	1.38451	0.38663	0.87547	0.0448	0.09235	Residence
576561	4148575	576560.75_4148575.45	0.04165	1.73909	0.44841	0.82253	0.04218	0.08874	Residence
576581	4148575	576580.75_4148575.45	0.04135	2.32044	0.52523	0.77124	0.03984	0.08554	Residence
576601	4148575	576600.75_4148575.45	0.04097	2.45203	0.6239	0.72221	0.03777	0.08278	Residence
576621	4148575	576620.75_4148575.45	0.04041	4.21534	0.74348	0.67229	0.03578	0.08004	Residence
576641	4148575	576640.75_4148575.45	0.03987	2.94226	0.89795	0.62654	0.03411	0.07785	Residence
576121	4148595	576120.75_4148595.45	0.03373	0.07703	0.04436	1.86117	1.00207	1.54251	Residence
576141	4148595	576140.75_4148595.45	0.0343	0.08316	0.04737	1.99218	0.68606	1.06607	Residence
576161	4148595	576160.75_4148595.45	0.03486	0.0901	0.0508	2.07729	0.50204	0.78529	Residence
576181	4148595	576180.75_4148595.45	0.0354	0.098	0.05472	2.11871	0.38442	0.60523	Residence
576201	4148595	576200.75_4148595.45	0.03593	0.10706	0.05917	2.11945	0.30421	0.48235	Residence
576221	4148595	576220.75_4148595.45	0.03646	0.1177	0.06428	2.08704	0.24741	0.39539	Residence
576241	4148595	576240.75_4148595.45	0.03696	0.12985	0.06991	2.02356	0.20485	0.33036	Residence
576261	4148595	576260.75_4148595.45	0.03745	0.14415	0.07622	1.94305	0.17263	0.28128	Residence
576281	4148595	576280.75_4148595.45	0.03792	0.16123	0.08333	1.85489	0.14777	0.24358	Residence
576301	4148595	576300.75_4148595.45	0.03839	0.18193	0.09143	1.76556	0.12828	0.2142	Residence
576321	4148595	576320.75_4148595.45	0.03883	0.20702	0.10066	1.67711	0.11266	0.1908	Residence
576341	4148595	576340.75_4148595.45	0.03926	0.23812	0.11155	1.59337	0.10014	0.17216	Residence
576361	4148595	576360.75_4148595.45	0.03962	0.27467	0.12377	1.50794	0.08947	0.15633	Residence
576381	4148595	576380.75_4148595.45	0.03991	0.3188	0.13805	1.42544	0.08053	0.14312	Residence
576441	4148595	576440.75_4148595.45	0.04051	0.51895	0.19904	1.20175	0.06127	0.1149	Residence
576461	4148595	576460.75_4148595.45	0.04067	0.62046	0.22825	1.13767	0.05678	0.10846	Residence
576481	4148595	576480.75_4148595.45	0.04071	0.73803	0.2612	1.07274	0.05271	0.10259	Residence
576501	4148595	576500.75_4148595.45	0.0407	0.87918	0.30013	1.01132	0.04918	0.09756	Residence
576521	4148595	576520.75_4148595.45	0.04067	1.05538	0.34747	0.95431	0.04616	0.09336	Residence
576541	4148595	576540.75_4148595.45	0.0405	1.27153	0.40302	0.89728	0.0434	0.08949	Residence
576561	4148595	576560.75_4148595.45	0.04024	1.5672	0.4705	0.84166	0.04091	0.08604	Residence
576581	4148595	576580.75_4148595.45	0.03987	2.04181	0.55507	0.78795	0.03869	0.08298	Residence

576601	4148595	576600.75_4148595.45	0.03942	3.01695	0.66369	0.73614	0.0367	0.08028	Residence
576621	4148595	576620.75_4148595.45	0.03883	2.08709	0.79919	0.68444	0.03482	0.0777	Residence
576641	4148595	576640.75_4148595.45	0.03818	3.38932	0.96956	0.6349	0.03313	0.07538	Residence
576141	4148615	576140.75_4148615.45	0.03397	0.08564	0.04735	2.23871	0.61839	0.96413	Residence
576161	4148615	576160.75_4148615.45	0.03451	0.09315	0.05069	2.32319	0.45935	0.7201	Residence
576181	4148615	576180.75_4148615.45	0.03503	0.10173	0.05454	2.35597	0.3555	0.56073	Residence
576201	4148615	576200.75_4148615.45	0.03553	0.11158	0.05896	2.34132	0.28367	0.45058	Residence
576221	4148615	576220.75_4148615.45	0.03601	0.12279	0.06394	2.28272	0.23136	0.37049	Residence
576241	4148615	576240.75_4148615.45	0.03646	0.13568	0.06957	2.19312	0.19223	0.31075	Residence
576261	4148615	576260.75_4148615.45	0.03691	0.15096	0.07604	2.08948	0.16262	0.26572	Residence
576281	4148615	576280.75_4148615.45	0.03733	0.16904	0.08335	1.98011	0.13958	0.23086	Residence
576301	4148615	576300.75_4148615.45	0.03774	0.19062	0.09163	1.8716	0.12137	0.20346	Residence
576321	4148615	576320.75_4148615.45	0.03811	0.21641	0.101	1.76667	0.10673	0.18155	Residence
576341	4148615	576340.75_4148615.45	0.03846	0.24781	0.11192	1.66919	0.09496	0.16405	Residence
576361	4148615	576360.75_4148615.45	0.03879	0.28577	0.12471	1.57771	0.0853	0.14975	Residence
576381	4148615	576380.75_4148615.45	0.03902	0.32933	0.13899	1.48575	0.07691	0.13732	Residence
576401	4148615	576400.75_4148615.45	0.03919	0.38087	0.15573	1.39801	0.06979	0.12679	Residence
576441	4148615	576440.75_4148615.45	0.03947	0.51977	0.2012	1.24354	0.0589	0.11084	Residence
576461	4148615	576460.75_4148615.45	0.03956	0.61079	0.23144	1.17408	0.05465	0.10469	Residence
576481	4148615	576480.75_4148615.45	0.0396	0.7181	0.26762	1.10808	0.05096	0.09939	Residence
576501	4148615	576500.75_4148615.45	0.03952	0.83778	0.30892	1.04155	0.04756	0.09449	Residence
576521	4148615	576520.75_4148615.45	0.0394	0.98452	0.3593	0.97978	0.04464	0.09036	Residence
576541	4148615	576540.75_4148615.45	0.03918	1.17018	0.42012	0.92015	0.04204	0.08671	Residence
576561	4148615	576560.75_4148615.45	0.03886	1.42601	0.49459	0.8621	0.03969	0.08344	Residence
576581	4148615	576580.75_4148615.45	0.03842	1.82093	0.58737	0.80521	0.03756	0.08047	Residence
576601	4148615	576600.75_4148615.45	0.0379	2.57962	0.70736	0.7504	0.03564	0.07782	Residence
576621	4148615	576620.75_4148615.45	0.0373	3.01779	0.86278	0.69721	0.03389	0.07542	Residence
576641	4148615	576640.75_4148615.45	0.03658	2.48556	1.05429	0.64422	0.03222	0.07306	Residence
576161	4148635	576160.75_4148635.45	0.03411	0.09635	0.05083	2.6127	0.41752	0.65635	Residence
576181	4148635	576180.75_4148635.45	0.03459	0.10537	0.05447	2.62623	0.32576	0.51505	Residence
576201	4148635	576200.75_4148635.45	0.03505	0.1157	0.05868	2.58408	0.26147	0.41631	Residence
576221	4148635	576220.75_4148635.45	0.0355	0.12772	0.0636	2.49713	0.21485	0.34494	Residence
576241	4148635	576240.75_4148635.45	0.03593	0.14168	0.06929	2.3799	0.17985	0.29156	Residence
576261	4148635	576260.75_4148635.45	0.03634	0.15787	0.07578	2.24783	0.1528	0.25051	Residence
576281	4148635	576280.75_4148635.45	0.03671	0.17675	0.08315	2.11318	0.13153	0.21841	Residence
576301	4148635	576300.75_4148635.45	0.03706	0.1991	0.09161	1.98471	0.11473	0.19317	Residence
576321	4148635	576320.75_4148635.45	0.03738	0.22543	0.10122	1.86365	0.10118	0.17291	Residence
576341	4148635	576340.75_4148635.45	0.03767	0.25692	0.11239	1.75287	0.09025	0.15666	Residence
576361	4148635	576360.75_4148635.45	0.03795	0.29447	0.12543	1.65095	0.08129	0.14339	Residence
576381	4148635	576380.75_4148635.45	0.03812	0.33666	0.13979	1.54907	0.07343	0.13172	Residence
576401	4148635	576400.75_4148635.45	0.03828	0.38727	0.15718	1.45657	0.06695	0.12213	Residence
576461	4148635	576460.75_4148635.45	0.0385	0.59676	0.23472	1.21394	0.05268	0.10116	Residence
576481	4148635	576480.75_4148635.45	0.03851	0.69211	0.2734	1.14475	0.04924	0.09622	Residence
576501	4148635	576500.75_4148635.45	0.03838	0.79645	0.31799	1.07454	0.04604	0.09158	Residence
576521	4148635	576520.75_4148635.45	0.03817	0.92177	0.37207	1.00809	0.04323	0.08756	Residence
576541	4148635	576540.75_4148635.45	0.03789	1.08321	0.43844	0.94492	0.04075	0.08405	Residence
576561	4148635	576560.75_4148635.45	0.03751	1.30757	0.52056	0.88378	0.03852	0.08092	Residence
576581	4148635	576580.75_4148635.45	0.03702	1.65463	0.62421	0.82425	0.0365	0.07809	Residence
576601	4148635	576600.75_4148635.45	0.03645	2.30821	0.75839	0.76632	0.03466	0.07552	Residence
576621	4148635	576620.75_4148635.45	0.0358	4.02769	0.93399	0.71005	0.03297	0.07316	Residence
576641	4148635	576640.75_4148635.45	0.03507	2.43723	1.15461	0.65436	0.03136	0.07085	Residence
576201	4148655	576200.75_4148655.45	0.03456	0.12025	0.05889	2.87351	0.24104	0.38479	Residence
576221	4148655	576220.75_4148655.45	0.03496	0.13273	0.06355	2.73952	0.19887	0.32023	Residence
576241	4148655	576240.75_4148655.45	0.03533	0.14705	0.06891	2.5754	0.16688	0.27153	Residence
576261	4148655	576260.75_4148655.45	0.03569	0.16393	0.07527	2.40984	0.14253	0.23465	Residence
576281	4148655	576280.75_4148655.45	0.03604	0.18377	0.08278	2.25292	0.12355	0.20608	Residence
576301	4148655	576300.75_4148655.45	0.03636	0.2069	0.09149	2.10659	0.1084	0.18339	Residence
576321	4148655	576320.75_4148655.45	0.03665	0.23357	0.1014	1.97005	0.09603	0.16493	Residence
576341	4148655	576340.75_4148655.45	0.0369	0.26469	0.11285	1.84511	0.08592	0.14988	Residence
576361	4148655	576360.75_4148655.45	0.0371	0.30048	0.12584	1.72811	0.07743	0.13726	Residence
576381	4148655	576380.75_4148655.45	0.03724	0.34106	0.14046	1.61658	0.07015	0.1264	Residence
576401	4148655	576400.75_4148655.45	0.03737	0.38959	0.15841	1.51783	0.06419	0.11757	Residence
576421	4148655	576420.75_4148655.45	0.03745	0.44457	0.1796	1.42395	0.05902	0.10989	Residence
576461	4148655	576460.75_4148655.45	0.03747	0.57912	0.23789	1.25675	0.0508	0.09778	Residence
576481	4148655	576480.75_4148655.45	0.0374	0.66122	0.27795	1.18167	0.04751	0.09299	Residence
576501	4148655	576500.75_4148655.45	0.03726	0.75682	0.32726	1.11043	0.04461	0.08881	Residence
576521	4148655	576520.75_4148655.45	0.03697	0.86421	0.38485	1.03822	0.04187	0.08483	Residence
576541	4148655	576540.75_4148655.45	0.0366	1.00298	0.45614	0.96988	0.03945	0.08136	Residence
576561	4148655	576560.75_4148655.45	0.03616	1.2029	0.54681	0.90557	0.03734	0.07837	Residence
576581	4148655	576580.75_4148655.45	0.03564	1.51322	0.66275	0.84322	0.03542	0.07568	Residence
576601	4148655	576600.75_4148655.45	0.035	2.06057	0.81182	0.78142	0.03363	0.07313	Residence
576621	4148655	576620.75_4148655.45	0.03436	3.36848	1.01458	0.72311	0.03206	0.07092	Residence
576641	4148655	576640.75_4148655.45	0.03362	3.82919	1.27086	0.66456	0.03051	0.06867	Residence
576242	4148666	576241.93_4148665.82	0.03505	0.15109	0.06937	2.68018	0.15936	0.25997	Residence

576262	4148666	576261.93_4148665.82	0.03538	0.16821	0.07562	2.49129	0.13639	0.22524	Residence
576282	4148666	576281.93_4148665.82	0.03569	0.1881	0.08298	2.31646	0.1184	0.19819	Residence
576302	4148666	576301.93_4148665.82	0.03599	0.21132	0.09168	2.15912	0.10416	0.17687	Residence
576322	4148666	576321.93_4148665.82	0.03627	0.23842	0.1019	2.01748	0.09269	0.15977	Residence
576342	4148666	576341.93_4148665.82	0.03651	0.2697	0.11367	1.88729	0.08321	0.14566	Residence
576362	4148666	576361.93_4148665.82	0.03669	0.30513	0.1269	1.76426	0.07513	0.13362	Residence
576382	4148666	576381.93_4148665.82	0.03681	0.34528	0.14191	1.64854	0.06822	0.12331	Residence
576402	4148666	576401.93_4148665.82	0.03692	0.3925	0.16018	1.54531	0.06251	0.11481	Residence
576422	4148666	576421.93_4148665.82	0.03697	0.44589	0.18199	1.44884	0.05759	0.10749	Residence
576482	4148666	576481.93_4148665.82	0.03684	0.65089	0.28331	1.19831	0.04649	0.09116	Residence
576502	4148666	576501.93_4148665.82	0.03667	0.74122	0.3348	1.1248	0.04369	0.0871	Residence
576522	4148666	576521.93_4148665.82	0.03634	0.84331	0.39542	1.0504	0.04103	0.08323	Residence
576542	4148666	576541.93_4148665.82	0.03593	0.97749	0.47125	0.98027	0.03869	0.07987	Residence
576562	4148666	576561.93_4148665.82	0.03545	1.17082	0.56784	0.91387	0.03663	0.07693	Residence
576582	4148666	576581.93_4148665.82	0.03488	1.46809	0.6911	0.84901	0.03475	0.07425	Residence
576602	4148666	576601.93_4148665.82	0.03425	2.00962	0.85426	0.7864	0.03304	0.07182	Residence
576622	4148666	576621.93_4148665.82	0.03359	3.29724	1.07524	0.7264	0.0315	0.06964	Residence
576642	4148666	576641.93_4148665.82	0.03286	4.26296	1.35797	0.66654	0.02999	0.06744	Residence
576302	4148686	576301.93_4148685.82	0.03526	0.21666	0.09153	2.29061	0.09818	0.16761	Residence
576322	4148686	576321.93_4148685.82	0.03548	0.24266	0.10142	2.12624	0.08754	0.15172	Residence
576342	4148686	576341.93_4148685.82	0.03568	0.27259	0.11304	1.97925	0.07879	0.13866	Residence
576362	4148686	576361.93_4148685.82	0.03585	0.30717	0.12676	1.84736	0.07153	0.12782	Residence
576382	4148686	576381.93_4148685.82	0.03598	0.34668	0.14284	1.72701	0.06538	0.11864	Residence
576402	4148686	576401.93_4148685.82	0.03605	0.39079	0.16159	1.61485	0.06006	0.11068	Residence
576422	4148686	576421.93_4148685.82	0.03607	0.43936	0.18383	1.5101	0.05542	0.10375	Residence
576442	4148686	576441.93_4148685.82	0.03602	0.4925	0.21082	1.41238	0.05138	0.09772	Residence
576482	4148686	576481.93_4148685.82	0.03579	0.62156	0.28858	1.24133	0.04495	0.08823	Residence
576502	4148686	576501.93_4148685.82	0.03553	0.69993	0.34221	1.16129	0.04222	0.08424	Residence
576522	4148686	576521.93_4148685.82	0.03517	0.79537	0.40905	1.0844	0.03977	0.08068	Residence
576542	4148686	576541.93_4148685.82	0.0347	0.91663	0.49149	1.00916	0.03752	0.07739	Residence
576562	4148686	576561.93_4148685.82	0.03415	1.08914	0.59679	0.93738	0.03551	0.07447	Residence
576582	4148686	576581.93_4148685.82	0.03355	1.36154	0.73571	0.86927	0.03372	0.07192	Residence
576602	4148686	576601.93_4148685.82	0.0329	1.83998	0.92097	0.80304	0.03209	0.06957	Residence
576622	4148686	576621.93_4148685.82	0.03223	2.96793	1.17555	0.73951	0.03061	0.06745	Residence
576642	4148686	576641.93_4148685.82	0.03151	1.84829	1.50855	0.67644	0.02916	0.06531	Residence
576362	4148706	576361.93_4148705.82	0.03501	0.30702	0.12639	1.93481	0.06806	0.12218	Residence
576382	4148706	576381.93_4148705.82	0.0351	0.34339	0.14228	1.80106	0.0623	0.11352	Residence
576402	4148706	576401.93_4148705.82	0.03515	0.38423	0.16155	1.68177	0.05744	0.10622	Residence
576422	4148706	576421.93_4148705.82	0.03515	0.42899	0.18478	1.57225	0.05322	0.0999	Residence
576442	4148706	576441.93_4148705.82	0.03509	0.47773	0.21315	1.47053	0.04953	0.09437	Residence
576482	4148706	576481.93_4148705.82	0.0347	0.58968	0.29189	1.2836	0.04332	0.08513	Residence
576502	4148706	576501.93_4148705.82	0.03439	0.66004	0.34817	1.19872	0.04075	0.08135	Residence
576522	4148706	576521.93_4148705.82	0.03401	0.7505	0.4214	1.11945	0.03851	0.07809	Residence
576542	4148706	576541.93_4148705.82	0.03349	0.86221	0.51114	1.03926	0.03635	0.07492	Residence
576562	4148706	576561.93_4148705.82	0.0329	1.02303	0.62838	0.96336	0.03444	0.07214	Residence
576582	4148706	576581.93_4148705.82	0.03227	1.27005	0.78377	0.89054	0.03272	0.06964	Residence
576602	4148706	576601.93_4148705.82	0.0316	1.68783	0.99504	0.82021	0.03115	0.06736	Residence
576622	4148706	576621.93_4148705.82	0.03093	2.55023	1.29133	0.75296	0.02973	0.0653	Residence
576642	4148706	576641.93_4148705.82	0.03023	2.74191	1.68875	0.68652	0.02835	0.06322	Residence
576422	4148726	576421.93_4148725.82	0.03423	0.41612	0.18507	1.63658	0.05102	0.09601	Residence
576442	4148726	576441.93_4148725.82	0.03411	0.45926	0.21383	1.52729	0.04755	0.0908	Residence
576502	4148726	576501.93_4148725.82	0.03328	0.62492	0.35424	1.23995	0.03936	0.07859	Residence
576522	4148726	576521.93_4148725.82	0.03284	0.70694	0.43123	1.15457	0.0372	0.07542	Residence
576542	4148726	576541.93_4148725.82	0.03231	0.81643	0.53174	1.07239	0.03525	0.07257	Residence
576562	4148726	576561.93_4148725.82	0.03168	0.96342	0.66024	0.9905	0.03339	0.06983	Residence
576582	4148726	576581.93_4148725.82	0.03102	1.18701	0.83446	0.91258	0.03174	0.06739	Residence
576602	4148726	576601.93_4148725.82	0.03035	1.55505	1.07706	0.83792	0.03024	0.06519	Residence
576622	4148726	576621.93_4148725.82	0.0297	2.27204	1.4252	0.76664	0.02888	0.06319	Residence
576642	4148726	576641.93_4148725.82	0.02902	2.7178	1.90595	0.69658	0.02755	0.06119	Residence
576522	4148746	576521.93_4148745.82	0.03168	0.66771	0.43998	1.19187	0.03592	0.0728	Residence
576542	4148746	576541.93_4148745.82	0.03112	0.76865	0.54762	1.10414	0.03407	0.07006	Residence
576562	4148746	576561.93_4148745.82	0.0305	0.91003	0.69279	1.01945	0.03238	0.06758	Residence
576582	4148746	576581.93_4148745.82	0.02984	1.11555	0.89037	0.93671	0.03081	0.06525	Residence
576602	4148746	576601.93_4148745.82	0.02918	1.44135	1.17118	0.85715	0.02937	0.06312	Residence
576622	4148746	576621.93_4148745.82	0.02851	2.01084	1.57749	0.78	0.02802	0.0611	Residence
576642	4148746	576641.93_4148745.82	0.02786	3.22261	2.16266	0.70558	0.02674	0.05913	Residence
576542	4148766	576541.93_4148765.82	0.02996	0.72404	0.56134	1.13725	0.0329	0.06759	Residence
576562	4148766	576561.93_4148765.82	0.02932	0.85143	0.71836	1.0465	0.03129	0.06519	Residence
576582	4148766	576581.93_4148765.82	0.02866	1.03467	0.9392	0.95858	0.0298	0.06297	Residence
576602	4148766	576601.93_4148765.82	0.02801	1.31578	1.2615	0.87391	0.02843	0.06092	Residence
576622	4148766	576621.93_4148765.82	0.02737	1.78208	1.74204	0.79168	0.02713	0.05895	Residence
576561	4146002	576560.72_4146001.66	0.0322	0.05477	0.04619	0.09441	0.38579	0.12809	Residence
576581	4146002	576580.72_4146001.66	0.03352	0.05624	0.0469	0.09537	0.421	0.12859	Residence
576601	4146002	576600.72_4146001.66	0.0349	0.05787	0.04768	0.09625	0.45336	0.12899	Residence

576621	4146002	576620.72_4146001.66	0.03631	0.05961	0.04858	0.09696	0.48029	0.12928	Residence
576641	4146002	576640.72_4146001.66	0.03777	0.06148	0.04959	0.09761	0.50113	0.12947	Residence
576661	4146002	576660.72_4146001.66	0.03931	0.06348	0.05072	0.09813	0.51588	0.12957	Residence
576681	4146002	576680.72_4146001.66	0.04097	0.06561	0.052	0.09852	0.525	0.12959	Residence
576701	4146002	576700.72_4146001.66	0.04275	0.06786	0.05339	0.09882	0.52982	0.12957	Residence
576721	4146002	576720.72_4146001.66	0.04462	0.07018	0.05485	0.09892	0.52951	0.12942	Residence
576741	4146002	576740.72_4146001.66	0.04672	0.07261	0.05644	0.09895	0.52716	0.12926	Residence
576761	4146002	576760.72_4146001.66	0.04903	0.07511	0.0581	0.09885	0.52256	0.12905	Residence
576781	4146002	576780.72_4146001.66	0.05158	0.07766	0.05982	0.09864	0.51651	0.12879	Residence
576801	4146002	576800.72_4146001.66	0.05438	0.08023	0.06159	0.0983	0.50918	0.12847	Residence
576821	4146002	576820.72_4146001.66	0.05746	0.08281	0.06338	0.09786	0.50117	0.1281	Residence
576841	4146002	576840.72_4146001.66	0.06082	0.0854	0.06517	0.0973	0.49265	0.12769	Residence
576861	4146002	576860.72_4146001.66	0.06447	0.08798	0.06696	0.09665	0.48378	0.12724	Residence
576881	4146002	576880.72_4146001.66	0.06841	0.09054	0.06872	0.09589	0.47458	0.12674	Residence
576901	4146002	576900.72_4146001.66	0.07268	0.0931	0.07045	0.09506	0.46553	0.12621	Residence
576921	4146002	576920.72_4146001.66	0.07711	0.09558	0.0721	0.09409	0.45527	0.1256	Residence
576961	4146002	576960.72_4146001.66	0.08723	0.10065	0.07534	0.09208	0.4379	0.12442	Residence
576981	4146002	576980.72_4146001.66	0.09275	0.10315	0.07688	0.09097	0.42925	0.12379	Residence
577001	4146002	577000.72_4146001.66	0.09869	0.10564	0.07839	0.08983	0.42121	0.12314	Residence
577021	4146002	577020.72_4146001.66	0.10497	0.10805	0.07984	0.08862	0.413	0.12245	Residence
577041	4146002	577040.72_4146001.66	0.11192	0.11047	0.08128	0.08743	0.40584	0.12177	Residence
577061	4146002	577060.72_4146001.66	0.11931	0.11275	0.08264	0.08617	0.39828	0.12104	Residence
577081	4146002	577080.72_4146001.66	0.12758	0.11498	0.084	0.08494	0.3916	0.1203	Residence
576561	4146022	576560.72_4146021.66	0.03231	0.05527	0.04656	0.09529	0.41591	0.13009	Residence
576581	4146022	576580.72_4146021.66	0.03366	0.05676	0.04727	0.09625	0.45495	0.13056	Residence
576601	4146022	576600.72_4146021.66	0.03506	0.05841	0.04803	0.09713	0.4903	0.13095	Residence
576621	4146022	576620.72_4146021.66	0.03651	0.06018	0.04896	0.09784	0.51917	0.13123	Residence
576641	4146022	576640.72_4146021.66	0.038	0.06208	0.04997	0.09847	0.54054	0.1314	Residence
576661	4146022	576660.72_4146021.66	0.03955	0.06411	0.0511	0.09898	0.55484	0.13148	Residence
576681	4146022	576680.72_4146021.66	0.0412	0.06626	0.05238	0.09936	0.56285	0.13149	Residence
576701	4146022	576700.72_4146021.66	0.04308	0.06858	0.05383	0.09967	0.56709	0.13151	Residence
576721	4146022	576720.72_4146021.66	0.04494	0.07092	0.05531	0.09974	0.56435	0.1313	Residence
576741	4146022	576740.72_4146021.66	0.04703	0.07339	0.05691	0.09974	0.56019	0.13112	Residence
576761	4146022	576760.72_4146021.66	0.04936	0.07593	0.05859	0.09962	0.5538	0.13088	Residence
576781	4146022	576780.72_4146021.66	0.05194	0.07852	0.06033	0.09938	0.54612	0.1306	Residence
576801	4146022	576800.72_4146021.66	0.05475	0.08113	0.06212	0.09901	0.53709	0.13024	Residence
576821	4146022	576820.72_4146021.66	0.05785	0.08376	0.06393	0.09853	0.52758	0.12985	Residence
576841	4146022	576840.72_4146021.66	0.06125	0.08639	0.06575	0.09795	0.51777	0.12941	Residence
576861	4146022	576860.72_4146021.66	0.06496	0.08902	0.06756	0.09727	0.50773	0.12892	Residence
576881	4146022	576880.72_4146021.66	0.069	0.09164	0.06934	0.0965	0.49776	0.12841	Residence
576901	4146022	576900.72_4146021.66	0.07351	0.09432	0.07113	0.0957	0.48917	0.12792	Residence
576921	4146022	576920.72_4146021.66	0.07802	0.09684	0.0728	0.09469	0.47776	0.12727	Residence
576961	4146022	576960.72_4146021.66	0.08842	0.10202	0.07608	0.09262	0.45893	0.12604	Residence
576981	4146022	576980.72_4146021.66	0.09418	0.10459	0.07766	0.09151	0.4501	0.12539	Residence
577001	4146022	577000.72_4146021.66	0.1003	0.10712	0.07919	0.09035	0.44147	0.12472	Residence
577021	4146022	577020.72_4146021.66	0.10685	0.10959	0.08067	0.08913	0.43304	0.12402	Residence
577041	4146022	577040.72_4146021.66	0.11396	0.11202	0.08211	0.0879	0.42523	0.1233	Residence
577061	4146022	577060.72_4146021.66	0.12179	0.11439	0.08352	0.08667	0.41804	0.12257	Residence
577081	4146022	577080.72_4146021.66	0.13019	0.11658	0.08486	0.08538	0.41038	0.12179	Residence
577101	4146022	577100.72_4146021.66	0.13975	0.11873	0.0862	0.08414	0.40397	0.12101	Residence
577121	4146022	577120.72_4146021.66	0.15024	0.1207	0.08746	0.08287	0.39727	0.12019	Residence
577141	4146022	577140.72_4146021.66	0.16203	0.12252	0.08868	0.08163	0.39107	0.11936	Residence
577181	4146022	577180.72_4146021.66	0.18992	0.1256	0.0909	0.07921	0.37903	0.11761	Residence
577201	4146022	577200.72_4146021.66	0.2061	0.12679	0.09185	0.078	0.37259	0.11667	Residence
577221	4146022	577220.72_4146021.66	0.22433	0.12779	0.0927	0.07684	0.36637	0.11572	Residence
577241	4146022	577240.72_4146021.66	0.24467	0.12858	0.09343	0.0757	0.35993	0.11474	Residence
577261	4146022	577260.72_4146021.66	0.2672	0.12913	0.09401	0.07456	0.35288	0.11372	Residence
577281	4146022	577280.72_4146021.66	0.2924	0.12947	0.09443	0.07344	0.34537	0.11267	Residence
577301	4146022	577300.72_4146021.66	0.32029	0.12959	0.09468	0.07232	0.33692	0.1116	Residence
577321	4146022	577320.72_4146021.66	0.3515	0.12953	0.09477	0.07122	0.32767	0.1105	Residence
577341	4146022	577340.72_4146021.66	0.38634	0.12932	0.0947	0.07015	0.31737	0.10939	Residence
577361	4146022	577360.72_4146021.66	0.42424	0.12892	0.09444	0.06906	0.30527	0.10824	Residence
577401	4146022	577400.72_4146021.66	0.50978	0.1278	0.09347	0.06696	0.2762	0.1059	Residence
577421	4146022	577420.72_4146021.66	0.55451	0.12703	0.09273	0.0659	0.25854	0.10469	Residence
576561	4146042	576560.72_4146041.66	0.03249	0.0558	0.04688	0.0962	0.45181	0.13221	Residence
576581	4146042	576580.72_4146041.66	0.0339	0.05736	0.04762	0.09718	0.49651	0.13272	Residence
576601	4146042	576600.72_4146041.66	0.03534	0.05903	0.04844	0.09805	0.53523	0.1331	Residence
576621	4146042	576620.72_4146041.66	0.03683	0.06082	0.04938	0.0988	0.56569	0.13335	Residence
576641	4146042	576640.72_4146041.66	0.03837	0.06275	0.05042	0.09943	0.58747	0.13351	Residence
576661	4146042	576660.72_4146041.66	0.03996	0.06481	0.05159	0.09993	0.60108	0.13358	Residence
576681	4146042	576680.72_4146041.66	0.04162	0.067	0.05287	0.10029	0.60754	0.13357	Residence
576701	4146042	576700.72_4146041.66	0.04343	0.06932	0.05428	0.10054	0.60859	0.13349	Residence
576721	4146042	576720.72_4146041.66	0.04533	0.07172	0.05579	0.10061	0.6042	0.1333	Residence
576741	4146042	576740.72_4146041.66	0.04748	0.07424	0.05741	0.10061	0.59837	0.13312	Residence

576761	4146042	576760.72_4146041.66	0.04983	0.07683	0.05912	0.10046	0.5901	0.13286	Residence
576781	4146042	576780.72_4146041.66	0.05241	0.07946	0.06089	0.10019	0.5803	0.13254	Residence
576801	4146042	576800.72_4146041.66	0.05526	0.08212	0.0627	0.0998	0.56955	0.13216	Residence
576821	4146042	576820.72_4146041.66	0.0584	0.0848	0.06453	0.09929	0.55848	0.13173	Residence
576841	4146042	576840.72_4146041.66	0.06186	0.08749	0.06638	0.09868	0.54725	0.13126	Residence
576861	4146042	576860.72_4146041.66	0.06563	0.09017	0.06821	0.09797	0.53598	0.13074	Residence
576881	4146042	576880.72_4146041.66	0.06976	0.09285	0.07002	0.09718	0.52504	0.1302	Residence
576901	4146042	576900.72_4146041.66	0.07434	0.09557	0.07183	0.09634	0.51525	0.12966	Residence
576921	4146042	576920.72_4146041.66	0.07903	0.09817	0.07353	0.09532	0.50343	0.12901	Residence
576961	4146042	576960.72_4146041.66	0.0897	0.10345	0.07686	0.0932	0.48291	0.12771	Residence
576981	4146042	576980.72_4146041.66	0.09561	0.10606	0.07845	0.09205	0.47324	0.12704	Residence
577001	4146042	577000.72_4146041.66	0.10192	0.10863	0.08	0.09086	0.46401	0.12634	Residence
577021	4146042	577020.72_4146041.66	0.10873	0.11116	0.08151	0.08964	0.45536	0.12562	Residence
577041	4146042	577040.72_4146041.66	0.11611	0.11363	0.08297	0.08839	0.4472	0.12488	Residence
577061	4146042	577060.72_4146041.66	0.12419	0.11602	0.0844	0.08713	0.43954	0.12412	Residence
577081	4146042	577080.72_4146041.66	0.13314	0.11831	0.08579	0.08587	0.43247	0.12334	Residence
577101	4146042	577100.72_4146041.66	0.14288	0.12041	0.08711	0.08458	0.42504	0.12251	Residence
577121	4146042	577120.72_4146041.66	0.15401	0.12243	0.08841	0.08333	0.41874	0.12168	Residence
577141	4146042	577140.72_4146041.66	0.16623	0.12422	0.08962	0.08206	0.41197	0.12081	Residence
577181	4146042	577180.72_4146041.66	0.19563	0.12731	0.09186	0.07963	0.39981	0.119	Residence
577201	4146042	577200.72_4146041.66	0.21287	0.12851	0.09283	0.07843	0.39342	0.11804	Residence
577221	4146042	577220.72_4146041.66	0.23217	0.1295	0.09368	0.07725	0.3869	0.11705	Residence
577241	4146042	577240.72_4146041.66	0.25374	0.13026	0.09439	0.07609	0.38006	0.11603	Residence
577261	4146042	577260.72_4146041.66	0.27775	0.13078	0.09495	0.07493	0.37262	0.11497	Residence
577281	4146042	577280.72_4146041.66	0.30477	0.1311	0.09536	0.0738	0.36474	0.11389	Residence
577301	4146042	577300.72_4146041.66	0.33502	0.13122	0.0956	0.07269	0.35601	0.11279	Residence
577321	4146042	577320.72_4146041.66	0.36863	0.13113	0.09565	0.07157	0.34595	0.11165	Residence
577341	4146042	577340.72_4146041.66	0.40637	0.13089	0.09555	0.07047	0.33473	0.1105	Residence
577401	4146042	577400.72_4146041.66	0.54187	0.12931	0.09421	0.06723	0.28919	0.1069	Residence
577421	4146042	577420.72_4146041.66	0.59133	0.12853	0.09344	0.06615	0.26936	0.10565	Residence
577481	4146042	577480.72_4146041.66	0.71729	0.12569	0.09041	0.06302	0.20431	0.10179	Residence
576561	4146062	576560.72_4146061.66	0.03254	0.0563	0.04728	0.0971	0.49141	0.13427	Residence
576581	4146062	576580.72_4146061.66	0.034	0.05788	0.04802	0.09806	0.54202	0.13478	Residence
576601	4146062	576600.72_4146061.66	0.03548	0.05958	0.04884	0.09893	0.58445	0.13514	Residence
576621	4146062	576620.72_4146061.66	0.03702	0.06141	0.04976	0.09968	0.61691	0.1354	Residence
576641	4146062	576640.72_4146061.66	0.0386	0.06337	0.05082	0.10031	0.63876	0.13555	Residence
576661	4146062	576660.72_4146061.66	0.04022	0.06547	0.052	0.1008	0.65099	0.13561	Residence
576681	4146062	576680.72_4146061.66	0.04193	0.0677	0.05331	0.10116	0.65559	0.1356	Residence
576801	4146062	576800.72_4146061.66	0.05579	0.08314	0.06328	0.10059	0.60525	0.13411	Residence
576821	4146062	576820.72_4146061.66	0.05899	0.08588	0.06515	0.10007	0.59283	0.13366	Residence
576841	4146062	576840.72_4146061.66	0.06251	0.08863	0.06703	0.09944	0.58032	0.13316	Residence
576861	4146062	576860.72_4146061.66	0.06636	0.09137	0.06889	0.0987	0.56792	0.13262	Residence
576881	4146062	576880.72_4146061.66	0.07057	0.0941	0.07072	0.09788	0.55577	0.13204	Residence
576901	4146062	576900.72_4146061.66	0.07512	0.09682	0.07252	0.09696	0.54379	0.13142	Residence
576921	4146062	576920.72_4146061.66	0.08004	0.09953	0.07428	0.09596	0.53213	0.13078	Residence
576961	4146062	576960.72_4146061.66	0.09101	0.10492	0.07765	0.09378	0.50989	0.12943	Residence
576981	4146062	576980.72_4146061.66	0.09713	0.10759	0.07927	0.09262	0.49973	0.12874	Residence
577001	4146062	577000.72_4146061.66	0.1036	0.1102	0.08083	0.0914	0.48963	0.128	Residence
577021	4146062	577020.72_4146061.66	0.11063	0.11277	0.08236	0.09015	0.48039	0.12726	Residence
577041	4146062	577040.72_4146061.66	0.11824	0.11527	0.08384	0.08888	0.4717	0.12649	Residence
577061	4146062	577060.72_4146061.66	0.12672	0.11771	0.0853	0.08762	0.46419	0.12571	Residence
577081	4146062	577080.72_4146061.66	0.13602	0.12002	0.08671	0.08635	0.45681	0.12491	Residence
577101	4146062	577100.72_4146061.66	0.14628	0.12218	0.08806	0.08506	0.44951	0.12406	Residence
577121	4146062	577120.72_4146061.66	0.15784	0.12419	0.08937	0.08379	0.44282	0.1232	Residence
577141	4146062	577140.72_4146061.66	0.17076	0.12601	0.09061	0.08252	0.43616	0.1223	Residence
577161	4146062	577160.72_4146061.66	0.18535	0.12765	0.09178	0.08129	0.42991	0.12138	Residence
577201	4146062	577200.72_4146061.66	0.21978	0.13025	0.09381	0.07884	0.41663	0.11942	Residence
577221	4146062	577220.72_4146061.66	0.24019	0.13121	0.09465	0.07764	0.40973	0.11839	Residence
577241	4146062	577240.72_4146061.66	0.26331	0.13197	0.09536	0.07648	0.40286	0.11734	Residence
577261	4146062	577260.72_4146061.66	0.28913	0.13249	0.09592	0.07533	0.39526	0.11625	Residence
577281	4146062	577280.72_4146061.66	0.31795	0.13277	0.09629	0.07417	0.38665	0.11512	Residence
577301	4146062	577300.72_4146061.66	0.35055	0.13286	0.09651	0.07303	0.37734	0.11398	Residence
577321	4146062	577320.72_4146061.66	0.38704	0.13275	0.09654	0.0719	0.36661	0.11281	Residence
577341	4146062	577340.72_4146061.66	0.42818	0.13249	0.09641	0.07079	0.35447	0.11162	Residence
577381	4146062	577380.72_4146061.66	0.52413	0.13155	0.09562	0.0686	0.32351	0.10916	Residence
577401	4146062	577400.72_4146061.66	0.57752	0.13086	0.09496	0.0675	0.30371	0.1079	Residence
577421	4146062	577420.72_4146061.66	0.63252	0.13006	0.09415	0.06641	0.28127	0.10662	Residence
577461	4146062	577460.72_4146061.66	0.73443	0.12824	0.09218	0.06429	0.23249	0.10399	Residence
577481	4146062	577480.72_4146061.66	0.771	0.12721	0.09104	0.06325	0.20837	0.10264	Residence
576561	4146082	576560.72_4146081.66	0.03265	0.05682	0.04764	0.09802	0.53943	0.13645	Residence
576581	4146082	576580.72_4146081.66	0.03416	0.05844	0.04841	0.09899	0.59694	0.13696	Residence
576601	4146082	576600.72_4146081.66	0.03567	0.06016	0.04922	0.09985	0.64322	0.1373	Residence
576621	4146082	576620.72_4146081.66	0.03723	0.06202	0.05016	0.10059	0.67673	0.13753	Residence
576641	4146082	576640.72_4146081.66	0.03882	0.06401	0.05123	0.10121	0.69766	0.13766	Residence

576661	4146082	576660.72_4146081.66	0.04048	0.06613	0.05241	0.10168	0.70748	0.13769	Residence
576681	4146082	576680.72_4146081.66	0.04222	0.0684	0.05373	0.10202	0.70882	0.13765	Residence
576801	4146082	576800.72_4146081.66	0.05621	0.0841	0.06384	0.10131	0.64248	0.13602	Residence
576821	4146082	576820.72_4146081.66	0.05943	0.08689	0.06573	0.10076	0.62826	0.13554	Residence
576841	4146082	576840.72_4146081.66	0.063	0.08969	0.06763	0.1001	0.61445	0.13501	Residence
576861	4146082	576860.72_4146081.66	0.0669	0.09249	0.06952	0.09934	0.60087	0.13444	Residence
576881	4146082	576880.72_4146081.66	0.07118	0.09528	0.07138	0.09849	0.58789	0.13383	Residence
576901	4146082	576900.72_4146081.66	0.07582	0.09806	0.07321	0.09754	0.57495	0.13319	Residence
576921	4146082	576920.72_4146081.66	0.08086	0.10083	0.07499	0.09652	0.5625	0.13253	Residence
576961	4146082	576960.72_4146081.66	0.09225	0.10639	0.07844	0.09435	0.53987	0.13117	Residence
576981	4146082	576980.72_4146081.66	0.09853	0.10911	0.08008	0.09316	0.52881	0.13045	Residence
577001	4146082	577000.72_4146081.66	0.10535	0.11182	0.08169	0.09195	0.51894	0.12971	Residence
577021	4146082	577020.72_4146081.66	0.11255	0.11441	0.08323	0.09067	0.50879	0.12893	Residence
577041	4146082	577040.72_4146081.66	0.12048	0.11696	0.08473	0.08939	0.49988	0.12814	Residence
577061	4146082	577060.72_4146081.66	0.12936	0.11946	0.08623	0.08813	0.49247	0.12735	Residence
577081	4146082	577080.72_4146081.66	0.13897	0.12178	0.08765	0.08683	0.48454	0.12651	Residence
577101	4146082	577100.72_4146081.66	0.14982	0.12399	0.08904	0.08555	0.47759	0.12565	Residence
577121	4146082	577120.72_4146081.66	0.16173	0.12597	0.09034	0.08424	0.47003	0.12473	Residence
577141	4146082	577140.72_4146081.66	0.1754	0.12782	0.0916	0.08298	0.46362	0.12381	Residence
577161	4146082	577160.72_4146081.66	0.19066	0.12945	0.09277	0.08173	0.45692	0.12285	Residence
577201	4146082	577200.72_4146081.66	0.22727	0.13206	0.09483	0.07928	0.44368	0.12083	Residence
577221	4146082	577220.72_4146081.66	0.24916	0.13303	0.09568	0.07809	0.43691	0.11976	Residence
577241	4146082	577240.72_4146081.66	0.27356	0.13373	0.09636	0.07689	0.42917	0.11866	Residence
577261	4146082	577260.72_4146081.66	0.30095	0.1342	0.09688	0.0757	0.42068	0.11753	Residence
577281	4146082	577280.72_4146081.66	0.33218	0.13448	0.09725	0.07454	0.4119	0.11637	Residence
577301	4146082	577300.72_4146081.66	0.36727	0.13454	0.09743	0.07338	0.40176	0.11519	Residence
577321	4146082	577320.72_4146081.66	0.40707	0.13442	0.09744	0.07224	0.39037	0.11398	Residence
577361	4146082	577360.72_4146081.66	0.50242	0.13372	0.09693	0.07	0.36145	0.11149	Residence
577381	4146082	577380.72_4146081.66	0.55769	0.13313	0.0964	0.06888	0.34242	0.11021	Residence
577401	4146082	577400.72_4146081.66	0.61706	0.13242	0.09571	0.06776	0.3199	0.10891	Residence
577421	4146082	577420.72_4146081.66	0.67932	0.13167	0.0949	0.06668	0.29466	0.1076	Residence
577461	4146082	577460.72_4146081.66	0.79213	0.12978	0.09282	0.06451	0.23895	0.10489	Residence
576441	4146102	576440.72_4146101.66	0.02502	0.04907	0.04383	0.09082	0.25805	0.13202	Residence
576461	4146102	576460.72_4146101.66	0.02607	0.05037	0.04464	0.09236	0.29321	0.13374	Residence
576481	4146102	576480.72_4146101.66	0.02721	0.05168	0.04539	0.09383	0.33642	0.1352	Residence
576501	4146102	576500.72_4146101.66	0.02857	0.05295	0.04602	0.09532	0.39144	0.13628	Residence
576561	4146102	576560.72_4146101.66	0.03286	0.05739	0.04795	0.099	0.59952	0.1388	Residence
576581	4146102	576580.72_4146101.66	0.0344	0.05904	0.04875	0.1	0.66451	0.13928	Residence
576601	4146102	576600.72_4146101.66	0.03596	0.0608	0.04962	0.10086	0.71488	0.1396	Residence
576621	4146102	576620.72_4146101.66	0.03754	0.06269	0.05059	0.10159	0.74917	0.13982	Residence
576641	4146102	576640.72_4146101.66	0.03918	0.06471	0.05167	0.10219	0.76818	0.13992	Residence
576661	4146102	576660.72_4146101.66	0.04086	0.06687	0.05287	0.10265	0.77466	0.13994	Residence
576681	4146102	576680.72_4146101.66	0.04263	0.06917	0.0542	0.10297	0.77191	0.13987	Residence
576801	4146102	576800.72_4146101.66	0.05677	0.08515	0.06444	0.10211	0.68649	0.13805	Residence
576821	4146102	576820.72_4146101.66	0.06008	0.08802	0.06637	0.10155	0.67148	0.13756	Residence
576841	4146102	576840.72_4146101.66	0.06369	0.09088	0.0683	0.10086	0.65619	0.137	Residence
576861	4146102	576860.72_4146101.66	0.06763	0.09372	0.0702	0.10006	0.64098	0.13638	Residence
576881	4146102	576880.72_4146101.66	0.07197	0.09656	0.07209	0.09917	0.62659	0.13574	Residence
576901	4146102	576900.72_4146101.66	0.07669	0.09939	0.07394	0.09819	0.61242	0.13506	Residence
576921	4146102	576920.72_4146101.66	0.08182	0.10222	0.07574	0.09714	0.59857	0.13436	Residence
576961	4146102	576960.72_4146101.66	0.09353	0.1079	0.07924	0.09492	0.57413	0.13296	Residence
576981	4146102	576980.72_4146101.66	0.10009	0.11071	0.08093	0.09374	0.56303	0.13223	Residence
577001	4146102	577000.72_4146101.66	0.10706	0.11345	0.08255	0.09249	0.55199	0.13145	Residence
577021	4146102	577020.72_4146101.66	0.11466	0.11614	0.08414	0.09123	0.54224	0.13067	Residence
577041	4146102	577040.72_4146101.66	0.12272	0.11869	0.08564	0.08989	0.532	0.12983	Residence
577061	4146102	577060.72_4146101.66	0.13186	0.1212	0.08715	0.08861	0.52397	0.129	Residence
577081	4146102	577080.72_4146101.66	0.14202	0.12359	0.08861	0.08732	0.51657	0.12814	Residence
577101	4146102	577100.72_4146101.66	0.1533	0.12581	0.09001	0.08602	0.5092	0.12725	Residence
577121	4146102	577120.72_4146101.66	0.16594	0.12784	0.09135	0.08473	0.50207	0.12632	Residence
577141	4146102	577140.72_4146101.66	0.18009	0.12966	0.0926	0.08343	0.4948	0.12534	Residence
577201	4146102	577200.72_4146101.66	0.23505	0.1339	0.09586	0.07972	0.47468	0.12225	Residence
577221	4146102	577220.72_4146101.66	0.25793	0.13479	0.09667	0.07848	0.46666	0.12114	Residence
577241	4146102	577240.72_4146101.66	0.284	0.13548	0.09734	0.07727	0.45864	0.12	Residence
577261	4146102	577260.72_4146101.66	0.31373	0.13597	0.09787	0.07609	0.45031	0.11883	Residence
577281	4146102	577280.72_4146101.66	0.34727	0.13622	0.09821	0.07491	0.44078	0.11763	Residence
577301	4146102	577300.72_4146101.66	0.3854	0.13626	0.09838	0.07374	0.4301	0.11641	Residence
577341	4146102	577340.72_4146101.66	0.47825	0.13583	0.09816	0.07144	0.40346	0.11389	Residence
577361	4146102	577360.72_4146101.66	0.53356	0.13536	0.09777	0.07029	0.3857	0.11259	Residence
577381	4146102	577380.72_4146101.66	0.59523	0.13477	0.09721	0.06916	0.3643	0.11127	Residence
577401	4146102	577400.72_4146101.66	0.66203	0.13407	0.09648	0.06803	0.33857	0.10994	Residence
577441	4146102	577440.72_4146101.66	0.79953	0.13239	0.09462	0.06584	0.27753	0.1072	Residence
577461	4146102	577460.72_4146101.66	0.8583	0.13138	0.09349	0.06474	0.24554	0.10579	Residence
576441	4146122	576440.72_4146121.66	0.0251	0.04944	0.04411	0.09172	0.2705	0.13441	Residence
576461	4146122	576460.72_4146121.66	0.02612	0.05077	0.04496	0.09326	0.3098	0.13614	Residence

576481	4146122	576480.72_4146121.66	0.02724	0.0521	0.04573	0.09474	0.35924	0.13759	Residence
576501	4146122	576500.72_4146121.66	0.02846	0.05345	0.04644	0.09615	0.42058	0.13882	Residence
576561	4146122	576560.72_4146121.66	0.03295	0.05792	0.04838	0.09993	0.66902	0.14109	Residence
576581	4146122	576580.72_4146121.66	0.03453	0.05961	0.04914	0.10094	0.74343	0.14157	Residence
576601	4146122	576600.72_4146121.66	0.03612	0.0614	0.05002	0.1018	0.7978	0.14188	Residence
576621	4146122	576620.72_4146121.66	0.03775	0.06332	0.05099	0.10252	0.8315	0.14206	Residence
576641	4146122	576640.72_4146121.66	0.03946	0.0654	0.0521	0.10314	0.84857	0.1422	Residence
576661	4146122	576660.72_4146121.66	0.04115	0.06758	0.0533	0.10356	0.84901	0.14216	Residence
576681	4146122	576680.72_4146121.66	0.04298	0.06993	0.05466	0.10388	0.84171	0.14209	Residence
576781	4146122	576780.72_4146121.66	0.05446	0.08339	0.06316	0.10346	0.75727	0.14069	Residence
576801	4146122	576800.72_4146121.66	0.05745	0.08628	0.06508	0.10297	0.73893	0.14019	Residence
576821	4146122	576820.72_4146121.66	0.06079	0.08919	0.06703	0.10237	0.72181	0.13965	Residence
576841	4146122	576840.72_4146121.66	0.06447	0.09212	0.06899	0.10166	0.70541	0.13906	Residence
576861	4146122	576860.72_4146121.66	0.06848	0.09502	0.07093	0.10083	0.68895	0.13841	Residence
576881	4146122	576880.72_4146121.66	0.07288	0.09791	0.07283	0.09989	0.67289	0.13772	Residence
576901	4146122	576900.72_4146121.66	0.07773	0.10082	0.07471	0.0989	0.65774	0.13703	Residence
576921	4146122	576920.72_4146121.66	0.08295	0.10369	0.07653	0.09781	0.64204	0.13629	Residence
576961	4146122	576960.72_4146121.66	0.09486	0.10946	0.08007	0.0955	0.61401	0.1348	Residence
576981	4146122	576980.72_4146121.66	0.10161	0.11233	0.08178	0.0943	0.60197	0.13404	Residence
577001	4146122	577000.72_4146121.66	0.10877	0.11511	0.08342	0.09302	0.58998	0.13323	Residence
577021	4146122	577020.72_4146121.66	0.11677	0.1179	0.08505	0.09178	0.58066	0.13244	Residence
577041	4146122	577040.72_4146121.66	0.12508	0.12048	0.08658	0.09042	0.5697	0.13157	Residence
577061	4146122	577060.72_4146121.66	0.13452	0.12302	0.0881	0.08911	0.56111	0.1307	Residence
577081	4146122	577080.72_4146121.66	0.14511	0.12544	0.08958	0.08781	0.55357	0.12981	Residence
577101	4146122	577100.72_4146121.66	0.15686	0.12767	0.091	0.0865	0.54593	0.12888	Residence
577121	4146122	577120.72_4146121.66	0.17031	0.12975	0.09238	0.08523	0.53945	0.12792	Residence
577141	4146122	577140.72_4146121.66	0.18534	0.13161	0.09366	0.08394	0.53252	0.12692	Residence
577161	4146122	577160.72_4146121.66	0.2022	0.13321	0.09485	0.08265	0.52504	0.12588	Residence
577181	4146122	577180.72_4146121.66	0.22153	0.13463	0.09595	0.08141	0.51836	0.12481	Residence
577201	4146122	577200.72_4146121.66	0.24286	0.13572	0.09688	0.08013	0.50975	0.12369	Residence
577221	4146122	577220.72_4146121.66	0.26749	0.13664	0.0977	0.0789	0.50203	0.12254	Residence
577241	4146122	577240.72_4146121.66	0.29525	0.1373	0.09836	0.07767	0.49333	0.12136	Residence
577261	4146122	577260.72_4146121.66	0.32699	0.13774	0.09886	0.07646	0.48418	0.12014	Residence
577281	4146122	577280.72_4146121.66	0.36328	0.13798	0.09918	0.07527	0.47421	0.11891	Residence
577321	4146122	577320.72_4146121.66	0.45259	0.13788	0.09929	0.07293	0.45004	0.11635	Residence
577341	4146122	577340.72_4146121.66	0.50669	0.13754	0.09904	0.07176	0.43391	0.11504	Residence
577361	4146122	577360.72_4146121.66	0.56847	0.13708	0.09863	0.0706	0.41438	0.1137	Residence
577381	4146122	577380.72_4146121.66	0.63746	0.13647	0.09803	0.06945	0.38985	0.11234	Residence
577401	4146122	577400.72_4146121.66	0.71284	0.13575	0.09726	0.06831	0.35992	0.11096	Residence
577441	4146122	577440.72_4146121.66	0.86827	0.13401	0.0953	0.06606	0.28838	0.10814	Residence
577461	4146122	577460.72_4146121.66	0.93504	0.13307	0.09418	0.065	0.25228	0.10669	Residence
576421	4146142	576420.72_4146141.66	0.02435	0.04844	0.04342	0.09103	0.24952	0.13487	Residence
576441	4146142	576440.72_4146141.66	0.02517	0.04982	0.0444	0.09262	0.28388	0.13689	Residence
576461	4146142	576460.72_4146141.66	0.02618	0.05117	0.04528	0.09418	0.32824	0.13864	Residence
576481	4146142	576480.72_4146141.66	0.02729	0.05254	0.04607	0.09567	0.38529	0.14017	Residence
576501	4146142	576500.72_4146141.66	0.02851	0.05392	0.0468	0.0971	0.4577	0.1414	Residence
576561	4146142	576560.72_4146141.66	0.03297	0.05843	0.04883	0.10089	0.75271	0.14338	Residence
576581	4146142	576580.72_4146141.66	0.03459	0.06016	0.04959	0.10186	0.83807	0.14386	Residence
576601	4146142	576600.72_4146141.66	0.03632	0.06202	0.05043	0.10277	0.89881	0.14424	Residence
576621	4146142	576620.72_4146141.66	0.03799	0.06398	0.05142	0.10349	0.93044	0.14442	Residence
576641	4146142	576640.72_4146141.66	0.03974	0.06609	0.05253	0.1041	0.94195	0.14453	Residence
576661	4146142	576660.72_4146141.66	0.04146	0.0683	0.05375	0.1045	0.93505	0.14446	Residence
576681	4146142	576680.72_4146141.66	0.04333	0.07069	0.05512	0.1048	0.92122	0.14437	Residence
576781	4146142	576780.72_4146141.66	0.055	0.08442	0.06374	0.10428	0.81731	0.14284	Residence
576801	4146142	576800.72_4146141.66	0.05792	0.0873	0.06566	0.1037	0.79457	0.14225	Residence
576821	4146142	576820.72_4146141.66	0.0613	0.09027	0.06764	0.10308	0.7761	0.14168	Residence
576841	4146142	576840.72_4146141.66	0.06503	0.09326	0.06963	0.10234	0.75853	0.14106	Residence
576861	4146142	576860.72_4146141.66	0.06908	0.09622	0.07159	0.10147	0.74054	0.14037	Residence
576881	4146142	576880.72_4146141.66	0.07358	0.09919	0.07353	0.10052	0.72359	0.13967	Residence
576901	4146142	576900.72_4146141.66	0.0785	0.10215	0.07543	0.09949	0.70649	0.13893	Residence
576921	4146142	576920.72_4146141.66	0.084	0.10515	0.07732	0.09844	0.69156	0.13822	Residence
576961	4146142	576960.72_4146141.66	0.09624	0.11105	0.08091	0.09609	0.6606	0.13668	Residence
576981	4146142	576980.72_4146141.66	0.10317	0.11398	0.08264	0.09486	0.64735	0.13589	Residence
577001	4146142	577000.72_4146141.66	0.11058	0.11683	0.08431	0.09358	0.63473	0.13506	Residence
577021	4146142	577020.72_4146141.66	0.11873	0.11964	0.08596	0.09229	0.62432	0.13422	Residence
577041	4146142	577040.72_4146141.66	0.12772	0.12237	0.08756	0.091	0.61529	0.13336	Residence
577061	4146142	577060.72_4146141.66	0.13742	0.12492	0.08909	0.08965	0.60578	0.13245	Residence
577081	4146142	577080.72_4146141.66	0.14844	0.12737	0.0906	0.08834	0.59798	0.13152	Residence
577101	4146142	577100.72_4146141.66	0.16079	0.12963	0.09204	0.08703	0.59046	0.13056	Residence
577121	4146142	577120.72_4146141.66	0.17457	0.13167	0.0934	0.0857	0.58236	0.12955	Residence
577141	4146142	577140.72_4146141.66	0.19013	0.13348	0.09468	0.08438	0.57423	0.1285	Residence
577161	4146142	577160.72_4146141.66	0.20798	0.1351	0.09588	0.08309	0.56686	0.12742	Residence
577181	4146142	577180.72_4146141.66	0.22863	0.13655	0.097	0.08186	0.56067	0.12631	Residence
577201	4146142	577200.72_4146141.66	0.25139	0.13764	0.09794	0.08057	0.55189	0.12516	Residence

577221	4146142	577220.72_4146141.66	0.27742	0.13852	0.09874	0.07932	0.54322	0.12396	Residence
577241	4146142	577240.72_4146141.66	0.30741	0.13919	0.09941	0.07809	0.53459	0.12274	Residence
577301	4146142	577300.72_4146141.66	0.42629	0.13985	0.10031	0.07447	0.50236	0.11889	Residence
577321	4146142	577320.72_4146141.66	0.47834	0.13967	0.10022	0.07327	0.4879	0.11756	Residence
577341	4146142	577340.72_4146141.66	0.5382	0.13932	0.09994	0.07208	0.47018	0.1162	Residence
577361	4146142	577360.72_4146141.66	0.60755	0.13887	0.09951	0.07092	0.44858	0.11482	Residence
577381	4146142	577380.72_4146141.66	0.68451	0.1382	0.09884	0.06973	0.4196	0.11341	Residence
577441	4146142	577440.72_4146141.66	0.94831	0.13571	0.096	0.0663	0.29987	0.10909	Residence
576421	4146162	576420.72_4146161.66	0.02444	0.0488	0.04369	0.09193	0.2601	0.13742	Residence
576441	4146162	576440.72_4146161.66	0.02527	0.0502	0.04469	0.09354	0.29833	0.13944	Residence
576461	4146162	576460.72_4146161.66	0.02625	0.05159	0.04559	0.09511	0.34864	0.14125	Residence
576481	4146162	576480.72_4146161.66	0.02734	0.05299	0.04641	0.09663	0.41505	0.14279	Residence
576501	4146162	576500.72_4146161.66	0.02855	0.05439	0.04716	0.09806	0.50151	0.14392	Residence
576561	4146162	576560.72_4146161.66	0.03307	0.05899	0.04923	0.10188	0.86106	0.14583	Residence
576581	4146162	576580.72_4146161.66	0.03471	0.06075	0.04999	0.10284	0.95828	0.14629	Residence
576601	4146162	576600.72_4146161.66	0.03654	0.06268	0.05086	0.10379	1.02356	0.14672	Residence
576621	4146162	576620.72_4146161.66	0.03826	0.06467	0.05186	0.1045	1.0498	0.14687	Residence
576641	4146162	576640.72_4146161.66	0.04004	0.06681	0.05298	0.10508	1.05227	0.14694	Residence
576661	4146162	576660.72_4146161.66	0.04181	0.06906	0.05421	0.10547	1.03621	0.14686	Residence
576681	4146162	576680.72_4146161.66	0.04373	0.07151	0.05561	0.10577	1.01484	0.14676	Residence
576781	4146162	576780.72_4146161.66	0.05558	0.08548	0.06434	0.10512	0.88891	0.14505	Residence
576801	4146162	576800.72_4146161.66	0.05853	0.08841	0.06629	0.10451	0.86363	0.14443	Residence
576821	4146162	576820.72_4146161.66	0.06195	0.09145	0.06829	0.10385	0.84365	0.14382	Residence
576841	4146162	576840.72_4146161.66	0.06568	0.09447	0.0703	0.10306	0.82343	0.14314	Residence
576861	4146162	576860.72_4146161.66	0.06983	0.0975	0.07229	0.10217	0.80446	0.14243	Residence
576881	4146162	576880.72_4146161.66	0.07444	0.10055	0.07427	0.10121	0.78638	0.14171	Residence
576901	4146162	576900.72_4146161.66	0.07946	0.10358	0.0762	0.10015	0.76749	0.14095	Residence
576921	4146162	576920.72_4146161.66	0.08511	0.10666	0.07812	0.09908	0.7509	0.14021	Residence
576961	4146162	576960.72_4146161.66	0.0977	0.1127	0.08177	0.09669	0.7162	0.13862	Residence
576981	4146162	576980.72_4146161.66	0.10488	0.11571	0.08354	0.09546	0.70215	0.1378	Residence
577001	4146162	577000.72_4146161.66	0.11254	0.11863	0.08524	0.09416	0.68875	0.13695	Residence
577021	4146162	577020.72_4146161.66	0.12082	0.12145	0.08689	0.09283	0.67659	0.13606	Residence
577041	4146162	577040.72_4146161.66	0.13028	0.12427	0.08854	0.09155	0.66855	0.13518	Residence
577061	4146162	577060.72_4146161.66	0.14048	0.12689	0.09011	0.09022	0.65949	0.13424	Residence
577081	4146162	577080.72_4146161.66	0.15169	0.1293	0.09161	0.08885	0.64986	0.13326	Residence
577101	4146162	577100.72_4146161.66	0.16447	0.13156	0.09306	0.08751	0.64149	0.13225	Residence
577121	4146162	577120.72_4146161.66	0.179	0.13363	0.09445	0.08618	0.63355	0.1312	Residence
577141	4146162	577140.72_4146161.66	0.19536	0.13545	0.09574	0.08485	0.62506	0.13011	Residence
577161	4146162	577160.72_4146161.66	0.21421	0.13707	0.09695	0.08356	0.61743	0.12899	Residence
577181	4146162	577180.72_4146161.66	0.23585	0.13848	0.09806	0.08229	0.61023	0.12784	Residence
577261	4146162	577260.72_4146161.66	0.35747	0.14155	0.10095	0.07729	0.57415	0.12284	Residence
577281	4146162	577280.72_4146161.66	0.40017	0.14175	0.10123	0.07607	0.56279	0.12151	Residence
577301	4146162	577300.72_4146161.66	0.44913	0.1417	0.10129	0.07482	0.54883	0.12015	Residence
577321	4146162	577320.72_4146161.66	0.5068	0.14153	0.10119	0.07362	0.53373	0.11877	Residence
577341	4146162	577340.72_4146161.66	0.57356	0.14117	0.10088	0.07242	0.51441	0.11737	Residence
577361	4146162	577360.72_4146161.66	0.65045	0.14065	0.10037	0.07122	0.48892	0.11595	Residence
577381	4146162	577380.72_4146161.66	0.73815	0.13999	0.09967	0.07001	0.45531	0.1145	Residence
577421	4146162	577420.72_4146161.66	0.94067	0.13839	0.09784	0.06768	0.36333	0.11155	Residence
577441	4146162	577440.72_4146161.66	1.04264	0.13749	0.09674	0.06656	0.31192	0.11005	Residence
576421	4146182	576420.72_4146181.66	0.02453	0.04917	0.04396	0.09284	0.27113	0.14006	Residence
576441	4146182	576440.72_4146181.66	0.02537	0.05059	0.04499	0.09448	0.3138	0.14207	Residence
576461	4146182	576460.72_4146181.66	0.02635	0.05201	0.04591	0.09607	0.37131	0.14387	Residence
576481	4146182	576480.72_4146181.66	0.02743	0.05343	0.04675	0.0976	0.4494	0.14541	Residence
576501	4146182	576500.72_4146181.66	0.02863	0.05487	0.04752	0.09905	0.55457	0.14653	Residence
576581	4146182	576580.72_4146181.66	0.03493	0.06139	0.05038	0.10389	1.1139	0.14889	Residence
576601	4146182	576600.72_4146181.66	0.03671	0.06331	0.05127	0.10478	1.17484	0.14921	Residence
576621	4146182	576620.72_4146181.66	0.03847	0.06534	0.05229	0.10548	1.19127	0.14935	Residence
576641	4146182	576640.72_4146181.66	0.04034	0.06755	0.05344	0.10608	1.18327	0.14943	Residence
576661	4146182	576660.72_4146181.66	0.04217	0.06984	0.05468	0.10646	1.15487	0.14933	Residence
576681	4146182	576680.72_4146181.66	0.04413	0.07233	0.05609	0.10674	1.12365	0.1492	Residence
576781	4146182	576780.72_4146181.66	0.0562	0.08657	0.06496	0.10598	0.97637	0.14733	Residence
576801	4146182	576800.72_4146181.66	0.05931	0.08962	0.06696	0.10539	0.95203	0.14673	Residence
576821	4146182	576820.72_4146181.66	0.06274	0.0927	0.06899	0.10469	0.92924	0.14607	Residence
576841	4146182	576840.72_4146181.66	0.06654	0.09579	0.07102	0.10387	0.90745	0.14536	Residence
576861	4146182	576860.72_4146181.66	0.07079	0.0989	0.07305	0.10296	0.88714	0.14463	Residence
576881	4146182	576880.72_4146181.66	0.07552	0.10203	0.07506	0.10198	0.86731	0.14387	Residence
576901	4146182	576900.72_4146181.66	0.08071	0.10515	0.07703	0.10091	0.84645	0.14309	Residence
576921	4146182	576920.72_4146181.66	0.08632	0.10823	0.07894	0.09975	0.82373	0.14227	Residence
576961	4146182	576960.72_4146181.66	0.09922	0.11439	0.08264	0.0973	0.78321	0.1406	Residence
576981	4146182	576980.72_4146181.66	0.10659	0.11746	0.08444	0.09604	0.76745	0.13975	Residence
577001	4146182	577000.72_4146181.66	0.11455	0.12045	0.08618	0.09474	0.75366	0.13887	Residence
577021	4146182	577020.72_4146181.66	0.12316	0.12334	0.08786	0.0934	0.74133	0.13795	Residence
577041	4146182	577040.72_4146181.66	0.13295	0.12621	0.08954	0.09211	0.73324	0.13703	Residence
577061	4146182	577060.72_4146181.66	0.14337	0.12883	0.09111	0.09073	0.72255	0.13605	Residence

577081	4146182	577080.72_4146181.66	0.15509	0.13128	0.09264	0.08936	0.71285	0.13503	Residence
577101	4146182	577100.72_4146181.66	0.16851	0.13359	0.09412	0.08802	0.70452	0.13398	Residence
577121	4146182	577120.72_4146181.66	0.18377	0.13568	0.09554	0.08669	0.69642	0.1329	Residence
577141	4146182	577140.72_4146181.66	0.20101	0.1375	0.09684	0.08536	0.68743	0.13176	Residence
577161	4146182	577160.72_4146181.66	0.22081	0.13911	0.09806	0.08404	0.67898	0.13059	Residence
577221	4146182	577220.72_4146181.66	0.29951	0.14248	0.10092	0.0802	0.65318	0.12686	Residence
577241	4146182	577240.72_4146181.66	0.33379	0.14308	0.10154	0.07893	0.64277	0.12555	Residence
577261	4146182	577260.72_4146181.66	0.37342	0.14345	0.10198	0.07766	0.63133	0.1242	Residence
577281	4146182	577280.72_4146181.66	0.42028	0.14367	0.10225	0.07644	0.62032	0.12282	Residence
577301	4146182	577300.72_4146181.66	0.47449	0.14364	0.10231	0.07521	0.60634	0.12142	Residence
577321	4146182	577320.72_4146181.66	0.53778	0.14342	0.10216	0.07397	0.58921	0.12	Residence
577341	4146182	577340.72_4146181.66	0.61209	0.14304	0.1018	0.07274	0.56764	0.11855	Residence
577361	4146182	577360.72_4146181.66	0.6983	0.14247	0.10124	0.0715	0.53801	0.11707	Residence
577421	4146182	577420.72_4146181.66	1.03486	0.14021	0.0986	0.06793	0.38552	0.11255	Residence
576421	4146202	576420.72_4146201.66	0.0246	0.04953	0.04424	0.09376	0.28258	0.14278	Residence
576441	4146202	576440.72_4146201.66	0.02548	0.05099	0.04528	0.09543	0.33039	0.14479	Residence
576461	4146202	576460.72_4146201.66	0.02646	0.05244	0.04623	0.09705	0.39632	0.14659	Residence
576481	4146202	576480.72_4146201.66	0.02753	0.05389	0.0471	0.0986	0.48903	0.14809	Residence
576501	4146202	576500.72_4146201.66	0.02872	0.05535	0.04788	0.10006	0.6193	0.14922	Residence
576561	4146202	576560.72_4146201.66	0.03338	0.06019	0.05001	0.10391	1.19106	0.1511	Residence
576581	4146202	576580.72_4146201.66	0.03511	0.06202	0.05076	0.10493	1.3133	0.15153	Residence
576601	4146202	576600.72_4146201.66	0.03687	0.06396	0.05169	0.10578	1.36339	0.15177	Residence
576621	4146202	576620.72_4146201.66	0.0387	0.06604	0.05273	0.10648	1.36333	0.15191	Residence
576641	4146202	576640.72_4146201.66	0.04062	0.06828	0.05389	0.10707	1.33851	0.15198	Residence
576661	4146202	576660.72_4146201.66	0.0425	0.07063	0.05516	0.10744	1.29498	0.15185	Residence
576681	4146202	576680.72_4146201.66	0.04454	0.07318	0.05659	0.10772	1.25476	0.15172	Residence
576781	4146202	576780.72_4146201.66	0.05671	0.08762	0.06554	0.10676	1.08048	0.14961	Residence
576801	4146202	576800.72_4146201.66	0.05978	0.09069	0.06755	0.10611	1.05118	0.14892	Residence
576821	4146202	576820.72_4146201.66	0.06331	0.09386	0.06963	0.10541	1.02856	0.14826	Residence
576841	4146202	576840.72_4146201.66	0.06718	0.09702	0.07169	0.10457	1.00516	0.14752	Residence
576861	4146202	576860.72_4146201.66	0.07147	0.10019	0.07375	0.10362	0.98186	0.14674	Residence
576881	4146202	576880.72_4146201.66	0.07627	0.10339	0.07579	0.10261	0.95942	0.14596	Residence
576901	4146202	576900.72_4146201.66	0.08153	0.10656	0.07778	0.10151	0.93436	0.14514	Residence
576921	4146202	576920.72_4146201.66	0.08731	0.10973	0.07973	0.10034	0.90836	0.1443	Residence
576961	4146202	576960.72_4146201.66	0.10081	0.11613	0.08354	0.09793	0.86567	0.14264	Residence
576981	4146202	576980.72_4146201.66	0.10843	0.11927	0.08537	0.09665	0.84862	0.14176	Residence
577001	4146202	577000.72_4146201.66	0.11666	0.12233	0.08713	0.09533	0.83401	0.14085	Residence
577021	4146202	577020.72_4146201.66	0.12577	0.12533	0.08887	0.09401	0.82313	0.13991	Residence
577041	4146202	577040.72_4146201.66	0.13553	0.12815	0.09053	0.09264	0.81129	0.13892	Residence
577061	4146202	577060.72_4146201.66	0.1463	0.1308	0.09213	0.09124	0.79962	0.13788	Residence
577081	4146202	577080.72_4146201.66	0.15879	0.13335	0.09371	0.08991	0.79158	0.13684	Residence
577101	4146202	577100.72_4146201.66	0.1727	0.13566	0.09521	0.08854	0.78204	0.13575	Residence
577121	4146202	577120.72_4146201.66	0.18863	0.13775	0.09663	0.0872	0.77302	0.13461	Residence
577181	4146202	577180.72_4146201.66	0.25186	0.14257	0.10029	0.08324	0.7463	0.13096	Residence
577201	4146202	577200.72_4146201.66	0.2795	0.14367	0.10125	0.08194	0.73693	0.12967	Residence
577221	4146202	577220.72_4146201.66	0.31129	0.1445	0.10203	0.08064	0.72656	0.12834	Residence
577241	4146202	577240.72_4146201.66	0.34799	0.14508	0.10263	0.07934	0.71496	0.12697	Residence
577261	4146202	577260.72_4146201.66	0.39082	0.14543	0.10304	0.07806	0.70264	0.12557	Residence
577281	4146202	577280.72_4146201.66	0.44151	0.1456	0.10328	0.0768	0.6902	0.12415	Residence
577301	4146202	577300.72_4146201.66	0.5017	0.14562	0.10333	0.07558	0.67672	0.1227	Residence
577321	4146202	577320.72_4146201.66	0.5713	0.14534	0.10312	0.0743	0.65714	0.12123	Residence
577341	4146202	577340.72_4146201.66	0.65431	0.14493	0.10272	0.07304	0.63312	0.11974	Residence
577361	4146202	577360.72_4146201.66	0.75314	0.14439	0.10214	0.07181	0.60019	0.11822	Residence
577401	4146202	577400.72_4146201.66	1.00256	0.14296	0.10045	0.06938	0.48661	0.11513	Residence
577421	4146202	577420.72_4146201.66	1.14707	0.1421	0.09938	0.0682	0.40991	0.11356	Residence
576421	4146222	576420.72_4146221.66	0.02474	0.04991	0.04452	0.09471	0.29483	0.14559	Residence
576441	4146222	576440.72_4146221.66	0.0256	0.0514	0.04559	0.0964	0.34786	0.14773	Residence
576461	4146222	576460.72_4146221.66	0.02656	0.05288	0.04656	0.09804	0.42356	0.14948	Residence
576481	4146222	576480.72_4146221.66	0.02763	0.05435	0.04745	0.09961	0.53458	0.1509	Residence
576501	4146222	576500.72_4146221.66	0.02882	0.05584	0.04825	0.10109	0.69874	0.15198	Residence
576561	4146222	576560.72_4146221.66	0.03358	0.06082	0.05036	0.105	1.45028	0.15389	Residence
576581	4146222	576580.72_4146221.66	0.03531	0.06267	0.0512	0.10599	1.57631	0.15426	Residence
576601	4146222	576600.72_4146221.66	0.03708	0.06464	0.05214	0.10683	1.6042	0.15447	Residence
576621	4146222	576620.72_4146221.66	0.03897	0.06677	0.05319	0.10754	1.57802	0.1546	Residence
576641	4146222	576640.72_4146221.66	0.04092	0.06905	0.05436	0.1081	1.52915	0.15463	Residence
576661	4146222	576660.72_4146221.66	0.04286	0.07144	0.05565	0.10846	1.46827	0.15448	Residence
576681	4146222	576680.72_4146221.66	0.04497	0.07404	0.0571	0.10873	1.41779	0.15432	Residence
576781	4146222	576780.72_4146221.66	0.05735	0.08875	0.06617	0.10763	1.21941	0.152	Residence
576801	4146222	576800.72_4146221.66	0.0605	0.09191	0.06822	0.10696	1.18833	0.1513	Residence
576821	4146222	576820.72_4146221.66	0.06407	0.09513	0.07032	0.10622	1.16243	0.15059	Residence
576841	4146222	576840.72_4146221.66	0.06804	0.09838	0.07243	0.10536	1.13776	0.14983	Residence
576861	4146222	576860.72_4146221.66	0.07246	0.10164	0.07453	0.10441	1.11304	0.14904	Residence
576881	4146222	576880.72_4146221.66	0.07735	0.10491	0.0766	0.10337	1.0862	0.14822	Residence
576901	4146222	576900.72_4146221.66	0.08273	0.10815	0.07862	0.10223	1.055	0.14736	Residence

576921	4146222	576920.72_4146221.66	0.08866	0.1114	0.0806	0.10104	1.02265	0.14649	Daycare	Deidra's Daycare
576961	4146222	576960.72_4146221.66	0.1025	0.11793	0.08446	0.09857	0.97017	0.14474	Residence	
576981	4146222	576980.72_4146221.66	0.11034	0.12113	0.08631	0.09726	0.95083	0.14382	Residence	
577001	4146222	577000.72_4146221.66	0.11881	0.12424	0.08811	0.09592	0.935	0.14286	Residence	
577021	4146222	577020.72_4146221.66	0.12835	0.12733	0.08989	0.09461	0.92524	0.14189	Residence	
577041	4146222	577040.72_4146221.66	0.1384	0.13018	0.09156	0.0932	0.91164	0.14085	Residence	
577061	4146222	577060.72_4146221.66	0.14979	0.13291	0.09321	0.09183	0.90079	0.13979	Residence	
577081	4146222	577080.72_4146221.66	0.1626	0.13546	0.0948	0.09045	0.89025	0.13868	Residence	
577101	4146222	577100.72_4146221.66	0.1771	0.13778	0.09631	0.08907	0.87948	0.13754	Residence	
577141	4146222	577140.72_4146221.66	0.21291	0.14174	0.0991	0.08637	0.85966	0.13513	Residence	
577161	4146222	577160.72_4146221.66	0.23484	0.14332	0.10032	0.08502	0.84919	0.13386	Residence	
577181	4146222	577180.72_4146221.66	0.2602	0.14466	0.10142	0.0837	0.83908	0.13255	Residence	
577201	4146222	577200.72_4146221.66	0.28949	0.14573	0.10237	0.08238	0.82861	0.13121	Residence	
577221	4146222	577220.72_4146221.66	0.32389	0.1466	0.10317	0.08109	0.8194	0.12983	Residence	
577241	4146222	577240.72_4146221.66	0.36301	0.14712	0.10373	0.07975	0.80534	0.12841	Residence	
577261	4146222	577260.72_4146221.66	0.40953	0.14747	0.10413	0.07846	0.79252	0.12697	Residence	
577281	4146222	577280.72_4146221.66	0.4643	0.14759	0.10432	0.07717	0.77783	0.12549	Residence	
577301	4146222	577300.72_4146221.66	0.53037	0.14758	0.10434	0.07592	0.76335	0.124	Residence	
577321	4146222	577320.72_4146221.66	0.60785	0.1473	0.10409	0.07462	0.74246	0.12247	Residence	
577341	4146222	577340.72_4146221.66	0.70133	0.14688	0.10366	0.07335	0.71662	0.12093	Residence	
577361	4146222	577360.72_4146221.66	0.81501	0.14636	0.10305	0.07211	0.67984	0.11937	Residence	
577401	4146222	577400.72_4146221.66	1.10777	0.14489	0.10126	0.06964	0.53433	0.11619	Residence	
576401	4146242	576400.72_4146241.66	0.02409	0.04872	0.04355	0.09395	0.26602	0.14622	Residence	
576421	4146242	576420.72_4146241.66	0.02486	0.05028	0.04479	0.09568	0.30758	0.14851	Residence	
576441	4146242	576440.72_4146241.66	0.02575	0.05179	0.04588	0.09741	0.36686	0.15052	Residence	
576461	4146242	576460.72_4146241.66	0.02672	0.0533	0.04687	0.09908	0.45402	0.15219	Residence	
576481	4146242	576480.72_4146241.66	0.0278	0.05481	0.04778	0.10067	0.58852	0.15355	Residence	
576501	4146242	576500.72_4146241.66	0.02898	0.05635	0.04861	0.10217	0.80137	0.15463	Residence	
576581	4146242	576580.72_4146241.66	0.03548	0.06333	0.05163	0.10706	1.92653	0.15707	Residence	
576601	4146242	576600.72_4146241.66	0.03729	0.06534	0.05259	0.10789	1.9104	0.15725	Residence	
576621	4146242	576620.72_4146241.66	0.03925	0.06753	0.05367	0.10862	1.85025	0.1574	Residence	
576641	4146242	576640.72_4146241.66	0.0412	0.06983	0.05483	0.10913	1.76702	0.15734	Residence	
576661	4146242	576660.72_4146241.66	0.04322	0.07227	0.05614	0.10948	1.68845	0.15717	Residence	
576681	4146242	576680.72_4146241.66	0.04535	0.0749	0.0576	0.1097	1.62522	0.15695	Residence	
576701	4146242	576700.72_4146241.66	0.04755	0.07767	0.0592	0.10976	1.56845	0.15661	Residence	
576721	4146242	576720.72_4146241.66	0.04987	0.08057	0.06094	0.10966	1.51967	0.15619	Residence	
576741	4146242	576740.72_4146241.66	0.05239	0.08361	0.06281	0.10943	1.47886	0.15571	Residence	
576761	4146242	576760.72_4146241.66	0.05509	0.08674	0.06478	0.10904	1.4414	0.15513	Residence	
576781	4146242	576780.72_4146241.66	0.05807	0.08995	0.06683	0.10853	1.40822	0.15449	Residence	
576801	4146242	576800.72_4146241.66	0.06136	0.09321	0.06893	0.10788	1.37757	0.1538	Residence	
576821	4146242	576820.72_4146241.66	0.065	0.09651	0.07107	0.10711	1.34885	0.15305	Residence	
576841	4146242	576840.72_4146241.66	0.06907	0.09984	0.07321	0.10623	1.32163	0.15226	Residence	
576861	4146242	576860.72_4146241.66	0.07361	0.10319	0.07535	0.10526	1.29382	0.15144	Residence	
576881	4146242	576880.72_4146241.66	0.07865	0.10654	0.07746	0.1042	1.26125	0.15059	Residence	
576961	4146242	576960.72_4146241.66	0.10426	0.11978	0.0854	0.09922	1.10561	0.1469	Residence	
576981	4146242	576980.72_4146241.66	0.1124	0.12306	0.08729	0.0979	1.0852	0.14594	Residence	
577001	4146242	577000.72_4146241.66	0.12114	0.12623	0.08911	0.09653	1.06793	0.14493	Residence	
577021	4146242	577020.72_4146241.66	0.13095	0.12936	0.09091	0.09519	1.05694	0.14391	Residence	
577041	4146242	577040.72_4146241.66	0.14148	0.13228	0.09262	0.09379	1.04288	0.14283	Residence	
577061	4146242	577060.72_4146241.66	0.15331	0.13505	0.0943	0.09239	1.03042	0.14172	Residence	
577081	4146242	577080.72_4146241.66	0.16654	0.1376	0.0959	0.09099	1.01704	0.14055	Residence	
577101	4146242	577100.72_4146241.66	0.18192	0.13999	0.09746	0.08963	1.00718	0.13937	Residence	
577121	4146242	577120.72_4146241.66	0.1992	0.14207	0.0989	0.08824	0.9942	0.13813	Residence	
577141	4146242	577140.72_4146241.66	0.21919	0.1439	0.10025	0.08687	0.98212	0.13684	Residence	
577161	4146242	577160.72_4146241.66	0.24238	0.1455	0.10149	0.08552	0.97104	0.13553	Residence	
577181	4146242	577180.72_4146241.66	0.2691	0.14681	0.10258	0.08417	0.95909	0.13416	Residence	
577201	4146242	577200.72_4146241.66	0.30036	0.14789	0.10353	0.08284	0.94839	0.13277	Residence	
577221	4146242	577220.72_4146241.66	0.33708	0.14874	0.10432	0.08154	0.93825	0.13133	Residence	
577241	4146242	577240.72_4146241.66	0.37948	0.14927	0.10488	0.0802	0.9238	0.12987	Residence	
577261	4146242	577260.72_4146241.66	0.42929	0.14955	0.10523	0.07886	0.90735	0.12837	Residence	
577281	4146242	577280.72_4146241.66	0.48919	0.14967	0.10539	0.07755	0.89156	0.12684	Residence	
577301	4146242	577300.72_4146241.66	0.5614	0.1496	0.10535	0.07625	0.87457	0.1253	Residence	
577321	4146242	577320.72_4146241.66	0.64763	0.1493	0.10507	0.07494	0.85237	0.12372	Residence	
577341	4146242	577340.72_4146241.66	0.75426	0.14891	0.10462	0.07367	0.82664	0.12213	Residence	
577381	4146242	577380.72_4146241.66	1.04464	0.14772	0.10313	0.07117	0.7091	0.1189	Residence	
577401	4146242	577400.72_4146241.66	1.23394	0.1469	0.1021	0.06992	0.59196	0.11725	Residence	
576401	4146262	576400.72_4146261.66	0.02421	0.04908	0.0438	0.09492	0.27647	0.14924	Residence	
576421	4146262	576420.72_4146261.66	0.02502	0.05067	0.04506	0.09669	0.32158	0.15153	Residence	
576441	4146262	576440.72_4146261.66	0.02591	0.05221	0.04617	0.09844	0.38715	0.15352	Residence	
576461	4146262	576460.72_4146261.66	0.02688	0.05374	0.0472	0.10013	0.4867	0.15518	Residence	
576481	4146262	576480.72_4146261.66	0.02794	0.05529	0.04813	0.10173	0.64888	0.15653	Residence	
576501	4146262	576500.72_4146261.66	0.02913	0.05686	0.04898	0.10324	0.92874	0.1576	Residence	
576581	4146262	576580.72_4146261.66	0.03561	0.06398	0.05207	0.10813	2.39145	0.15993	Residence	
576601	4146262	576600.72_4146261.66	0.03746	0.06604	0.05304	0.10896	2.30119	0.16011	Residence	

576621	4146262	576620.72_4146261.66	0.03951	0.0683	0.05414	0.10971	2.20092	0.16026	Residence	
576641	4146262	576640.72_4146261.66	0.0415	0.07063	0.05532	0.11019	2.08423	0.16016	Residence	
576661	4146262	576660.72_4146261.66	0.04355	0.07311	0.05663	0.1105	1.98365	0.15993	Residence	
576681	4146262	576680.72_4146261.66	0.04574	0.07579	0.05811	0.1107	1.9098	0.15966	Residence	
576701	4146262	576700.72_4146261.66	0.04795	0.07858	0.05972	0.11069	1.83768	0.15924	Residence	
576721	4146262	576720.72_4146261.66	0.05028	0.08151	0.06147	0.11054	1.77702	0.15874	Residence	
576741	4146262	576740.72_4146261.66	0.05283	0.0846	0.06336	0.11028	1.73082	0.15821	Residence	
576761	4146262	576760.72_4146261.66	0.05559	0.08779	0.06536	0.10987	1.69	0.15761	Residence	
576781	4146262	576780.72_4146261.66	0.0586	0.09106	0.06744	0.10932	1.65215	0.15694	Residence	
576801	4146262	576800.72_4146261.66	0.06192	0.09439	0.06957	0.10864	1.61632	0.1562	Residence	
576821	4146262	576820.72_4146261.66	0.06563	0.09776	0.07174	0.10784	1.58464	0.15542	Residence	
576841	4146262	576840.72_4146261.66	0.06977	0.10117	0.07392	0.10694	1.55504	0.15461	Residence	
576861	4146262	576860.72_4146261.66	0.07437	0.10459	0.07609	0.10594	1.52174	0.15376	Residence	
576881	4146262	576880.72_4146261.66	0.07954	0.10803	0.07824	0.10486	1.4819	0.15289	Residence	
576961	4146262	576960.72_4146261.66	0.10606	0.12167	0.08635	0.09987	1.28624	0.1491	Residence	
576981	4146262	576980.72_4146261.66	0.11449	0.12503	0.08828	0.09854	1.26527	0.1481	Residence	
577001	4146262	577000.72_4146261.66	0.12358	0.12828	0.09013	0.09716	1.24752	0.14705	Residence	
577021	4146262	577020.72_4146261.66	0.13368	0.13145	0.09196	0.09579	1.23442	0.14597	Residence	
577041	4146262	577040.72_4146261.66	0.14456	0.1344	0.09369	0.09436	1.21644	0.14483	Residence	
577061	4146262	577060.72_4146261.66	0.15697	0.13724	0.0954	0.09297	1.20321	0.14368	Residence	
577081	4146262	577080.72_4146261.66	0.17083	0.13983	0.09703	0.09156	1.18798	0.14247	Residence	
577101	4146262	577100.72_4146261.66	0.18675	0.1422	0.0986	0.09017	1.17457	0.14122	Residence	
577121	4146262	577120.72_4146261.66	0.20483	0.14429	0.10006	0.08876	1.15897	0.13992	Residence	
577141	4146262	577140.72_4146261.66	0.22586	0.14613	0.10142	0.08738	1.14517	0.13858	Residence	
577161	4146262	577160.72_4146261.66	0.25024	0.1477	0.10266	0.08601	1.13182	0.13721	Residence	
577181	4146262	577180.72_4146261.66	0.27876	0.14904	0.10377	0.08466	1.12022	0.1358	Residence	
577201	4146262	577200.72_4146261.66	0.31217	0.15012	0.10473	0.08333	1.10933	0.13435	Residence	
577221	4146262	577220.72_4146261.66	0.35089	0.1509	0.10547	0.08197	1.09457	0.13286	Residence	
577241	4146262	577240.72_4146261.66	0.39692	0.15146	0.10604	0.08064	1.08054	0.13134	Residence	
577261	4146262	577260.72_4146261.66	0.45081	0.15172	0.10636	0.07927	1.06096	0.12979	Residence	
577281	4146262	577280.72_4146261.66	0.51624	0.15181	0.10649	0.07794	1.04305	0.12821	Residence	
577301	4146262	577300.72_4146261.66	0.59537	0.1517	0.1064	0.0766	1.02268	0.12661	Residence	
577321	4146262	577320.72_4146261.66	0.69242	0.15141	0.10609	0.07529	1.00067	0.12499	Residence	
577341	4146262	577340.72_4146261.66	0.81381	0.15101	0.1056	0.074	0.97641	0.12335	Residence	
577381	4146262	577380.72_4146261.66	1.15396	0.14975	0.10399	0.07143	0.82766	0.12001	Residence	
577401	4146262	577400.72_4146261.66	1.38713	0.14898	0.10294	0.0702	0.66039	0.11832	Residence	
576401	4146282	576400.72_4146281.66	0.02434	0.04944	0.04405	0.09591	0.28803	0.15236	Residence	
576421	4146282	576420.72_4146281.66	0.0252	0.05102	0.04531	0.09774	0.33784	0.15468	Residence	
576441	4146282	576440.72_4146281.66	0.02617	0.05255	0.04636	0.09955	0.41148	0.15662	Residence	
576461	4146282	576460.72_4146281.66	0.02716	0.05412	0.04742	0.10125	0.52556	0.15826	Residence	
576481	4146282	576480.72_4146281.66	0.02823	0.05571	0.04841	0.10286	0.72102	0.15956	Residence	
576501	4146282	576500.72_4146281.66	0.02938	0.05735	0.04935	0.10436	1.09392	0.16064	Residence	
576561	4146282	576560.72_4146281.66	0.034	0.06268	0.05164	0.10824	3.10866	0.16261	Residence	
576581	4146282	576580.72_4146281.66	0.03579	0.06466	0.05252	0.10923	3.01417	0.16292	Daycare	Au P'tit Mode de East Palo Alto
576601	4146282	576600.72_4146281.66	0.03761	0.06674	0.05349	0.11002	2.80504	0.16302	Daycare	Au P'tit Mode de East Palo Alto
576621	4146282	576620.72_4146281.66	0.03975	0.06906	0.05462	0.11079	2.67508	0.16319	Residence	
576641	4146282	576640.72_4146281.66	0.04183	0.07147	0.05583	0.11129	2.54051	0.16309	Residence	
576661	4146282	576660.72_4146281.66	0.04394	0.074	0.05716	0.11158	2.41853	0.16282	Residence	
576681	4146282	576680.72_4146281.66	0.04618	0.07672	0.05865	0.11175	2.33075	0.16251	Residence	
576701	4146282	576700.72_4146281.66	0.0485	0.0796	0.0603	0.11175	2.25509	0.16208	Residence	
576721	4146282	576720.72_4146281.66	0.05094	0.08261	0.06208	0.1116	2.18927	0.16157	Residence	
576741	4146282	576740.72_4146281.66	0.05353	0.08575	0.06399	0.11129	2.13048	0.16098	Residence	
576761	4146282	576760.72_4146281.66	0.05633	0.089	0.06602	0.11084	2.07822	0.16032	Residence	
576781	4146282	576780.72_4146281.66	0.05938	0.09233	0.06812	0.11025	2.02935	0.15959	Residence	
576801	4146282	576800.72_4146281.66	0.06276	0.09572	0.07029	0.10954	1.98608	0.15881	Residence	
576821	4146282	576820.72_4146281.66	0.06653	0.09917	0.07249	0.10871	1.94665	0.15799	Residence	
576841	4146282	576840.72_4146281.66	0.07074	0.10265	0.0747	0.10778	1.91075	0.15713	Residence	
576861	4146282	576860.72_4146281.66	0.07544	0.10614	0.0769	0.10674	1.86893	0.15624	Residence	
576881	4146282	576880.72_4146281.66	0.08071	0.10967	0.07909	0.10564	1.81276	0.15533	Residence	
576901	4146282	576900.72_4146281.66	0.08645	0.11314	0.0812	0.10441	1.7258	0.15435	Residence	
576921	4146282	576920.72_4146281.66	0.09294	0.11666	0.0833	0.10317	1.64626	0.15339	Residence	
576961	4146282	576960.72_4146281.66	0.10799	0.12363	0.08734	0.10054	1.54156	0.15137	Residence	
576981	4146282	576980.72_4146281.66	0.11655	0.12702	0.08927	0.09916	1.51439	0.15029	Residence	
577001	4146282	577000.72_4146281.66	0.12603	0.13036	0.09117	0.09778	1.49656	0.1492	Residence	
577021	4146282	577020.72_4146281.66	0.13654	0.1336	0.09303	0.09639	1.48182	0.14808	Residence	
577041	4146282	577040.72_4146281.66	0.1479	0.13661	0.0948	0.09496	1.45979	0.14689	Residence	
577061	4146282	577060.72_4146281.66	0.16087	0.13949	0.09654	0.09355	1.44416	0.14568	Residence	
577081	4146282	577080.72_4146281.66	0.17535	0.14211	0.09819	0.09213	1.42518	0.14441	Residence	
577101	4146282	577100.72_4146281.66	0.19194	0.14449	0.09977	0.09072	1.40748	0.1431	Residence	
577121	4146282	577120.72_4146281.66	0.21099	0.1466	0.10126	0.08931	1.38935	0.14175	Residence	
577141	4146282	577140.72_4146281.66	0.23324	0.14845	0.10264	0.08792	1.37403	0.14036	Residence	
577161	4146282	577160.72_4146281.66	0.25899	0.15002	0.10388	0.08653	1.35794	0.13892	Residence	
577181	4146282	577180.72_4146281.66	0.28916	0.15133	0.10499	0.08516	1.34372	0.13745	Residence	
577201	4146282	577200.72_4146281.66	0.32413	0.15233	0.1059	0.08377	1.32545	0.13594	Residence	

577221	4146282	577220.72_4146281.66	0.36517	0.15307	0.10662	0.08238	1.30544	0.1344	Residence
577241	4146282	577240.72_4146281.66	0.41463	0.15362	0.10717	0.08103	1.28951	0.13283	Residence
577261	4146282	577260.72_4146281.66	0.47378	0.15392	0.1075	0.07967	1.27113	0.13122	Residence
577281	4146282	577280.72_4146281.66	0.54436	0.15395	0.10757	0.07829	1.24617	0.12958	Residence
577301	4146282	577300.72_4146281.66	0.63195	0.15384	0.10745	0.07695	1.22408	0.12793	Residence
577381	4146282	577380.72_4146281.66	1.28538	0.15191	0.10489	0.07173	0.99675	0.12114	Residence
576401	4146302	576400.72_4146301.66	0.02449	0.04981	0.04434	0.09692	0.30109	0.1556	Residence
576421	4146302	576420.72_4146301.66	0.02537	0.05142	0.04554	0.09878	0.35546	0.15791	Residence
576441	4146302	576440.72_4146301.66	0.02641	0.05302	0.04663	0.10066	0.43893	0.15986	Residence
576461	4146302	576460.72_4146301.66	0.02744	0.05463	0.04767	0.10241	0.57081	0.16152	Residence
576481	4146302	576480.72_4146301.66	0.02855	0.05627	0.04859	0.10407	0.80908	0.16286	Residence
576501	4146302	576500.72_4146301.66	0.02968	0.05788	0.04966	0.10554	1.30771	0.16379	Residence
576541	4146302	576540.72_4146301.66	0.03269	0.06148	0.05118	0.10831	4.12463	0.16542	Residence
576561	4146302	576560.72_4146301.66	0.03428	0.06336	0.05206	0.10942	4.23039	0.16582	Residence
576581	4146302	576580.72_4146301.66	0.03608	0.06539	0.053	0.11042	3.87753	0.16611	Residence
576601	4146302	576600.72_4146301.66	0.0379	0.0675	0.05398	0.11118	3.53675	0.16615	Residence
576621	4146302	576620.72_4146301.66	0.04	0.06985	0.05511	0.11189	3.36616	0.16623	Residence
576641	4146302	576640.72_4146301.66	0.04212	0.07229	0.05633	0.11236	3.19827	0.16607	Residence
576661	4146302	576660.72_4146301.66	0.04432	0.0749	0.05768	0.11266	3.06254	0.16579	Residence
576681	4146302	576680.72_4146301.66	0.04662	0.07768	0.0592	0.11281	2.95998	0.16543	Residence
576701	4146302	576700.72_4146301.66	0.04896	0.08058	0.06085	0.11275	2.8498	0.16492	Residence
576721	4146302	576720.72_4146301.66	0.05142	0.08363	0.06264	0.11254	2.75603	0.16432	Residence
576741	4146302	576740.72_4146301.66	0.05409	0.08685	0.06459	0.11222	2.69302	0.16371	Residence
576761	4146302	576760.72_4146301.66	0.05697	0.09017	0.06665	0.11175	2.63329	0.16302	Residence
576781	4146302	576780.72_4146301.66	0.06009	0.09358	0.06879	0.11114	2.57555	0.16225	Residence
576801	4146302	576800.72_4146301.66	0.06357	0.09706	0.071	0.11041	2.52909	0.16146	Residence
576821	4146302	576820.72_4146301.66	0.06742	0.10059	0.07324	0.10956	2.48358	0.1606	Residence
576841	4146302	576840.72_4146301.66	0.07173	0.10416	0.0755	0.10861	2.44177	0.15972	Residence
576861	4146302	576860.72_4146301.66	0.07656	0.10775	0.07774	0.10756	2.39472	0.1588	Residence
576881	4146302	576880.72_4146301.66	0.08195	0.11136	0.07996	0.10642	2.30577	0.15784	Residence
576901	4146302	576900.72_4146301.66	0.08773	0.11488	0.08209	0.10514	2.15488	0.1568	Residence
576921	4146302	576920.72_4146301.66	0.09445	0.1185	0.08423	0.1039	2.0443	0.15581	Residence
576961	4146302	576960.72_4146301.66	0.11002	0.12566	0.08835	0.10124	1.91743	0.1537	Residence
576981	4146302	576980.72_4146301.66	0.11896	0.12915	0.09033	0.09985	1.89136	0.15258	Residence
577001	4146302	577000.72_4146301.66	0.12877	0.13255	0.09225	0.09844	1.86746	0.15143	Residence
577021	4146302	577020.72_4146301.66	0.13958	0.13582	0.09413	0.09702	1.84302	0.15023	Residence
577041	4146302	577040.72_4146301.66	0.15147	0.1389	0.09593	0.09558	1.81513	0.14899	Residence
577061	4146302	577060.72_4146301.66	0.16487	0.14179	0.09769	0.09414	1.79033	0.14771	Residence
577081	4146302	577080.72_4146301.66	0.1802	0.14448	0.09939	0.09273	1.77106	0.14639	Residence
577101	4146302	577100.72_4146301.66	0.1975	0.14686	0.10098	0.09129	1.74561	0.14501	Residence
577121	4146302	577120.72_4146301.66	0.21761	0.14898	0.10249	0.08987	1.7242	0.1436	Residence
577141	4146302	577140.72_4146301.66	0.24102	0.15083	0.10388	0.08846	1.70448	0.14215	Residence
577161	4146302	577160.72_4146301.66	0.26829	0.15239	0.10513	0.08705	1.6846	0.14066	Residence
577181	4146302	577180.72_4146301.66	0.29983	0.15363	0.1062	0.08563	1.65887	0.13912	Residence
577201	4146302	577200.72_4146301.66	0.33687	0.1546	0.1071	0.08421	1.63369	0.13755	Residence
577221	4146302	577220.72_4146301.66	0.38089	0.15533	0.10782	0.08281	1.61035	0.13594	Residence
577241	4146302	577240.72_4146301.66	0.43417	0.15587	0.10834	0.08144	1.59139	0.13432	Residence
577261	4146302	577260.72_4146301.66	0.49888	0.1562	0.10867	0.08009	1.57394	0.13267	Residence
577341	4146302	577340.72_4146301.66	0.95471	0.15538	0.10758	0.07464	1.49534	0.12581	Residence
577361	4146302	577360.72_4146301.66	1.16279	0.1548	0.10677	0.07331	1.47595	0.12405	Residence
576441	4146322	576440.72_4146321.66	0.02662	0.05346	0.04691	0.10177	0.46886	0.16325	Residence
576461	4146322	576460.72_4146321.66	0.02772	0.05515	0.04789	0.10359	0.62231	0.16496	Residence
576481	4146322	576480.72_4146321.66	0.02883	0.05681	0.04891	0.10523	0.90359	0.16626	Residence
576541	4146322	576540.72_4146321.66	0.03291	0.06211	0.05162	0.10947	3.70257	0.1687	Residence
576561	4146322	576560.72_4146321.66	0.03455	0.06406	0.05253	0.11061	3.01393	0.16912	Residence
576581	4146322	576580.72_4146321.66	0.0363	0.0661	0.05347	0.11156	3.64567	0.16932	Residence
576601	4146322	576600.72_4146321.66	0.03823	0.06831	0.05449	0.11239	3.19315	0.16943	Residence
576621	4146322	576620.72_4146321.66	0.04027	0.07065	0.0556	0.11301	2.87533	0.16935	Residence
576641	4146322	576640.72_4146321.66	0.04243	0.07314	0.05683	0.11346	2.6524	0.16915	Residence
576661	4146322	576660.72_4146321.66	0.04467	0.07579	0.05821	0.11373	4.01204	0.16881	Residence
576681	4146322	576680.72_4146321.66	0.0471	0.07866	0.05976	0.11389	3.91348	0.16845	Residence
576701	4146322	576700.72_4146321.66	0.04948	0.08161	0.06142	0.11378	3.75942	0.16787	Residence
576721	4146322	576720.72_4146321.66	0.052	0.08472	0.06324	0.11354	3.63083	0.16722	Residence
576741	4146322	576740.72_4146321.66	0.05472	0.08799	0.06521	0.11318	3.54082	0.16654	Residence
576761	4146322	576760.72_4146321.66	0.05764	0.09138	0.0673	0.11268	3.45786	0.16579	Residence
576781	4146322	576780.72_4146321.66	0.06087	0.09488	0.06948	0.11206	3.40078	0.16502	Residence
576801	4146322	576800.72_4146321.66	0.06439	0.09843	0.07172	0.11129	3.3328	0.16417	Residence
576821	4146322	576820.72_4146321.66	0.06827	0.10201	0.07399	0.11039	3.26097	0.16325	Residence
576841	4146322	576840.72_4146321.66	0.07263	0.10565	0.07627	0.10939	3.20241	0.16232	Residence
576861	4146322	576860.72_4146321.66	0.07753	0.10932	0.07855	0.10831	3.1425	0.16136	Residence
576881	4146322	576880.72_4146321.66	0.08301	0.113	0.0808	0.10714	2.98949	0.16036	Residence
577021	4146322	577020.72_4146321.66	0.14278	0.13811	0.09525	0.09766	2.3861	0.15243	Residence
577041	4146322	577040.72_4146321.66	0.15523	0.14125	0.0971	0.09621	2.34921	0.15113	Residence
577061	4146322	577060.72_4146321.66	0.16932	0.14421	0.09889	0.09477	2.32028	0.14979	Residence

577081	4146322	577080.72_4146321.66	0.18528	0.1469	0.10061	0.09333	2.29036	0.1484	Residence
577101	4146322	577100.72_4146321.66	0.20332	0.14927	0.10221	0.09186	2.24992	0.14695	Residence
577121	4146322	577120.72_4146321.66	0.22455	0.15141	0.10374	0.09043	2.22505	0.14548	Residence
577141	4146322	577140.72_4146321.66	0.24919	0.15325	0.10513	0.08899	2.19763	0.14397	Residence
577161	4146322	577160.72_4146321.66	0.278	0.15479	0.10639	0.08757	2.17012	0.14241	Residence
577181	4146322	577180.72_4146321.66	0.31124	0.15599	0.10744	0.08611	2.12793	0.14081	Residence
577201	4146322	577200.72_4146321.66	0.35095	0.15696	0.10834	0.08468	2.09765	0.13918	Residence
577221	4146322	577220.72_4146321.66	0.398	0.15767	0.10903	0.08325	2.06451	0.13751	Residence
577241	4146322	577240.72_4146321.66	0.45482	0.15815	0.10952	0.08184	2.03385	0.13582	Residence
577261	4146322	577260.72_4146321.66	0.5256	0.1585	0.10983	0.08047	2.01925	0.13413	Residence
577281	4146322	577280.72_4146321.66	0.61113	0.15854	0.10985	0.07907	1.98267	0.13239	Residence
577301	4146322	577300.72_4146321.66	0.71791	0.15838	0.10964	0.07766	1.94151	0.13062	Residence
577321	4146322	577320.72_4146321.66	0.85722	0.15812	0.10923	0.07631	1.92627	0.12885	Residence
577341	4146322	577340.72_4146321.66	1.03937	0.15768	0.10859	0.07496	1.96822	0.12705	Residence
576441	4146342	576440.72_4146341.66	0.02699	0.05398	0.04705	0.103	0.50417	0.16689	Residence
576461	4146342	576460.72_4146341.66	0.02802	0.05566	0.04817	0.10475	0.6757	0.16849	Residence
576481	4146342	576480.72_4146341.66	0.02915	0.05735	0.04922	0.10641	1.00923	0.16978	Residence
577021	4146342	577020.72_4146341.66	0.14625	0.14048	0.09641	0.09832	3.21098	0.15468	Residence
577041	4146342	577040.72_4146341.66	0.15911	0.14365	0.09828	0.09684	3.14681	0.1533	Residence
577061	4146342	577060.72_4146341.66	0.17394	0.14666	0.10011	0.09539	3.11574	0.15189	Residence
577081	4146342	577080.72_4146341.66	0.19066	0.14939	0.10185	0.09393	3.07526	0.15044	Residence
577101	4146342	577100.72_4146341.66	0.20966	0.15178	0.10348	0.09245	3.02014	0.14893	Residence
577121	4146342	577120.72_4146341.66	0.23193	0.15391	0.10501	0.091	2.98359	0.14739	Residence
577141	4146342	577140.72_4146341.66	0.25779	0.15572	0.10641	0.08953	2.93721	0.1458	Residence
577161	4146342	577160.72_4146341.66	0.28848	0.15727	0.10767	0.08809	2.90748	0.14418	Residence
577181	4146342	577180.72_4146341.66	0.3237	0.15843	0.10872	0.0866	2.83904	0.14252	Residence
577201	4146342	577200.72_4146341.66	0.36608	0.15939	0.10961	0.08515	2.79628	0.14082	Residence
577221	4146342	577220.72_4146341.66	0.41667	0.16008	0.11028	0.0837	2.75251	0.1391	Residence
577241	4146342	577240.72_4146341.66	0.47824	0.16056	0.11075	0.08226	2.71477	0.13735	Residence
577261	4146342	577260.72_4146341.66	0.55423	0.16083	0.11099	0.08085	2.68096	0.13559	Residence
577281	4146342	577280.72_4146341.66	0.64864	0.16089	0.11099	0.07943	2.63916	0.1338	Residence
577301	4146342	577300.72_4146341.66	0.76877	0.16077	0.11076	0.07803	2.59771	0.13199	Residence
577321	4146342	577320.72_4146341.66	0.92503	0.16047	0.11029	0.07664	2.56558	0.13015	Residence
577341	4146342	577340.72_4146341.66	1.13453	0.15999	0.10959	0.07526	2.68597	0.1283	Residence
577361	4146342	577360.72_4146341.66	1.43035	0.1594	0.1087	0.07391	3.07323	0.12643	Residence
576441	4146362	576440.72_4146361.66	0.02729	0.05446	0.04738	0.10416	0.53448	0.17056	Residence
576461	4146362	576460.72_4146361.66	0.02832	0.05616	0.04852	0.10591	0.72674	0.1721	Residence
576481	4146362	576480.72_4146361.66	0.02945	0.05789	0.0496	0.10759	1.12156	0.17338	Residence
576501	4146362	576500.72_4146361.66	0.03067	0.05966	0.05061	0.10915	2.15223	0.17436	Residence
576641	4146362	576640.72_4146361.66	0.0432	0.07492	0.05789	0.11573	2.02822	0.17565	Residence
577121	4146362	577120.72_4146361.66	0.23987	0.15648	0.10632	0.09157	1.18355	0.14932	Residence
577141	4146362	577140.72_4146361.66	0.26713	0.15827	0.10772	0.09007	1.13315	0.14766	Residence
577161	4146362	577160.72_4146361.66	0.29978	0.15981	0.10899	0.08862	1.11013	0.14598	Residence
577181	4146362	577180.72_4146361.66	0.33764	0.16099	0.11004	0.08712	1.0856	0.14426	Residence
577201	4146362	577200.72_4146361.66	0.38289	0.16191	0.11091	0.08563	1.07934	0.1425	Residence
577221	4146362	577220.72_4146361.66	0.43692	0.16256	0.11155	0.08414	2.16604	0.1407	Residence
577241	4146362	577240.72_4146361.66	0.50529	0.16311	0.11203	0.08273	2.08117	0.13892	Residence
577261	4146362	577260.72_4146361.66	0.58686	0.16329	0.11221	0.08125	1.98518	0.13708	Residence
577281	4146362	577280.72_4146361.66	0.69103	0.16334	0.11217	0.07981	1.93692	0.13523	Residence
577301	4146362	577300.72_4146361.66	0.82497	0.16321	0.11189	0.07839	1.91629	0.13336	Residence
577321	4146362	577320.72_4146361.66	1.00152	0.16288	0.11136	0.07697	1.92145	0.13147	Residence
576441	4146382	576440.72_4146381.66	0.02759	0.05493	0.0477	0.10532	0.5677	0.17433	Residence
576461	4146382	576460.72_4146381.66	0.02862	0.05667	0.04887	0.10709	0.78843	0.17584	Residence
576481	4146382	576480.72_4146381.66	0.02978	0.05844	0.04998	0.10879	1.24052	0.1771	Residence
576501	4146382	576500.72_4146381.66	0.03104	0.06026	0.05103	0.11038	2.33043	0.1781	Residence
576621	4146382	576620.72_4146381.66	0.04135	0.07317	0.05715	0.1165	1.69961	0.17941	Residence
576641	4146382	576640.72_4146381.66	0.04361	0.07581	0.05842	0.11686	1.53292	0.17902	Residence
576661	4146382	576660.72_4146381.66	0.04607	0.07867	0.05986	0.11709	1.43003	0.17857	Residence
576841	4146382	576840.72_4146381.66	0.07645	0.11066	0.07883	0.11205	1.20914	0.17086	Residence
576861	4146382	576860.72_4146381.66	0.08167	0.11459	0.08122	0.11087	1.23272	0.16974	Residence
576881	4146382	576880.72_4146381.66	0.08755	0.11854	0.08358	0.10962	1.29717	0.16858	Residence
576901	4146382	576900.72_4146381.66	0.09422	0.12253	0.08592	0.10831	1.40575	0.1674	Residence
576961	4146382	576960.72_4146381.66	0.11923	0.13435	0.0926	0.10409	1.22286	0.16355	Residence
576981	4146382	576980.72_4146381.66	0.12971	0.13821	0.09474	0.10265	1.24413	0.16219	Residence
577001	4146382	577000.72_4146381.66	0.14119	0.14191	0.09681	0.10118	1.25536	0.16077	Residence
577021	4146382	577020.72_4146381.66	0.15385	0.14542	0.09881	0.09967	1.26594	0.15929	Residence
577041	4146382	577040.72_4146381.66	0.1679	0.1487	0.10073	0.09814	1.2772	0.15776	Residence
577061	4146382	577060.72_4146381.66	0.18406	0.15177	0.10262	0.09665	1.3091	0.15621	Residence
577081	4146382	577080.72_4146381.66	0.20267	0.15458	0.10443	0.09518	0.93273	0.15461	Residence
577101	4146382	577100.72_4146381.66	0.22373	0.157	0.1061	0.09366	0.92332	0.15296	Residence
577121	4146382	577120.72_4146381.66	0.24838	0.15911	0.10765	0.09215	0.919	0.15127	Residence
577141	4146382	577140.72_4146381.66	0.27742	0.16091	0.10906	0.09064	0.92081	0.14955	Residence
577161	4146382	577160.72_4146381.66	0.31195	0.16242	0.11033	0.08915	0.93101	0.1478	Residence
577181	4146382	577180.72_4146381.66	0.35287	0.16362	0.1114	0.08765	0.94278	0.14601	Residence

577201	4146382	577200.72_4146381.66	0.40164	0.16453	0.11225	0.08614	0.95709	0.14419	Residence
577221	4146382	577220.72_4146381.66	0.46048	0.16518	0.11288	0.08463	0.97405	0.14235	Residence
576441	4146402	576440.72_4146401.66	0.02791	0.05542	0.04804	0.10652	0.60858	0.17825	Residence
576461	4146402	576460.72_4146401.66	0.02894	0.05718	0.04923	0.10828	0.85119	0.17972	Residence
576481	4146402	576480.72_4146401.66	0.03012	0.059	0.05036	0.11001	1.32244	0.18096	Residence
576501	4146402	576500.72_4146401.66	0.03142	0.06088	0.05145	0.11164	2.40388	0.18197	Residence
576621	4146402	576620.72_4146401.66	0.04177	0.07404	0.05768	0.11768	1.47811	0.18298	Residence
576641	4146402	576640.72_4146401.66	0.04408	0.07675	0.05897	0.11804	1.30534	0.18254	Residence
576661	4146402	576660.72_4146401.66	0.04658	0.07966	0.06043	0.11823	1.18863	0.182	Residence
576841	4146402	576840.72_4146401.66	0.07784	0.1124	0.07971	0.11293	0.88101	0.17385	Residence
576861	4146402	576860.72_4146401.66	0.08317	0.11642	0.08213	0.11172	0.88931	0.17267	Residence
576881	4146402	576880.72_4146401.66	0.0892	0.12047	0.08454	0.11044	0.91381	0.17145	Residence
576901	4146402	576900.72_4146401.66	0.09601	0.12454	0.0869	0.1091	0.95005	0.17019	Residence
576961	4146402	576960.72_4146401.66	0.122	0.1367	0.09373	0.10485	1.02866	0.16616	Residence
576981	4146402	576980.72_4146401.66	0.13292	0.14067	0.09592	0.1034	1.04892	0.16473	Residence
577001	4146402	577000.72_4146401.66	0.14484	0.14444	0.09802	0.10189	1.05718	0.16322	Residence
577021	4146402	577020.72_4146401.66	0.15788	0.14797	0.10003	0.10034	1.05531	0.16165	Residence
577041	4146402	577040.72_4146401.66	0.17249	0.15129	0.10199	0.09879	1.05532	0.16003	Residence
577061	4146402	577060.72_4146401.66	0.18945	0.15441	0.1039	0.09728	1.07045	0.1584	Residence
577081	4146402	577080.72_4146401.66	0.20908	0.15725	0.10574	0.09579	1.09431	0.15674	Residence
577101	4146402	577100.72_4146401.66	0.23117	0.15967	0.10742	0.09424	1.10127	0.15501	Residence
577121	4146402	577120.72_4146401.66	0.25723	0.16179	0.10899	0.09271	1.11508	0.15325	Residence
577141	4146402	577140.72_4146401.66	0.28793	0.16357	0.11041	0.09118	1.12793	0.15145	Residence
577161	4146402	577160.72_4146401.66	0.32492	0.16509	0.11169	0.08967	1.15279	0.14964	Residence
577181	4146402	577180.72_4146401.66	0.36816	0.16623	0.11273	0.08813	1.16047	0.14778	Residence
577201	4146402	577200.72_4146401.66	0.42042	0.16713	0.11357	0.08659	1.17371	0.14589	Residence
577221	4146402	577220.72_4146401.66	0.48419	0.16778	0.11418	0.08507	1.18927	0.14398	Residence
577261	4146402	577260.72_4146401.66	0.66247	0.16844	0.11469	0.08206	1.22171	0.1401	Residence
577281	4146402	577280.72_4146401.66	0.78978	0.16845	0.11457	0.08057	1.23535	0.13813	Residence
577301	4146402	577300.72_4146401.66	0.95783	0.16829	0.11418	0.07909	1.24962	0.13614	Residence
577321	4146402	577320.72_4146401.66	1.18882	0.16796	0.11356	0.07763	1.23407	0.13413	Residence
576241	4146422	576240.72_4146421.66	0.01951	0.03877	0.03424	0.08654	0.16003	0.14392	Residence
576261	4146422	576260.72_4146421.66	0.02015	0.04023	0.03555	0.08869	0.17273	0.14936	Residence
576281	4146422	576280.72_4146421.66	0.02082	0.04176	0.0369	0.09082	0.18723	0.15457	Residence
576301	4146422	576300.72_4146421.66	0.02156	0.04337	0.03832	0.09308	0.20441	0.15951	Residence
576321	4146422	576320.72_4146421.66	0.02238	0.04507	0.03979	0.09526	0.22539	0.16413	Residence
576341	4146422	576340.72_4146421.66	0.02329	0.04684	0.04129	0.09746	0.25212	0.16839	Residence
576361	4146422	576360.72_4146421.66	0.02417	0.04862	0.04277	0.09959	0.28558	0.17208	Residence
576381	4146422	576380.72_4146421.66	0.02511	0.05044	0.04423	0.1017	0.33102	0.1753	Residence
576401	4146422	576400.72_4146421.66	0.0261	0.05226	0.04566	0.10377	0.3957	0.17807	Residence
576421	4146422	576420.72_4146421.66	0.02711	0.05408	0.04704	0.10577	0.49227	0.18037	Residence
576441	4146422	576440.72_4146421.66	0.0282	0.05591	0.04836	0.10771	0.647	0.18229	Residence
576461	4146422	576460.72_4146421.66	0.02923	0.0577	0.04958	0.10949	0.89696	0.18372	Residence
576481	4146422	576480.72_4146421.66	0.03047	0.05956	0.05075	0.11124	1.36326	0.18496	Residence
576501	4146422	576500.72_4146421.66	0.0318	0.0615	0.05187	0.1129	2.42777	0.18597	Residence
576581	4146422	576580.72_4146421.66	0.03807	0.06992	0.05595	0.11766	2.09213	0.18722	Residence
576601	4146422	576600.72_4146421.66	0.04006	0.07236	0.05704	0.11839	1.63243	0.18705	Residence
576621	4146422	576620.72_4146421.66	0.04219	0.07493	0.05822	0.11889	1.3555	0.18666	Residence
576641	4146422	576640.72_4146421.66	0.04455	0.07771	0.05954	0.11923	1.17854	0.18617	Residence
576661	4146422	576660.72_4146421.66	0.04711	0.08068	0.06101	0.1194	1.05685	0.18558	Residence
576841	4146422	576840.72_4146421.66	0.07926	0.1142	0.0806	0.11384	0.70614	0.17693	Residence
576861	4146422	576860.72_4146421.66	0.08474	0.11833	0.08308	0.1126	0.70574	0.1757	Residence
576881	4146422	576880.72_4146421.66	0.09091	0.12247	0.08552	0.11129	0.71166	0.17441	Residence
576901	4146422	576900.72_4146421.66	0.09794	0.12666	0.08793	0.10993	0.72164	0.17309	Residence
576941	4146422	576940.72_4146421.66	0.11489	0.13505	0.09264	0.10711	0.73734	0.17032	Residence
576961	4146422	576960.72_4146421.66	0.12476	0.13912	0.09488	0.10561	0.73702	0.16882	Residence
576981	4146422	576980.72_4146421.66	0.13588	0.14312	0.09708	0.10411	0.73817	0.16729	Residence
577001	4146422	577000.72_4146421.66	0.14845	0.14701	0.09924	0.10261	0.742	0.16571	Residence
577021	4146422	577020.72_4146421.66	0.16211	0.15063	0.1013	0.10104	0.73819	0.16406	Residence
577041	4146422	577040.72_4146421.66	0.17756	0.15403	0.1033	0.09949	0.73725	0.16237	Residence
577061	4146422	577060.72_4146421.66	0.19532	0.15718	0.10524	0.09795	0.74083	0.16065	Residence
577081	4146422	577080.72_4146421.66	0.2158	0.16002	0.1071	0.09643	0.74703	0.1589	Residence
577101	4146422	577100.72_4146421.66	0.23897	0.16244	0.10879	0.09485	0.74563	0.15709	Residence
577121	4146422	577120.72_4146421.66	0.26628	0.16453	0.11037	0.09328	0.7464	0.15524	Residence
577141	4146422	577140.72_4146421.66	0.29848	0.16627	0.11178	0.09171	0.74646	0.15336	Residence
577161	4146422	577160.72_4146421.66	0.33832	0.16783	0.11307	0.0902	0.75918	0.15149	Residence
577181	4146422	577180.72_4146421.66	0.38446	0.16895	0.1141	0.08862	0.75872	0.14956	Residence
577201	4146422	577200.72_4146421.66	0.44085	0.16984	0.11493	0.08707	0.7624	0.14761	Residence
577221	4146422	577220.72_4146421.66	0.50996	0.17049	0.11553	0.08552	0.7659	0.14564	Residence
577261	4146422	577260.72_4146421.66	0.70438	0.1711	0.11595	0.08245	0.76833	0.14163	Residence
577281	4146422	577280.72_4146421.66	0.84486	0.17109	0.11577	0.08093	0.76399	0.13959	Residence
577301	4146422	577300.72_4146421.66	1.03493	0.17094	0.11535	0.07944	0.74675	0.13755	Residence
577321	4146422	577320.72_4146421.66	1.30123	0.17062	0.11468	0.07797	0.66851	0.13549	Residence
576241	4146442	576240.72_4146441.66	0.01967	0.03896	0.03432	0.08742	0.16308	0.14744	Residence

576261	4146442	576260.72_4146441.66	0.0203	0.04042	0.03563	0.08959	0.1762	0.15305	Residence	
576281	4146442	576280.72_4146441.66	0.02097	0.04196	0.03701	0.09176	0.19119	0.15838	Residence	
576301	4146442	576300.72_4146441.66	0.0217	0.0436	0.03845	0.09394	0.20907	0.16344	Residence	
576321	4146442	576320.72_4146441.66	0.02253	0.04535	0.03994	0.09629	0.23165	0.16822	Residence	
576341	4146442	576340.72_4146441.66	0.02345	0.04715	0.04147	0.09852	0.26008	0.17253	Residence	
576361	4146442	576360.72_4146441.66	0.0243	0.04895	0.04297	0.10067	0.29575	0.17622	Residence	
576381	4146442	576380.72_4146441.66	0.02525	0.0508	0.04447	0.10281	0.34497	0.17948	Residence	
576401	4146442	576400.72_4146441.66	0.02625	0.05266	0.04593	0.10491	0.41467	0.18224	Residence	
576421	4146442	576420.72_4146441.66	0.02736	0.05454	0.04734	0.10697	0.51888	0.18459	Residence	
576441	4146442	576440.72_4146441.66	0.02851	0.05643	0.0487	0.10897	0.68098	0.18655	Residence	
576461	4146442	576460.72_4146441.66	0.02966	0.0583	0.04998	0.11083	0.93993	0.18806	Residence	
576481	4146442	576480.72_4146441.66	0.03084	0.06016	0.05116	0.11254	1.39061	0.18918	Residence	
576501	4146442	576500.72_4146441.66	0.03215	0.06212	0.0523	0.11419	2.44116	0.19011	Residence	
576601	4146442	576600.72_4146441.66	0.04042	0.0732	0.05757	0.11962	1.55643	0.1909	School	The Primary School
576621	4146442	576620.72_4146441.66	0.0426	0.07585	0.05877	0.12013	1.28103	0.19049	School	The Primary School
576841	4146442	576840.72_4146441.66	0.08065	0.11606	0.08152	0.11476	0.60039	0.18011	Residence	
576861	4146442	576860.72_4146441.66	0.08625	0.12029	0.08404	0.11349	0.59321	0.17881	Residence	
576881	4146442	576880.72_4146441.66	0.09258	0.12454	0.08652	0.11216	0.58913	0.17746	Residence	
576901	4146442	576900.72_4146441.66	0.09976	0.12883	0.08898	0.11077	0.58609	0.17605	Residence	
576941	4146442	576940.72_4146441.66	0.11726	0.13744	0.09377	0.10791	0.58252	0.17312	Residence	
576961	4146442	576960.72_4146441.66	0.12741	0.14159	0.09605	0.10638	0.57669	0.17153	Residence	
576981	4146442	576980.72_4146441.66	0.13892	0.14569	0.0983	0.10485	0.57287	0.1699	Residence	
577001	4146442	577000.72_4146441.66	0.15205	0.14968	0.1005	0.10334	0.57211	0.16825	Residence	
577021	4146442	577020.72_4146441.66	0.16643	0.15339	0.10261	0.10177	0.56797	0.16652	Residence	
577041	4146442	577040.72_4146441.66	0.18266	0.15685	0.10465	0.1002	0.56468	0.16474	Residence	
577061	4146442	577060.72_4146441.66	0.20125	0.16003	0.10662	0.09864	0.56324	0.16293	Residence	
577081	4146442	577080.72_4146441.66	0.22257	0.16287	0.10848	0.09707	0.56206	0.16109	Residence	
577101	4146442	577100.72_4146441.66	0.2469	0.16529	0.11019	0.09546	0.55793	0.15919	Residence	
577121	4146442	577120.72_4146441.66	0.27574	0.16738	0.11178	0.09387	0.55548	0.15727	Residence	
577141	4146442	577140.72_4146441.66	0.30965	0.16909	0.11319	0.09226	0.55158	0.1553	Residence	
577161	4146442	577160.72_4146441.66	0.35224	0.17065	0.11449	0.09073	0.55644	0.15337	Residence	
577181	4146442	577180.72_4146441.66	0.40143	0.17174	0.11551	0.08912	0.55267	0.15136	Daycare	Sweet Angels Daycare
577201	4146442	577200.72_4146441.66	0.46193	0.17261	0.11631	0.08754	0.55107	0.14934	Residence	
577221	4146442	577220.72_4146441.66	0.53728	0.17328	0.1169	0.08598	0.55088	0.14732	Residence	
577261	4146442	577260.72_4146441.66	0.75064	0.17388	0.11725	0.08286	0.54043	0.14318	Residence	
577301	4146442	577300.72_4146441.66	1.12137	0.1737	0.11654	0.07979	0.48341	0.13897	Residence	
576241	4146462	576240.72_4146461.66	0.01984	0.03917	0.03443	0.08835	0.16672	0.15119	Residence	
576261	4146462	576260.72_4146461.66	0.02047	0.04066	0.03575	0.09055	0.18036	0.15696	Residence	
576281	4146462	576280.72_4146461.66	0.02114	0.04222	0.03715	0.09277	0.19625	0.16248	Residence	
576301	4146462	576300.72_4146461.66	0.0219	0.0439	0.03861	0.09513	0.21574	0.16773	Residence	
576321	4146462	576320.72_4146461.66	0.02271	0.04565	0.04012	0.09738	0.23945	0.17254	Residence	
576341	4146462	576340.72_4146461.66	0.02362	0.04747	0.04166	0.09964	0.26989	0.1769	Residence	
576361	4146462	576360.72_4146461.66	0.02447	0.0493	0.04318	0.10181	0.30818	0.18062	Residence	
576381	4146462	576380.72_4146461.66	0.02543	0.05119	0.04471	0.10398	0.36079	0.18388	Residence	
576401	4146462	576400.72_4146461.66	0.02645	0.05309	0.04621	0.10611	0.43416	0.18665	Residence	
576421	4146462	576420.72_4146461.66	0.02756	0.055	0.04764	0.10819	0.541	0.18898	Residence	
576441	4146462	576440.72_4146461.66	0.02877	0.05695	0.04904	0.11024	0.70529	0.19096	Residence	
576461	4146462	576460.72_4146461.66	0.02995	0.05886	0.05035	0.11212	0.96004	0.19244	Residence	
576481	4146462	576480.72_4146461.66	0.03116	0.06078	0.05157	0.11386	1.40776	0.19355	Residence	
576501	4146462	576500.72_4146461.66	0.03249	0.06277	0.05273	0.11551	2.46077	0.19443	Residence	
576601	4146462	576600.72_4146461.66	0.04076	0.07407	0.05811	0.12089	1.50665	0.19492	School	The Primary School
576621	4146462	576620.72_4146461.66	0.04296	0.07679	0.05934	0.12138	1.23088	0.19444	School	The Primary School
576841	4146462	576840.72_4146461.66	0.08196	0.11798	0.08246	0.11569	0.53033	0.18339	Residence	
576861	4146462	576860.72_4146461.66	0.08769	0.12232	0.08502	0.1144	0.51882	0.18201	Residence	
576881	4146462	576880.72_4146461.66	0.09417	0.12668	0.08755	0.11304	0.50908	0.18058	Residence	
576901	4146462	576900.72_4146461.66	0.10154	0.13108	0.09005	0.11163	0.50062	0.1791	Residence	
576941	4146462	576940.72_4146461.66	0.11954	0.13991	0.09494	0.10872	0.48754	0.17598	Residence	
576961	4146462	576960.72_4146461.66	0.13003	0.14416	0.09726	0.10717	0.47954	0.1743	Residence	
576981	4146462	576980.72_4146461.66	0.14195	0.14835	0.09954	0.10562	0.47323	0.17258	Residence	
577001	4146462	577000.72_4146461.66	0.15564	0.15244	0.1018	0.10409	0.46956	0.17083	Residence	
577021	4146462	577020.72_4146461.66	0.17068	0.15623	0.10395	0.10251	0.46415	0.16901	Residence	
577041	4146462	577040.72_4146461.66	0.18766	0.15975	0.10602	0.10091	0.45913	0.16715	Residence	
577061	4146462	577060.72_4146461.66	0.20703	0.16295	0.10801	0.09932	0.45486	0.16524	Residence	
577081	4146462	577080.72_4146461.66	0.22937	0.1658	0.1099	0.09772	0.45109	0.16331	Residence	
577101	4146462	577100.72_4146461.66	0.25494	0.16822	0.11163	0.09608	0.44574	0.16132	Residence	
577121	4146462	577120.72_4146461.66	0.28574	0.17034	0.11324	0.09448	0.44271	0.15933	Residence	
577141	4146462	577140.72_4146461.66	0.32184	0.17205	0.11466	0.09284	0.43802	0.15729	Residence	
577161	4146462	577160.72_4146461.66	0.36688	0.17357	0.11595	0.09127	0.43742	0.15528	Residence	
577181	4146462	577180.72_4146461.66	0.41898	0.17461	0.11693	0.08962	0.43116	0.15318	Residence	
577201	4146462	577200.72_4146461.66	0.48465	0.1755	0.11774	0.08802	0.42801	0.15111	Residence	
577221	4146462	577220.72_4146461.66	0.56629	0.17615	0.11829	0.08643	0.42375	0.14901	Residence	
577301	4146462	577300.72_4146461.66	1.22067	0.17657	0.11776	0.08016	0.33731	0.14043	Residence	
576241	4146482	576240.72_4146481.66	0.01998	0.03938	0.03453	0.08928	0.17072	0.15509	Residence	
576261	4146482	576260.72_4146481.66	0.02061	0.0409	0.03587	0.09153	0.18518	0.16106	Residence	

576281	4146482	576280.72_4146481.66	0.02129	0.04248	0.03728	0.0938	0.20222	0.16677	Residence	
576301	4146482	576300.72_4146481.66	0.02213	0.0442	0.03881	0.09624	0.22357	0.17224	Residence	
576321	4146482	576320.72_4146481.66	0.02291	0.04596	0.04031	0.0985	0.24861	0.17709	Residence	
576341	4146482	576340.72_4146481.66	0.02378	0.0478	0.04185	0.10078	0.28078	0.18147	Residence	
576361	4146482	576360.72_4146481.66	0.02461	0.04966	0.04339	0.10298	0.32125	0.18521	Residence	
576381	4146482	576380.72_4146481.66	0.02558	0.05158	0.04495	0.10518	0.37611	0.18848	Residence	
576401	4146482	576400.72_4146481.66	0.02664	0.05353	0.04646	0.10735	0.45196	0.19127	Residence	
576421	4146482	576420.72_4146481.66	0.02776	0.05549	0.04795	0.10946	0.55937	0.19358	Residence	
576441	4146482	576440.72_4146481.66	0.02899	0.05748	0.04939	0.11155	0.72273	0.19556	Residence	
576461	4146482	576460.72_4146481.66	0.03019	0.05943	0.05073	0.11344	0.97255	0.197	Residence	
576481	4146482	576480.72_4146481.66	0.03147	0.06142	0.052	0.11524	1.42896	0.19814	Residence	
576501	4146482	576500.72_4146481.66	0.03278	0.06343	0.05318	0.11686	2.48594	0.19893	Residence	
576561	4146482	576560.72_4146481.66	0.03729	0.06994	0.05643	0.12064	2.81187	0.19967	School	The Primary School
576581	4146482	576580.72_4146481.66	0.03909	0.07237	0.05751	0.12151	1.93031	0.19947	School	The Primary School
576601	4146482	576600.72_4146481.66	0.04109	0.07498	0.05867	0.1222	1.47303	0.19911	School	The Primary School
576621	4146482	576620.72_4146481.66	0.04331	0.07777	0.05992	0.12268	1.19729	0.19858	School	The Primary School
576841	4146482	576840.72_4146481.66	0.08308	0.1199	0.08339	0.11659	0.47951	0.18672	School	Los Robles Ronald McNair Academy
576861	4146482	576860.72_4146481.66	0.08891	0.12434	0.08599	0.11527	0.4649	0.18526	School	Los Robles Ronald McNair Academy
576881	4146482	576880.72_4146481.66	0.09554	0.12883	0.08858	0.11389	0.45232	0.18374	School	Los Robles Ronald McNair Academy
576901	4146482	576900.72_4146481.66	0.10313	0.13336	0.09113	0.11247	0.44146	0.18218	Residence	
576941	4146482	576940.72_4146481.66	0.12174	0.14244	0.09612	0.10954	0.42415	0.1789	Residence	
576961	4146482	576960.72_4146481.66	0.13259	0.14681	0.0985	0.10797	0.41502	0.17712	Residence	
576981	4146482	576980.72_4146481.66	0.14494	0.15109	0.10082	0.10639	0.40731	0.1753	Residence	
577001	4146482	577000.72_4146481.66	0.15932	0.1553	0.10314	0.10487	0.40237	0.17347	Residence	
577021	4146482	577020.72_4146481.66	0.175	0.15916	0.10533	0.10326	0.39577	0.17155	Residence	
577041	4146482	577040.72_4146481.66	0.19275	0.16273	0.10743	0.10164	0.38964	0.16959	Residence	
577061	4146482	577060.72_4146481.66	0.21303	0.16597	0.10945	0.10001	0.38409	0.16759	Residence	
577081	4146482	577080.72_4146481.66	0.23645	0.16883	0.11136	0.09838	0.37891	0.16556	Residence	
577101	4146482	577100.72_4146481.66	0.26324	0.17124	0.1131	0.09671	0.37255	0.16348	Residence	
577121	4146482	577120.72_4146481.66	0.29584	0.17336	0.11473	0.09508	0.36828	0.16141	Residence	
577141	4146482	577140.72_4146481.66	0.33453	0.17509	0.11616	0.09343	0.36345	0.15931	Residence	
577161	4146482	577160.72_4146481.66	0.38222	0.17657	0.11743	0.09182	0.36	0.1572	Residence	
577181	4146482	577180.72_4146481.66	0.43803	0.17759	0.1184	0.09013	0.35298	0.15504	Residence	
577201	4146482	577200.72_4146481.66	0.50862	0.17846	0.11918	0.0885	0.34712	0.15289	Residence	
577221	4146482	577220.72_4146481.66	0.5971	0.17909	0.1197	0.08688	0.33943	0.15073	Residence	
577261	4146482	577260.72_4146481.66	0.85619	0.17969	0.1199	0.08366	0.31056	0.14635	Residence	
577281	4146482	577280.72_4146481.66	1.05335	0.17968	0.11957	0.08207	0.28492	0.14413	Residence	
576241	4146502	576240.72_4146501.66	0.02016	0.03964	0.03471	0.09039	0.17596	0.15932	Residence	
576261	4146502	576260.72_4146501.66	0.02079	0.04115	0.03603	0.09267	0.19125	0.16547	Residence	
576281	4146502	576280.72_4146501.66	0.0215	0.04277	0.03747	0.095	0.20953	0.17137	Residence	
576301	4146502	576300.72_4146501.66	0.02228	0.04449	0.03896	0.09734	0.23169	0.17687	Residence	
576321	4146502	576320.72_4146501.66	0.02305	0.04627	0.04048	0.09964	0.25815	0.18181	Residence	
576341	4146502	576340.72_4146501.66	0.0239	0.04813	0.04204	0.10194	0.29179	0.18624	Residence	
576361	4146502	576360.72_4146501.66	0.0248	0.05005	0.04361	0.10421	0.33463	0.19008	Residence	
576381	4146502	576380.72_4146501.66	0.02574	0.052	0.04519	0.10644	0.39084	0.19334	Residence	
576401	4146502	576400.72_4146501.66	0.0268	0.05398	0.04675	0.10863	0.46723	0.19611	Residence	
576421	4146502	576420.72_4146501.66	0.02795	0.05599	0.04827	0.11078	0.57465	0.19842	Residence	
576441	4146502	576440.72_4146501.66	0.02918	0.05803	0.04974	0.11289	0.73604	0.20036	Residence	
576461	4146502	576460.72_4146501.66	0.0304	0.06002	0.05111	0.1148	0.98283	0.20177	Residence	
576481	4146502	576480.72_4146501.66	0.03169	0.06205	0.05241	0.1166	1.43624	0.20285	Residence	
576501	4146502	576500.72_4146501.66	0.03304	0.06411	0.05363	0.11823	2.50897	0.2036	Residence	
576561	4146502	576560.72_4146501.66	0.03757	0.07075	0.05695	0.12199	2.77322	0.20414	School	The Primary School
576581	4146502	576580.72_4146501.66	0.03939	0.07325	0.05806	0.12287	1.9045	0.2039	School	The Primary School
576601	4146502	576600.72_4146501.66	0.04138	0.07591	0.05924	0.12353	1.4472	0.20345	School	The Primary School
576621	4146502	576620.72_4146501.66	0.04361	0.07877	0.06051	0.12399	1.17162	0.20284	School	The Primary School
576641	4146502	576640.72_4146501.66	0.04609	0.08184	0.06193	0.12426	0.98906	0.20211	School	The Primary School
576661	4146502	576660.72_4146501.66	0.04889	0.08516	0.06352	0.12438	0.86195	0.20132	School	The Primary School
576681	4146502	576680.72_4146501.66	0.05187	0.08865	0.06527	0.12426	0.76508	0.20037	School	The Primary School
576701	4146502	576700.72_4146501.66	0.05505	0.09231	0.06719	0.12394	0.68964	0.1993	School	The Primary School
576721	4146502	576720.72_4146501.66	0.05845	0.09617	0.06929	0.12345	0.63035	0.19818	School	The Primary School
576801	4146502	576800.72_4146501.66	0.07423	0.11298	0.07907	0.11999	0.4841	0.19308	School	Los Robles Ronald McNair Academy
576821	4146502	576820.72_4146501.66	0.079	0.11743	0.08171	0.11882	0.46191	0.19166	School	Los Robles Ronald McNair Academy
576841	4146502	576840.72_4146501.66	0.08432	0.12195	0.08437	0.11756	0.4432	0.19019	School	Los Robles Ronald McNair Academy
576861	4146502	576860.72_4146501.66	0.09026	0.1265	0.08702	0.11621	0.42664	0.18863	School	Los Robles Ronald McNair Academy
576881	4146502	576880.72_4146501.66	0.09705	0.13111	0.08966	0.11481	0.41233	0.18703	School	Los Robles Ronald McNair Academy
576901	4146502	576900.72_4146501.66	0.10473	0.13572	0.09224	0.11334	0.39923	0.18534	School	Los Robles Ronald McNair Academy
576941	4146502	576940.72_4146501.66	0.12396	0.14507	0.09734	0.11038	0.37935	0.18188	Residence	
576961	4146502	576960.72_4146501.66	0.13523	0.14955	0.09977	0.10879	0.36959	0.18	Residence	
576981	4146502	576980.72_4146501.66	0.14811	0.15395	0.10215	0.1072	0.36125	0.17809	Residence	
577001	4146502	577000.72_4146501.66	0.163	0.15824	0.1045	0.10564	0.3547	0.17614	Residence	
577021	4146502	577020.72_4146501.66	0.17932	0.16216	0.10672	0.10401	0.34725	0.17412	Residence	
577041	4146502	577040.72_4146501.66	0.19781	0.16577	0.10886	0.10235	0.34026	0.17206	Residence	
577061	4146502	577060.72_4146501.66	0.21901	0.16904	0.1109	0.10069	0.33386	0.16996	Residence	
577081	4146502	577080.72_4146501.66	0.24385	0.17195	0.11285	0.09905	0.32841	0.16785	Residence	

577101	4146502	577100.72_4146501.66	0.27203	0.17436	0.1146	0.09734	0.32159	0.16568	Residence	
577121	4146502	577120.72_4146501.66	0.3064	0.17646	0.11624	0.09567	0.31625	0.16352	Residence	
577141	4146502	577140.72_4146501.66	0.34791	0.17822	0.11769	0.09401	0.31103	0.16135	Residence	
577161	4146502	577160.72_4146501.66	0.39881	0.17968	0.11895	0.09237	0.30601	0.15916	Residence	
577181	4146502	577180.72_4146501.66	0.45881	0.18068	0.11991	0.09065	0.29802	0.15693	Residence	
577201	4146502	577200.72_4146501.66	0.53497	0.18152	0.12066	0.08898	0.29007	0.1547	Residence	
577221	4146502	577220.72_4146501.66	0.63081	0.18213	0.12114	0.08733	0.27986	0.15247	Residence	
577261	4146502	577260.72_4146501.66	0.91832	0.18273	0.12125	0.08407	0.24862	0.14796	Residence	
577281	4146502	577280.72_4146501.66	1.14165	0.18273	0.12087	0.08245	0.22608	0.14569	Residence	
576181	4146522	576180.72_4146521.66	0.01857	0.03588	0.03146	0.08454	0.14415	0.14366	Residence	
576201	4146522	576200.72_4146521.66	0.01911	0.03712	0.03248	0.08679	0.15508	0.15037	Residence	
576221	4146522	576220.72_4146521.66	0.01969	0.03845	0.03364	0.08909	0.16749	0.15711	Residence	
576241	4146522	576240.72_4146521.66	0.02031	0.03988	0.03489	0.0914	0.18155	0.1637	Residence	
576261	4146522	576260.72_4146521.66	0.02096	0.04141	0.03621	0.09374	0.19787	0.17007	Residence	
576281	4146522	576280.72_4146521.66	0.02166	0.04304	0.03762	0.09609	0.2171	0.17611	Residence	
576301	4146522	576300.72_4146521.66	0.0224	0.04477	0.03911	0.09846	0.24009	0.18171	Residence	
576321	4146522	576320.72_4146521.66	0.02319	0.04659	0.04065	0.10082	0.26822	0.18679	Residence	
576341	4146522	576340.72_4146521.66	0.02405	0.0485	0.04224	0.10318	0.30341	0.1913	Residence	
576361	4146522	576360.72_4146521.66	0.02497	0.05046	0.04386	0.10551	0.34817	0.19522	Residence	
576381	4146522	576380.72_4146521.66	0.02596	0.05248	0.04547	0.10781	0.40652	0.19855	Residence	
576401	4146522	576400.72_4146521.66	0.02702	0.05451	0.04707	0.11005	0.48414	0.20132	Residence	
576421	4146522	576420.72_4146521.66	0.02814	0.05655	0.04862	0.1122	0.59094	0.20358	Residence	
576441	4146522	576440.72_4146521.66	0.02933	0.05859	0.0501	0.11426	0.74619	0.20537	Residence	
576461	4146522	576460.72_4146521.66	0.03057	0.06063	0.0515	0.11619	0.99165	0.20673	Residence	
576481	4146522	576480.72_4146521.66	0.03188	0.0627	0.05283	0.11799	1.44521	0.20776	Residence	
576501	4146522	576500.72_4146521.66	0.03325	0.0648	0.05408	0.11963	2.53284	0.20845	Residence	
576561	4146522	576560.72_4146521.66	0.03783	0.07158	0.05748	0.12337	2.74053	0.20879	School	The Primary School
576581	4146522	576580.72_4146521.66	0.03965	0.07413	0.05862	0.12423	1.88028	0.20847	School	The Primary School
576601	4146522	576600.72_4146521.66	0.04164	0.07686	0.05981	0.12488	1.42595	0.20794	School	The Primary School
576621	4146522	576620.72_4146521.66	0.04387	0.07978	0.06111	0.12532	1.15063	0.20725	School	The Primary School
576641	4146522	576640.72_4146521.66	0.04636	0.08293	0.06255	0.12556	0.96797	0.20644	School	The Primary School
576661	4146522	576660.72_4146521.66	0.04919	0.08633	0.06417	0.12566	0.84016	0.20559	School	The Primary School
576681	4146522	576680.72_4146521.66	0.05221	0.0899	0.06594	0.1255	0.74239	0.20455	School	The Primary School
576701	4146522	576700.72_4146521.66	0.05549	0.09368	0.0679	0.12516	0.66707	0.20344	School	The Primary School
576721	4146522	576720.72_4146521.66	0.05898	0.09762	0.07004	0.12463	0.60704	0.20224	School	The Primary School
576801	4146522	576800.72_4146521.66	0.07521	0.11485	0.07997	0.12103	0.4582	0.19682	School	Los Robles Ronald McNair Academy
576821	4146522	576820.72_4146521.66	0.08011	0.11942	0.08266	0.11983	0.43498	0.19532	School	Los Robles Ronald McNair Academy
576841	4146522	576840.72_4146521.66	0.08555	0.12406	0.08537	0.11854	0.41504	0.19375	School	Los Robles Ronald McNair Academy
576861	4146522	576860.72_4146521.66	0.09166	0.12874	0.08808	0.11717	0.39751	0.19211	School	Los Robles Ronald McNair Academy
576881	4146522	576880.72_4146521.66	0.09857	0.13346	0.09075	0.11573	0.38189	0.19039	School	Los Robles Ronald McNair Academy
576901	4146522	576900.72_4146521.66	0.10648	0.1382	0.09339	0.11424	0.36806	0.1886	Residence	
576941	4146522	576940.72_4146521.66	0.1263	0.14779	0.09859	0.11124	0.34616	0.18492	Residence	
576961	4146522	576960.72_4146521.66	0.13804	0.15241	0.10108	0.10964	0.33608	0.18295	Residence	
576981	4146522	576980.72_4146521.66	0.15136	0.1569	0.1035	0.10802	0.32694	0.18092	Residence	
577001	4146522	577000.72_4146521.66	0.1669	0.16129	0.1059	0.10645	0.31962	0.17886	Residence	
577021	4146522	577020.72_4146521.66	0.18378	0.16525	0.10815	0.10476	0.31139	0.17673	Residence	
577041	4146522	577040.72_4146521.66	0.2033	0.16895	0.11034	0.1031	0.30431	0.17457	Residence	
577061	4146522	577060.72_4146521.66	0.22558	0.17225	0.11242	0.10141	0.29746	0.17238	Residence	
577081	4146522	577080.72_4146521.66	0.25174	0.17519	0.11439	0.09974	0.29136	0.17017	Residence	
577101	4146522	577100.72_4146521.66	0.28144	0.17758	0.11615	0.09799	0.28415	0.16791	Residence	
577121	4146522	577120.72_4146521.66	0.3179	0.17969	0.1178	0.09629	0.27809	0.16566	Residence	
577141	4146522	577140.72_4146521.66	0.36177	0.1814	0.11924	0.09458	0.27167	0.1634	Residence	
577161	4146522	577160.72_4146521.66	0.41643	0.18286	0.1205	0.09292	0.26552	0.16114	Residence	
577181	4146522	577180.72_4146521.66	0.48061	0.18382	0.12143	0.09115	0.25645	0.15883	Residence	
577201	4146522	577200.72_4146521.66	0.56328	0.18466	0.12216	0.08946	0.24733	0.15654	Residence	
577221	4146522	577220.72_4146521.66	0.66905	0.1853	0.12262	0.08779	0.23639	0.15424	Residence	
577281	4146522	577280.72_4146521.66	1.24159	0.18588	0.12219	0.08284	0.18705	0.14727	Residence	
576181	4146542	576180.72_4146541.66	0.0186	0.03605	0.03154	0.0854	0.14784	0.14738	Residence	
576201	4146542	576200.72_4146541.66	0.01917	0.03731	0.0326	0.08771	0.15945	0.1544	Residence	
576221	4146542	576220.72_4146541.66	0.01976	0.03866	0.03373	0.09004	0.17247	0.16138	Residence	
576241	4146542	576240.72_4146541.66	0.02038	0.0401	0.03498	0.0924	0.18733	0.16822	Residence	
576261	4146542	576260.72_4146541.66	0.02107	0.04166	0.03634	0.0948	0.20467	0.17484	Residence	
576281	4146542	576280.72_4146541.66	0.02178	0.04331	0.03777	0.09721	0.22485	0.18107	Residence	
576301	4146542	576300.72_4146541.66	0.02247	0.04505	0.03926	0.09958	0.24835	0.18674	Residence	
576321	4146542	576320.72_4146541.66	0.02327	0.04689	0.04082	0.10199	0.27731	0.19192	Residence	
576341	4146542	576340.72_4146541.66	0.02414	0.04884	0.04244	0.10441	0.31373	0.19654	Residence	
576361	4146542	576360.72_4146541.66	0.02506	0.05085	0.04408	0.10678	0.35903	0.20048	Residence	
576381	4146542	576380.72_4146541.66	0.02603	0.05289	0.04572	0.10909	0.41661	0.20379	Residence	
576401	4146542	576400.72_4146541.66	0.02709	0.05497	0.04734	0.11137	0.49353	0.20656	Residence	
576421	4146542	576420.72_4146541.66	0.02825	0.05707	0.04894	0.11358	0.6001	0.20883	Residence	
576441	4146542	576440.72_4146541.66	0.02944	0.05915	0.05045	0.11564	0.75257	0.21056	Residence	
576461	4146542	576460.72_4146541.66	0.03071	0.06124	0.0519	0.1176	0.99911	0.21191	Residence	
576481	4146542	576480.72_4146541.66	0.03205	0.06336	0.05326	0.11941	1.45458	0.21288	Residence	
576501	4146542	576500.72_4146541.66	0.03344	0.0655	0.05454	0.12105	2.55906	0.21351	Residence	

576541	4146542	576540.72_4146541.66	0.03648	0.07004	0.05691	0.12378	4.83353	0.21391	Residence	
576561	4146542	576560.72_4146541.66	0.03813	0.07247	0.05804	0.12482	2.72843	0.21369	Residence	
576581	4146542	576580.72_4146541.66	0.03991	0.07505	0.05919	0.12563	1.86228	0.21323	Residence	
576601	4146542	576600.72_4146541.66	0.04191	0.07784	0.06041	0.12626	1.4095	0.21261	Residence	
576621	4146542	576620.72_4146541.66	0.04413	0.08083	0.06172	0.12667	1.13388	0.21183	Residence	
576641	4146542	576640.72_4146541.66	0.04662	0.08404	0.06318	0.12688	0.95051	0.21092	Residence	
576661	4146542	576660.72_4146541.66	0.04944	0.08751	0.06481	0.12692	0.82127	0.20996	Residence	
576681	4146542	576680.72_4146541.66	0.05255	0.09119	0.06663	0.12676	0.72446	0.20889	School	The Primary School
576701	4146542	576700.72_4146541.66	0.05588	0.09506	0.06862	0.12638	0.64854	0.2077	School	The Primary School
576721	4146542	576720.72_4146541.66	0.05948	0.09911	0.07079	0.12583	0.58836	0.20643	School	The Primary School
576741	4146542	576740.72_4146541.66	0.0633	0.10334	0.07313	0.12511	0.53959	0.2051	Residence	
576761	4146542	576760.72_4146541.66	0.06737	0.10773	0.07563	0.12425	0.49965	0.20371	Residence	
576781	4146542	576780.72_4146541.66	0.07172	0.11226	0.07824	0.12327	0.46662	0.20227	Residence	
576801	4146542	576800.72_4146541.66	0.07633	0.11685	0.08093	0.12213	0.43829	0.20073	Residence	
576821	4146542	576820.72_4146541.66	0.08136	0.12153	0.08366	0.1209	0.41414	0.19912	Residence	
576841	4146542	576840.72_4146541.66	0.08696	0.1263	0.08643	0.11959	0.39338	0.19746	Residence	
576861	4146542	576860.72_4146541.66	0.09324	0.13111	0.08918	0.11819	0.37508	0.19571	Residence	
576881	4146542	576880.72_4146541.66	0.10038	0.13597	0.09192	0.11673	0.35891	0.19389	Residence	
576901	4146542	576900.72_4146541.66	0.1085	0.14084	0.09461	0.11522	0.3444	0.19199	Residence	
576941	4146542	576940.72_4146541.66	0.12864	0.15059	0.09987	0.1121	0.3203	0.18802	Residence	
576961	4146542	576960.72_4146541.66	0.14083	0.15534	0.10241	0.11049	0.30987	0.18593	Residence	
576981	4146542	576980.72_4146541.66	0.15466	0.15993	0.10488	0.10885	0.30034	0.18379	Residence	
577001	4146542	577000.72_4146541.66	0.17097	0.16444	0.10734	0.10726	0.29261	0.18162	Residence	
577021	4146542	577020.72_4146541.66	0.18854	0.16846	0.10963	0.10554	0.28402	0.17939	Residence	
577041	4146542	577040.72_4146541.66	0.20873	0.17217	0.11183	0.10382	0.27621	0.17711	Residence	
577061	4146542	577060.72_4146541.66	0.23206	0.17551	0.11394	0.1021	0.26894	0.17482	Residence	
577081	4146542	577080.72_4146541.66	0.25996	0.17851	0.11595	0.10042	0.26266	0.17252	Residence	
577101	4146542	577100.72_4146541.66	0.29122	0.18089	0.11773	0.09863	0.255	0.17016	Residence	
577121	4146542	577120.72_4146541.66	0.32982	0.18298	0.11938	0.0969	0.24819	0.16783	Residence	
577141	4146542	577140.72_4146541.66	0.37658	0.18468	0.12082	0.09516	0.24101	0.16548	Residence	
577161	4146542	577160.72_4146541.66	0.43529	0.18613	0.12208	0.09346	0.23391	0.16315	Residence	
577181	4146542	577180.72_4146541.66	0.50447	0.18707	0.12298	0.09166	0.22434	0.16075	Residence	
577281	4146542	577280.72_4146541.66	1.35596	0.18917	0.12354	0.08324	0.16037	0.1489	Residence	
576181	4146562	576180.72_4146561.66	0.01865	0.03624	0.03167	0.0863	0.15204	0.15133	Residence	
576201	4146562	576200.72_4146561.66	0.01922	0.03751	0.03271	0.08865	0.16425	0.15864	Residence	
576221	4146562	576220.72_4146561.66	0.01981	0.03887	0.03384	0.09103	0.17792	0.16589	Residence	
576241	4146562	576240.72_4146561.66	0.02045	0.04033	0.03513	0.09343	0.1935	0.17299	Residence	
576261	4146562	576260.72_4146561.66	0.02115	0.04191	0.03647	0.09589	0.21162	0.17985	Residence	
576281	4146562	576280.72_4146561.66	0.02185	0.04358	0.0379	0.09833	0.23245	0.18624	Residence	
576301	4146562	576300.72_4146561.66	0.02256	0.04534	0.03941	0.10075	0.25666	0.19205	Residence	
576321	4146562	576320.72_4146561.66	0.02334	0.0472	0.04099	0.10318	0.28602	0.1973	Residence	
576341	4146562	576340.72_4146561.66	0.02421	0.04918	0.04263	0.10564	0.32264	0.20197	Residence	
576361	4146562	576360.72_4146561.66	0.02512	0.05122	0.0443	0.10806	0.36816	0.20596	Residence	
576381	4146562	576380.72_4146561.66	0.02609	0.0533	0.04596	0.1104	0.42496	0.20925	Residence	
576401	4146562	576400.72_4146561.66	0.02716	0.05543	0.04762	0.11271	0.50089	0.21202	Residence	
576421	4146562	576420.72_4146561.66	0.02832	0.05759	0.04925	0.11496	0.60669	0.21428	Residence	
576441	4146562	576440.72_4146561.66	0.0295	0.0597	0.05079	0.11702	0.75521	0.21594	Residence	
576461	4146562	576460.72_4146561.66	0.0308	0.06184	0.05228	0.119	1.00007	0.21724	Residence	
576481	4146562	576480.72_4146561.66	0.03218	0.06402	0.05368	0.12085	1.45968	0.21819	Residence	
576501	4146562	576500.72_4146561.66	0.03359	0.0662	0.05499	0.12248	2.57409	0.21874	Residence	
576541	4146562	576540.72_4146561.66	0.0367	0.07086	0.05743	0.12523	3.95873	0.21901	Residence	
576561	4146562	576560.72_4146561.66	0.0384	0.07336	0.0586	0.12628	2.71047	0.21874	Residence	
576581	4146562	576580.72_4146561.66	0.04019	0.076	0.05977	0.12706	1.84689	0.21817	Residence	
576601	4146562	576600.72_4146561.66	0.0422	0.07886	0.06102	0.12767	1.39674	0.21748	Residence	
576621	4146562	576620.72_4146561.66	0.04441	0.0819	0.06235	0.12804	1.11989	0.21658	Residence	
576641	4146562	576640.72_4146561.66	0.04693	0.08521	0.06384	0.12824	0.93733	0.21562	Residence	
576661	4146562	576660.72_4146561.66	0.04968	0.0887	0.06547	0.12819	0.80502	0.21447	Residence	
576681	4146562	576680.72_4146561.66	0.05283	0.09248	0.06731	0.128	0.70848	0.21334	School	East Palo Alto Academy
576701	4146562	576700.72_4146561.66	0.05619	0.09642	0.06932	0.12757	0.63192	0.21204	School	East Palo Alto Academy
576721	4146562	576720.72_4146561.66	0.05983	0.10057	0.07152	0.12696	0.57123	0.21068	School	East Palo Alto Academy
576741	4146562	576740.72_4146561.66	0.0638	0.10493	0.07392	0.12623	0.52287	0.2093	School	East Palo Alto Academy
576761	4146562	576760.72_4146561.66	0.06799	0.10943	0.07645	0.12533	0.48263	0.20782	School	East Palo Alto Academy
576781	4146562	576780.72_4146561.66	0.07243	0.11405	0.0791	0.1243	0.44884	0.20626	School	East Palo Alto Academy
576801	4146562	576800.72_4146561.66	0.07726	0.11881	0.08185	0.12317	0.42066	0.20467	Residence	
576821	4146562	576820.72_4146561.66	0.08243	0.12362	0.08464	0.12191	0.39599	0.20296	Residence	
576841	4146562	576840.72_4146561.66	0.08813	0.12849	0.08745	0.12055	0.37448	0.20117	Residence	
576861	4146562	576860.72_4146561.66	0.09452	0.13342	0.09025	0.11912	0.35556	0.19929	Residence	
576881	4146562	576880.72_4146561.66	0.10204	0.13849	0.09308	0.1177	0.33961	0.19742	Residence	
576901	4146562	576900.72_4146561.66	0.11054	0.14354	0.09584	0.11619	0.32508	0.19543	Residence	
576941	4146562	576940.72_4146561.66	0.13103	0.15347	0.10117	0.11298	0.29962	0.19117	Residence	
576961	4146562	576960.72_4146561.66	0.14365	0.15834	0.10377	0.11134	0.28889	0.18896	Residence	
576981	4146562	576980.72_4146561.66	0.1582	0.16309	0.10631	0.1097	0.27931	0.18672	Residence	
577001	4146562	577000.72_4146561.66	0.17515	0.16768	0.10881	0.10808	0.27102	0.18443	Residence	
577021	4146562	577020.72_4146561.66	0.19335	0.17175	0.11113	0.10632	0.26205	0.18208	Residence	

577041	4146562	577040.72_4146561.66	0.21454	0.17553	0.11338	0.10457	0.25401	0.1797	Residence	
577061	4146562	577060.72_4146561.66	0.23884	0.17886	0.1155	0.1028	0.2462	0.17729	Residence	
577081	4146562	577080.72_4146561.66	0.26854	0.18192	0.11756	0.10111	0.23954	0.1749	Residence	
577101	4146562	577100.72_4146561.66	0.30147	0.18428	0.11934	0.09927	0.23147	0.17245	Residence	
577121	4146562	577120.72_4146561.66	0.34264	0.18637	0.121	0.09751	0.22416	0.17003	Residence	
577141	4146562	577140.72_4146561.66	0.39278	0.18807	0.12245	0.09574	0.2165	0.1676	Residence	
577161	4146562	577160.72_4146561.66	0.45583	0.1895	0.12369	0.094	0.20871	0.16519	Residence	
577181	4146562	577180.72_4146561.66	0.53115	0.19044	0.12458	0.09218	0.19907	0.16273	Residence	
576181	4146582	576180.72_4146581.66	0.0187	0.03644	0.0318	0.08723	0.15668	0.15551	Residence	
576201	4146582	576200.72_4146581.66	0.01924	0.0377	0.0328	0.0896	0.16929	0.16307	Residence	
576221	4146582	576220.72_4146581.66	0.01986	0.03909	0.03397	0.09204	0.18371	0.17066	Residence	
576241	4146582	576240.72_4146581.66	0.02051	0.04056	0.03525	0.09449	0.19985	0.17801	Residence	
576261	4146582	576260.72_4146581.66	0.0212	0.04215	0.0366	0.09697	0.2184	0.18506	Residence	
576281	4146582	576280.72_4146581.66	0.0219	0.04384	0.03804	0.09945	0.23969	0.19163	Residence	
576301	4146582	576300.72_4146581.66	0.02265	0.04564	0.03956	0.10195	0.26481	0.19764	Residence	
576321	4146582	576320.72_4146581.66	0.02341	0.04752	0.04115	0.10441	0.29426	0.20295	Residence	
576341	4146582	576340.72_4146581.66	0.02427	0.04953	0.04282	0.10691	0.33093	0.20767	Residence	
576361	4146582	576360.72_4146581.66	0.02518	0.0516	0.04451	0.10936	0.37587	0.21167	Residence	
576381	4146582	576380.72_4146581.66	0.02615	0.05372	0.04621	0.11174	0.43229	0.21499	Residence	
576401	4146582	576400.72_4146581.66	0.02721	0.05589	0.0479	0.11407	0.5065	0.21771	Residence	
576421	4146582	576420.72_4146581.66	0.02839	0.05811	0.04957	0.11637	0.61192	0.21997	Residence	
576441	4146582	576440.72_4146581.66	0.02958	0.06026	0.05115	0.11845	0.75913	0.22158	Residence	
576461	4146582	576460.72_4146581.66	0.03087	0.06245	0.05266	0.12043	1.00134	0.22281	Residence	
576481	4146582	576480.72_4146581.66	0.03231	0.0647	0.05412	0.12232	1.46942	0.22375	Residence	
576501	4146582	576500.72_4146581.66	0.03378	0.06696	0.05547	0.12399	2.61414	0.22426	Residence	
576541	4146582	576540.72_4146581.66	0.03692	0.07169	0.05796	0.1267	3.97326	0.22431	Residence	
576561	4146582	576560.72_4146581.66	0.03867	0.07427	0.05917	0.12775	2.69134	0.22397	Residence	
576581	4146582	576580.72_4146581.66	0.04047	0.07696	0.06036	0.12851	1.83287	0.2233	Residence	
576601	4146582	576600.72_4146581.66	0.04253	0.07991	0.06164	0.12913	1.38709	0.22255	Residence	
576621	4146582	576620.72_4146581.66	0.04473	0.08302	0.06299	0.12945	1.10881	0.22154	Residence	
576641	4146582	576640.72_4146581.66	0.04729	0.08642	0.06451	0.12964	0.92707	0.22052	Residence	
576661	4146582	576660.72_4146581.66	0.05002	0.08998	0.06616	0.12953	0.79334	0.21925	Residence	
576681	4146582	576680.72_4146581.66	0.05321	0.09386	0.06804	0.12932	0.69655	0.21804	School	East Palo Alto Academy
576701	4146582	576700.72_4146581.66	0.05659	0.09789	0.07007	0.12883	0.61926	0.21663	School	East Palo Alto Academy
576721	4146582	576720.72_4146581.66	0.06033	0.10215	0.07231	0.1282	0.55855	0.21519	School	East Palo Alto Academy
576741	4146582	576740.72_4146581.66	0.0645	0.10667	0.07477	0.12747	0.51066	0.21377	School	East Palo Alto Academy
576761	4146582	576760.72_4146581.66	0.06879	0.11127	0.07734	0.12652	0.46963	0.21217	School	East Palo Alto Academy
576781	4146582	576780.72_4146581.66	0.07332	0.11599	0.08002	0.12542	0.43505	0.21048	School	East Palo Alto Academy
576801	4146582	576800.72_4146581.66	0.0784	0.12092	0.08284	0.1243	0.40681	0.20881	Residence	
576821	4146582	576820.72_4146581.66	0.08368	0.12584	0.08567	0.12299	0.38146	0.20696	Residence	
576841	4146582	576840.72_4146581.66	0.08945	0.13081	0.08851	0.12158	0.35919	0.20501	Residence	
576861	4146582	576860.72_4146581.66	0.096	0.13588	0.09137	0.12012	0.33991	0.20301	Residence	
576881	4146582	576880.72_4146581.66	0.10364	0.14106	0.09424	0.11865	0.3234	0.201	Residence	
576901	4146582	576900.72_4146581.66	0.1124	0.14626	0.09707	0.11713	0.30863	0.19889	Residence	
576941	4146582	576940.72_4146581.66	0.13357	0.15647	0.10252	0.11388	0.28278	0.19439	Residence	
576961	4146582	576960.72_4146581.66	0.14662	0.16147	0.10517	0.11222	0.27178	0.19206	Residence	
576981	4146582	576980.72_4146581.66	0.16165	0.1663	0.10775	0.11054	0.26182	0.18969	Residence	
577001	4146582	577000.72_4146581.66	0.17939	0.17101	0.11031	0.1089	0.25318	0.18729	Residence	
577021	4146582	577020.72_4146581.66	0.1985	0.17517	0.11268	0.10711	0.24412	0.18482	Residence	
577041	4146582	577040.72_4146581.66	0.22074	0.179	0.11497	0.10534	0.23578	0.18233	Residence	
577061	4146582	577060.72_4146581.66	0.2461	0.18234	0.1171	0.10352	0.22753	0.1798	Residence	
577081	4146582	577080.72_4146581.66	0.27752	0.18542	0.11919	0.10179	0.22035	0.17733	Residence	
577101	4146582	577100.72_4146581.66	0.31288	0.18782	0.121	0.09993	0.21222	0.17478	Residence	
577121	4146582	577120.72_4146581.66	0.35644	0.18987	0.12265	0.09812	0.20436	0.17226	Residence	
577141	4146582	577140.72_4146581.66	0.41022	0.19155	0.1241	0.09631	0.19637	0.16975	Residence	
577161	4146582	577160.72_4146581.66	0.4782	0.19297	0.12532	0.09454	0.18823	0.16727	Residence	
577181	4146582	577180.72_4146581.66	0.55998	0.19389	0.12619	0.09268	0.17864	0.16472	Residence	
576181	4146602	576180.72_4146601.66	0.01874	0.03663	0.03197	0.08819	0.16161	0.15993	Residence	
576201	4146602	576200.72_4146601.66	0.01924	0.03789	0.03289	0.09049	0.17445	0.1677	Residence	
576221	4146602	576220.72_4146601.66	0.01987	0.03929	0.03406	0.09305	0.18938	0.17561	Residence	
576241	4146602	576240.72_4146601.66	0.02052	0.04079	0.03535	0.09555	0.20611	0.18326	Residence	
576261	4146602	576260.72_4146601.66	0.02124	0.0424	0.03672	0.09808	0.22511	0.19055	Residence	
576281	4146602	576280.72_4146601.66	0.02196	0.04411	0.03817	0.10062	0.24691	0.19732	Residence	
576301	4146602	576300.72_4146601.66	0.02271	0.04593	0.03971	0.10316	0.27233	0.20347	Residence	
576321	4146602	576320.72_4146601.66	0.02349	0.04785	0.04133	0.10568	0.30216	0.20891	Residence	
576341	4146602	576340.72_4146601.66	0.02434	0.04988	0.04301	0.1082	0.33838	0.21365	Residence	
576361	4146602	576360.72_4146601.66	0.02524	0.05198	0.04472	0.11068	0.38265	0.21765	Residence	
576381	4146602	576380.72_4146601.66	0.02621	0.05414	0.04645	0.1131	0.43805	0.22095	Residence	
576401	4146602	576400.72_4146601.66	0.02725	0.05634	0.04817	0.11544	0.51033	0.22362	Residence	
576421	4146602	576420.72_4146601.66	0.02845	0.05863	0.04988	0.11779	0.61534	0.2259	Residence	
576441	4146602	576440.72_4146601.66	0.02968	0.06087	0.05152	0.11995	0.76619	0.22754	Residence	
576461	4146602	576460.72_4146601.66	0.03096	0.06308	0.05306	0.12191	1.00528	0.22865	Residence	
576481	4146602	576480.72_4146601.66	0.03241	0.06538	0.05455	0.12381	1.47479	0.22951	Residence	
576501	4146602	576500.72_4146601.66	0.03393	0.06771	0.05595	0.1255	2.64101	0.22998	Residence	

576541	4146602	576540.72_4146601.66	0.03714	0.07255	0.0585	0.12818	3.98729	0.22982	Residence	Primeros Cinco by Sister Daycare
576561	4146602	576560.72_4146601.66	0.03888	0.07516	0.05972	0.12919	2.65387	0.22933	Residence	
576581	4146602	576580.72_4146601.66	0.04078	0.07796	0.06097	0.13	1.82143	0.22865	Residence	
576621	4146602	576620.72_4146601.66	0.04508	0.08417	0.06365	0.1309	1.09945	0.2267	Residence	
576641	4146602	576640.72_4146601.66	0.04765	0.08766	0.0652	0.13106	0.91737	0.22559	Residence	
576661	4146602	576660.72_4146601.66	0.05039	0.0913	0.06687	0.13091	0.78325	0.22422	Residence	
576681	4146602	576680.72_4146601.66	0.05365	0.09531	0.06879	0.13068	0.68696	0.22296	School	East Palo Alto Academy
576701	4146602	576700.72_4146601.66	0.05703	0.09941	0.07085	0.13013	0.6086	0.22141	School	East Palo Alto Academy
576721	4146602	576720.72_4146601.66	0.06084	0.10378	0.07312	0.12945	0.54761	0.21986	School	East Palo Alto Academy
576741	4146602	576740.72_4146601.66	0.06508	0.10841	0.07561	0.12868	0.49908	0.21832	School	East Palo Alto Academy
576761	4146602	576760.72_4146601.66	0.0695	0.11313	0.07822	0.12769	0.45783	0.21661	School	East Palo Alto Academy
576781	4146602	576780.72_4146601.66	0.07424	0.11801	0.08097	0.12658	0.4233	0.21483	School	East Palo Alto Academy
576801	4146602	576800.72_4146601.66	0.07948	0.12307	0.08384	0.12542	0.39459	0.21304	Residence	
576821	4146602	576820.72_4146601.66	0.08495	0.12814	0.08673	0.12409	0.36902	0.21107	Residence	
576841	4146602	576840.72_4146601.66	0.091	0.1333	0.08965	0.12268	0.34682	0.20903	Residence	
576861	4146602	576860.72_4146601.66	0.09761	0.13845	0.09254	0.12116	0.32692	0.20685	Residence	
576881	4146602	576880.72_4146601.66	0.10537	0.14375	0.09545	0.11965	0.30989	0.20467	Residence	
576901	4146602	576900.72_4146601.66	0.11434	0.14909	0.09834	0.1181	0.29483	0.20243	Residence	
576941	4146602	576940.72_4146601.66	0.13619	0.15958	0.10391	0.1148	0.26863	0.19767	Residence	
576961	4146602	576960.72_4146601.66	0.14978	0.16472	0.10661	0.11312	0.25747	0.19522	Residence	
576981	4146602	576980.72_4146601.66	0.1654	0.16967	0.10925	0.11142	0.24725	0.19272	Residence	
577001	4146602	577000.72_4146601.66	0.18379	0.17445	0.11185	0.10974	0.23815	0.19019	Residence	
577021	4146602	577020.72_4146601.66	0.20389	0.1787	0.11427	0.10792	0.22894	0.18761	Residence	
577041	4146602	577040.72_4146601.66	0.22702	0.18254	0.11658	0.10609	0.2202	0.18499	Residence	
577061	4146602	577060.72_4146601.66	0.25379	0.18592	0.11875	0.10423	0.21172	0.18235	Residence	
577081	4146602	577080.72_4146601.66	0.28718	0.18903	0.12086	0.10247	0.20419	0.17979	Residence	
577101	4146602	577100.72_4146601.66	0.32491	0.19143	0.12269	0.10058	0.1959	0.17715	Residence	
577121	4146602	577120.72_4146601.66	0.37204	0.19352	0.12437	0.09875	0.18798	0.17455	Residence	
577141	4146602	577140.72_4146601.66	0.42957	0.19516	0.12579	0.09689	0.17973	0.17195	Residence	
577161	4146602	577160.72_4146601.66	0.50227	0.19652	0.12699	0.09506	0.17131	0.16938	Residence	
577181	4146602	577180.72_4146601.66	0.59166	0.19747	0.12784	0.09319	0.16207	0.16677	Residence	
576181	4146622	576180.72_4146621.66	0.0188	0.03684	0.03215	0.08917	0.16677	0.16461	Residence	
576201	4146622	576200.72_4146621.66	0.01933	0.03812	0.0331	0.09162	0.1803	0.1728	Residence	
576221	4146622	576220.72_4146621.66	0.01994	0.03953	0.03422	0.09413	0.19555	0.18096	Residence	
576241	4146622	576240.72_4146621.66	0.0206	0.04103	0.03551	0.09667	0.21259	0.18886	Residence	
576261	4146622	576260.72_4146621.66	0.02126	0.04265	0.03685	0.09922	0.23175	0.19634	Residence	
576281	4146622	576280.72_4146621.66	0.02199	0.04437	0.03831	0.10179	0.25373	0.20328	Residence	
576301	4146622	576300.72_4146621.66	0.02276	0.04622	0.03986	0.10439	0.27935	0.20959	Residence	
576321	4146622	576320.72_4146621.66	0.02356	0.04817	0.0415	0.10696	0.30923	0.21512	Residence	
576341	4146622	576340.72_4146621.66	0.02442	0.05024	0.0432	0.10954	0.34538	0.21994	Residence	
576361	4146622	576360.72_4146621.66	0.02532	0.05237	0.04494	0.11205	0.38889	0.22394	Residence	
576381	4146622	576380.72_4146621.66	0.02626	0.05456	0.04669	0.11449	0.44301	0.2272	Residence	
576401	4146622	576400.72_4146621.66	0.02732	0.05682	0.04845	0.11689	0.51528	0.22989	Residence	
576421	4146622	576420.72_4146621.66	0.02848	0.05912	0.05019	0.11921	0.61635	0.23203	Residence	
576441	4146622	576440.72_4146621.66	0.02973	0.06143	0.05186	0.1214	0.76681	0.23365	Residence	
576461	4146622	576460.72_4146621.66	0.03107	0.06374	0.05346	0.12343	1.01174	0.23478	Residence	
576481	4146622	576480.72_4146621.66	0.03253	0.06609	0.05499	0.12534	1.48311	0.23555	Residence	
576501	4146622	576500.72_4146621.66	0.03406	0.06846	0.05642	0.12702	2.65667	0.2359	Residence	
576941	4146622	576940.72_4146621.66	0.13893	0.16281	0.10533	0.11575	0.25646	0.20101	Residence	
576961	4146622	576960.72_4146621.66	0.15304	0.16808	0.1081	0.11404	0.24511	0.19843	Residence	
576981	4146622	576980.72_4146621.66	0.16921	0.17313	0.11078	0.11229	0.2346	0.19579	Residence	
577001	4146622	577000.72_4146621.66	0.18842	0.178	0.11343	0.11058	0.22518	0.19315	Residence	
577021	4146622	577020.72_4146621.66	0.20939	0.18231	0.11588	0.10872	0.21573	0.19043	Residence	
577041	4146622	577040.72_4146621.66	0.23384	0.18622	0.11823	0.10685	0.20683	0.1877	Residence	
577061	4146622	577060.72_4146621.66	0.26234	0.18964	0.12044	0.10497	0.19825	0.18496	Residence	
577081	4146622	577080.72_4146621.66	0.29782	0.19277	0.12258	0.10317	0.19043	0.1823	Residence	
577101	4146622	577100.72_4146621.66	0.3382	0.19518	0.12443	0.10124	0.18207	0.17956	Residence	
577121	4146622	577120.72_4146621.66	0.38826	0.19722	0.12609	0.09935	0.17393	0.17686	Residence	
577141	4146622	577140.72_4146621.66	0.45025	0.19886	0.12752	0.09747	0.16569	0.17418	Residence	
577161	4146622	577160.72_4146621.66	0.52878	0.20022	0.12869	0.09561	0.15735	0.17154	Residence	
577181	4146622	577180.72_4146621.66	0.62614	0.20119	0.12953	0.09371	0.14851	0.16887	Residence	
577201	4146622	577200.72_4146621.66	0.74528	0.20168	0.12996	0.09175	0.13898	0.16605	Residence	
576181	4146642	576180.72_4146641.66	0.01885	0.03704	0.03233	0.09016	0.17197	0.16952	Residence	
576201	4146642	576200.72_4146641.66	0.01945	0.03836	0.03332	0.09271	0.18627	0.17818	Residence	
576221	4146642	576220.72_4146641.66	0.02004	0.03977	0.03442	0.09525	0.20186	0.18664	Residence	
576241	4146642	576240.72_4146641.66	0.02067	0.04129	0.03565	0.09782	0.21913	0.1948	Residence	
576261	4146642	576260.72_4146641.66	0.02131	0.04291	0.03699	0.1004	0.2384	0.20247	Residence	
576281	4146642	576280.72_4146641.66	0.02208	0.04467	0.03846	0.10304	0.26083	0.20966	Residence	
576301	4146642	576300.72_4146641.66	0.02286	0.04655	0.04003	0.1057	0.28664	0.21611	Residence	
576321	4146642	576320.72_4146641.66	0.02365	0.04851	0.04168	0.1083	0.31614	0.2217	Residence	
576341	4146642	576340.72_4146641.66	0.02451	0.0506	0.0434	0.11091	0.3517	0.22654	Residence	
576361	4146642	576360.72_4146641.66	0.02543	0.05279	0.04517	0.11349	0.3954	0.2306	Residence	
576381	4146642	576380.72_4146641.66	0.02641	0.05505	0.04697	0.116	0.45035	0.23392	Residence	
576441	4146642	576440.72_4146641.66	0.02984	0.06204	0.05223	0.12295	0.7723	0.24013	Residence	

576461	4146642	576460.72_4146641.66	0.03119	0.06441	0.05388	0.12501	1.02055	0.2412	Residence	
576481	4146642	576480.72_4146641.66	0.03268	0.06683	0.05545	0.12694	1.50243	0.24191	Residence	
576501	4146642	576500.72_4146641.66	0.03424	0.06926	0.05692	0.12862	2.70057	0.24215	Residence	
576541	4146642	576540.72_4146641.66	0.0376	0.07434	0.05961	0.13128	4.03436	0.24157	Residence	
576561	4146642	576560.72_4146641.66	0.03949	0.07713	0.06092	0.13233	2.63543	0.24095	Residence	
576581	4146642	576580.72_4146641.66	0.04146	0.08007	0.06222	0.13309	1.80534	0.24005	Residence	
576601	4146642	576600.72_4146641.66	0.04359	0.08323	0.06358	0.13362	1.3601	0.23897	Residence	
576621	4146642	576620.72_4146641.66	0.04592	0.08662	0.06504	0.13392	1.08581	0.23773	Residence	
576641	4146642	576640.72_4146641.66	0.04847	0.09025	0.06662	0.13397	0.90099	0.23636	Residence	
576661	4146642	576660.72_4146641.66	0.05134	0.09415	0.06838	0.13382	0.76905	0.2349	Residence	
576681	4146642	576680.72_4146641.66	0.05454	0.09829	0.07034	0.13345	0.66981	0.23332	Residence	
576701	4146642	576700.72_4146641.66	0.05807	0.10266	0.07248	0.13286	0.59217	0.23162	School	Eastside College Preparatory School
576721	4146642	576720.72_4146641.66	0.06208	0.10731	0.07485	0.13215	0.53125	0.22989	School	Eastside College Preparatory School
576741	4146642	576740.72_4146641.66	0.06643	0.11215	0.0774	0.13124	0.48112	0.22803	School	Eastside College Preparatory School
576761	4146642	576760.72_4146641.66	0.07108	0.11712	0.0801	0.13016	0.43912	0.22604	School	Eastside College Preparatory School
576781	4146642	576780.72_4146641.66	0.07609	0.12226	0.08293	0.12897	0.40388	0.22396	School	Eastside College Preparatory School
576801	4146642	576800.72_4146641.66	0.08149	0.12752	0.08587	0.12767	0.37387	0.2218	School	Eastside College Preparatory School
576821	4146642	576820.72_4146641.66	0.0874	0.13293	0.08889	0.12631	0.34818	0.21958	School	Eastside College Preparatory School
576841	4146642	576840.72_4146641.66	0.09391	0.13842	0.09194	0.12487	0.32582	0.21727	School	Eastside College Preparatory School
576861	4146642	576860.72_4146641.66	0.10106	0.14394	0.09498	0.12334	0.30591	0.21484	School	Eastside College Preparatory School
576941	4146642	576940.72_4146641.66	0.14184	0.16616	0.10679	0.11671	0.24579	0.20443	Residence	
576961	4146642	576960.72_4146641.66	0.15641	0.17154	0.10961	0.11496	0.23418	0.20169	Residence	
576981	4146642	576980.72_4146641.66	0.17328	0.17671	0.11235	0.11318	0.22349	0.19892	Residence	
577001	4146642	577000.72_4146641.66	0.19337	0.18168	0.11505	0.11143	0.2138	0.19615	Residence	
577021	4146642	577020.72_4146641.66	0.21534	0.18604	0.11754	0.10952	0.20418	0.19331	Residence	
577041	4146642	577040.72_4146641.66	0.24132	0.19002	0.11994	0.10763	0.1952	0.19047	Residence	
577061	4146642	577060.72_4146641.66	0.27199	0.19354	0.12221	0.10574	0.18663	0.18764	Residence	
577081	4146642	577080.72_4146641.66	0.30954	0.19666	0.12435	0.10388	0.17857	0.18486	Residence	
577101	4146642	577100.72_4146641.66	0.35253	0.19904	0.1262	0.1019	0.17015	0.18202	Residence	
577121	4146642	577120.72_4146641.66	0.40612	0.20107	0.12787	0.09997	0.16198	0.17923	Residence	
577141	4146642	577140.72_4146641.66	0.47287	0.20271	0.12929	0.09805	0.15383	0.17648	Residence	
577161	4146642	577160.72_4146641.66	0.55748	0.20406	0.13045	0.09616	0.14568	0.17376	Residence	
577181	4146642	577180.72_4146641.66	0.66304	0.20503	0.13126	0.09424	0.13728	0.17102	Residence	
576181	4146662	576180.72_4146661.66	0.01893	0.03725	0.03249	0.0912	0.17734	0.17475	Residence	
576201	4146662	576200.72_4146661.66	0.01951	0.03858	0.03347	0.09378	0.192	0.18377	Residence	
576221	4146662	576220.72_4146661.66	0.0201	0.04001	0.03456	0.09637	0.20793	0.19258	Residence	
576241	4146662	576240.72_4146661.66	0.02073	0.04153	0.03579	0.09898	0.22547	0.20103	Residence	
576261	4146662	576260.72_4146661.66	0.0214	0.04318	0.03713	0.10162	0.24506	0.20898	Residence	
576281	4146662	576280.72_4146661.66	0.02215	0.04496	0.03861	0.10431	0.26757	0.21635	Residence	
576301	4146662	576300.72_4146661.66	0.02294	0.04686	0.04019	0.10701	0.29324	0.22294	Residence	
576321	4146662	576320.72_4146661.66	0.02373	0.04885	0.04185	0.10965	0.32239	0.22859	Residence	
576341	4146662	576340.72_4146661.66	0.0246	0.05097	0.04359	0.11231	0.35762	0.23347	Residence	
576361	4146662	576360.72_4146661.66	0.02553	0.0532	0.0454	0.11494	0.40091	0.23755	Residence	
576381	4146662	576380.72_4146661.66	0.02651	0.05551	0.04723	0.11749	0.45546	0.24086	Residence	
576441	4146662	576440.72_4146661.66	0.02996	0.06267	0.05261	0.12454	0.77872	0.24694	Residence	
576461	4146662	576460.72_4146661.66	0.03128	0.06507	0.05428	0.12657	1.02283	0.24784	Residence	
576481	4146662	576480.72_4146661.66	0.0328	0.06756	0.0559	0.12853	1.51024	0.24848	Residence	
576501	4146662	576500.72_4146661.66	0.03436	0.07004	0.0574	0.1302	2.71834	0.24859	Residence	
576541	4146662	576540.72_4146661.66	0.03779	0.07525	0.06017	0.13285	4.03831	0.24777	Residence	
576561	4146662	576560.72_4146661.66	0.03974	0.07812	0.06152	0.13389	2.61202	0.24706	Residence	
576581	4146662	576580.72_4146661.66	0.04179	0.08116	0.06287	0.13467	1.79498	0.24608	Residence	
576601	4146662	576600.72_4146661.66	0.04395	0.08439	0.06425	0.13516	1.35031	0.24488	Residence	
576621	4146662	576620.72_4146661.66	0.04634	0.08788	0.06574	0.13545	1.07842	0.24357	Residence	
576641	4146662	576640.72_4146661.66	0.0489	0.0916	0.06735	0.13546	0.8933	0.24208	Residence	
576661	4146662	576660.72_4146661.66	0.05179	0.0956	0.06915	0.13528	0.76143	0.2405	Residence	
576681	4146662	576680.72_4146661.66	0.05499	0.09984	0.07113	0.13486	0.66192	0.23879	Residence	
576701	4146662	576700.72_4146661.66	0.05857	0.10434	0.07331	0.13424	0.58447	0.23698	School	Eastside College Preparatory School
576721	4146662	576720.72_4146661.66	0.06256	0.10907	0.07571	0.13345	0.52273	0.23507	School	Eastside College Preparatory School
576741	4146662	576740.72_4146661.66	0.06696	0.11402	0.07829	0.13249	0.47238	0.23305	School	Eastside College Preparatory School
576761	4146662	576760.72_4146661.66	0.07177	0.11917	0.08105	0.1314	0.43062	0.23094	School	Eastside College Preparatory School
576781	4146662	576780.72_4146661.66	0.07696	0.12446	0.08394	0.13018	0.39535	0.22871	School	Eastside College Preparatory School
576801	4146662	576800.72_4146661.66	0.08255	0.12989	0.08694	0.12885	0.36525	0.22639	School	Eastside College Preparatory School
576821	4146662	576820.72_4146661.66	0.08857	0.13541	0.08999	0.12743	0.33916	0.22397	School	Eastside College Preparatory School
576841	4146662	576840.72_4146661.66	0.0952	0.14104	0.09309	0.12594	0.31651	0.22147	School	Eastside College Preparatory School
576861	4146662	576860.72_4146661.66	0.10255	0.14671	0.09619	0.12437	0.29649	0.21887	School	Eastside College Preparatory School
576941	4146662	576940.72_4146661.66	0.14483	0.16961	0.10829	0.11768	0.23615	0.20789	Residence	
576961	4146662	576960.72_4146661.66	0.15997	0.17512	0.11116	0.1159	0.22439	0.20501	Residence	
576981	4146662	576980.72_4146661.66	0.17762	0.18041	0.11396	0.11408	0.21356	0.20211	Residence	
577001	4146662	577000.72_4146661.66	0.19867	0.18548	0.11671	0.11229	0.20367	0.19922	Residence	
577021	4146662	577020.72_4146661.66	0.22192	0.18992	0.11925	0.11035	0.194	0.19624	Residence	
577041	4146662	577040.72_4146661.66	0.24953	0.19398	0.1217	0.10843	0.18496	0.19329	Residence	
577061	4146662	577060.72_4146661.66	0.28232	0.19754	0.12401	0.1065	0.17637	0.19037	Residence	
577081	4146662	577080.72_4146661.66	0.32211	0.20066	0.12617	0.10459	0.16818	0.18747	Residence	
577101	4146662	577100.72_4146661.66	0.36803	0.20304	0.12803	0.10257	0.1598	0.18454	Residence	

577121	4146662	577120.72_4146661.66	0.42574	0.20509	0.1297	0.10061	0.15174	0.18168	Residence	
577141	4146662	577140.72_4146661.66	0.49735	0.20672	0.13112	0.09865	0.14372	0.17884	Residence	
577161	4146662	577160.72_4146661.66	0.58799	0.20804	0.13224	0.09671	0.13581	0.17604	Residence	
577181	4146662	577180.72_4146661.66	0.70227	0.20901	0.13303	0.09476	0.1279	0.17324	Residence	
576181	4146682	576180.72_4146681.66	0.01899	0.03746	0.03266	0.09224	0.18274	0.18027	Residence	
576201	4146682	576200.72_4146681.66	0.01958	0.0388	0.03363	0.09488	0.19775	0.18969	Residence	
576221	4146682	576220.72_4146681.66	0.02017	0.04024	0.03471	0.09752	0.21402	0.19886	Residence	
576241	4146682	576240.72_4146681.66	0.0208	0.04179	0.03593	0.10018	0.23186	0.20764	Residence	
576261	4146682	576260.72_4146681.66	0.02149	0.04347	0.03729	0.10289	0.25176	0.21589	Residence	
576281	4146682	576280.72_4146681.66	0.02223	0.04526	0.03876	0.10561	0.27407	0.22342	Residence	
576301	4146682	576300.72_4146681.66	0.02302	0.04718	0.04035	0.10835	0.29958	0.23013	Residence	
576321	4146682	576320.72_4146681.66	0.02383	0.04921	0.04203	0.11106	0.32879	0.2359	Residence	
576341	4146682	576340.72_4146681.66	0.0247	0.05136	0.0438	0.11375	0.3635	0.24079	Residence	
576361	4146682	576360.72_4146681.66	0.02563	0.05362	0.04562	0.11642	0.40625	0.24486	Residence	
576381	4146682	576380.72_4146681.66	0.02662	0.05597	0.04748	0.11902	0.46046	0.24815	Residence	
576461	4146682	576460.72_4146681.66	0.03141	0.06576	0.0547	0.12821	1.03158	0.25487	Residence	
576481	4146682	576480.72_4146681.66	0.03291	0.0683	0.05635	0.13015	1.51752	0.25535	Residence	
576501	4146682	576500.72_4146681.66	0.0345	0.07085	0.0579	0.13183	2.74901	0.25535	Residence	
576541	4146682	576540.72_4146681.66	0.03796	0.07617	0.06073	0.13443	4.45357	0.25421	Residence	
576561	4146682	576560.72_4146681.66	0.03995	0.07911	0.06211	0.13545	2.57747	0.25337	Residence	
576581	4146682	576580.72_4146681.66	0.04211	0.08227	0.06351	0.13626	1.78279	0.25236	Residence	
576601	4146682	576600.72_4146681.66	0.04432	0.08559	0.06493	0.13674	1.34134	0.25105	Residence	
576621	4146682	576620.72_4146681.66	0.04674	0.08917	0.06645	0.13699	1.06987	0.24962	Residence	
576641	4146682	576640.72_4146681.66	0.04933	0.09297	0.06809	0.13696	0.88505	0.248	Residence	
576661	4146682	576660.72_4146681.66	0.05217	0.09703	0.0699	0.1367	0.75224	0.24625	Residence	
576681	4146682	576680.72_4146681.66	0.05547	0.10145	0.07194	0.1363	0.65453	0.24448	Residence	
576701	4146682	576700.72_4146681.66	0.05906	0.10606	0.07416	0.13564	0.57704	0.24253	School	Eastside College Preparatory School
576721	4146682	576720.72_4146681.66	0.0631	0.11092	0.0766	0.1348	0.51527	0.24047	School	Eastside College Preparatory School
576741	4146682	576740.72_4146681.66	0.06757	0.11601	0.07923	0.1338	0.46481	0.23829	School	Eastside College Preparatory School
576761	4146682	576760.72_4146681.66	0.07249	0.12131	0.08203	0.13267	0.42295	0.23601	School	Eastside College Preparatory School
576781	4146682	576780.72_4146681.66	0.07787	0.12678	0.08499	0.13143	0.3877	0.23363	School	Eastside College Preparatory School
576801	4146682	576800.72_4146681.66	0.08362	0.13235	0.08803	0.13006	0.35738	0.23112	School	Eastside College Preparatory School
576821	4146682	576820.72_4146681.66	0.08988	0.13805	0.09115	0.12861	0.33122	0.22852	School	Eastside College Preparatory School
576841	4146682	576840.72_4146681.66	0.09677	0.14385	0.09432	0.1271	0.30847	0.22585	School	Eastside College Preparatory School
576861	4146682	576860.72_4146681.66	0.10436	0.14968	0.09748	0.1255	0.28833	0.22307	School	Eastside College Preparatory School
576881	4146682	576880.72_4146681.66	0.11316	0.15564	0.10065	0.1239	0.27074	0.22029	School	Eastside College Preparatory School
576901	4146682	576900.72_4146681.66	0.12296	0.16149	0.10374	0.12217	0.25466	0.21735	School	Eastside College Preparatory School
576941	4146682	576940.72_4146681.66	0.14822	0.17324	0.10984	0.11869	0.22749	0.21145	Residence	
576961	4146682	576960.72_4146681.66	0.16404	0.17889	0.11278	0.11687	0.21561	0.20842	Residence	
576981	4146682	576980.72_4146681.66	0.18254	0.18429	0.11564	0.11502	0.20467	0.20538	Residence	
577001	4146682	577000.72_4146681.66	0.20441	0.18941	0.11842	0.11316	0.19458	0.20234	Residence	
577021	4146682	577020.72_4146681.66	0.22893	0.19392	0.12101	0.11118	0.18487	0.19923	Residence	
577041	4146682	577040.72_4146681.66	0.25842	0.19806	0.12351	0.10923	0.17585	0.19618	Residence	
577061	4146682	577060.72_4146681.66	0.29348	0.2017	0.12586	0.10727	0.16727	0.19315	Residence	
577081	4146682	577080.72_4146681.66	0.33562	0.2048	0.12803	0.10531	0.15903	0.19015	Residence	
577101	4146682	577100.72_4146681.66	0.38487	0.20721	0.12991	0.10326	0.15076	0.18714	Residence	
577121	4146682	577120.72_4146681.66	0.44613	0.20922	0.13157	0.10124	0.14277	0.18418	Residence	
577141	4146682	577140.72_4146681.66	0.52319	0.21087	0.13298	0.09926	0.13501	0.18127	Residence	
577161	4146682	577160.72_4146681.66	0.62035	0.21216	0.13408	0.09727	0.1274	0.17839	Residence	
577181	4146682	577180.72_4146681.66	0.74378	0.21312	0.13482	0.09529	0.11995	0.17552	Residence	
576181	4146702	576180.72_4146701.66	0.01907	0.03767	0.03284	0.09331	0.18818	0.1861	Residence	
576201	4146702	576200.72_4146701.66	0.01965	0.03902	0.03379	0.096	0.20356	0.19596	Residence	
576221	4146702	576220.72_4146701.66	0.02025	0.04048	0.03487	0.0987	0.22015	0.20553	Residence	
576241	4146702	576240.72_4146701.66	0.02088	0.04205	0.03609	0.10141	0.23819	0.21465	Residence	
576261	4146702	576260.72_4146701.66	0.02158	0.04375	0.03744	0.10418	0.2583	0.22319	Residence	
576281	4146702	576280.72_4146701.66	0.02231	0.04556	0.03892	0.10694	0.28041	0.23088	Residence	
576301	4146702	576300.72_4146701.66	0.0231	0.04751	0.04052	0.10973	0.30568	0.23771	Residence	
576321	4146702	576320.72_4146701.66	0.02393	0.04957	0.04222	0.1125	0.33477	0.24357	Residence	
576341	4146702	576340.72_4146701.66	0.0248	0.05175	0.044	0.11524	0.36916	0.24849	Residence	
576361	4146702	576360.72_4146701.66	0.02574	0.05405	0.04585	0.11794	0.41163	0.25256	Residence	
576381	4146702	576380.72_4146701.66	0.02674	0.05644	0.04774	0.12057	0.46533	0.2558	Residence	
576401	4146702	576400.72_4146701.66	0.02782	0.05891	0.04965	0.12313	0.53741	0.25835	Residence	
576421	4146702	576420.72_4146701.66	0.02898	0.06142	0.05153	0.12555	0.63871	0.26023	Residence	
576441	4146702	576440.72_4146701.66	0.03022	0.06395	0.05337	0.12783	0.7914	0.26152	Residence	
576461	4146702	576460.72_4146701.66	0.03158	0.0665	0.05514	0.12993	1.04543	0.26228	Residence	
576481	4146702	576480.72_4146701.66	0.03304	0.06906	0.05681	0.13181	1.52602	0.26254	Residence	
576501	4146702	576500.72_4146701.66	0.03465	0.07169	0.05841	0.13351	2.78638	0.26243	Residence	
576541	4146702	576540.72_4146701.66	0.03822	0.07719	0.06134	0.13615	4.42497	0.26111	Residence	
576561	4146702	576560.72_4146701.66	0.04022	0.08019	0.06275	0.13712	2.56332	0.26008	Residence	
576581	4146702	576580.72_4146701.66	0.04239	0.0834	0.06417	0.13787	1.7676	0.25889	Residence	
576601	4146702	576600.72_4146701.66	0.04469	0.08683	0.06563	0.13835	1.3321	0.2575	Residence	
576621	4146702	576620.72_4146701.66	0.04716	0.09051	0.06718	0.13857	1.06192	0.25594	Residence	
576641	4146702	576640.72_4146701.66	0.04977	0.0944	0.06885	0.1385	0.87722	0.25418	Residence	
576661	4146702	576660.72_4146701.66	0.05267	0.09858	0.0707	0.13821	0.7454	0.25232	Residence	

576681	4146702	576680.72_4146701.66	0.05596	0.10309	0.07276	0.13775	0.64725	0.25039	Residence	
576701	4146702	576700.72_4146701.66	0.05955	0.10782	0.07502	0.13704	0.5697	0.24826	School	Eastside College Preparatory School
576721	4146702	576720.72_4146701.66	0.06363	0.11282	0.0775	0.13617	0.50806	0.24604	School	Eastside College Preparatory School
576741	4146702	576740.72_4146701.66	0.06819	0.11807	0.08018	0.13514	0.45773	0.2437	School	Eastside College Preparatory School
576761	4146702	576760.72_4146701.66	0.07322	0.12352	0.08304	0.13398	0.41579	0.24124	School	Eastside College Preparatory School
576781	4146702	576780.72_4146701.66	0.07872	0.12913	0.08604	0.13268	0.38032	0.23865	School	Eastside College Preparatory School
576801	4146702	576800.72_4146701.66	0.08466	0.13487	0.08915	0.13127	0.34986	0.23594	School	Eastside College Preparatory School
576821	4146702	576820.72_4146701.66	0.09122	0.14078	0.09234	0.12982	0.32381	0.23319	School	Eastside College Preparatory School
576841	4146702	576840.72_4146701.66	0.09834	0.14674	0.09557	0.12826	0.30089	0.23032	School	Eastside College Preparatory School
576861	4146702	576860.72_4146701.66	0.1062	0.15275	0.09879	0.12663	0.28065	0.22735	School	Eastside College Preparatory School
576881	4146702	576880.72_4146701.66	0.11523	0.15885	0.10202	0.12498	0.26286	0.22437	School	Eastside College Preparatory School
576901	4146702	576900.72_4146701.66	0.12551	0.16491	0.10519	0.12325	0.24684	0.22129	School	Eastside College Preparatory School
576941	4146702	576940.72_4146701.66	0.15205	0.17705	0.11146	0.11974	0.21958	0.2151	Residence	
576961	4146702	576960.72_4146701.66	0.16857	0.18282	0.11445	0.11788	0.2076	0.21192	Residence	
576981	4146702	576980.72_4146701.66	0.18783	0.18831	0.11736	0.11597	0.19656	0.20871	Residence	
577001	4146702	577000.72_4146701.66	0.21057	0.19347	0.12017	0.11404	0.18635	0.20552	Residence	
577021	4146702	577020.72_4146701.66	0.23711	0.19817	0.12285	0.11206	0.17677	0.20233	Residence	
577041	4146702	577040.72_4146701.66	0.2684	0.20236	0.1254	0.11007	0.16774	0.19915	Residence	
577061	4146702	577060.72_4146701.66	0.30549	0.20601	0.12777	0.10806	0.15915	0.19601	Residence	
577081	4146702	577080.72_4146701.66	0.34977	0.20908	0.12994	0.10603	0.15087	0.19289	Residence	
577101	4146702	577100.72_4146701.66	0.40323	0.21158	0.13187	0.10397	0.14283	0.18981	Residence	
577121	4146702	577120.72_4146701.66	0.46904	0.2136	0.13354	0.10192	0.13504	0.18677	Residence	
577141	4146702	577140.72_4146701.66	0.55112	0.2152	0.13491	0.09988	0.12749	0.18378	Residence	
577161	4146702	577160.72_4146701.66	0.65494	0.21644	0.13596	0.09785	0.12019	0.18082	Residence	
577181	4146702	577180.72_4146701.66	0.78719	0.21736	0.13664	0.09581	0.11313	0.17786	Residence	
576501	4146722	576500.72_4146721.66	0.03484	0.07258	0.05894	0.13527	2.84366	0.26991	Residence	
576541	4146722	576540.72_4146721.66	0.03845	0.07823	0.06196	0.13789	4.39804	0.26829	Residence	
576561	4146722	576560.72_4146721.66	0.04052	0.08132	0.06341	0.13886	2.55729	0.26715	Residence	
576881	4146722	576880.72_4146721.66	0.11767	0.16226	0.10345	0.12613	0.25569	0.2286	School	Eastside College Preparatory School
576901	4146722	576900.72_4146721.66	0.12835	0.16849	0.1067	0.12437	0.23958	0.22533	School	Eastside College Preparatory School
576941	4146722	576940.72_4146721.66	0.15559	0.18083	0.11305	0.12072	0.21203	0.21875	Residence	
576961	4146722	576960.72_4146721.66	0.1729	0.18676	0.11612	0.11883	0.20006	0.21542	Residence	
576981	4146722	576980.72_4146721.66	0.19297	0.19235	0.11907	0.11687	0.18898	0.21206	Residence	
577001	4146722	577000.72_4146721.66	0.21678	0.19761	0.12194	0.11489	0.17876	0.20874	Residence	
577021	4146722	577020.72_4146721.66	0.24484	0.20241	0.12468	0.11288	0.16922	0.20544	Residence	
577041	4146722	577040.72_4146721.66	0.27805	0.20669	0.12728	0.11086	0.16025	0.20217	Residence	
577061	4146722	577060.72_4146721.66	0.31707	0.21035	0.12968	0.10879	0.15168	0.19892	Residence	
577081	4146722	577080.72_4146721.66	0.36329	0.21337	0.13184	0.10669	0.14342	0.19569	Residence	
577101	4146722	577100.72_4146721.66	0.42011	0.2159	0.13379	0.1046	0.13556	0.19253	Residence	
577121	4146722	577120.72_4146721.66	0.48979	0.2179	0.13544	0.10251	0.12797	0.18941	Residence	
577141	4146722	577140.72_4146721.66	0.57762	0.21951	0.13681	0.10044	0.12074	0.18634	Residence	
577161	4146722	577160.72_4146721.66	0.68926	0.22077	0.13784	0.09838	0.11383	0.1833	Residence	
577181	4146722	577180.72_4146721.66	0.83504	0.22182	0.13853	0.09636	0.10731	0.18032	Residence	
576181	4146742	576180.72_4146741.66	0.01925	0.03811	0.03322	0.09552	0.19937	0.1989	Residence	
576241	4146742	576240.72_4146741.66	0.02106	0.04258	0.03641	0.10397	0.25079	0.22995	Residence	
576261	4146742	576260.72_4146741.66	0.02174	0.04431	0.03775	0.10682	0.27069	0.23899	Residence	
576281	4146742	576280.72_4146741.66	0.02249	0.04619	0.03924	0.10972	0.29299	0.24714	Residence	
576301	4146742	576300.72_4146741.66	0.02328	0.04819	0.04086	0.11261	0.31786	0.25422	Residence	
576321	4146742	576320.72_4146741.66	0.02411	0.0503	0.04258	0.11546	0.34628	0.26019	Residence	
576341	4146742	576340.72_4146741.66	0.025	0.05255	0.04441	0.1183	0.38017	0.26516	Residence	
576361	4146742	576360.72_4146741.66	0.02596	0.05493	0.04631	0.1211	0.42217	0.2692	Residence	
576381	4146742	576380.72_4146741.66	0.02699	0.05742	0.04827	0.12383	0.47592	0.27238	Residence	
576461	4146742	576460.72_4146741.66	0.03188	0.06796	0.05601	0.1334	1.06493	0.27807	Residence	
576481	4146742	576480.72_4146741.66	0.03338	0.07069	0.05779	0.13534	1.56654	0.27809	Residence	
576501	4146742	576500.72_4146741.66	0.03501	0.07348	0.05948	0.13705	2.89513	0.2777	Residence	
576541	4146742	576540.72_4146741.66	0.03869	0.07931	0.06259	0.13967	4.37543	0.27581	Residence	
576741	4146742	576740.72_4146741.66	0.06954	0.12241	0.08218	0.13792	0.44459	0.25509	Residence	
576761	4146742	576760.72_4146741.66	0.07488	0.12825	0.08517	0.13671	0.40288	0.25226	Residence	
576821	4146742	576820.72_4146741.66	0.09447	0.14673	0.09489	0.13242	0.31068	0.24304	Residence	
576901	4146742	576900.72_4146741.66	0.13167	0.1723	0.10827	0.12555	0.23286	0.22952	Residence	
576941	4146742	576940.72_4146741.66	0.15988	0.18489	0.11474	0.12178	0.20514	0.22254	Residence	
576961	4146742	576960.72_4146741.66	0.17802	0.19097	0.11788	0.11985	0.19317	0.21906	Residence	
576981	4146742	576980.72_4146741.66	0.19905	0.19667	0.12089	0.11784	0.18211	0.21556	Residence	
577001	4146742	577000.72_4146741.66	0.22397	0.20201	0.12381	0.11581	0.1719	0.21209	Residence	
577021	4146742	577020.72_4146741.66	0.2534	0.20687	0.1266	0.11375	0.16237	0.20866	Residence	
577041	4146742	577040.72_4146741.66	0.28646	0.21094	0.12913	0.11156	0.15321	0.20515	Residence	
577061	4146742	577060.72_4146741.66	0.32593	0.21446	0.13148	0.10937	0.14453	0.20168	Residence	
577081	4146742	577080.72_4146741.66	0.37495	0.21756	0.1337	0.10726	0.13649	0.1984	Residence	
577101	4146742	577100.72_4146741.66	0.43458	0.22009	0.13565	0.10513	0.12882	0.19515	Residence	
577121	4146742	577120.72_4146741.66	0.50856	0.22213	0.13731	0.10302	0.12154	0.19197	Residence	
577141	4146742	577140.72_4146741.66	0.60225	0.22378	0.13868	0.10093	0.11465	0.18885	Residence	
577161	4146742	577160.72_4146741.66	0.72444	0.22521	0.13974	0.0989	0.10823	0.18584	Residence	
576181	4146762	576180.72_4146761.66	0.01934	0.03834	0.03342	0.09667	0.20509	0.20591	Residence	
576241	4146762	576240.72_4146761.66	0.02116	0.04284	0.03658	0.10529	0.25711	0.23831	Residence	

576261	4146762	576260.72_4146761.66	0.02183	0.04459	0.03791	0.10819	0.27689	0.24761	Residence	
576281	4146762	576280.72_4146761.66	0.02258	0.0465	0.03941	0.11115	0.29913	0.25598	Residence	
576301	4146762	576300.72_4146761.66	0.02337	0.04853	0.04103	0.1141	0.32394	0.26319	Residence	
576321	4146762	576320.72_4146761.66	0.02421	0.05068	0.04277	0.11701	0.35221	0.26923	Residence	
576341	4146762	576340.72_4146761.66	0.0251	0.05296	0.04461	0.11988	0.38568	0.27418	Residence	
576381	4146762	576380.72_4146761.66	0.02711	0.05792	0.04854	0.12552	0.48143	0.28134	Residence	
576401	4146762	576400.72_4146761.66	0.02818	0.06051	0.05054	0.12813	0.55203	0.28357	Residence	
576441	4146762	576440.72_4146761.66	0.03066	0.06595	0.05453	0.13304	0.81261	0.28617	Residence	
576461	4146762	576460.72_4146761.66	0.03205	0.06872	0.05645	0.13521	1.07692	0.28655	Residence	
576481	4146762	576480.72_4146761.66	0.03356	0.07153	0.05828	0.13716	1.589	0.28643	Residence	
576501	4146762	576500.72_4146761.66	0.03517	0.07437	0.06001	0.13884	2.93731	0.28582	Residence	
576541	4146762	576540.72_4146761.66	0.03889	0.08038	0.06322	0.14146	4.33633	0.28362	Residence	
576561	4146762	576560.72_4146761.66	0.041	0.08362	0.06474	0.14236	2.51533	0.28213	Residence	
576661	4146762	576660.72_4146761.66	0.05408	0.10343	0.07315	0.14282	0.72225	0.27189	Residence	
576681	4146762	576680.72_4146761.66	0.0574	0.10826	0.07531	0.14219	0.62454	0.26936	Residence	
576701	4146762	576700.72_4146761.66	0.06124	0.11348	0.07774	0.14144	0.54945	0.26679	Residence	
576741	4146762	576740.72_4146761.66	0.07026	0.12469	0.08321	0.13934	0.43817	0.26104	Residence	
576821	4146762	576820.72_4146761.66	0.09607	0.1498	0.09618	0.13372	0.30418	0.24809	Residence	
576901	4146762	576900.72_4146761.66	0.135	0.17616	0.10986	0.1267	0.22632	0.23375	Residence	
576941	4146762	576940.72_4146761.66	0.16443	0.18909	0.11647	0.12285	0.19865	0.22642	Daycare	Tiny Town Daycare
576961	4146762	576960.72_4146761.66	0.18324	0.19528	0.11967	0.12086	0.18669	0.22277	Residence	
576981	4146762	576980.72_4146761.66	0.2053	0.20112	0.12275	0.11881	0.17568	0.21913	Residence	
577001	4146762	577000.72_4146761.66	0.23155	0.20659	0.12574	0.11674	0.16552	0.21555	Residence	
577021	4146762	577020.72_4146761.66	0.26226	0.2115	0.12856	0.11461	0.15604	0.21198	Residence	
577041	4146762	577040.72_4146761.66	0.29608	0.21547	0.13108	0.11232	0.14684	0.20825	Residence	
577061	4146762	577060.72_4146761.66	0.3378	0.21903	0.13347	0.1101	0.13831	0.20469	Residence	
577081	4146762	577080.72_4146761.66	0.38942	0.22215	0.1357	0.10793	0.13044	0.2013	Residence	
577101	4146762	577100.72_4146761.66	0.4523	0.22466	0.13764	0.10576	0.12297	0.19796	Residence	
577121	4146762	577120.72_4146761.66	0.52981	0.22662	0.13927	0.10357	0.11588	0.19463	Residence	
577141	4146762	577140.72_4146761.66	0.62819	0.22821	0.14059	0.10142	0.10924	0.19139	Residence	
577161	4146762	577160.72_4146761.66	0.75798	0.22964	0.14161	0.09936	0.10316	0.18834	Residence	
576181	4146782	576180.72_4146781.66	0.01942	0.03856	0.03363	0.09783	0.21087	0.21335	Residence	
576201	4146782	576200.72_4146781.66	0.01998	0.03993	0.03452	0.10071	0.22718	0.22514	Residence	
576221	4146782	576220.72_4146781.66	0.02059	0.04144	0.03555	0.10364	0.24456	0.23649	Residence	
576241	4146782	576240.72_4146781.66	0.0212	0.04306	0.03673	0.10655	0.26278	0.24701	Residence	
576261	4146782	576260.72_4146781.66	0.02195	0.04489	0.03809	0.10962	0.28353	0.25685	Residence	
576281	4146782	576280.72_4146781.66	0.0227	0.04683	0.03959	0.11265	0.30574	0.26542	Residence	
576301	4146782	576300.72_4146781.66	0.02348	0.04888	0.04121	0.11564	0.33024	0.27272	Residence	
576321	4146782	576320.72_4146781.66	0.02432	0.05107	0.04296	0.1186	0.35832	0.2788	Residence	
576341	4146782	576340.72_4146781.66	0.02521	0.05339	0.04482	0.12153	0.39168	0.28376	Residence	
576401	4146782	576400.72_4146781.66	0.02834	0.0611	0.05086	0.12994	0.55951	0.29299	Residence	
576441	4146782	576440.72_4146781.66	0.03081	0.06664	0.05493	0.13486	0.82074	0.29523	Residence	
576461	4146782	576460.72_4146781.66	0.0322	0.06948	0.05689	0.13703	1.08709	0.29542	Residence	
576481	4146782	576480.72_4146781.66	0.03371	0.07236	0.05877	0.13899	1.6053	0.29511	Residence	
576501	4146782	576500.72_4146781.66	0.03534	0.07529	0.06055	0.14068	2.98804	0.29433	Residence	
576541	4146782	576540.72_4146781.66	0.03907	0.08146	0.06385	0.14326	4.28347	0.29177	Residence	
576581	4146782	576580.72_4146781.66	0.04349	0.08832	0.06696	0.14472	1.70457	0.28822	Residence	
576601	4146782	576600.72_4146781.66	0.04599	0.09212	0.06855	0.14505	1.28437	0.28619	Residence	
576621	4146782	576620.72_4146781.66	0.0487	0.09622	0.07024	0.14513	1.02382	0.28402	Residence	
576661	4146782	576660.72_4146781.66	0.0546	0.10517	0.07402	0.14442	0.715	0.27896	Residence	
576681	4146782	576680.72_4146781.66	0.05801	0.11015	0.07623	0.14377	0.61798	0.27623	Residence	
576701	4146782	576700.72_4146781.66	0.06192	0.11553	0.0787	0.14298	0.54317	0.27344	Residence	
576741	4146782	576740.72_4146781.66	0.07108	0.12706	0.08427	0.1408	0.43192	0.26719	Residence	
576941	4146782	576940.72_4146781.66	0.16922	0.19345	0.11825	0.12393	0.1925	0.23039	Residence	
576961	4146782	576960.72_4146781.66	0.1888	0.19978	0.12151	0.12189	0.18058	0.22659	Residence	
576981	4146782	576980.72_4146781.66	0.21181	0.20575	0.12467	0.11979	0.16963	0.2228	Residence	
577001	4146782	577000.72_4146781.66	0.23924	0.21131	0.12771	0.11766	0.15954	0.21909	Residence	
577021	4146782	577020.72_4146781.66	0.27152	0.21631	0.13059	0.1155	0.15015	0.21541	Residence	
577041	4146782	577040.72_4146781.66	0.30706	0.22031	0.13314	0.11314	0.1411	0.21157	Residence	
577061	4146782	577060.72_4146781.66	0.35166	0.22397	0.13559	0.1109	0.13281	0.20796	Residence	
577081	4146782	577080.72_4146781.66	0.40682	0.22715	0.13785	0.1087	0.12516	0.20451	Residence	
577101	4146782	577100.72_4146781.66	0.47456	0.22973	0.13982	0.1065	0.11797	0.20113	Residence	
577121	4146782	577120.72_4146781.66	0.5571	0.23166	0.14143	0.10427	0.11112	0.1977	Residence	
577141	4146782	577140.72_4146781.66	0.66187	0.23319	0.1427	0.10207	0.10473	0.19434	Residence	
577161	4146782	577160.72_4146781.66	0.79989	0.23456	0.14365	0.09994	0.09887	0.19114	Residence	
576181	4146802	576180.72_4146801.66	0.01952	0.0388	0.03385	0.09903	0.21689	0.22134	Residence	
576201	4146802	576200.72_4146801.66	0.02007	0.04017	0.03472	0.10196	0.23339	0.23367	Residence	
576221	4146802	576220.72_4146801.66	0.02066	0.04168	0.03573	0.10493	0.25081	0.24548	Residence	
576241	4146802	576240.72_4146801.66	0.0213	0.04333	0.03691	0.10794	0.26929	0.25647	Residence	
576261	4146802	576260.72_4146801.66	0.02204	0.04516	0.03825	0.11102	0.28962	0.26652	Residence	
576281	4146802	576280.72_4146801.66	0.02281	0.04715	0.03976	0.11416	0.31227	0.2754	Residence	
576301	4146802	576300.72_4146801.66	0.0236	0.04924	0.0414	0.11722	0.33682	0.28283	Residence	
576321	4146802	576320.72_4146801.66	0.02443	0.05145	0.04315	0.12022	0.36446	0.28892	Residence	
576341	4146802	576340.72_4146801.66	0.02532	0.05381	0.04504	0.12321	0.39777	0.29388	Residence	

576401	4146802	576400.72_4146801.66	0.02845	0.06166	0.05115	0.13171	0.56462	0.30278	Residence
576421	4146802	576420.72_4146801.66	0.02965	0.06447	0.05325	0.13429	0.66827	0.30409	Residence
576441	4146802	576440.72_4146801.66	0.03097	0.06736	0.05533	0.13673	0.83031	0.30477	Residence
576461	4146802	576460.72_4146801.66	0.03236	0.07026	0.05734	0.13891	1.09954	0.30475	Residence
576481	4146802	576480.72_4146801.66	0.03387	0.07321	0.05927	0.14086	1.62601	0.30423	Residence
576501	4146802	576500.72_4146801.66	0.03551	0.07623	0.0611	0.14256	3.04623	0.30327	Residence
576541	4146802	576540.72_4146801.66	0.03928	0.08258	0.0645	0.14512	4.22526	0.30035	Residence
576581	4146802	576580.72_4146801.66	0.04375	0.08964	0.06769	0.14651	1.68505	0.29642	Residence
576601	4146802	576600.72_4146801.66	0.04632	0.09357	0.06933	0.14683	1.27258	0.29423	Residence
576621	4146802	576620.72_4146801.66	0.0491	0.09778	0.07106	0.14687	1.01455	0.29184	Residence
576701	4146802	576700.72_4146801.66	0.06273	0.11769	0.0797	0.1446	0.53737	0.28037	Residence
576741	4146802	576740.72_4146801.66	0.07198	0.12952	0.08536	0.14229	0.42569	0.27354	Residence
576781	4146802	576780.72_4146801.66	0.0842	0.14256	0.09187	0.13955	0.34854	0.26629	Residence
576801	4146802	576800.72_4146801.66	0.09152	0.14938	0.09533	0.13802	0.31807	0.2625	Residence
576821	4146802	576820.72_4146801.66	0.09965	0.15632	0.09888	0.1364	0.29162	0.25861	Residence
576841	4146802	576840.72_4146801.66	0.10834	0.1632	0.10241	0.13461	0.26835	0.25455	Residence
576861	4146802	576860.72_4146801.66	0.11805	0.17015	0.10597	0.13276	0.24789	0.25047	Residence
576881	4146802	576880.72_4146801.66	0.12957	0.17735	0.10962	0.13099	0.23011	0.24656	Residence
576901	4146802	576900.72_4146801.66	0.14243	0.1844	0.11319	0.12909	0.21409	0.24255	Residence
576941	4146802	576940.72_4146801.66	0.1742	0.19798	0.12008	0.12503	0.18664	0.23448	Residence
576961	4146802	576960.72_4146801.66	0.19447	0.20445	0.12341	0.12292	0.17478	0.23051	Residence
576981	4146802	576980.72_4146801.66	0.21861	0.21057	0.12664	0.12078	0.16393	0.22661	Residence
577001	4146802	577000.72_4146801.66	0.24721	0.21623	0.12974	0.1186	0.15392	0.22276	Residence
577021	4146802	577020.72_4146801.66	0.28113	0.22131	0.13268	0.11639	0.14465	0.21896	Residence
577041	4146802	577040.72_4146801.66	0.3205	0.22562	0.13537	0.11409	0.13596	0.21519	Residence
577061	4146802	577060.72_4146801.66	0.36377	0.2288	0.13766	0.11159	0.12748	0.21111	Residence
577081	4146802	577080.72_4146801.66	0.42196	0.23201	0.13993	0.10936	0.12006	0.2076	Residence
577101	4146802	577100.72_4146801.66	0.49421	0.23467	0.14193	0.10714	0.11318	0.20419	Residence
577121	4146802	577120.72_4146801.66	0.57937	0.23642	0.14346	0.10481	0.10646	0.20052	Residence
577141	4146802	577140.72_4146801.66	0.69506	0.23824	0.1448	0.10267	0.10056	0.19731	Residence
577161	4146802	577160.72_4146801.66	0.84731	0.23981	0.14578	0.10058	0.0951	0.19417	Residence
576181	4146822	576180.72_4146821.66	0.01963	0.03907	0.0341	0.1003	0.22333	0.22996	Residence
576201	4146822	576200.72_4146821.66	0.0202	0.04044	0.03494	0.10329	0.24007	0.24291	Residence
576221	4146822	576220.72_4146821.66	0.02081	0.04196	0.03595	0.10633	0.25773	0.25526	Residence
576241	4146822	576240.72_4146821.66	0.02144	0.04362	0.0371	0.10939	0.27624	0.26664	Residence
576281	4146822	576280.72_4146821.66	0.02292	0.04747	0.03994	0.1157	0.31884	0.28599	Residence
576301	4146822	576300.72_4146821.66	0.02371	0.04959	0.04158	0.11882	0.34329	0.29353	Residence
576321	4146822	576320.72_4146821.66	0.02454	0.05184	0.04335	0.12188	0.3708	0.29965	Residence
576341	4146822	576340.72_4146821.66	0.02545	0.05425	0.04525	0.12495	0.40431	0.30462	Residence
576421	4146822	576420.72_4146821.66	0.02977	0.0651	0.05359	0.13614	0.67429	0.31424	Residence
576441	4146822	576440.72_4146821.66	0.03113	0.06809	0.05574	0.13864	0.84007	0.31479	Residence
576461	4146822	576460.72_4146821.66	0.03252	0.07106	0.05779	0.14083	1.11449	0.31457	Residence
576481	4146822	576480.72_4146821.66	0.03405	0.0741	0.05978	0.1428	1.65572	0.31384	Residence
576501	4146822	576500.72_4146821.66	0.03573	0.07722	0.06167	0.14452	2.74649	0.31272	Residence
576541	4146822	576540.72_4146821.66	0.0395	0.08374	0.06516	0.14703	4.1432	0.30937	Residence
576901	4146822	576900.72_4146821.66	0.14635	0.18874	0.11491	0.1303	0.20827	0.24712	Residence
576941	4146822	576940.72_4146821.66	0.17933	0.2027	0.12196	0.12613	0.181	0.2387	Residence
576961	4146822	576960.72_4146821.66	0.20043	0.20933	0.12537	0.12398	0.16925	0.23458	Residence
576981	4146822	576980.72_4146821.66	0.22541	0.21555	0.12866	0.12177	0.15848	0.23052	Residence
577001	4146822	577000.72_4146821.66	0.25522	0.22129	0.13182	0.11954	0.14859	0.22654	Residence
577021	4146822	577020.72_4146821.66	0.29078	0.22645	0.13481	0.11727	0.13947	0.22263	Residence
577041	4146822	577040.72_4146821.66	0.33245	0.23085	0.13756	0.11493	0.13097	0.21877	Residence
577061	4146822	577060.72_4146821.66	0.3804	0.23432	0.13997	0.11248	0.12295	0.21482	Residence
577081	4146822	577080.72_4146821.66	0.44096	0.23739	0.1422	0.11014	0.11564	0.21109	Residence
577101	4146822	577100.72_4146821.66	0.51683	0.23997	0.14417	0.10785	0.10892	0.20752	Residence
577121	4146822	577120.72_4146821.66	0.61058	0.24194	0.14575	0.10555	0.10263	0.20395	Residence
577141	4146822	577140.72_4146821.66	0.73928	0.244	0.14715	0.10345	0.09705	0.20076	Residence
577161	4146822	577160.72_4146821.66	0.90132	0.2454	0.14802	0.10127	0.09173	0.19739	Residence
576181	4146842	576180.72_4146841.66	0.01971	0.03934	0.03434	0.10158	0.22984	0.23914	Residence
576201	4146842	576200.72_4146841.66	0.02029	0.0407	0.03517	0.10462	0.2468	0.25272	Residence
576221	4146842	576220.72_4146841.66	0.02092	0.04223	0.03616	0.10774	0.26471	0.26565	Residence
576321	4146842	576320.72_4146841.66	0.02465	0.05223	0.04354	0.12358	0.37738	0.31103	Residence
576341	4146842	576340.72_4146841.66	0.02555	0.05468	0.04546	0.12668	0.41046	0.31593	Residence
576441	4146842	576440.72_4146841.66	0.03123	0.06878	0.05612	0.14053	0.84578	0.32522	Residence
576461	4146842	576460.72_4146841.66	0.03269	0.07188	0.05825	0.1428	1.1302	0.32489	Residence
576481	4146842	576480.72_4146841.66	0.03425	0.07501	0.0603	0.14479	1.69267	0.32397	Residence
576501	4146842	576500.72_4146841.66	0.03592	0.0782	0.06224	0.14647	2.83377	0.32258	Residence
576541	4146842	576540.72_4146841.66	0.03972	0.08491	0.06583	0.14895	4.03481	0.3188	Residence
576561	4146842	576560.72_4146841.66	0.04189	0.08853	0.06752	0.14974	2.37128	0.31651	Residence
576581	4146842	576580.72_4146841.66	0.04433	0.09242	0.06921	0.15026	1.64866	0.31407	Residence
576601	4146842	576600.72_4146841.66	0.04697	0.09657	0.07092	0.15047	1.24644	0.31137	Residence
576621	4146842	576620.72_4146841.66	0.04983	0.10098	0.07271	0.15038	0.99244	0.30843	Residence
576641	4146842	576640.72_4146841.66	0.05297	0.10574	0.07464	0.15005	0.81954	0.30531	Residence
576661	4146842	576660.72_4146841.66	0.05639	0.11083	0.07677	0.1495	0.69394	0.30199	Residence

576681	4146842	576680.72_4146841.66	0.06019	0.11631	0.07913	0.14876	0.59894	0.29852	Residence
576701	4146842	576700.72_4146841.66	0.06439	0.12215	0.08174	0.14784	0.52421	0.29486	Residence
576721	4146842	576720.72_4146841.66	0.06903	0.12831	0.08458	0.14671	0.46349	0.29098	Residence
576741	4146842	576740.72_4146841.66	0.07422	0.13478	0.08765	0.14542	0.41341	0.28692	Residence
576761	4146842	576760.72_4146841.66	0.08031	0.14165	0.09097	0.14405	0.37173	0.2828	Residence
576781	4146842	576780.72_4146841.66	0.08693	0.14859	0.09439	0.14245	0.33599	0.27842	Residence
576801	4146842	576800.72_4146841.66	0.09478	0.15588	0.098	0.14086	0.30565	0.27408	Residence
576821	4146842	576820.72_4146841.66	0.10355	0.16328	0.10169	0.13914	0.27933	0.26965	Residence
576841	4146842	576840.72_4146841.66	0.11345	0.17081	0.10545	0.13737	0.25642	0.26522	Residence
576861	4146842	576860.72_4146841.66	0.1242	0.17826	0.10919	0.13546	0.23623	0.2607	Residence
576881	4146842	576880.72_4146841.66	0.13658	0.18584	0.11297	0.13355	0.21847	0.25627	Residence
576901	4146842	576900.72_4146841.66	0.15037	0.19327	0.11668	0.13152	0.20262	0.25183	Residence
576941	4146842	576940.72_4146841.66	0.18483	0.20767	0.12393	0.12728	0.17559	0.24309	Residence
576961	4146842	576960.72_4146841.66	0.20679	0.21446	0.12742	0.12508	0.16395	0.23882	Residence
576981	4146842	576980.72_4146841.66	0.233	0.22084	0.1308	0.12283	0.15333	0.23462	Residence
577001	4146842	577000.72_4146841.66	0.26398	0.22664	0.134	0.12051	0.14357	0.2305	Residence
577021	4146842	577020.72_4146841.66	0.30089	0.23181	0.13702	0.11816	0.13459	0.22646	Residence
577041	4146842	577040.72_4146841.66	0.34514	0.2363	0.13982	0.11578	0.12632	0.2225	Residence
577061	4146842	577060.72_4146841.66	0.39912	0.24017	0.1424	0.11343	0.1187	0.21866	Residence
577081	4146842	577080.72_4146841.66	0.46516	0.24338	0.14469	0.11108	0.11168	0.21489	Residence
577101	4146842	577100.72_4146841.66	0.54683	0.24598	0.14666	0.10875	0.10519	0.21121	Residence
577121	4146842	577120.72_4146841.66	0.64971	0.24806	0.14826	0.10644	0.0992	0.20761	Residence
576181	4146862	576180.72_4146861.66	0.01979	0.03962	0.0346	0.10289	0.23663	0.24898	Residence
576201	4146862	576200.72_4146861.66	0.02038	0.04097	0.03541	0.10599	0.25384	0.26325	Residence
576301	4146862	576300.72_4146861.66	0.02395	0.0503	0.04196	0.12216	0.35717	0.31702	Residence
576321	4146862	576320.72_4146861.66	0.02478	0.05264	0.04375	0.12536	0.38472	0.3232	Residence
576341	4146862	576340.72_4146861.66	0.02568	0.05513	0.04569	0.12851	0.4177	0.32803	Residence
576421	4146862	576420.72_4146861.66	0.0301	0.06649	0.05433	0.14013	0.69443	0.33651	Residence
576441	4146862	576440.72_4146861.66	0.03142	0.06956	0.05655	0.14258	0.86028	0.33643	Residence
576461	4146862	576460.72_4146861.66	0.03287	0.07272	0.05872	0.14483	1.14962	0.33578	Residence
576481	4146862	576480.72_4146861.66	0.03443	0.07592	0.06081	0.14679	1.72825	0.33458	Residence
576501	4146862	576500.72_4146861.66	0.03611	0.0792	0.06281	0.14847	2.93755	0.33295	Residence
576541	4146862	576540.72_4146861.66	0.03995	0.08611	0.06651	0.15092	3.93083	0.32871	Residence
576561	4146862	576560.72_4146861.66	0.04215	0.08984	0.06825	0.15167	2.33274	0.32618	Residence
576581	4146862	576580.72_4146861.66	0.04462	0.09384	0.06998	0.15215	1.62665	0.32347	Residence
576601	4146862	576600.72_4146861.66	0.04731	0.09812	0.07174	0.15233	1.23202	0.32051	Residence
576621	4146862	576620.72_4146861.66	0.05022	0.10266	0.07356	0.15218	0.98103	0.31725	Residence
576641	4146862	576640.72_4146861.66	0.05344	0.10755	0.07553	0.15181	0.80984	0.31381	Residence
576661	4146862	576660.72_4146861.66	0.05698	0.11279	0.0777	0.15121	0.68548	0.31018	Residence
576681	4146862	576680.72_4146861.66	0.06093	0.11845	0.08012	0.15044	0.59141	0.30641	Residence
576701	4146862	576700.72_4146861.66	0.06523	0.12444	0.08276	0.14945	0.51681	0.3024	Residence
576721	4146862	576720.72_4146861.66	0.07001	0.13079	0.08567	0.14829	0.45651	0.29821	Residence
576741	4146862	576740.72_4146861.66	0.07541	0.1375	0.08881	0.14698	0.40682	0.29386	Residence
576761	4146862	576760.72_4146861.66	0.08178	0.14467	0.09223	0.14563	0.36539	0.28949	Residence
576781	4146862	576780.72_4146861.66	0.08855	0.15181	0.09571	0.14398	0.32975	0.28479	Residence
576801	4146862	576800.72_4146861.66	0.0965	0.15928	0.09938	0.14229	0.29938	0.2801	Residence
576821	4146862	576820.72_4146861.66	0.10576	0.16703	0.10318	0.14059	0.2733	0.27547	Residence
576841	4146862	576840.72_4146861.66	0.1161	0.17483	0.10703	0.13878	0.25051	0.27078	Residence
576861	4146862	576860.72_4146861.66	0.12735	0.18254	0.11086	0.13683	0.23047	0.26602	Residence
576881	4146862	576880.72_4146861.66	0.14004	0.19029	0.11469	0.13483	0.21279	0.26133	Residence
576901	4146862	576900.72_4146861.66	0.15442	0.19796	0.1185	0.13276	0.19708	0.25669	Residence
576941	4146862	576940.72_4146861.66	0.18997	0.21272	0.12591	0.12839	0.1703	0.24758	Residence
576961	4146862	576960.72_4146861.66	0.21296	0.21972	0.1295	0.12615	0.15882	0.24318	Residence
576981	4146862	576980.72_4146861.66	0.23988	0.22616	0.13291	0.12381	0.14833	0.23883	Residence
577001	4146862	577000.72_4146861.66	0.27188	0.232	0.13616	0.12141	0.13873	0.23456	Residence
577021	4146862	577020.72_4146861.66	0.31095	0.23731	0.13926	0.11903	0.12997	0.23043	Residence
577041	4146862	577040.72_4146861.66	0.35681	0.24177	0.14207	0.11657	0.12189	0.22634	Residence
577061	4146862	577060.72_4146861.66	0.41266	0.24558	0.14464	0.11414	0.11448	0.22236	Residence
577081	4146862	577080.72_4146861.66	0.48241	0.24885	0.14696	0.11176	0.10771	0.21854	Residence
577101	4146862	577100.72_4146861.66	0.5699	0.25157	0.14895	0.10942	0.1015	0.21481	Residence
577121	4146862	577120.72_4146861.66	0.67838	0.25362	0.15052	0.10706	0.09575	0.21112	Residence
577141	4146862	577140.72_4146861.66	0.81948	0.25532	0.15169	0.10475	0.09048	0.20751	Residence
577161	4146862	577160.72_4146861.66	1.01157	0.2569	0.15249	0.10255	0.08569	0.20399	Residence
577181	4146862	577180.72_4146861.66	1.27492	0.25819	0.15281	0.10038	0.08129	0.20051	Residence
577201	4146862	577200.72_4146861.66	1.6648	0.25941	0.15272	0.09829	0.07728	0.19709	Residence
577221	4146862	577220.72_4146861.66	2.29076	0.26048	0.15218	0.09626	0.0736	0.19372	Residence
577241	4146862	577240.72_4146861.66	3.48003	0.26139	0.15124	0.09431	0.07022	0.19037	Residence
576181	4146882	576180.72_4146881.66	0.01985	0.0399	0.03487	0.10422	0.24369	0.25954	Residence
576201	4146882	576200.72_4146881.66	0.02046	0.04126	0.03566	0.1074	0.26127	0.27457	Residence
576241	4146882	576240.72_4146881.66	0.02181	0.04452	0.03775	0.11398	0.29902	0.30156	Residence
576301	4146882	576300.72_4146881.66	0.02407	0.05067	0.04216	0.1239	0.36482	0.32995	Residence
576321	4146882	576320.72_4146881.66	0.02491	0.05304	0.04396	0.12715	0.39211	0.33609	Residence
576341	4146882	576340.72_4146881.66	0.02583	0.05559	0.04591	0.13039	0.42539	0.34089	Residence
576361	4146882	576360.72_4146881.66	0.02682	0.05831	0.048	0.13356	0.46724	0.34443	Residence

576381	4146882	576380.72_4146881.66	0.02789	0.06116	0.05019	0.13661	0.52188	0.3468	Residence
576401	4146882	576400.72_4146881.66	0.029	0.06409	0.05241	0.13943	0.59455	0.34802	Residence
576421	4146882	576420.72_4146881.66	0.03023	0.06716	0.05468	0.14212	0.70193	0.34843	Residence
576441	4146882	576440.72_4146881.66	0.03159	0.07034	0.05696	0.14464	0.87303	0.34817	Residence
576461	4146882	576460.72_4146881.66	0.03304	0.07356	0.05918	0.14687	1.16748	0.34721	Residence
576481	4146882	576480.72_4146881.66	0.03461	0.07685	0.06133	0.14883	1.76468	0.34574	Residence
576501	4146882	576500.72_4146881.66	0.03632	0.08022	0.06339	0.15051	3.05544	0.34387	Residence
576541	4146882	576540.72_4146881.66	0.04019	0.08731	0.06719	0.1529	3.82315	0.33907	Residence
576561	4146882	576560.72_4146881.66	0.04243	0.09116	0.06899	0.15364	2.29209	0.33629	Residence
576581	4146882	576580.72_4146881.66	0.04488	0.09525	0.07075	0.15404	1.59975	0.33321	Residence
576601	4146882	576600.72_4146881.66	0.04762	0.09966	0.07255	0.15417	1.21401	0.32994	Residence
576621	4146882	576620.72_4146881.66	0.05065	0.10438	0.07444	0.15403	0.96954	0.32645	Residence
576641	4146882	576640.72_4146881.66	0.05399	0.10944	0.07646	0.15362	0.80074	0.3227	Residence
576661	4146882	576660.72_4146881.66	0.05765	0.11485	0.07867	0.15297	0.67728	0.31872	Residence
576681	4146882	576680.72_4146881.66	0.06183	0.12074	0.08116	0.15221	0.58456	0.3147	Residence
576701	4146882	576700.72_4146881.66	0.06634	0.12695	0.08388	0.1512	0.51038	0.31037	Residence
576721	4146882	576720.72_4146881.66	0.07116	0.13341	0.0868	0.14993	0.44965	0.30573	Residence
576741	4146882	576740.72_4146881.66	0.07679	0.14038	0.09003	0.14862	0.40027	0.30109	Residence
576761	4146882	576760.72_4146881.66	0.08338	0.1478	0.09353	0.14725	0.35892	0.2964	Residence
576781	4146882	576780.72_4146881.66	0.0902	0.15512	0.09706	0.1455	0.32335	0.29133	Residence
576801	4146882	576800.72_4146881.66	0.09852	0.16293	0.10083	0.14383	0.29326	0.28641	Residence
576821	4146882	576820.72_4146881.66	0.10804	0.17093	0.10471	0.14207	0.26727	0.28147	Residence
576841	4146882	576840.72_4146881.66	0.11878	0.17901	0.10866	0.14022	0.24462	0.27652	Residence
576861	4146882	576860.72_4146881.66	0.13046	0.18698	0.11257	0.13821	0.22474	0.27152	Residence
576881	4146882	576880.72_4146881.66	0.14362	0.19496	0.11649	0.13615	0.20722	0.26659	Residence
576901	4146882	576900.72_4146881.66	0.15859	0.20289	0.12039	0.13403	0.19165	0.26175	Residence
576941	4146882	576940.72_4146881.66	0.19523	0.21799	0.12794	0.12951	0.16517	0.25225	Residence
576961	4146882	576960.72_4146881.66	0.21916	0.22516	0.13162	0.12721	0.15386	0.24772	Residence
576981	4146882	576980.72_4146881.66	0.24735	0.23176	0.13513	0.12483	0.14356	0.24324	Residence
577001	4146882	577000.72_4146881.66	0.28093	0.23773	0.13845	0.12238	0.13417	0.23885	Residence
577021	4146882	577020.72_4146881.66	0.32151	0.24305	0.14158	0.11992	0.12562	0.23459	Residence
577041	4146882	577040.72_4146881.66	0.37	0.2476	0.14445	0.11742	0.11778	0.23041	Residence
577061	4146882	577060.72_4146881.66	0.42934	0.25149	0.14706	0.11496	0.11062	0.22636	Residence
577081	4146882	577080.72_4146881.66	0.50264	0.25474	0.14936	0.11252	0.10409	0.22242	Residence
577101	4146882	577100.72_4146881.66	0.59459	0.25743	0.15133	0.11012	0.0981	0.21857	Residence
577121	4146882	577120.72_4146881.66	0.71084	0.25955	0.15288	0.10774	0.09261	0.2148	Residence
577141	4146882	577140.72_4146881.66	0.86394	0.26137	0.15404	0.10543	0.0876	0.21112	Residence
577161	4146882	577160.72_4146881.66	1.07056	0.26292	0.15477	0.10318	0.08303	0.2075	Residence
577181	4146882	577180.72_4146881.66	1.36008	0.26427	0.15502	0.10099	0.07885	0.20395	Residence
577201	4146882	577200.72_4146881.66	1.79818	0.26555	0.15485	0.09888	0.07503	0.20045	Residence
577221	4146882	577220.72_4146881.66	2.54063	0.26673	0.15425	0.09686	0.07155	0.19699	Residence
577241	4146882	577240.72_4146881.66	4.00468	0.26763	0.15319	0.09487	0.06831	0.19357	Residence
576181	4146902	576180.72_4146901.66	0.01991	0.04018	0.03514	0.10557	0.25107	0.27089	Residence
576201	4146902	576200.72_4146901.66	0.02053	0.04156	0.03593	0.10885	0.26913	0.28676	Residence
576241	4146902	576240.72_4146901.66	0.02189	0.04481	0.03797	0.11554	0.30705	0.3148	Residence
576261	4146902	576260.72_4146901.66	0.02263	0.04673	0.03926	0.11895	0.32744	0.32633	Residence
576281	4146902	576280.72_4146901.66	0.02338	0.04879	0.04072	0.1223	0.34883	0.3359	Residence
576301	4146902	576300.72_4146901.66	0.0242	0.05105	0.04237	0.1257	0.37298	0.34377	Residence
576321	4146902	576320.72_4146901.66	0.02505	0.05347	0.04418	0.12903	0.40041	0.3499	Residence
576341	4146902	576340.72_4146901.66	0.02596	0.05604	0.04614	0.13229	0.43309	0.35452	Residence
576361	4146902	576360.72_4146901.66	0.02694	0.05879	0.04824	0.13548	0.47426	0.35781	Residence
576381	4146902	576380.72_4146901.66	0.02802	0.06171	0.05046	0.13859	0.52898	0.35998	Residence
576401	4146902	576400.72_4146901.66	0.02913	0.06471	0.05272	0.14145	0.602	0.36092	Residence
576421	4146902	576420.72_4146901.66	0.03037	0.06785	0.05504	0.14417	0.71036	0.36105	Residence
576441	4146902	576440.72_4146901.66	0.03173	0.07109	0.05736	0.14669	0.88297	0.36047	Residence
576461	4146902	576460.72_4146901.66	0.03318	0.07438	0.05963	0.14891	1.18037	0.35917	Residence
576481	4146902	576480.72_4146901.66	0.03478	0.07777	0.06185	0.1509	1.79748	0.35746	Residence
576501	4146902	576500.72_4146901.66	0.03651	0.08123	0.06396	0.15256	3.17324	0.35529	Residence
576541	4146902	576540.72_4146901.66	0.04039	0.08849	0.06785	0.15485	3.69456	0.34979	Residence
576561	4146902	576560.72_4146901.66	0.04274	0.09253	0.06973	0.15564	2.25086	0.34689	Residence
576581	4146902	576580.72_4146901.66	0.04531	0.09681	0.07158	0.15607	1.58307	0.34364	Residence
576601	4146902	576600.72_4146901.66	0.04805	0.10131	0.0734	0.15611	1.19989	0.33993	Residence
576621	4146902	576620.72_4146901.66	0.05117	0.10619	0.07534	0.15593	0.95884	0.33609	Residence
576681	4146902	576680.72_4146901.66	0.06267	0.12303	0.0822	0.15395	0.57663	0.32318	Residence
576701	4146902	576700.72_4146901.66	0.06728	0.12938	0.08495	0.15287	0.50254	0.31842	Residence
576721	4146902	576720.72_4146901.66	0.07241	0.13615	0.08797	0.15163	0.44269	0.31352	Residence
576741	4146902	576740.72_4146901.66	0.07824	0.14335	0.09127	0.15028	0.39352	0.30854	Residence
576761	4146902	576760.72_4146901.66	0.08493	0.15098	0.09483	0.14884	0.35227	0.30349	Residence
576781	4146902	576780.72_4146901.66	0.09191	0.15855	0.09843	0.14705	0.31682	0.29806	Residence
576801	4146902	576800.72_4146901.66	0.10049	0.16667	0.1023	0.14536	0.28699	0.29288	Residence
576821	4146902	576820.72_4146901.66	0.11027	0.17495	0.10627	0.14356	0.26118	0.28766	Residence
576841	4146902	576840.72_4146901.66	0.1214	0.18334	0.11031	0.14167	0.23873	0.28246	Residence
576861	4146902	576860.72_4146901.66	0.13336	0.19153	0.11429	0.13958	0.21902	0.27717	Residence
576881	4146902	576880.72_4146901.66	0.14718	0.19983	0.11833	0.13749	0.20169	0.27205	Residence

576901	4146902	576900.72_4146901.66	0.16272	0.208	0.12232	0.1353	0.18631	0.267	Residence
576941	4146902	576940.72_4146901.66	0.20096	0.22356	0.13008	0.13068	0.1602	0.25718	Residence
576961	4146902	576960.72_4146901.66	0.2256	0.23085	0.13382	0.12829	0.14906	0.25246	Residence
576981	4146902	576980.72_4146901.66	0.25478	0.23754	0.13739	0.12583	0.13897	0.24783	Residence
577001	4146902	577000.72_4146901.66	0.28971	0.24359	0.14077	0.12331	0.1298	0.24331	Residence
577021	4146902	577020.72_4146901.66	0.33215	0.24898	0.14395	0.1208	0.12148	0.23893	Residence
577041	4146902	577040.72_4146901.66	0.38362	0.25366	0.14689	0.11828	0.11391	0.23467	Residence
577061	4146902	577060.72_4146901.66	0.44641	0.25761	0.14953	0.11577	0.10701	0.23053	Residence
577081	4146902	577080.72_4146901.66	0.52402	0.2609	0.15185	0.1133	0.10072	0.22649	Residence
577101	4146902	577100.72_4146901.66	0.62166	0.2636	0.1538	0.11086	0.09498	0.22254	Residence
577121	4146902	577120.72_4146901.66	0.74508	0.26573	0.15531	0.10843	0.08972	0.21867	Residence
577141	4146902	577140.72_4146901.66	0.90882	0.26755	0.15641	0.10608	0.08493	0.21489	Residence
577161	4146902	577160.72_4146901.66	1.13494	0.26923	0.1571	0.10383	0.08059	0.21119	Residence
577181	4146902	577180.72_4146901.66	1.45498	0.27065	0.15729	0.10162	0.07661	0.20755	Residence
577201	4146902	577200.72_4146901.66	1.95391	0.27202	0.15704	0.0995	0.07299	0.20396	Residence
577221	4146902	577220.72_4146901.66	2.83611	0.27319	0.15632	0.09744	0.06965	0.20042	Residence
577241	4146902	577240.72_4146901.66	4.77571	0.27412	0.15517	0.09545	0.06656	0.19692	Residence
576181	4146922	576180.72_4146921.66	0.01997	0.04049	0.03543	0.10699	0.25906	0.2832	Residence
576201	4146922	576200.72_4146921.66	0.02061	0.04188	0.03621	0.11035	0.27761	0.29995	Residence
576301	4146922	576300.72_4146921.66	0.02432	0.05142	0.04258	0.12753	0.3815	0.35851	Residence
576421	4146922	576420.72_4146921.66	0.03054	0.06855	0.0554	0.14628	0.71992	0.37442	Residence
576441	4146922	576440.72_4146921.66	0.03191	0.07188	0.05778	0.14881	0.89492	0.37351	Residence
576461	4146922	576460.72_4146921.66	0.03337	0.07526	0.0601	0.15105	1.19938	0.3719	Residence
576481	4146922	576480.72_4146921.66	0.03499	0.07873	0.06237	0.15302	1.83247	0.36985	Residence
576501	4146922	576500.72_4146921.66	0.03676	0.0823	0.06455	0.15469	2.63779	0.36741	Residence
576541	4146922	576540.72_4146921.66	0.04071	0.08977	0.06856	0.15693	3.59828	0.36125	Residence
576561	4146922	576560.72_4146921.66	0.0431	0.09392	0.0705	0.15768	2.21006	0.35802	Residence
576721	4146922	576720.72_4146921.66	0.07376	0.13901	0.08918	0.15337	0.4356	0.32162	Residence
576741	4146922	576740.72_4146921.66	0.07976	0.14645	0.09255	0.15198	0.38657	0.31627	Residence
576761	4146922	576760.72_4146921.66	0.08654	0.15428	0.09616	0.15046	0.34546	0.31083	Residence
576781	4146922	576780.72_4146921.66	0.09373	0.16215	0.09985	0.14865	0.31024	0.30506	Residence
576801	4146922	576800.72_4146921.66	0.10251	0.17056	0.10382	0.14692	0.28064	0.29958	Residence
576821	4146922	576820.72_4146921.66	0.11256	0.17916	0.10789	0.14508	0.25507	0.29409	Residence
576841	4146922	576840.72_4146921.66	0.12402	0.18786	0.11202	0.14315	0.23283	0.28864	Residence
576861	4146922	576860.72_4146921.66	0.13661	0.19642	0.11613	0.14104	0.21336	0.28315	Residence
576881	4146922	576880.72_4146921.66	0.15088	0.20496	0.12025	0.13887	0.19623	0.27778	Residence
576901	4146922	576900.72_4146921.66	0.16708	0.2134	0.12434	0.13662	0.18104	0.27252	Residence
576941	4146922	576940.72_4146921.66	0.20727	0.22949	0.13232	0.13191	0.15536	0.26237	Residence
576961	4146922	576960.72_4146921.66	0.23286	0.23692	0.13614	0.12945	0.14445	0.25747	Residence
576981	4146922	576980.72_4146921.66	0.26311	0.2437	0.13977	0.12689	0.13458	0.25269	Residence
577001	4146922	577000.72_4146921.66	0.29915	0.24975	0.14318	0.12428	0.12564	0.24801	Residence
577021	4146922	577020.72_4146921.66	0.34346	0.2552	0.14641	0.1217	0.11757	0.24351	Residence
577041	4146922	577040.72_4146921.66	0.39779	0.25996	0.1494	0.11915	0.11026	0.23915	Residence
577061	4146922	577060.72_4146921.66	0.46395	0.26395	0.15207	0.11659	0.10361	0.2349	Residence
577081	4146922	577080.72_4146921.66	0.54577	0.26725	0.15438	0.11407	0.09756	0.23075	Residence
577101	4146922	577100.72_4146921.66	0.6495	0.26999	0.15632	0.11159	0.09207	0.2267	Residence
577121	4146922	577120.72_4146921.66	0.78274	0.27223	0.15783	0.10916	0.08706	0.22274	Residence
577141	4146922	577140.72_4146921.66	0.9595	0.27411	0.15888	0.10678	0.0825	0.21886	Residence
577161	4146922	577160.72_4146921.66	1.20201	0.27573	0.15945	0.10447	0.07834	0.21507	Residence
577181	4146922	577180.72_4146921.66	1.5573	0.27726	0.15958	0.10225	0.07455	0.21133	Residence
577201	4146922	577200.72_4146921.66	2.12988	0.27873	0.15926	0.10013	0.0711	0.20765	Residence
577221	4146922	577220.72_4146921.66	3.1935	0.27999	0.15846	0.09807	0.06791	0.20402	Residence
577241	4146922	577240.72_4146921.66	5.42487	0.28098	0.15722	0.09607	0.06496	0.20043	Residence
576181	4146942	576180.72_4146941.66	0.02002	0.04081	0.03573	0.10842	0.2675	0.29647	Residence
576201	4146942	576200.72_4146941.66	0.02065	0.04218	0.03648	0.11185	0.28635	0.31409	Residence
576221	4146942	576220.72_4146941.66	0.02133	0.04371	0.03738	0.11531	0.3054	0.33019	Residence
576241	4146942	576240.72_4146941.66	0.02203	0.04543	0.03845	0.1188	0.32481	0.34437	Residence
576301	4146942	576300.72_4146941.66	0.02441	0.05177	0.04278	0.12937	0.39019	0.3742	Residence
576321	4146942	576320.72_4146941.66	0.02531	0.0543	0.04461	0.13288	0.41784	0.38026	Residence
576341	4146942	576340.72_4146941.66	0.02626	0.05699	0.04661	0.13629	0.45073	0.38459	Residence
576361	4146942	576360.72_4146941.66	0.02726	0.05984	0.04875	0.13958	0.49173	0.38739	Residence
576381	4146942	576380.72_4146941.66	0.02831	0.06283	0.051	0.1427	0.54491	0.38879	Residence
576401	4146942	576400.72_4146941.66	0.02946	0.06598	0.05335	0.14566	0.61922	0.38912	Residence
576421	4146942	576420.72_4146941.66	0.03072	0.06928	0.05577	0.14845	0.73019	0.38859	Residence
576441	4146942	576440.72_4146941.66	0.0321	0.07267	0.05819	0.15098	0.90664	0.38728	Residence
576461	4146942	576460.72_4146941.66	0.0336	0.07616	0.06058	0.15325	1.22016	0.38539	Residence
576481	4146942	576480.72_4146941.66	0.03525	0.07973	0.06292	0.15522	1.87587	0.38301	Residence
576501	4146942	576500.72_4146941.66	0.03706	0.08341	0.06516	0.15689	2.7263	0.38026	Residence
576521	4146942	576520.72_4146941.66	0.03901	0.08719	0.06729	0.15818	3.84684	0.37704	Residence
576541	4146942	576540.72_4146941.66	0.04115	0.09115	0.06932	0.15914	3.53186	0.37352	Residence
576561	4146942	576560.72_4146941.66	0.04354	0.09538	0.07129	0.15979	2.17308	0.36975	Residence
576581	4146942	576580.72_4146941.66	0.04619	0.09992	0.07323	0.16013	1.5372	0.3657	Residence
576721	4146942	576720.72_4146941.66	0.07513	0.14198	0.09042	0.15514	0.4282	0.33002	Residence
576741	4146942	576740.72_4146941.66	0.08133	0.14967	0.09386	0.15371	0.37942	0.32428	Residence

576761	4146942	576760.72_4146941.66	0.08821	0.15773	0.09753	0.15212	0.33848	0.31844	Residence
576781	4146942	576780.72_4146941.66	0.09557	0.16588	0.10131	0.15028	0.30351	0.31232	Residence
576801	4146942	576800.72_4146941.66	0.10471	0.17471	0.1054	0.14856	0.27429	0.30663	Residence
576821	4146942	576820.72_4146941.66	0.11494	0.18359	0.10956	0.14666	0.24893	0.30083	Residence
576841	4146942	576840.72_4146941.66	0.12652	0.19252	0.11377	0.14463	0.22691	0.29504	Residence
576861	4146942	576860.72_4146941.66	0.13953	0.2014	0.11798	0.14247	0.20768	0.28931	Residence
576881	4146942	576880.72_4146941.66	0.15445	0.21027	0.12221	0.14025	0.19078	0.28373	Residence
576901	4146942	576900.72_4146941.66	0.17118	0.21893	0.12639	0.13792	0.17582	0.27825	Residence
576941	4146942	576940.72_4146941.66	0.21229	0.23531	0.13449	0.13299	0.15059	0.26764	Residence
576961	4146942	576960.72_4146941.66	0.23885	0.24292	0.13841	0.13047	0.13992	0.26262	Residence
576981	4146942	576980.72_4146941.66	0.27078	0.24994	0.14216	0.1279	0.13033	0.25775	Residence
577001	4146942	577000.72_4146941.66	0.30949	0.25629	0.14572	0.12531	0.1217	0.253	Residence
577021	4146942	577020.72_4146941.66	0.35632	0.26185	0.14902	0.12269	0.1139	0.24838	Residence
577041	4146942	577040.72_4146941.66	0.41328	0.26662	0.15203	0.12007	0.10684	0.24388	Residence
577061	4146942	577060.72_4146941.66	0.48286	0.27062	0.15471	0.11745	0.10044	0.2395	Residence
577081	4146942	577080.72_4146941.66	0.56984	0.27396	0.15703	0.11489	0.09464	0.23523	Residence
577101	4146942	577100.72_4146941.66	0.68018	0.27672	0.15894	0.11237	0.08938	0.23107	Residence
577121	4146942	577120.72_4146941.66	0.82298	0.279	0.16041	0.1099	0.08459	0.227	Residence
577141	4146942	577140.72_4146941.66	1.01536	0.28098	0.16142	0.10752	0.08025	0.22303	Residence
577161	4146942	577160.72_4146941.66	1.28316	0.28272	0.16195	0.1052	0.0763	0.21913	Residence
577181	4146942	577180.72_4146941.66	1.68148	0.28434	0.162	0.10297	0.07269	0.21529	Residence
577201	4146942	577200.72_4146941.66	2.34778	0.28585	0.16157	0.10082	0.06938	0.21152	Residence
577221	4146942	577220.72_4146941.66	3.71832	0.28719	0.16069	0.09875	0.06632	0.20778	Residence
577241	4146942	577240.72_4146941.66	4.56491	0.28824	0.15937	0.09676	0.06348	0.20409	Residence
576181	4146962	576180.72_4146961.66	0.02006	0.04113	0.03604	0.10989	0.27649	0.31084	Residence
576201	4146962	576200.72_4146961.66	0.0207	0.04249	0.03677	0.11337	0.29567	0.32937	Residence
576221	4146962	576220.72_4146961.66	0.02138	0.04403	0.03765	0.11692	0.31503	0.3462	Residence
576241	4146962	576240.72_4146961.66	0.0221	0.04575	0.0387	0.1205	0.33464	0.3609	Residence
576261	4146962	576260.72_4146961.66	0.02288	0.0477	0.03995	0.12414	0.3552	0.37335	Residence
576281	4146962	576280.72_4146961.66	0.02367	0.04982	0.04138	0.12773	0.37649	0.38331	Residence
576301	4146962	576300.72_4146961.66	0.02452	0.05216	0.04301	0.13131	0.40005	0.39113	Residence
576321	4146962	576320.72_4146961.66	0.02542	0.0547	0.04483	0.13485	0.42715	0.39697	Residence
576341	4146962	576340.72_4146961.66	0.02638	0.05744	0.04683	0.13832	0.4597	0.40105	Residence
576361	4146962	576360.72_4146961.66	0.02741	0.06036	0.049	0.14169	0.50087	0.40357	Residence
576381	4146962	576380.72_4146961.66	0.02849	0.06343	0.05129	0.14487	0.55434	0.40463	Residence
576401	4146962	576400.72_4146961.66	0.02967	0.06666	0.05369	0.14789	0.62985	0.40463	Residence
576421	4146962	576420.72_4146961.66	0.03091	0.07	0.05613	0.15065	0.73999	0.40355	Residence
576441	4146962	576440.72_4146961.66	0.03232	0.07349	0.05861	0.1532	0.91876	0.40187	Residence
576461	4146962	576460.72_4146961.66	0.03384	0.07706	0.06106	0.15547	1.2369	0.39958	Residence
576481	4146962	576480.72_4146961.66	0.03551	0.08073	0.06345	0.15744	1.90901	0.39682	Residence
576501	4146962	576500.72_4146961.66	0.03738	0.08453	0.06577	0.15912	2.8141	0.39377	Residence
576521	4146962	576520.72_4146961.66	0.03939	0.08844	0.06797	0.16041	3.95519	0.39022	Residence
576541	4146962	576540.72_4146961.66	0.04159	0.09253	0.07006	0.16134	3.44619	0.38628	Residence
576561	4146962	576560.72_4146961.66	0.04406	0.09692	0.0721	0.16199	2.14128	0.38216	Residence
576581	4146962	576580.72_4146961.66	0.04679	0.10161	0.07411	0.16229	1.51983	0.37769	Residence
576721	4146962	576720.72_4146961.66	0.0765	0.14505	0.09168	0.15695	0.42047	0.33874	Residence
576741	4146962	576740.72_4146961.66	0.08294	0.15305	0.09521	0.1555	0.37207	0.33266	Residence
576761	4146962	576760.72_4146961.66	0.08997	0.16136	0.09895	0.15385	0.33137	0.32641	Residence
576781	4146962	576780.72_4146961.66	0.09749	0.16981	0.10282	0.15196	0.2967	0.31992	Residence
576801	4146962	576800.72_4146961.66	0.10682	0.17897	0.10701	0.1502	0.26778	0.31393	Residence
576821	4146962	576820.72_4146961.66	0.11713	0.18812	0.11125	0.14822	0.24268	0.30779	Residence
576841	4146962	576840.72_4146961.66	0.12905	0.19741	0.11557	0.14614	0.22097	0.30176	Residence
576861	4146962	576860.72_4146961.66	0.1424	0.20658	0.11987	0.14391	0.202	0.29575	Residence
576881	4146962	576880.72_4146961.66	0.15786	0.21576	0.12421	0.14162	0.18537	0.28994	Residence
576901	4146962	576900.72_4146961.66	0.17545	0.22476	0.12851	0.13925	0.17067	0.28428	Residence
576921	4146962	576920.72_4146961.66	0.19521	0.23337	0.13271	0.13674	0.15761	0.2787	Residence
576941	4146962	576940.72_4146961.66	0.21825	0.2416	0.13682	0.13417	0.14597	0.2733	Residence
576961	4146962	576960.72_4146961.66	0.24526	0.24924	0.14077	0.13153	0.13555	0.26803	Residence
576981	4146962	576980.72_4146961.66	0.27811	0.25635	0.14459	0.12887	0.12623	0.26298	Residence
577001	4146962	577000.72_4146961.66	0.3182	0.26277	0.14821	0.12621	0.11787	0.25812	Residence
577021	4146962	577020.72_4146961.66	0.36695	0.2684	0.15156	0.12354	0.11035	0.2534	Residence
577041	4146962	577040.72_4146961.66	0.42595	0.27316	0.15459	0.12085	0.10355	0.24877	Residence
577061	4146962	577060.72_4146961.66	0.49979	0.27729	0.15731	0.11822	0.09743	0.24431	Residence
577081	4146962	577080.72_4146961.66	0.59074	0.28061	0.15961	0.11559	0.09187	0.23993	Residence
577101	4146962	577100.72_4146961.66	0.70896	0.28352	0.16153	0.11308	0.08685	0.23569	Residence
577121	4146962	577120.72_4146961.66	0.85916	0.28574	0.16291	0.11054	0.08227	0.23149	Residence
577141	4146962	577140.72_4146961.66	1.06691	0.28786	0.16389	0.10815	0.07814	0.22743	Residence
577161	4146962	577160.72_4146961.66	1.3569	0.28966	0.16434	0.1058	0.07435	0.22342	Residence
577181	4146962	577180.72_4146961.66	1.79689	0.29137	0.1643	0.10355	0.0709	0.21949	Residence
577201	4146962	577200.72_4146961.66	2.56753	0.29307	0.16383	0.10142	0.06774	0.21561	Residence
577221	4146962	577220.72_4146961.66	4.18092	0.29447	0.16285	0.09934	0.0648	0.21177	Residence
576181	4146982	576180.72_4146981.66	0.0201	0.04144	0.03635	0.11137	0.28605	0.32638	Residence
576201	4146982	576200.72_4146981.66	0.02074	0.04282	0.03707	0.11495	0.30579	0.34597	Residence
576221	4146982	576220.72_4146981.66	0.02143	0.04435	0.03793	0.11856	0.32539	0.36353	Residence

576241	4146982	576240.72_4146981.66	0.02216	0.04607	0.03897	0.12223	0.34516	0.37872	Residence
576261	4146982	576260.72_4146981.66	0.02294	0.04802	0.0402	0.12595	0.36567	0.39142	Residence
576281	4146982	576280.72_4146981.66	0.02376	0.05018	0.04161	0.12963	0.38705	0.40151	Residence
576301	4146982	576300.72_4146981.66	0.02462	0.05255	0.04324	0.13329	0.41047	0.40926	Residence
576321	4146982	576320.72_4146981.66	0.02554	0.05512	0.04506	0.13689	0.43725	0.41487	Residence
576341	4146982	576340.72_4146981.66	0.02653	0.05792	0.04708	0.14044	0.46979	0.41869	Residence
576361	4146982	576360.72_4146981.66	0.02757	0.06089	0.04926	0.14385	0.51051	0.42081	Residence
576381	4146982	576380.72_4146981.66	0.02868	0.06404	0.05158	0.1471	0.56452	0.42151	Residence
576401	4146982	576400.72_4146981.66	0.0299	0.06736	0.05402	0.15018	0.64105	0.42113	Residence
576421	4146982	576420.72_4146981.66	0.0312	0.0708	0.05652	0.153	0.75399	0.41971	Residence
576441	4146982	576440.72_4146981.66	0.03262	0.07437	0.05905	0.15555	0.93611	0.41756	Residence
576461	4146982	576460.72_4146981.66	0.03418	0.07805	0.06157	0.15784	1.26493	0.41489	Residence
576481	4146982	576480.72_4146981.66	0.03587	0.0818	0.06402	0.15978	1.95969	0.41164	Residence
576501	4146982	576500.72_4146981.66	0.03778	0.08572	0.0664	0.16144	2.92996	0.40816	Residence
576521	4146982	576520.72_4146981.66	0.03983	0.08973	0.06866	0.16269	4.06416	0.40411	Residence
576541	4146982	576540.72_4146981.66	0.04208	0.09395	0.07082	0.1636	3.36434	0.39973	Residence
576561	4146982	576560.72_4146981.66	0.04463	0.09848	0.07293	0.16422	2.10769	0.39516	Residence
576581	4146982	576580.72_4146981.66	0.04741	0.10331	0.07499	0.16446	1.49926	0.39016	Residence
576601	4146982	576600.72_4146981.66	0.05053	0.10854	0.07707	0.16443	1.1473	0.38492	Residence
576701	4146982	576700.72_4146981.66	0.07209	0.14059	0.08971	0.16025	0.47145	0.35448	Residence
576721	4146982	576720.72_4146981.66	0.07788	0.14827	0.09298	0.1588	0.4125	0.34786	Residence
576741	4146982	576740.72_4146981.66	0.08446	0.15652	0.09658	0.15729	0.36435	0.34133	Residence
576761	4146982	576760.72_4146981.66	0.09147	0.165	0.10036	0.15552	0.32378	0.33456	Residence
576781	4146982	576780.72_4146981.66	0.09936	0.17389	0.10437	0.15366	0.2897	0.32784	Residence
576801	4146982	576800.72_4146981.66	0.10881	0.18335	0.10865	0.15183	0.26111	0.32151	Residence
576821	4146982	576820.72_4146981.66	0.11934	0.19285	0.11299	0.1498	0.23637	0.31508	Residence
576841	4146982	576840.72_4146981.66	0.13156	0.20249	0.11742	0.14768	0.21498	0.30879	Residence
576861	4146982	576860.72_4146981.66	0.14523	0.21196	0.12182	0.14536	0.1963	0.30249	Residence
576881	4146982	576880.72_4146981.66	0.16135	0.22152	0.12628	0.14303	0.17998	0.29649	Residence
576901	4146982	576900.72_4146981.66	0.17962	0.23081	0.13069	0.14057	0.16558	0.2906	Residence
576921	4146982	576920.72_4146981.66	0.20023	0.23968	0.135	0.13799	0.15281	0.28482	Residence
576941	4146982	576940.72_4146981.66	0.22412	0.24811	0.1392	0.13534	0.14147	0.27922	Residence
576961	4146982	576960.72_4146981.66	0.25264	0.25605	0.14329	0.13267	0.13137	0.27386	Residence
576981	4146982	576980.72_4146981.66	0.28606	0.26312	0.14713	0.12989	0.12232	0.26855	Residence
577001	4146982	577000.72_4146981.66	0.32784	0.26967	0.15083	0.12718	0.11426	0.26358	Residence
577021	4146982	577020.72_4146981.66	0.37877	0.27537	0.15424	0.12445	0.10702	0.25873	Residence
577041	4146982	577040.72_4146981.66	0.44076	0.28019	0.1573	0.12172	0.10049	0.25398	Residence
577061	4146982	577060.72_4146981.66	0.51751	0.28426	0.16	0.11901	0.09461	0.24937	Residence
577081	4146982	577080.72_4146981.66	0.61491	0.28773	0.16233	0.11638	0.08931	0.2449	Residence
577101	4146982	577100.72_4146981.66	0.73933	0.2906	0.16419	0.11379	0.08451	0.24052	Residence
577121	4146982	577120.72_4146981.66	0.90296	0.29302	0.16558	0.11127	0.08015	0.23624	Residence
577141	4146982	577140.72_4146981.66	1.12878	0.29524	0.16651	0.10886	0.07621	0.23206	Residence
577161	4146982	577160.72_4146981.66	1.44705	0.29713	0.16687	0.1065	0.07259	0.22794	Residence
577181	4146982	577180.72_4146981.66	1.94065	0.29894	0.16675	0.10423	0.06927	0.22389	Residence
577201	4146982	577200.72_4146981.66	2.85371	0.30071	0.16617	0.10208	0.06623	0.2199	Residence
577221	4146982	577220.72_4146981.66	4.88186	0.30214	0.16508	0.09998	0.06339	0.21595	Residence
576181	4147002	576180.72_4147001.66	0.02016	0.04178	0.03668	0.11292	0.2966	0.3434	Residence
576201	4147002	576200.72_4147001.66	0.0208	0.04316	0.03739	0.11657	0.31681	0.36405	Residence
576221	4147002	576220.72_4147001.66	0.0215	0.0447	0.03824	0.12029	0.33683	0.38242	Residence
576241	4147002	576240.72_4147001.66	0.02223	0.04642	0.03925	0.12404	0.3568	0.39811	Residence
576261	4147002	576260.72_4147001.66	0.02302	0.04837	0.04046	0.12783	0.37721	0.41101	Residence
576281	4147002	576280.72_4147001.66	0.02386	0.05056	0.04187	0.13162	0.39874	0.42121	Residence
576301	4147002	576300.72_4147001.66	0.02472	0.05293	0.04347	0.13532	0.42165	0.42872	Residence
576321	4147002	576320.72_4147001.66	0.02566	0.05555	0.04529	0.139	0.44821	0.43408	Residence
576341	4147002	576340.72_4147001.66	0.02667	0.05839	0.04732	0.1426	0.4804	0.43752	Residence
576361	4147002	576360.72_4147001.66	0.02776	0.06144	0.04952	0.14609	0.52128	0.43927	Residence
576381	4147002	576380.72_4147001.66	0.02891	0.06467	0.05188	0.14941	0.57578	0.43957	Residence
576401	4147002	576400.72_4147001.66	0.03015	0.06807	0.05436	0.15253	0.65266	0.43869	Residence
576421	4147002	576420.72_4147001.66	0.03149	0.0716	0.05691	0.15538	0.76716	0.43681	Residence
576441	4147002	576440.72_4147001.66	0.03295	0.07528	0.0595	0.15797	0.95405	0.43425	Residence
576461	4147002	576460.72_4147001.66	0.03454	0.07904	0.06208	0.16024	1.28964	0.43104	Residence
576481	4147002	576480.72_4147001.66	0.03629	0.08292	0.0646	0.16219	2.01629	0.42738	Residence
576501	4147002	576500.72_4147001.66	0.03825	0.08695	0.06706	0.16384	3.07074	0.42342	Residence
576521	4147002	576520.72_4147001.66	0.04034	0.09108	0.06938	0.16505	4.18225	0.41884	Residence
576541	4147002	576540.72_4147001.66	0.04266	0.09544	0.07161	0.16594	3.29613	0.41398	Residence
576561	4147002	576560.72_4147001.66	0.04524	0.10008	0.07377	0.16648	2.07353	0.4088	Residence
576581	4147002	576580.72_4147001.66	0.04811	0.10509	0.0759	0.1667	1.48014	0.40332	Residence
576601	4147002	576600.72_4147001.66	0.05128	0.11048	0.07803	0.16661	1.13247	0.3975	Residence
576641	4147002	576640.72_4147001.66	0.05877	0.12252	0.0826	0.16557	0.74577	0.38504	Residence
576681	4147002	576680.72_4147001.66	0.06803	0.13624	0.08794	0.16356	0.53557	0.3716	Residence
576701	4147002	576700.72_4147001.66	0.07353	0.14383	0.09104	0.1623	0.46338	0.36472	Residence
576721	4147002	576720.72_4147001.66	0.07951	0.1518	0.0944	0.16082	0.40475	0.35766	Residence
576741	4147002	576740.72_4147001.66	0.08611	0.16024	0.09803	0.15919	0.35659	0.35056	Residence
576761	4147002	576760.72_4147001.66	0.09329	0.16903	0.1019	0.15737	0.31641	0.34337	Residence

576781	4147002	576780.72_4147001.66	0.1017	0.17844	0.10607	0.15556	0.28295	0.3365	Residence	
576801	4147002	576800.72_4147001.66	0.11092	0.18799	0.11036	0.15354	0.25439	0.32955	Residence	
576821	4147002	576820.72_4147001.66	0.1217	0.19786	0.11481	0.15145	0.23001	0.32281	Residence	
576841	4147002	576840.72_4147001.66	0.13406	0.20779	0.11932	0.14923	0.20895	0.31617	Residence	
576861	4147002	576860.72_4147001.66	0.14803	0.21757	0.12382	0.14682	0.19058	0.30956	Residence	
576881	4147002	576880.72_4147001.66	0.16475	0.22749	0.12841	0.14443	0.17462	0.30335	Residence	
576901	4147002	576900.72_4147001.66	0.18373	0.2371	0.13293	0.1419	0.16055	0.29725	Residence	
576921	4147002	576920.72_4147001.66	0.20522	0.24627	0.13736	0.13925	0.14811	0.29127	Residence	
576941	4147002	576940.72_4147001.66	0.23022	0.25496	0.14168	0.13654	0.1371	0.28551	Residence	
576961	4147002	576960.72_4147001.66	0.26006	0.26313	0.14588	0.13382	0.12733	0.28001	Residence	
576981	4147002	576980.72_4147001.66	0.29473	0.27033	0.1498	0.13096	0.1186	0.27453	Residence	
577001	4147002	577000.72_4147001.66	0.33731	0.27679	0.15351	0.12813	0.11081	0.26929	Residence	
577021	4147002	577020.72_4147001.66	0.39018	0.28254	0.15696	0.12534	0.10386	0.2643	Residence	
577041	4147002	577040.72_4147001.66	0.45477	0.28737	0.16005	0.12255	0.0976	0.2594	Residence	
577061	4147002	577060.72_4147001.66	0.53647	0.29158	0.1628	0.11983	0.09199	0.25472	Residence	
577081	4147002	577080.72_4147001.66	0.64041	0.29517	0.16513	0.11719	0.08694	0.25016	Residence	
577101	4147002	577100.72_4147001.66	0.77185	0.29801	0.16693	0.11454	0.08234	0.24561	Residence	
577121	4147002	577120.72_4147001.66	0.94855	0.30055	0.16828	0.112	0.07818	0.24121	Residence	
577141	4147002	577140.72_4147001.66	1.19256	0.30282	0.16913	0.10955	0.0744	0.23691	Residence	
577161	4147002	577160.72_4147001.66	1.54686	0.30494	0.16946	0.1072	0.07094	0.23269	Residence	
577181	4147002	577180.72_4147001.66	2.10085	0.30684	0.16925	0.10492	0.06775	0.22851	Residence	
577201	4147002	577200.72_4147001.66	3.15819	0.30866	0.16855	0.10275	0.0648	0.22441	Residence	
577221	4147002	577220.72_4147001.66	3.96927	0.31014	0.16736	0.10063	0.06205	0.22034	Residence	
576941	4147022	576940.72_4147021.66	0.2363	0.26211	0.14423	0.13775	0.13287	0.29216	Residence	
576961	4147022	576960.72_4147021.66	0.26714	0.27044	0.14852	0.13493	0.12344	0.28646	Residence	
576981	4147022	576980.72_4147021.66	0.30318	0.27777	0.15253	0.13202	0.11503	0.28081	Residence	
577001	4147022	577000.72_4147021.66	0.34723	0.28429	0.15629	0.12911	0.10755	0.27538	Residence	
577021	4147022	577020.72_4147021.66	0.40192	0.29002	0.15977	0.12625	0.10088	0.27019	Residence	
577041	4147022	577040.72_4147021.66	0.46972	0.29492	0.16289	0.12341	0.0949	0.26516	Residence	
577061	4147022	577060.72_4147021.66	0.55581	0.29919	0.16565	0.12066	0.08955	0.26035	Residence	
577081	4147022	577080.72_4147021.66	0.66549	0.3028	0.16797	0.11797	0.08472	0.25565	Residence	
577101	4147022	577100.72_4147021.66	0.80654	0.30576	0.16975	0.1153	0.08033	0.25097	Residence	
577121	4147022	577120.72_4147021.66	0.99772	0.30843	0.17106	0.11275	0.07635	0.24646	Residence	
577141	4147022	577140.72_4147021.66	1.2646	0.31084	0.17184	0.11029	0.07272	0.24203	Residence	
577161	4147022	577160.72_4147021.66	1.65621	0.31305	0.17209	0.10791	0.06939	0.23768	Residence	
577181	4147022	577180.72_4147021.66	2.28277	0.31511	0.1718	0.10563	0.06632	0.23338	Residence	
577201	4147022	577200.72_4147021.66	3.45137	0.31697	0.17098	0.10343	0.06346	0.22914	Residence	
577221	4147022	577220.72_4147021.66	4.75948	0.31851	0.16969	0.1013	0.06079	0.22494	Residence	
576181	4147042	576180.72_4147041.66	0.02031	0.04247	0.03737	0.11615	0.32067	0.38238	Residence	
576201	4147042	576200.72_4147041.66	0.02092	0.04385	0.03805	0.11993	0.34172	0.40517	Residence	
576221	4147042	576220.72_4147041.66	0.02167	0.04544	0.03889	0.12391	0.36298	0.42545	Residence	
576241	4147042	576240.72_4147041.66	0.02242	0.0472	0.03988	0.12789	0.38368	0.44223	Residence	
576261	4147042	576260.72_4147041.66	0.02322	0.04914	0.04103	0.13181	0.40382	0.45536	Residence	
576281	4147042	576280.72_4147041.66	0.02405	0.05132	0.0424	0.13571	0.42465	0.4653	Residence	
576301	4147042	576300.72_4147041.66	0.02498	0.05378	0.044	0.13964	0.44779	0.47256	Residence	
576321	4147042	576320.72_4147041.66	0.02599	0.05649	0.04582	0.1435	0.47412	0.47725	Residence	
576341	4147042	576340.72_4147041.66	0.02705	0.05943	0.04785	0.14723	0.50563	0.47969	Residence	
576361	4147042	576360.72_4147041.66	0.02819	0.0626	0.05009	0.15081	0.54571	0.48028	Residence	
576381	4147042	576380.72_4147041.66	0.02941	0.06598	0.0525	0.15423	0.60018	0.47945	Residence	
576401	4147042	576400.72_4147041.66	0.03075	0.06956	0.05506	0.15745	0.67854	0.47751	Residence	
576421	4147042	576420.72_4147041.66	0.03218	0.07328	0.05772	0.16036	0.79671	0.47455	Residence	
576481	4147042	576480.72_4147041.66	0.03727	0.08525	0.06579	0.1672	2.14061	0.46179	Residence	
576521	4147042	576520.72_4147041.66	0.04147	0.09385	0.07083	0.1699	4.38467	0.45071	Residence	
576541	4147042	576540.72_4147041.66	0.04391	0.09848	0.07321	0.17071	3.15233	0.44466	Residence	
576561	4147042	576560.72_4147041.66	0.04658	0.1034	0.07549	0.17114	2.00322	0.43819	Residence	
576581	4147042	576580.72_4147041.66	0.04956	0.10873	0.07774	0.17126	1.43526	0.43148	Residence	
576601	4147042	576600.72_4147041.66	0.0529	0.11452	0.08001	0.17109	1.10033	0.42457	Residence	
576621	4147042	576620.72_4147041.66	0.05659	0.12076	0.08236	0.17062	0.87932	0.41734	Residence	
576641	4147042	576640.72_4147041.66	0.06061	0.1274	0.08482	0.16983	0.7218	0.40973	Residence	
576661	4147042	576660.72_4147041.66	0.06516	0.13457	0.0875	0.16887	0.60568	0.40207	Residence	
576681	4147042	576680.72_4147041.66	0.07017	0.14217	0.09043	0.16766	0.51565	0.39418	Residence	
576701	4147042	576700.72_4147041.66	0.0758	0.15029	0.09365	0.16628	0.44448	0.38625	Residence	
576721	4147042	576720.72_4147041.66	0.08201	0.15887	0.09717	0.16471	0.38691	0.37823	Residence	
576741	4147042	576740.72_4147041.66	0.08876	0.16784	0.10094	0.16291	0.33954	0.37005	School	KIPP Esperanza High School
576761	4147042	576760.72_4147041.66	0.09656	0.17747	0.10505	0.16109	0.3007	0.36224	Residence	
576781	4147042	576780.72_4147041.66	0.10551	0.18766	0.10944	0.1592	0.26826	0.35469	School	KIPP Esperanza High School
576801	4147042	576800.72_4147041.66	0.1152	0.19795	0.11393	0.15704	0.24061	0.34698	Residence	
576821	4147042	576820.72_4147041.66	0.12627	0.20846	0.11857	0.15477	0.21703	0.33946	Residence	
576841	4147042	576840.72_4147041.66	0.13922	0.21916	0.12332	0.1524	0.1968	0.33222	Residence	
576861	4147042	576860.72_4147041.66	0.15416	0.22979	0.1281	0.1499	0.17928	0.32514	Residence	
576881	4147042	576880.72_4147041.66	0.17146	0.24024	0.13286	0.14727	0.16401	0.31824	Residence	
576901	4147042	576900.72_4147041.66	0.19189	0.25057	0.13764	0.1446	0.15073	0.31171	Residence	
576921	4147042	576920.72_4147041.66	0.21523	0.26036	0.14231	0.14181	0.13905	0.30533	Residence	
576941	4147042	576940.72_4147041.66	0.24258	0.26964	0.14688	0.13898	0.12879	0.29924	Residence	

576961	4147042	576960.72_4147041.66	0.27421	0.27805	0.15124	0.13606	0.11971	0.29328	Residence	
576981	4147042	576980.72_4147041.66	0.31195	0.28559	0.15536	0.1331	0.11166	0.2875	Residence	
577001	4147042	577000.72_4147041.66	0.35788	0.29221	0.15919	0.13014	0.1045	0.28192	Residence	
577021	4147042	577020.72_4147041.66	0.41448	0.29792	0.1627	0.1272	0.09811	0.2765	Residence	
577041	4147042	577040.72_4147041.66	0.48609	0.30293	0.16587	0.12433	0.09241	0.27135	Residence	
577061	4147042	577060.72_4147041.66	0.57664	0.3072	0.16862	0.12153	0.08729	0.26636	Residence	
577081	4147042	577080.72_4147041.66	0.69276	0.31084	0.1709	0.11878	0.08266	0.26148	Residence	
576181	4147062	576180.72_4147061.66	0.02043	0.04283	0.03774	0.11785	0.33456	0.40482	Residence	
576201	4147062	576200.72_4147061.66	0.02104	0.04424	0.03842	0.12174	0.35635	0.42893	Residence	
576221	4147062	576220.72_4147061.66	0.02173	0.0458	0.03922	0.12574	0.37757	0.44979	Residence	
576241	4147062	576240.72_4147061.66	0.02253	0.04757	0.0402	0.12984	0.39858	0.46711	Residence	
576261	4147062	576260.72_4147061.66	0.02332	0.04953	0.04134	0.13387	0.41881	0.48039	Residence	
576281	4147062	576280.72_4147061.66	0.02417	0.05172	0.04269	0.13787	0.43949	0.49017	Residence	
576301	4147062	576300.72_4147061.66	0.02511	0.0542	0.04427	0.14187	0.46217	0.49702	Residence	
576321	4147062	576320.72_4147061.66	0.02617	0.05697	0.0461	0.14584	0.4885	0.50132	Residence	
576341	4147062	576340.72_4147061.66	0.02724	0.05995	0.04813	0.14962	0.51927	0.50305	Residence	
576361	4147062	576360.72_4147061.66	0.0284	0.06318	0.05037	0.15326	0.55888	0.50296	Residence	
576381	4147062	576380.72_4147061.66	0.02969	0.06664	0.05281	0.15672	0.61293	0.50144	Residence	
576401	4147062	576400.72_4147061.66	0.03106	0.0703	0.05541	0.15996	0.69098	0.49879	Residence	
576421	4147062	576420.72_4147061.66	0.03254	0.07413	0.05811	0.16292	0.81037	0.49522	Residence	
576441	4147062	576440.72_4147061.66	0.03414	0.07809	0.06087	0.16554	1.00701	0.49084	Residence	
576461	4147062	576460.72_4147061.66	0.03587	0.08218	0.06364	0.1678	1.37009	0.48584	Residence	
576481	4147062	576480.72_4147061.66	0.03778	0.08642	0.06638	0.16974	2.19292	0.48041	Residence	
576521	4147062	576520.72_4147061.66	0.04211	0.09529	0.07157	0.1724	4.7324	0.46802	Residence	
576541	4147062	576540.72_4147061.66	0.0446	0.10007	0.07402	0.17317	3.08251	0.46129	Residence	
576561	4147062	576560.72_4147061.66	0.04736	0.10518	0.07639	0.17359	1.97239	0.45424	Residence	
576581	4147062	576580.72_4147061.66	0.05037	0.11066	0.0787	0.17363	1.41327	0.4468	Residence	
576601	4147062	576600.72_4147061.66	0.05375	0.11664	0.08104	0.17341	1.08323	0.43922	Residence	
576621	4147062	576620.72_4147061.66	0.05753	0.12314	0.08346	0.17292	0.86582	0.43146	Residence	
576641	4147062	576640.72_4147061.66	0.0616	0.13002	0.08598	0.17207	0.70959	0.42321	Residence	
576661	4147062	576660.72_4147061.66	0.06618	0.13743	0.08873	0.17104	0.59416	0.41491	Residence	
576681	4147062	576680.72_4147061.66	0.07128	0.14534	0.09174	0.1698	0.50507	0.4065	Residence	
576701	4147062	576700.72_4147061.66	0.07699	0.15378	0.09504	0.16838	0.43455	0.39804	Residence	
576721	4147062	576720.72_4147061.66	0.0833	0.16269	0.09864	0.16676	0.37759	0.3895	Residence	
576741	4147062	576740.72_4147061.66	0.09013	0.17196	0.10248	0.16488	0.33069	0.38074	School	KIPP Esperanza High School
576761	4147062	576760.72_4147061.66	0.09819	0.18201	0.1067	0.16302	0.29256	0.37255	Residence	
576781	4147062	576780.72_4147061.66	0.1074	0.1926	0.1112	0.16107	0.26068	0.3646	School	KIPP Esperanza High School
576801	4147062	576800.72_4147061.66	0.11738	0.2033	0.11581	0.15885	0.23356	0.35651	Residence	
576821	4147062	576820.72_4147061.66	0.1287	0.21419	0.12055	0.15649	0.21047	0.34859	Residence	
576841	4147062	576840.72_4147061.66	0.14207	0.22535	0.12545	0.15407	0.19074	0.34107	Residence	
576861	4147062	576860.72_4147061.66	0.1572	0.23629	0.13032	0.15145	0.17364	0.33359	Residence	
576881	4147062	576880.72_4147061.66	0.17497	0.24713	0.13522	0.14873	0.15883	0.32642	Residence	
576901	4147062	576900.72_4147061.66	0.19604	0.2578	0.14012	0.14598	0.14598	0.31964	Residence	
576921	4147062	576920.72_4147061.66	0.2201	0.26786	0.1449	0.14309	0.13471	0.31298	Residence	
576941	4147062	576940.72_4147061.66	0.24828	0.27734	0.14957	0.14016	0.12484	0.30664	Residence	
576961	4147062	576960.72_4147061.66	0.28135	0.28602	0.15405	0.13719	0.11615	0.30052	Residence	
576981	4147062	576980.72_4147061.66	0.32029	0.29364	0.15824	0.13415	0.10844	0.29452	Residence	
577001	4147062	577000.72_4147061.66	0.36781	0.30032	0.16213	0.13112	0.1016	0.28872	Residence	
577021	4147062	577020.72_4147061.66	0.42646	0.30602	0.16567	0.12811	0.09548	0.28306	Residence	
577041	4147062	577040.72_4147061.66	0.5013	0.31106	0.16886	0.1252	0.09004	0.27774	Residence	
577061	4147062	577060.72_4147061.66	0.59651	0.31537	0.1716	0.12235	0.08515	0.27257	Residence	
577081	4147062	577080.72_4147061.66	0.72056	0.31916	0.17389	0.11959	0.08074	0.26758	Residence	
577141	4147062	577140.72_4147061.66	1.43245	0.32808	0.17749	0.11182	0.06967	0.25317	School	East Palo Alto Charter School
577161	4147062	577160.72_4147061.66	1.92385	0.33063	0.17757	0.10943	0.06656	0.24854	School	East Palo Alto Charter School

Appendix BIO1

Biological Resources Existing Conditions Report











H. T. HARVEY & ASSOCIATES
Ecological Consultants
50 years of field notes, exploration, and excellence

SAFER Bay
Biological Resources Existing Conditions Report

Project #3550-05

Prepared for:

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Prepared by:

H. T. Harvey & Associates

April 5, 2024

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Section 1. Introduction

This report describes the existing biological resources present in the Primary Biological Resources Study Area (Biological Study Area) of the proposed Strategy to Advance Flood protection, Ecosystem restoration and Recreation along the San Francisco Bay Project (SAFER Bay or Project). The Project is administered by the San Francisquito Creek Joint Powers Authority (SFCJPA), which includes the cities of East Palo Alto, Palo Alto, and Menlo Park, the San Mateo County Flood and Sea Level Resiliency District, and the Santa Clara Valley Water District.

1.1 Project Description

The Project extends from the Redwood City-Menlo Park border in the north eastward/southward along the Menlo Park and East Palo Alto shoreline to San Francisquito Creek at the East Palo Alto-Palo Alto border (Figure 1). The Project will provide flood protection from the predicted 100-year coastal flood event in East Palo Alto and Menlo Park with 3.5 vertical feet of resilience to sea level rise. These two cities are currently within the 1-percent annual chance flood hazard area as mapped by the Federal Emergency Management Agency. The Project includes actions within the Don Edwards San Francisco Bay National Wildlife Refuge's (Refuge's) Ravenswood Pond Complex (Ravenswood ponds) and Refuge-managed land in the Faber-Laumeister Tract Marshes (owned by the City of Palo Alto), as well as within the Midpeninsula Open Space District's Ravenswood Open Space Preserve (Ravenswood OSP) (Figure 2). The Project also includes actions within land owned by the San Francisco Public Utilities Commission (SFPUC), the Cargill Corporation, and many others, and within the Caltrans State Route 84 right-of-way at the western approach to the Dumbarton Bridge. As a multi-benefit project, it will also restore and/or enhance up to 550 acres (ac) of habitat within the Ravenswood ponds and create or improve shoreline access on approximately 1 to 2.5 miles of bay trails, including segments of the San Francisco Bay Trail.

Shoreline protection against coastal flooding will be accomplished by building a combination of levees, floodwalls, flood gates, and other improvements. With flood risks addressed, the Project will be able to perform tidal salt marsh restoration in collaboration with the South Bay Salt Pond Restoration Project (SBSPRP), which will involve restoring tidal action to former salt production ponds within the Refuge's Ravenswood ponds and enhancing managed pond habitats. The Project will construct tidal-marsh-upland transition zone habitat on levee slopes within restored former salt ponds and existing marshes to provide high-tide refugia for endangered marsh wildlife species, including the California Ridgway's rail (*Rallus obsoletus obsoletus*) and salt marsh harvest mouse (*Reithrodontomys raviventris*); promote high plant and animal diversity; and potentially accommodate some landward movement of tidal marsh with sea level rise, where appropriate. Portions of remaining managed Ravenswood ponds in the Biological Study Area will be enhanced to increase numbers and productivity of breeding western snowy plovers (*Charadrius nivosus nivosus*), a threatened shorebird species that requires sparsely vegetated and dry habitat currently provided by some of the Ravenswood ponds. Elevations of existing and

new public trails will be raised to reduce exposure to flooding and connected to increase the length and connectivity of the San Francisco Bay Trail.



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Figure 1. Vicinity Map
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April 2024



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Figure 2. Primary Biological Resources Study Area
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Section 2. Methods

2.1 Background Review

H. T. Harvey & Associates ecologists reviewed the updated project materials provided by the SFCJPA through August 2023. Prior to conducting our site visit, we reviewed maps and images of the Biological Study Area obtained from the National Wetlands Inventory (2023), a Natural Resources Conservation Service (NRCS) soil survey for the Biological Study Area (2023), historical aerial photographs provided by UC Santa Barbara (UCSB 2023), and current and historical aerials available on Google Earth Pro software (Google LLC 2023). The California Natural Diversity Database (CNDDB 2023) was also queried for special-status plants and animals, and natural communities of special concern that occur within a 5-mile (mi) radius surrounding the Biological Study Area (referred to hereafter as the "Project Vicinity"; see Figure 1, Project Vicinity). We also reviewed records of birds reported in nearby areas on eBird (Cornell Lab of Ornithology 2023) and other wildlife reported in nearby areas on iNaturalist (2023).

In addition, for plants we reviewed all species on current California Native Plant Society (CNPS 2023) California Rare Plant Rank (CRPR) 1A, 1B, 2A, 2B, 3 and 4 lists occurring in the project region, which is defined as the *Palo Alto* and the *Mountain View, California* U.S. Geological Survey (USGS) 7.5-minute quadrangles and surrounding ten quadrangles (*San Mateo, Redwood Point, Newark, Niles, Woodside, Milpitas, La Honda, Mindego Hill, Cupertino, San Jose West*).

2.2 Site Visits

Reconnaissance-level field surveys of the Biological Study Area were conducted by H. T. Harvey & Associates senior wildlife ecologist Ben Pearl, M.S., restoration biologist Jenna Shikuzawa, and botanist Vanessa Morales on May 10, 11, and 16, 2023. The purpose of these surveys was to (1) assess existing biotic habitats and general wildlife communities in the Biological Study Area and in adjacent areas, (2) assess habitat suitability and potential for occurrence of special-status species and/or their habitats, and (3) identify potential jurisdictional habitats, such as waters of the U.S./State. Because of the proximity of the site to sensitive/regulated habitats, including habitats potentially supporting several special-status species, adjacent areas were evaluated as well.

The reconnaissance surveys took place in the middle of the spring in a year of above-average rainfall. Prior to the surveys, during the rainy season (between October 2022 and April 2023), the site received 27.65 inches of rainfall, which is 178% of normal based on climate data from 1991 to 2020 (PRISM Climate Group 2023). These unusually wet conditions were considered when assessing the biotic habitats present on the site. Biotic habitats were mapped in the field using a Geode GPS unit capable of submeter accuracy. Final habitat mapping utilized a combination of GPS data and aerial imagery (Google LLC 2023).

Section 3. Regulatory Setting

Biological resources in the Biological Study Area are regulated by a number of federal, state, and local laws and ordinances, which are described below.

3.1 Federal Regulations

3.1.1 Clean Water Act

The Clean Water Act (CWA) functions to maintain and restore the physical, chemical, and biological integrity of waters of the U.S., which include, but are not limited to, tributaries to traditionally navigable waters currently or historically used for interstate or foreign commerce, and adjacent wetlands. Historically, in non-tidal waters, U.S. Army Corps of Engineers (USACE) jurisdiction extends to the ordinary high water (OHW) mark, which is defined in Title 33, CFR, Part 328.3. If there are wetlands adjacent to channelized features, the limits of USACE jurisdiction extend beyond the OHW mark to the outer edges of the wetlands. In tidal waters, USACE jurisdiction extends to the landward extent of vegetation associated with salt or brackish water or the high tide line. The high tide line is defined in 33 CFR Part 328.3 as "the line of intersection of the land with the water's surface at the maximum height reached by a rising tide." If there are wetlands adjacent to channelized features, the limits of USACE jurisdiction extend beyond the OHW mark or high tide line to the outer edges of the wetlands. A May 25, 2023 U.S. Supreme Court decision in *Sackett v. Environmental Protection Agency* limited the definition of jurisdictional wetlands that are considered waters of the U.S. to those wetlands having a continuous surface connection with traditional navigable waters.

Section 404 of the CWA authorizes USACE to issue permits to regulate the discharge of dredged or fill material into waters of the U.S. No USACE permit will be effective in the absence of Section 401 Water Quality Certification. The State Water Resources Control Board (SWRCB) is the state agency (together with the Regional Water Quality Control Boards [RWQCBs]) charged with implementing water quality certification in California.

Project Applicability—Much of the Biological Study Area is located within jurisdictional aquatic or managed pond habitat, tidal salt marsh below the high tide line, and non-tidal wetlands that are expected to be considered waters of the U.S. by USACE. Project activities would adversely affect these habitats, and thus a 404 permit from USACE would be required for the Project.

3.1.2 Rivers and Harbors Act

Section 10 of the Rivers and Harbors Act (RHA) of 1899 prohibits the creation of any obstruction to the navigable capacity of waters of the U.S., including discharge of fill and the building of any wharfs, piers, jetties, and other structures without Congressional approval or authorization by the Chief of Engineers and Secretary of the Army (33 U.S.C. 403).

Navigable waters of the U.S., which are defined in 33 CFR, Part 329.4, include all waters subject to the ebb and flow of the tide, and/or those that are presently or have historically been used to transport commerce. The shoreward jurisdictional limit of tidal waters is further defined in 33 CFR, Part 329.12 as "the line on the shore reached by the plane of the mean (average) high water." It is important to understand that USACE does not regulate wetlands under Section 10, only the aquatic or open waters component of bay habitat, and that there is overlap between Section 10 jurisdiction and Section 404 jurisdiction. According to 33 CFR, Part 329.9, a waterbody that was once navigable in its natural or improved state retains its character as "navigable in law" even though it is not presently used for commerce because of changed conditions and/or the presence of obstructions. Historical Section 10 waters (e.g., remnant sloughs) may occur behind levees in areas that are not currently exposed to tidal or muted-tidal influence and meet the following criteria: (1) the area is presently at or below the mean high water (MHW) line; (2) the area was historically at or below MHW in its "unobstructed, natural state"; and (3) there is no evidence that the area was ever above MHW.

If a project also proposes to discharge dredged or fill material and/or introduce other potential obstructions in navigable waters of the U.S., a Letter of Permission authorizing these impacts must be obtained from USACE under Section 10 of the RHA.

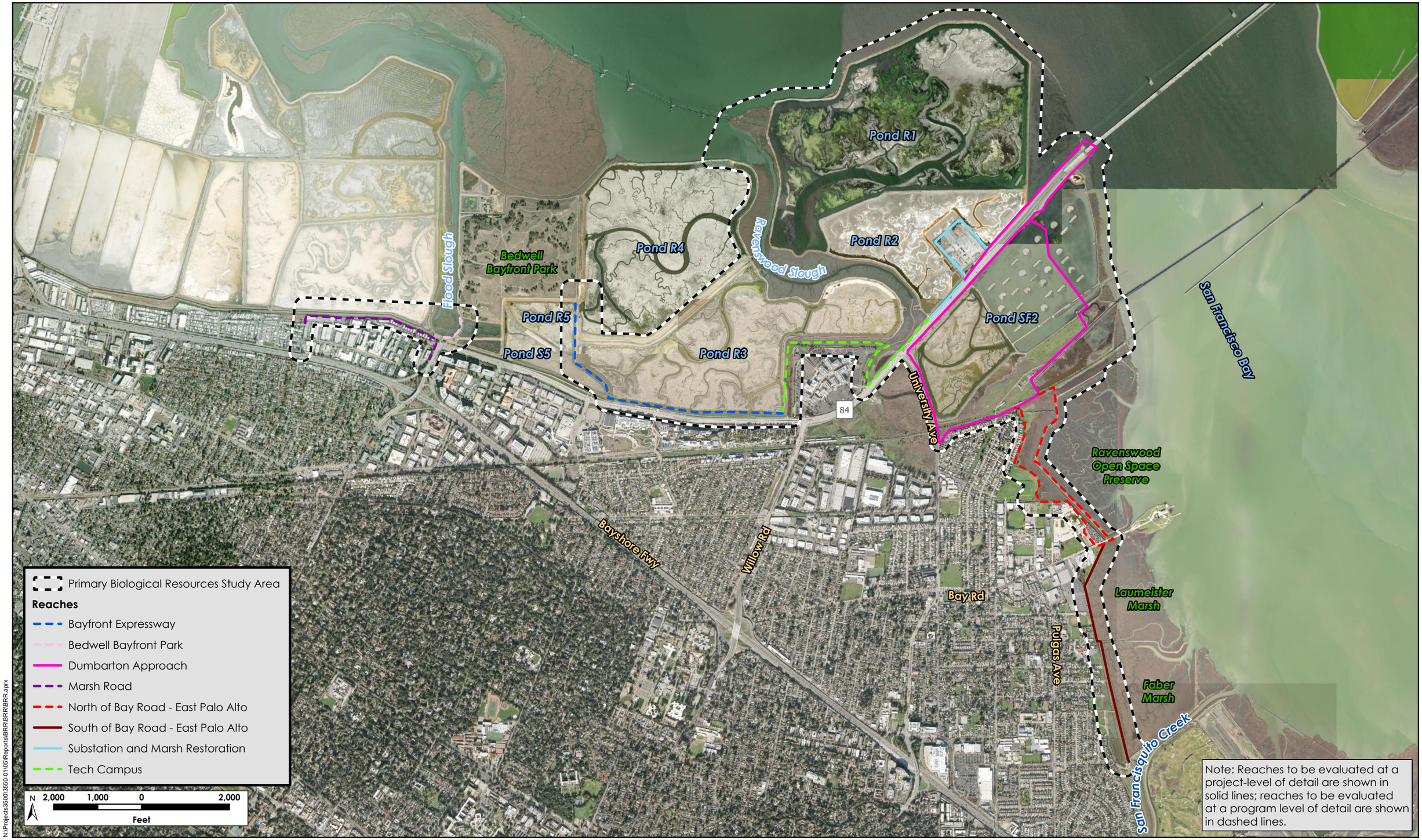
Project Applicability—The Biological Study Area overlaps with current Section 10 Waters, as portions of the work areas are located within the jurisdictional limit of tidal waters (below MHW). In addition, the Biological Study Area overlaps with historical Section 10 Waters, as portions of the Biological Study Area are located behind levees that are presently below MHW. Therefore, a Letter of Permission would be required for the Project.

3.1.3 Federal Endangered Species Act

The Federal Endangered Species Act (FESA) protects federally listed 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 of a listed wildlife species. An activity can be defined as take even if it is unintentional or accidental. Listed plant species are also legally protected from take under the FESA under certain circumstances, such as if they occur on federal lands or effects are in violation of state law.

The U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) have jurisdiction over federally listed, threatened, and endangered species under FESA. USFWS also maintains lists of proposed and candidate species; species on these lists are not legally protected under FESA, but may become listed in the near future and are often included in their review of a project.

Project Applicability—The federally endangered California Ridgway's rail and salt marsh harvest mouse are known to occur in the Biological Study Area in tidal marshes located immediately east of the Bay Trail in the South of Bay Road and North of Bay Road Reaches of the Project, and within Ravenswood Slough in the



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Figure 3. SAFER Project Reaches
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Substation and Marsh Restoration and Tech Campus Reaches (Figure 3) (CNDDB 2023). The federally western snowy plover is known to breed in salt ponds within the Biological Study Area, including at ponds R1 and R2 in the Substation and Marsh Restoration Reach, at pond SF2 within the Dumbarton Approach Reach, and ponds R3, R4, and R5/S5 within the Tech Campus and Bayfront Expressway Reaches (Figure 3) (CNDDB 2023, Pearl et al. 2023). Foraging snowy plovers are occasionally found on tidal mudflats on the outboard side of pond R1, R4, and SF2 (B. Pearl, pers. obs.). The federally endangered California least tern (*Sternula antillarum browni*) does not breed in the Biological Study Area, but it may occur in small numbers as a forager from April through August, in open waters that support fish. The federally threatened Central California coast steelhead (*Oncorhynchus mykiss*) Evolutionary Significant Unit (ESU) and green sturgeon (*Acipenser medirostris*) southern Distinct Population Segment (DPS), and the proposed endangered longfin smelt (*Spirinchus thaleichthys*) may occur in tidal sloughs and channels within the Biological Study Area (CNDDB 2023), though they are not expected to breed in the Biological Study Area. The candidate species monarch butterfly (*Danaus plexippus*) could breed in the Biological Study Area if milkweed (*Asclepias* spp.) is present, but it is more likely to occur as a migrant. The northwestern pond turtle (*Actinemys marmorata*), federally proposed as threatened, is not found in the Biological Study Area due to lack of suitable habitat.

3.1.4 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 (FMPs) to achieve the optimum yield from U.S. fisheries in their regions. These councils, with assistance from NMFS, establish Essential Fish Habitat (EFH) in FMPs for all managed species. Federal agencies that fund, permit, or implement activities that may adversely affect EFH are required to consult with the NMFS regarding potential adverse effects of their actions on EFH, and respond in writing to recommendations by the NMFS.

Project Applicability—San Francisco Bay is designated as EFH for the Pacific Coast Salmon, Coastal Pelagics, and Pacific Groundfish FMPs. All tidal aquatic habitats associated with the San Francisco Bay along the project alignment are considered EFH under these FMPs, and a number of fish species managed per these FMPs occur in tidal waters in the Biological Study Area.

3.1.5 Federal Migratory Bird Treaty Act

The federal Migratory Bird Treaty Act (MBTA), 16 U.S.C. Section 703, prohibits killing, possessing, or trading of migratory birds except in accordance with regulations prescribed by the Secretary of the Interior. The MBTA protects whole birds, parts of birds, and bird eggs and nests, and it prohibits the possession of all nests of protected bird species whether they are active or inactive. An active nest is defined as having eggs or young, as described by USFWS in its June 14, 2018 memorandum "Destruction and Relocation of Migratory Bird Nest Contents". Nest starts (nests that are under construction and do not yet contain eggs) and inactive nests are not protected from destruction.

Project Applicability—All native bird species that occur within the Biological Study Area are protected under the MBTA.

3.2 State Regulations

3.2.1 California Endangered Species Act

The California Endangered Species Act (CESA; California Fish and Game Code, Chapter 1.5, Sections 2050-2116) prohibits the take of any plant or animal listed or proposed for listing as rare (plants only), threatened, or endangered. In accordance with CESA, the California Department of Fish and Wildlife (CDFW) has jurisdiction over state-listed species (Fish and Game Code 2070). CDFW regulates activities that may result in take of individuals (i.e., "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill"). Habitat degradation or modification is not expressly included in the definition of take under the California Fish and Game Code. CDFW, however, has interpreted take to include the "killing of a member of a species which is the proximate result of habitat modification."

Project Applicability—The state endangered California Ridgway's rail and salt marsh harvest mouse, and the threatened California black rail (*Laterallus jamaicensis coturniculus*), are known or expected to occur in the Biological Study Area in the Faber-Laumeister Tract Marshes in the South of Bay Road, and North of Bay Road Reaches and within Ravenswood Slough in the Substation and Marsh Restoration and Tech Campus Reaches (Figure 3) (CNDDB 2023). The state candidate Crotch's bumble bee (*Bombus crotchii*) is known to occur near the Biological Study Area as close as 1.3 miles to the southeast in the Palo Alto Baylands (CNDDB 2023, iNaturalist 2023). It may occur as a breeder and forager in the Biological Study Area where ruderal upland and ruderal levee slope habitat is present (Figure 3). The state endangered California least tern and bald eagle (*Haliaeetus leucocephalus*) do not breed in the Biological Study Area, but may occur as foragers in all reaches that support fish populations. The state threatened tricolored blackbird (*Agelaius tricolor*) does not breed in the Biological Study Area, but it may occur as a forager in non-tidal brackish marsh, ruderal upland, or ruderal levee slope habitats. The burrowing owl (*Athene cunicularia*), a candidate for state listing, does not breeding in the Biological Study Area, but it ma occur as a winter migrant in managed ponds or ruderal upland. The state threatened longfin smelt is not expected to breed in the Biological Study Area, but may occur in tidal sloughs and channels within the Biological Study Area (CNDDB 2023).

3.2.2 California Environmental Quality Act

California Environmental Quality Act (CEQA; Public Resources Code Division 13, Section 21000 *et seq*) is a state law that requires state and local agencies to document and consider the environmental implications of their actions and to refrain from approving projects with significant environmental effects if there are feasible alternatives or mitigation measures that can substantially lessen or avoid those effects. CEQA requires the full disclosure of the environmental effects of agency actions, such as approval of a general plan update or the projects covered by that plan, on resources such as air quality, water quality, cultural resources, and biological resources. The CEQA Guidelines (California Code of Regulations Title 4, Division 6, Chapter 3) are regulations that guide the implementation of CEQA.

Section 15380(b) of the CEQA Guidelines provides that a species not listed on the federal or state lists of protected species may be considered rare if the species can be shown to meet certain specified criteria. These criteria have been modeled after the definitions in the FESA and the CESA and the section of the California Fish and Game Code dealing with rare or endangered plants and animals. This section was included in the guidelines primarily to deal with situations in which a public agency is reviewing a project that may have a significant effect on a species that has not yet been listed by either USFWS or CDFW or species that are locally or regionally rare.

CDFW has produced four lists (amphibians and reptiles, birds, fish, and mammals) of "species of special concern" that currently satisfy one or more of the following criteria:

- is extirpated from the State or, in the case of birds, is extirpated in its primary season or breeding role.
- is listed as federally, but not state, threatened or endangered, or meets the state definition of threatened or endangered but has not formally been listed.
- is experiencing, or formerly experienced, serious (noncyclical) population declines or range retractions (not reversed) that, if continued or resumed, could qualify it for state threatened or endangered status.
- has naturally small populations exhibiting high susceptibility to risk from any factor(s), that if realized, could lead to declines that would qualify it for state threatened or endangered status.

These species may receive special attention during environmental review as potential rare species, but do not have specific statutory protection. All potentially rare or sensitive species, or habitats capable of supporting rare species, are considered for environmental review per the CEQA Section 15380(b).

CNPS, a non-governmental conservation organization, has developed CRPRs for plant species of concern in California in the CNPS Inventory of Rare and Endangered Plants. The CRPRs include lichens, vascular, and non-vascular plants, and are defined as follows:

- CRPR 1A Plants considered extinct.
- CRPR 1B Plants rare, threatened, or endangered in California and elsewhere.
- CRPR 2A Plants considered extinct in California but more common elsewhere.
- CRPR 2B Plants rare, threatened, or endangered in California but more common elsewhere.
- CRPR 3 Plants about which more information is needed - review list.
- CRPR 4 Plants of limited distribution-watch list.

The CRPRs are further described by the following threat code extensions:

- .1—seriously endangered in California;
- .2—fairly endangered in California;
- .3—not very endangered in California.

Although CNPS is not a regulatory agency and plants on these lists have no formal regulatory protection, plants appearing as CRPR 1B or 2 are, in general, considered to meet CEQA's Section 15380 criteria, and adverse effects to these species may be considered significant. Impacts on plants that are listed by CNPS on CRPR 3 or 4 are also considered during CEQA review, although because these species are typically not as rare as those of CRPR 1B or 2, impacts on them are less frequently considered significant.

Compliance with CEQA Guidelines Section 15065(a) requires consideration of natural communities of special concern, in addition to plant and wildlife species. Vegetation types of "special concern" are tracked in Rarefind (CNDDB 2023). Further, CDFW ranks sensitive vegetation alliances based on their global (G) and state (S) rankings analogous to those provided in the CNDDB. Global rankings (G1–G5) of natural communities reflect the overall condition (rarity and endangerment) of a habitat throughout its range, whereas S rankings are a reflection of the condition of a habitat within California. If an alliance is marked as a G1–G3, all of the associations within it would also be of high priority. CDFW provides the Vegetation Classification and Mapping Program's currently accepted list of vegetation alliances and associations (CDFW 2023).

Project Applicability—All potential impacts on biological resources will be considered during CEQA review of the project.

3.2.3 California Fish and Game Code

Ephemeral, intermittent, and perennial streams, rivers, creeks, dry washes, sloughs, blue line streams on USGS maps, and watercourses with subsurface flows fall under CDFW jurisdiction. Canals, aqueducts, irrigation ditches, and other means of water conveyance may also be considered streams if they support aquatic life, riparian vegetation, or stream-dependent terrestrial wildlife. A *stream* is defined in Title 14, California Code of Regulations Section 1.72, as "a body of water that follows at least periodically or intermittently through a bed or channel having banks and that supports fish and other aquatic life. This includes watercourses having surface or subsurface flow that supports or has supported riparian vegetation." Using this definition, CDFW extends its jurisdiction to encompass riparian habitats that function as a part of a watercourse. California Fish and Game Code Section 2786 defines *riparian habitat* as "lands which contain habitat which grows close to and which depends upon soil moisture from a nearby freshwater source." The lateral extent of a stream and associated riparian habitat that would fall under the jurisdiction of CDFW can be measured in several ways, depending on the particular situation and the type of fish or wildlife at risk. At minimum, CDFW would claim jurisdiction over a stream's bed and bank. Where riparian habitat is present, the outer edge of riparian vegetation is generally used as the line of demarcation between riparian and upland habitats.

Pursuant to California Fish and Game Code Section 1603, CDFW regulates any project proposed by any person that will "substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any river, stream, or lake designated by the department, or use any material from the streambeds." California Fish and Game Code Section 1602 requires an entity to notify CDFW of any proposed activity that may modify a river, stream, or lake. If CDFW determines that proposed activities may substantially adversely affect fish and wildlife resources, a Lake and Streambed Alteration Agreement (LSAA) must be prepared. The LSAA sets reasonable conditions necessary to protect fish and wildlife and must comply with CEQA. The applicant may then proceed with the activity in accordance with the final LSAA.

Certain sections of the California Fish and Game Code describe regulations pertaining to protection of certain wildlife species. For example, Code Section 2000 prohibits take of any bird, mammal, fish, reptile, or amphibian except as provided by other sections of the code.

The California Fish and Game Code Sections 3503, 3513, and 3800 (and other sections and subsections) protect native birds, including their nests and eggs, from all forms of take. Disturbance that causes nest abandonment and/or loss of reproductive effort is considered a take by CDFW. Raptors (e.g., eagles, hawks, and owls) and their nests are specifically protected in California under Code Section 3503.5. Section 3503.5 states that it is "unlawful to take, possess, or destroy any birds in the order Falconiformes or Strigiformes (birds of prey) or to take, possess, or destroy the nest or eggs of any such bird except as otherwise provided by this code or any regulation adopted pursuant thereto."

Bats and other non-game mammals are protected by California Fish and Game Code Section 4150, which states that all non-game mammals or parts thereof may not be taken or possessed except as provided otherwise in the code or in accordance with regulations adopted by the commission. Activities resulting in mortality of non-game mammals (e.g., destruction of an occupied bat roost, resulting in the death of bats), or disturbance that causes the loss of a maternity colony of bats (resulting in the death of young), may be considered take by CDFW.

Project Applicability—San Francisquito Creek is located along the southern boundary of the Biological Study Area and would be regulated by CDFW. The Bayfront Canal and Flood Slough are hydraulically connected with Atherton Channel, and impacts on these waterbodies would likely be regulated by CDFW. Ravenswood Slough and the salt ponds located within the Biological Study Area do not receive hydrology from streams or creeks (e.g., Ravenswood Slough is hydrologically connected to lands across State Route 84 via a pump station), and therefore they should not be regulated by CDFW.

All native bird, mammal, and other wildlife species that occur within the Biological Study Area and in the immediate vicinity are protected by the California Fish and Game Code.

3.2.4 Porter-Cologne Water Quality Control Act

The State Water Resources Control Board (SWRCB) works in coordination with the nine regional water quality control boards (RWQCBs) to preserve, protect, enhance, and restore water quality. Each RWQCB makes decisions related to water quality for its region, and may approve, with or without conditions, or deny projects that could affect waters of the state. Their authority comes from the CWA and the Porter-Cologne Water Quality Control Act (Porter-Cologne). Porter-Cologne broadly defines waters of the state as "any surface water or groundwater, including saline waters, within the boundaries of the state." Because Porter-Cologne applies to any waters, whereas the CWA applies only to certain waters, California's jurisdictional reach overlaps and may exceed the boundaries of waters of the U.S. For example, Water Quality Order No. 2004-0004-DWQ states that "shallow" waters of the state include headwaters, wetlands, and riparian areas. Moreover, the San Francisco Bay Region RWQCB's Assistant Executive Director has stated that, in practice, the RWQCBs claim jurisdiction over riparian areas. Where riparian habitat is not present, as the case may be at headwaters, jurisdiction is taken to the top of bank.

On April 2, 2019, the SWRCB adopted the *State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State*. In these guidelines, riparian habitats are not specifically described as waters of the state but instead as important buffer habitats to streams that conform to the State Wetland Definition. The *Procedures* describe riparian habitat buffers as both important resources that may be included in required mitigation packages for permits for impacts to waters of the state, as well as areas requiring permit authorization from the RWQCBs.

Pursuant to the CWA, projects that are regulated by USACE must also obtain a Section 401 Water Quality Certification permit from the RWQCB. This certification ensures that the proposed project will uphold state water quality standards. Because California's jurisdiction to regulate its water resources is much broader than that of the federal government, proposed impacts on Waters of the State may require Waste Discharge Requirements even if the area occurs outside of USACE jurisdiction. Moreover, the RWQCB may impose mitigation requirements even if USACE does not, for example for riparian habitats which are buffers to Waters of the State. Under the Porter-Cologne, the SWRCB and the nine regional boards also have the responsibility of granting CWA National Pollutant Discharge Elimination System (NPDES) permits and Waste Discharge Requirements for certain point-source and non-point discharges to waters. These regulations limit impacts on aquatic and riparian habitats from a variety of urban sources.

Project Applicability—All wetlands and other waters described in Section 3.1.1 as being regulated by USACE under Section 404 of the CWA would also be considered waters of the state by the RWQCB. In addition, the RWQCB could potentially regulate some features that would not be considered waters of the U.S., such as wetlands that lack a continuous surface connection to navigable waters and the banks of San Francisquito Creek between OHW and the top of bank. Because the Project will adversely affect waters of the state, a Section 401 Water Quality Certification (and possibly Porter-Cologne Waste Discharge Requirements) would be necessary.

3.2.5 The McAteer-Petris Act

The McAteer-Petris Act, enacted on September 17, 1965, serves as a legal provision under California state law to preserve San Francisco Bay from indiscriminate filling. The act initially established the San Francisco Bay Conservation and Development Commission (BCDC) as a temporary state agency charged with preparing a plan for the long-term use of the San Francisco Bay. In August 1969, the McAteer-Petris Act was amended to make BCDC a permanent regulatory agency to incorporate the policies of the Bay Plan (BCDC 2012). BCDC jurisdiction includes a 100-foot wide band along the shoreline of the San Francisco Bay. The *shoreline* is defined as all areas that are subject to tidal action from the south end of the San Francisco Bay to the Golden Gate (Point Bonita–Point Lobos), and to the Sacramento River line (a line between Stake Point and Simmons Point, extended northeasterly to the mouth of Marwill Cut). BCDC will claim all sloughs (specifically, marshlands lying between mean high tide and up to 5 feet above Mean Sea Level (MSL) where marsh vegetation is present); tidelands (lands between mean high tide and mean low tide); and submerged lands (land lying below mean low tide) in this region. The McAteer-Petris Act also requires that "maximum feasible public access, consistent with a project be included as part of each project to be approved by the BCDC."

Project Applicability—Because tidal waters and marshlands occur in the Biological Study Area, the Bay Shoreline would be located at 5 feet (ft) above MSL, and this elevation line would be used to demarcate the limit of BCDC Bay jurisdiction. A 100-ft area extending laterally landward of this Bay Shoreline would be jurisdictional as Shoreline Band. Within the Biological Study Area, the Shoreline Band extends laterally landward either to its 100-ft extent or until it intersects another Bay Shoreline (e.g., tidal habitats occur to both the north and south of the access roads, in some cases within less than 100 ft). A MSL elevation of 3.48 ft NAVD88 was obtained from the nearest National Oceanic and Atmospheric Administration (NOAA) tidal benchmark station at Dumbarton Bridge (Station #9414509)[1], and thus the Bay Shoreline, shoreward limit of BCDC Bay jurisdiction, and bayward limit of BCDC Shoreline Band jurisdiction is approximately 8.48 ft NAVD88. Ponds R1, R2, R3, R4, R5, S5, and SF2 are former salt production ponds, and therefore these ponds and their levees would continue to have the Salt Pond jurisdictional designation under BCDC. The portion of the Ravenswood OSP within the Biological Study Area is a fully tidal, restored salt pond, and would therefore have both Bay and Salt Pond jurisdiction. Because the Project will include activities within BCDC jurisdiction, a BCDC permit would be necessary for the construction activities proposed as part of the Project.

3.2.6 California State Lands Commission

The California State Lands Commission was established in 1938 to manage California's waterways on behalf of the public. Under the common law Public Trust doctrine, they "manage sovereign or public trust lands consisting of tide and submerged lands and the beds of natural navigable rivers, streams, lakes, bays, estuaries, inlets, and straits" for the benefit, use, and enjoyment of the public. These lands are held in trust by the State

[1]Benchmark MSL data for the Dumbarton Bridge (NOAA 2012) are relative to the mean lower low water at the monitoring station (12 ft). The difference between mean lower low water and the NAVD88 datum were calculated using the guidance provided by Foxgrover et al. (2005). An orthometric height conversion was then performed to calculate the datum shift from the local datum to NAVD88 (NOAA n.d.). Finally, the MSL elevation was determined to be approximately 3.48 ft.

of California for the statewide public and for uses that further the purposes of the trust. They protect and enhance these lands by issuing leases for use, development, and environmental preservation.

Project Applicability—If project construction would affect lands subject to State Lands Commission permitting, project construction would require a lease agreement from the State Lands Commission. The need for a State Lands Commission lease agreement would be evaluated during the detailed design and regulatory permitting phase of the project.

3.2.7 SWRCB Stormwater Regulation

Construction Phase—Construction projects in California causing land disturbances that are equal to 1 ac or greater must comply with state requirements to control the discharge of stormwater pollutants under the NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (Construction General Permit; Water Board Order No. 2009-0009-DWQ, as amended and administratively extended). Prior to the start of construction/demolition, a Notice of Intent must be filed with the SWRCB describing the project. A Storm Water Pollution Prevention Plan must be developed and maintained during construction, and it must include the use of best management practices (BMPs) to protect water quality until the site is stabilized.

Standard permit conditions under the Construction General Permit requires that the applicant utilize various measures, including onsite sediment control BMPs, damp street sweeping, temporary cover of disturbed land surfaces to control erosion during construction, and utilization of stabilized construction entrances and/or wash racks, among other factors. Additionally, the Construction General Permit does not extend coverage to projects if stormwater discharge-related activities are likely to jeopardize the continued existence or result in take of any federally listed endangered or threatened species.

Post-Construction Phase—In many Bay Area counties, including San Mateo County, projects must also comply with the California RWQCB, San Francisco Bay Region, Municipal Regional Stormwater NPDES Permit (Water Board Order No. R2-2015-0049, as amended). This permit requires that all projects implement BMPs and incorporate Low Impact Development practices into the design that prevent stormwater runoff pollution, promote infiltration, and hold/slow down the volume of water coming from a site. In order to meet these permit and policy requirements, projects must incorporate the use of green roofs, permeable surfaces, tree planters, grassy swales, bioretention and/or detention basins, among other factors.

Project Applicability—The project will comply with the requirements of the NPDES Statewide Storm Water Permit and Statewide General Construction Permit.

3.3 Local Regulations

3.3.1 City of East Palo Alto Tree Protection Policies

Section 6420 of the City's Municipal Code states that it is unlawful for any person to destroy or remove or cause to be destroyed or removed, any protected tree upon any private or public property in the city without first having obtained a permit to do so. The removal of trees with a main stem or trunk that measures 40 inches in circumference (12.7 inches in diameter) 2 ft above the natural grade and the removal of all street trees planted in the public right-of-way requires the issuance of a Tree Removal permit from the City's Planning and Housing Division. The conditions of the permit require mitigation at a ratio of up to 3:1 for the removal of trees protected by this ordinance (referred to as "ordinance-size trees"). In addition, the removal of any tree that existed at the time of an approval granted under the City's subdivision or zoning ordinance and required to be preserved as part of such approval, as well as any tree required to be planted as a condition of any development approval granted by the City, requires a permit. However, tree trimming does not require authorization by the City. Furthermore, the following activities are exempt from the permitting process:

- If the condition of a tree presents an immediate hazard to life or property, it may be removed without a permit by order of the city manager, the city building inspector, or the city director of planning.
- Employees of the city may without a permit take such action with regard to trees on city-owned property as may be necessary to maintain safety.
- Public utilities subject to the jurisdiction of the state public utilities commission may without a permit take such action as may be necessary to comply with the safety regulations of the commission and may be necessary to maintain a safe operation of their facilities.
- Where removal of a tree has been authorized as part of any development approval granted by the City, no permit will be required for removal of such tree.

Project Applicability—The Project will comply with the City of East Palo Alto's Tree Protection Policies for the removal of any ordinance-size tree(s) or tree(s) required to be preserved as part of an approval under the City's subdivision or zoning ordinance and required to be preserved as part of such approval.

3.3.2 City of Menlo Park Tree Protection Policies

Section 13.24.040 of the City of Menlo Park Code states that it is unlawful for any person to remove, or cause to be removed, any heritage tree from any parcel of property in the city, or perform major pruning on a heritage tree, without obtaining a permit. The removal of trees other than oaks with a trunk that measures 47.1 inches in circumference (15 inches in diameter) or more 54 inches above the natural grade, oak trees (*Quercus*) native to California with trunks that measure 31.4 inches in circumference (10 inches in diameter) or more 54 inches above natural grade, or a tree or group of trees of historical significance, special character or community benefit, or specifically designated by resolution of the city council, are considered heritage trees and require the issuance

of a permit by the City's Public Works department. The conditions of the permit require mitigation at a 1:1 ratio based upon the appraised value of the removed heritage tree(s), or pay a heritage tree in-lieu fee.

Project Applicability—The Project will comply with the City of Menlo Park's Tree Protection Policies for removal of any heritage trees.

3.3.3 City of Palo Alto Tree Protection Policies

Chapter 8.04 of the City's Municipal Code states that it is unlawful for any person to plant, prune, trim, shape, remove, top, or in any way damage, destroy, injure or mutilate a public tree, shrub, hedge, or plant without a tree permit. The removal of protected trees requires a protected tree removal permit. Protected trees include bigleaf maple (*Acer macrophylum*), California incense cedar (*Calocedrus decurrens*), coast live oak (*Quercus agrifolia*), blue oak (*Quercus douglasii*), California black oak (*Quercus kelloggii*), or valley oak (*Quercus lobata*) which is 11.5 inches in diameter (36 inches in circumference) or more when measured 54 inches above natural grade; coast redwood (*Sequioa sempervirens*) that is 18 inches in diameter (57 inches in circumference) or more when measured 54 inches above natural grade; any tree designated for protection during review and approval of a development project; any tree designated for carbon sequestration and storage and/or environmental mitigation purposes as identified in an agreement between the property owner and a responsible government agency or recorded as a deed restriction; any heritage tree designated by the city council in accordance with the provisions of this chapter; any replacement mitigation tree or other tree designated to be planted due to the conditions listed in Section 8.10.055. If a tree is removed because it is dead, hazardous, or constitutes a nuisance, mitigation for the removed tree, replacement tree ratio, in lieu fees, or a combination thereof shall be determined by the urban forester, based on factors including bot not limited to the species, size, location, and specific reason for removal of the protected tree, in accordance with the standards and specifications in the *Tree and Landscape Technical Manual*. If a tree is removed for any other reason, it shall be replaced in accordance with the standards and specifications in the *Tree and Landscape Technical Manual*, including but not limited to prioritization of locally native species, satisfaction of right tree in the right place principles, and incorporation of a secondary goal of net tree canopy increase on the property within fifteen years. The urban forester shall approve the number, species, size, and location of replacement trees.

Project Applicability—The Project will comply with the City of Palo Alto's Tree and Landscape Preservation and Management Policies.

3.3.4 City of Redwood City Tree Protection Policies

Sections 35.2 of the City of Redwood City Code states that the Commission may declare any tree, regardless of size, to be a heritage tree under this Chapter if said tree is healthy and has adapted well to the climatic conditions of the area, if said tree is visually accessible from a public righ-of-way and if the Commission finds that at least one of the following conditions exist: That said tree has historical significance, is indigenous to the area, or said tree is one of a group of tree and that each is depended on the other tree for survival. Section 35.3 stats that it is unlawful for any person to cut, move, or remove or cause to be cut, moved or removed any tree, unless such

person first obtains a permit from the Parks and Recreation Director to do so in a manner prescribed by him for such removal.

Project Applicability—The Project will comply with the City of Redwood City's Tree Protection Policies for removal or pruning of any trees.

3.3.5 County of San Mateo Tree Protection Policies

Section 11,051 states that it is unlawful for any person to cut down, destroy, move, trim or prune a tree so that it effectively removes any heritage tree growing on any public or private property within the unincorporated area of San Mateo County without first obtaining a permit from the San Mateo County Planning Department. Heritage tree shall include the following: any tree or grove of tree so designated after board inspection, advertised public hearing and resolution by the Board of Supervisors, or any of a list of seventeen tree species with varying minimum circumferences by species at 54 inches above ground level. Section 12,020 of the County of San Mateo Code states that a permit shall be required under this Part for the cutting down, pruning that effectively removes a tree, poisoning or otherwise killing or destroying or causing to be removed any significant tree or community of trees, whether indigenous or exotic, on any private property. A significant tree shall mean any live woody plant rising above the ground with a single stem or trunk of a circumference of 38 inches or more measured at 54 inches vertically above the ground or immediately below the lowest branch, whichever is lower, and having the inherent capacity of naturally producing one main axis continuing to grow more vigorously than the lateral axes. A community of trees shall mean a group of trees of any size which are ecologically or aesthetically related to each other such that loss of several of them would cause a significant ecological, aesthetic, or environmental impact in the immediate area. Sections 11,051.1 and 12,020.4 state that applicants seeking Planning or Building permits (including Grading or Demolition permits) shall submit an Existing Tree Plan separate from, but consistent with the required site plan, to assess tree impacts associated with proposed demolition or development, and establish tree protection measures for demolition or development when activity would occur within the dripline of a significant tree or a heritage tree.

Under Section 12,020.1, no permit shall be required under this Part for tree cutting which has been authorized by the Planning Commission, Design Review Committee, or Community Development Director as part of a permit approval process in which the provisions of this Part have been considered and applied.

Project Applicability—The Project will comply with the County of San Mateo's Tree Protection Policies for removal or pruning of any trees.

Section 4. Environmental Setting

4.1 General Study Area Description

The 7-mile-long Biological Study Area is located in the Cities of East Palo Alto, Menlo Park, and Redwood City in San Mateo County, California and occurs within the *Palo Alto* and *Mountain View*, *California* USGS 7.5-minute quadrangles (Figure 2). Starting at the northwest corner of the project in the Marsh Road Reach and moving southeast along the project, neighboring land uses to the Biological Study Area in the Bayward direction include active salt production ponds, Flood Slough, Bedwell Bayfront Park, ponds and marshes within the Refuge, Ravenswood Slough, Mosely Tract, San Francisco Bay, a former duck hunting club, Ravenswood Open Space Preserve (OSP), two marshes within the Palo Alto Baylands, and San Francisquito Creek. The Refuge, managed by USFWS, is a 30,000-ac reserve that spans the southern portion of the San Francisco Bay including marshlands and managed ponds in San Mateo, Santa Clara, and Alameda Counties. The Ravenswood OSP, managed by the Midpeninsula Regional Open Space District (Midpen), is a 376-ac preserve comprised of two noncontiguous areas located south of the Dumbarton Bridge and adjacent to San Francisco Bay. The Palo Alto Baylands is a large tract of undisturbed marshland consisting of approximately 1,940 ac in both Palo Alto and East Palo Alto. The Biological Study Area includes portions of the Refuge, Ravenswood OSP, and the Palo Alto Baylands. In the landward direction, adjacent land uses include residential housing and industrial development in Redwood City, Marsh Road, Bayfront Expressway, residential housing and industrial development in Menlo Park, a large tech campus, PG&E's Ravenswood Substation, University Avenue, and residential housing and industrial development in East Palo Alto.

These public lands include portions of the San Francisco Bay Trail and various tidal wetland and aquatic habitats. Historical aerial photographs indicate that by 1930 some tidal marshlands had been diked for salt production, while much of the land surrounding the wetlands had been converted to agriculture (UCSB 2023). By 1948, most of the marsh within the Biological Study Area had been diked and converted to salt production ponds (Google LLC 2023), while much of the agricultural lands had been developed for housing and industrial use, as they remain today (UCSB 2023).

The Biological Study Area runs along the interface between urban/suburban development and the wetlands and former salt production ponds at the edge of San Francisco Bay, with former salt production ponds created from diked marsh found on the outboard side of most of the proposed flood protection. There is little natural topographic variation, with elevations ranging from approximately 0 to 15 ft North American Vertical Datum of 1988 (NAVD88). The Biological Study Area includes the following 16 land features as shown on Figures 2-3: (1) Flood Slough (at the west end of the Biological Study Area); (2) Pond S5 (east of Flood Slough); (3) Pond R5 (north of Pond S5); (4) Bedwell Bayfront Park (north of Pond R5); (5) Pond R3 (east of Pond S5); (6) Pond R4 (north of Pond R3); (7) Ravenswood Slough (northeast of Ponds R3 and R4); (8) Pond R2 (north of Ravenswood Slough); (9) Pond R1 (north of Pond R2); (10) Highway 84 (near the western entrance of the Dumbarton Bridge west to Flood Slough); (11) Pond SF2 (south of Highway 84); (12) San Francisco Bay (north

of Pond R1 and east of Pond SF2; (13) Ravenswood OSP (south of Pond SF2); (14) Laumeister Marsh (south of Ravenswood OSP); (15) Faber Marsh (south of Laumeister Marsh); and (16) San Francisquito Creek (south of Faber Marsh).

Climate conditions in the Biological Study Area include a 30-year average of approximately 17 inches of annual precipitation, and an average temperature range of 50ºF to 67ºF (PRISM Climate Group 2023). Relative to the 30-year climate normals, the Biological Study Area experienced wetter than normal conditions during the 2022/2023 wet season prior to the May 2023 survey. From October 2022 through April 2023, the region received 27.65 inches of precipitation, which is approximately 178% of the 30-year average for this time period (16.06 inches; 1991–2020) (PRISM Climate Group 2023).

NRCS (2023) maps eight soil units in the Biological Study Area: (1) Botella-Urban land complex, 0 to 5 percent slopes (2) Novato clay, 0 to 1 percent slopes (3) Novato clay, 0 to 1 percent slopes, ponded (4) Aquic Xerorthents, bay mud substratum, 0 to 2 percent slopes; (5) Pits and Dumps; (6) Urban land-Orthents, cut and fill complex, 0 to 5 percent slopes; (7) Urban land-Orthents, reclaimed complex, 0 to 2 percent slopes; and (8) Novato clay, 0 to 1 percent slopes, tidally flooded. Novato clay comprises approximately 81% of the Biological Study Area in the wetlands and developed land near Ravenswood OSP and the Refuge. This soil type is tidally flooded or ponded, very poorly drained, strongly saline, and consists entirely of clay (Soil Conservation Service [SCS] 1991). Urban land, Urban land-Orthents, and Pits and Dumps comprise approximately 9% of the Biological Study Area in the developed and ruderal grasslands in the central portion. Urban land and Orthents soils are defined as well drained mixed alluvium that are nonsaline and consist mostly of urban land soil composition (SCS 1991). Botella-Urban land complex soils are defined as well drained mixed alluvium that are nonsaline to very slightly saline and consists entirely of clay loam (SCS 1991). Botella-Urban land complex comprises approximately 1% of the Biological Study Area and includes all portions located in the channel adjacent to Faber Marsh.

4.2 Land Cover/Habitat Types

Land cover/habitat types in the Biological Study Area were designated based on CDFW's List of California Terrestrial Natural Communities (Holland 1986). Reconnaissance-level surveys identified 17 land cover/habitat types in the Biological Study Area: tidal northern coastal salt marsh, non-tidal/muted tidal northern coastal salt marsh, managed pond, intertidal mudflat, saline seasonal wetland, non-tidal saline pond, tidal open water, muted tidal open water, tidal brackish marsh, non-tidal brackish marsh, detention basin/canal, landscaped/developed, ruderal levee slope, ruderal upland, culvert/riprap, ornamental woodland (riparian), and ornamental woodland (upland) (Figures 4a-i). These habitat types are described in detail below.

Table 1 provides a preliminary determination of the approximate acreage of each habitat type within the Biological Study Area boundaries. As planning and design progress, refinements may be made to these estimates, which will be reflected in the environmental impact report for the Project.

Table 1. Land Cover/Habitat Types within the Biological Study Area

Land Cover/Habitat Type	Preliminary Estimated Area (Acres)[1]
Tidal Northern Coastal Salt Marsh	241.0
Non-Tidal/Muted Tidal Northern Coastal Salt Marsh	35.1
Managed Pond	1148.3
Intertidal Mudflat	85.4
Saline Seasonal Wetlands	16.2
Non-Tidal Saline Pond	8.0
Tidal Open Water	39.1
Muted Tidal Open Water	18.4
Tidal Brackish Marsh	2.3
Non-Tidal Brackish Marsh	0.5
Detention Basin/Canal	4.3
Landscaped/Developed	240.8
Ruderal Levee Slope	57.5
Ruderal Upland	111.4
Culvert/Riprap	4.3
Ornamental Woodland (Riparian)	0.8
Ornamental Woodland (Upland)	3.1
Total	**2016.3**

[1]Note: Refinements to the Project as planning and design progress may lead to refinements in the study area for biological resources and changes to acreage estimates. Changes to these estimates (if warranted) will be reflected in the environmental impact report.

4.2.1 Tidal Northern Coastal Salt Marsh

Since the mid-1800s, the San Francisco Bay estuary has lost approximately 85% of its historical tidal marshes due to a combination of diking for salt production and farming and fill for development and disposal of waste materials (Goals Project 1999). In the South Bay, the majority of tidal marsh lost was northern coastal salt marsh, a highly productive environment that contains dense stands of salt tolerant vegetation providing ample foraging and breeding habitat for numerous wildlife species. Northern coastal salt marsh habitat supports a variety of wildlife species and provides critical filtration of sediments and toxins from the water. Decaying salt marsh vegetation provides a source of nourishment for bacteria and invertebrates, and remaining detritus provides fertilizer for regeneration of marsh vegetation.

Despite wide-scale loss within the region, tidal northern coastal salt marsh is the second most extensive habitat type within the Biological Study Area at approximately 240.9 ac (Figures 4a-i, Table 1) and is found throughout all reaches of the Biological Study Area except Marsh Road (Figures 3, Photo 1). Large tracts of tidal northern coastal salt marsh are found at the Faber-Laumeister Tract in the South of Bay Road Reach; Ravenswood OSP in the North of Bay Road Reach; Ravenswood Slough in the Substation and Marsh Restoration Reach; and the

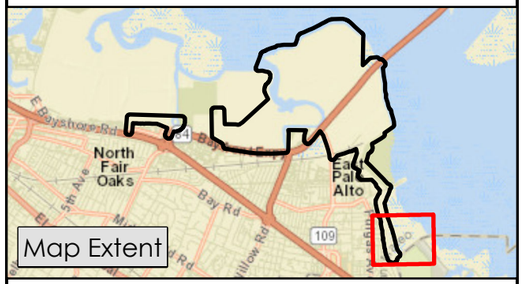


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Figure 4a. Habitat Map

SAFER Bay Biological Resources Report (3550-05)
April 2024



Primary Biological Resources Study Area (2,016.25 ac)

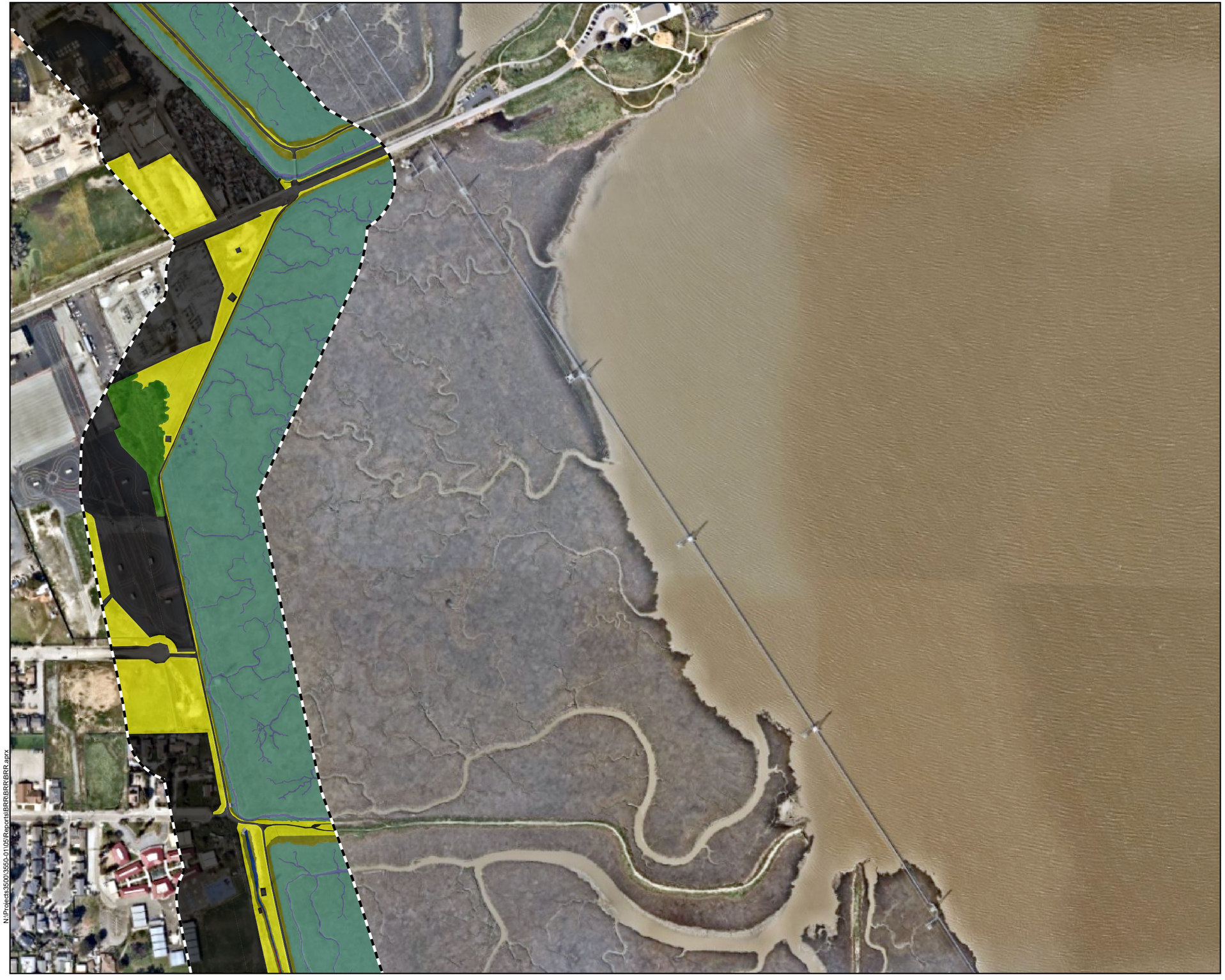
Habitat

- Culvert/Riprap (4.27 ac)
- Detention Basin/Canal (4.34 ac)
- Intertidal Mudflat (112.29 ac)
- Landscaped/Developed (240.77 ac)
- Non-Tidal Brackish Marsh (0.46 ac)
- Non-Tidal/Muted Tidal Northern Coastal Salt Marsh (35.05 ac)
- Ornamental Woodland (Riparian) (0.79 ac)
- Ornamental Woodland (Upland) (3.12 ac)
- Ruderal Levee Slope (57.52 ac)
- Ruderal Upland (111.43 ac)
- Saline Seasonal Wetland (16.15 ac)
- Tidal Northern Coastal Salt Marsh (240.92 ac)
- Tidal Open Water (39.08 ac)

N

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Feet



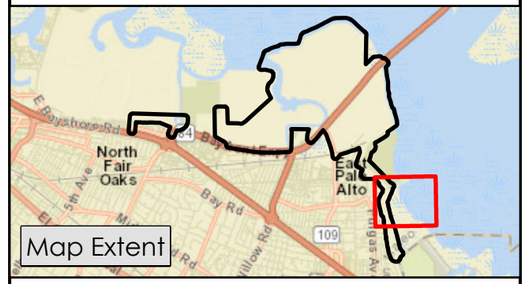
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Figure 4b. Habitat Map

SAFER Bay Biological Resources Report (3550-05)
April 2024



Primary Biological Resources Study Area (2,016.25 ac)

Habitat

- Culvert/Riprap (4.27 ac)
- Detention Basin/Canal (4.34 ac)
- Landscaped/Developed (240.77 ac)
- Ornamental Woodland (Upland) (3.12 ac)
- Ruderal Levee Slope (57.52 ac)
- Ruderal Upland (111.43 ac)
- Tidal Northern Coastal Salt Marsh (240.92 ac)
- Tidal Open Water (39.08 ac)

N

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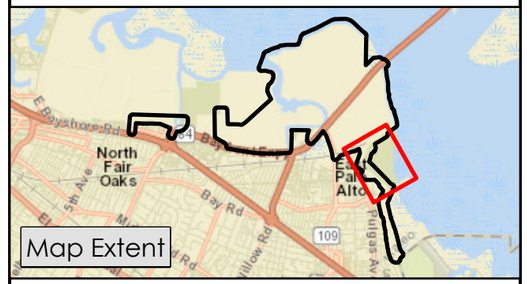
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Figure 4c. Habitat Map

SAFER Bay Biological Resources Report (3550-05)
April 2024



Primary Biological Resources Study Area (2,016.25 ac)

Habitat

- Detention Basin/Canal (4.34 ac)
- Landscaped/Developed (240.77 ac)
- Ruderal Levee Slope (57.52 ac)
- Ruderal Upland (111.43 ac)
- Saline Seasonal Wetland (16.15 ac)
- Tidal Northern Coastal Salt Marsh (240.92 ac)
- Tidal Open Water (39.08 ac)

N

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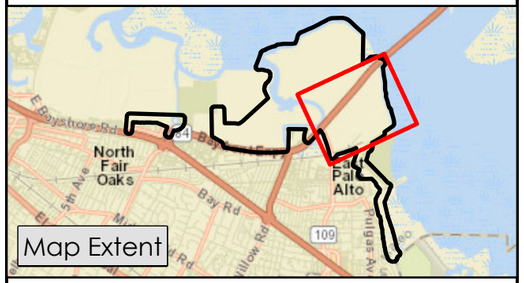
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Figure 4d. Habitat Map

SAFER Bay Biological Resources Report (3550-05)
April 2024



Primary Biological Resources Study Area (2,016.25 ac)

Habitat

- Culvert/Riprap (4.27 ac)
- Intertidal Mudflat (112.29 ac)
- Landscaped/Developed (240.77 ac)
- Managed Pond (1,121.33 ac)
- Muted Tidal Open Water (18.39 ac)
- Non-Tidal Saline Pond (7.98 ac)
- Non-Tidal/Muted Tidal Northern Coastal Salt Marsh (35.05 ac)
- Ruderal Levee Slope (57.52 ac)
- Ruderal Upland (111.43 ac)
- Saline Seasonal Wetland (16.15 ac)
- Tidal Northern Coastal Salt Marsh (240.92 ac)
- Tidal Open Water (39.08 ac)

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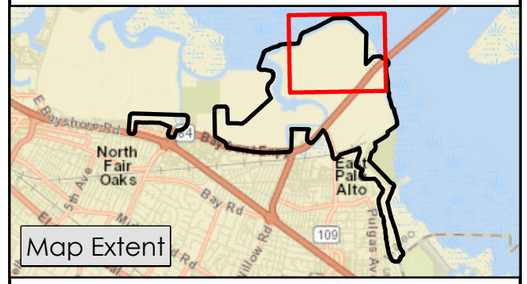


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Figure 4e. Habitat Map

SAFER Bay Biological Resources Report (3550-05)
April 2024



- Primary Biological Resources Study Area (2,016.25 ac)

Habitat

- Culvert/Riprap (4.27 ac)
- Intertidal Mudflat (112.29 ac)
- Landscaped/Developed (240.77 ac)
- Managed Pond (1,121.33 ac)
- Non-Tidal/Muted Tidal Northern Coastal Salt Marsh (35.05 ac)
- Ruderal Levee Slope (57.52 ac)
- Ruderal Upland (111.43 ac)
- Tidal Northern Coastal Salt Marsh (240.92 ac)
- Tidal Open Water (39.08 ac)

N

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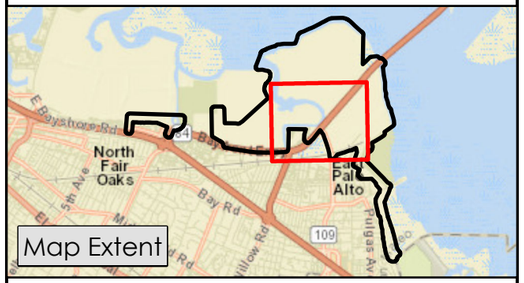
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H. T. HARVEY & ASSOCIATES
Ecological Consultants

Figure 4f. Habitat Map

SAFER Bay Biological Resources Report (3550-05)
April 2024



- Primary Biological Resources Study Area (2,016.25 ac)

Habitat

- Culvert/Riprap (4.27 ac)
- Detention Basin/Canal (4.34 ac)
- Landscaped/Developed (240.77 ac)
- Managed Pond (1,121.33 ac)
- Muted Tidal Open Water (18.39 ac)
- Non-Tidal Saline Pond (7.98 ac)
- Non-Tidal/Muted Tidal Northern Coastal Salt Marsh (35.05 ac)
- Ornamental Woodland (Riparian) (0.79 ac)
- Ornamental Woodland (Upland) (3.12 ac)
- Ruderal Levee Slope (57.52 ac)
- Ruderal Upland (111.43 ac)
- Saline Seasonal Wetland (16.15 ac)
- Tidal Brackish Marsh (2.35 ac)
- Tidal Northern Coastal Salt Marsh (240.92 ac)
- Tidal Open Water (39.08 ac)

N

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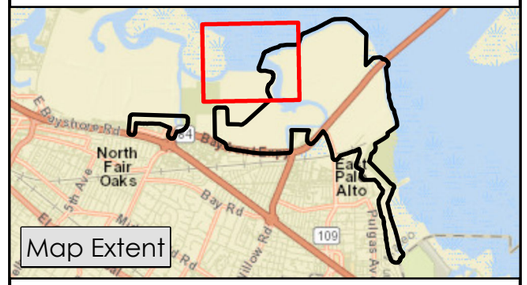
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Ecological Consultants

Figure 4g. Habitat Map

SAFER Bay Biological Resources Report (3550-05)
April 2024



- Primary Biological Resources Study Area (2,016.25 ac)

Habitat

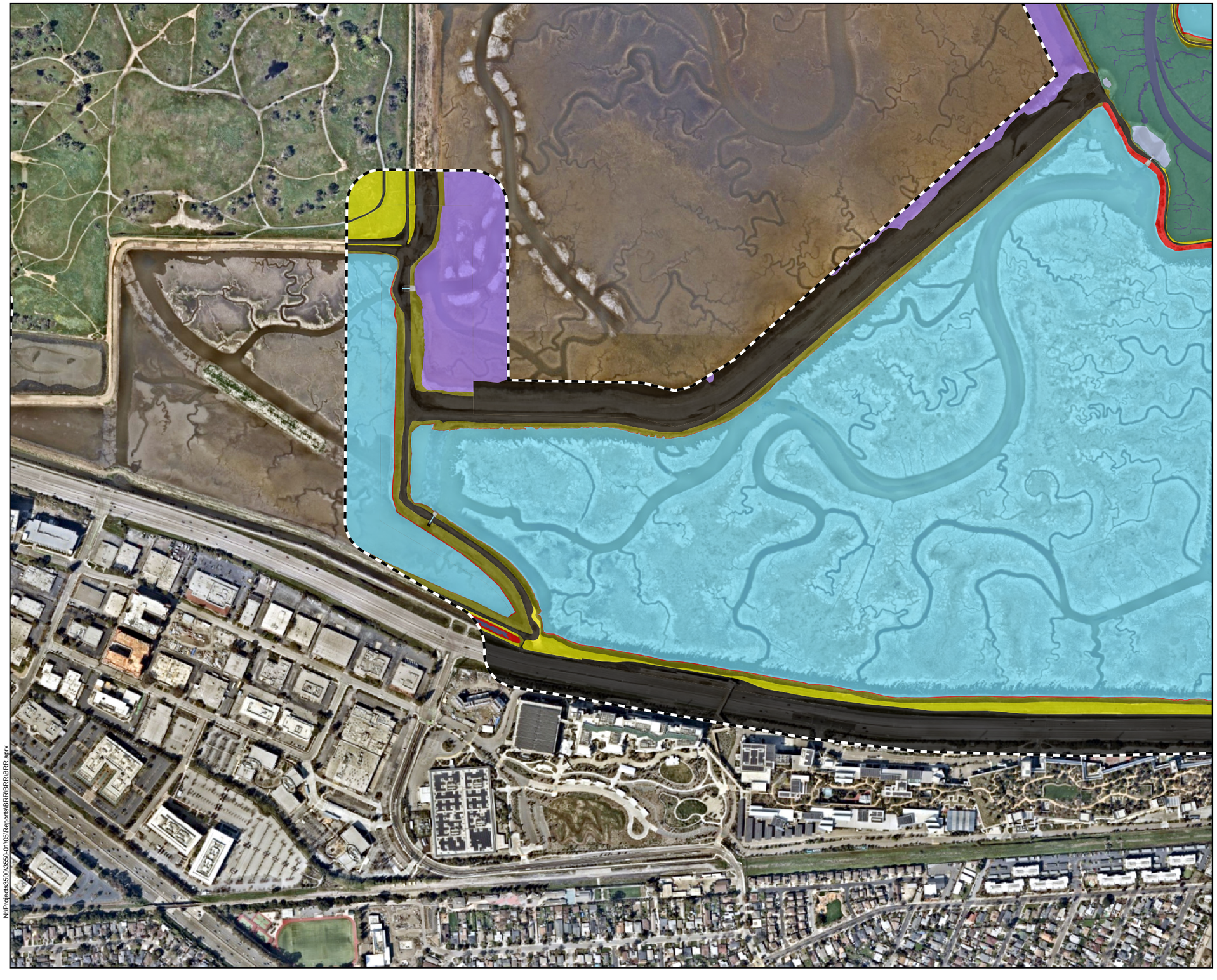
- Culvert/Riprap (4.27 ac)
- Intertidal Mudflat (112.29 ac)
- Landscaped/Developed (240.77 ac)
- Managed Pond (1,121.33 ac)
- Non-Tidal/Muted Tidal Northern Coastal Salt Marsh (35.05 ac)
- Ruderal Levee Slope (57.52 ac)
- Ruderal Upland (111.43 ac)
- Tidal Northern Coastal Salt Marsh (240.92 ac)
- Tidal Open Water (39.08 ac)

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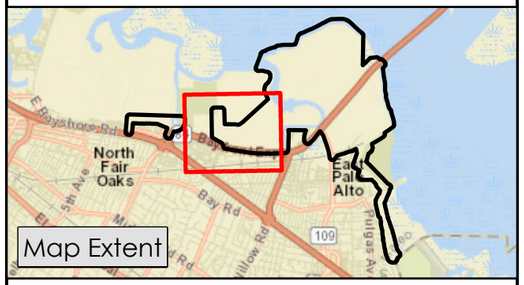
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H. T. HARVEY & ASSOCIATES
Ecological Consultants

Figure 4h. Habitat Map

SAFER Bay Biological Resources Report (3550-05)
April 2024



Primary Biological Resources Study Area (2,016.25 ac)

Habitat

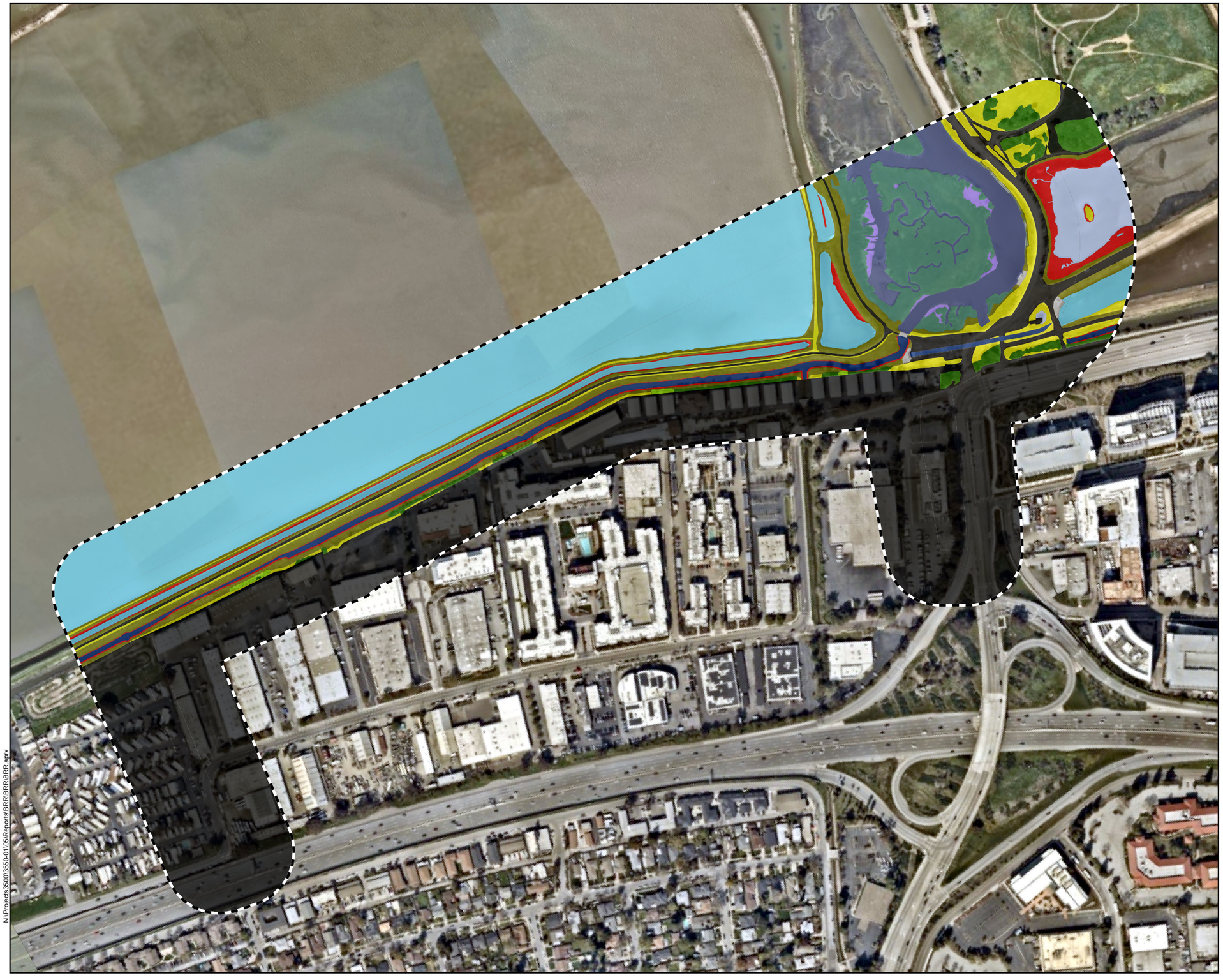
- Culvert/Riprap (4.27 ac)
- Intertidal Mudflat (112.29 ac)
- Landscaped/Developed (240.77 ac)
- Managed Pond (1,121.33 ac)
- Muted Tidal Open Water (18.39 ac)
- Non-Tidal/Muted Tidal Northern Coastal Salt Marsh (35.05 ac)
- Ruderal Levee Slope (57.52 ac)
- Ruderal Upland (111.43 ac)
- Tidal Northern Coastal Salt Marsh (240.92 ac)
- Tidal Open Water (39.08 ac)

N

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Feet

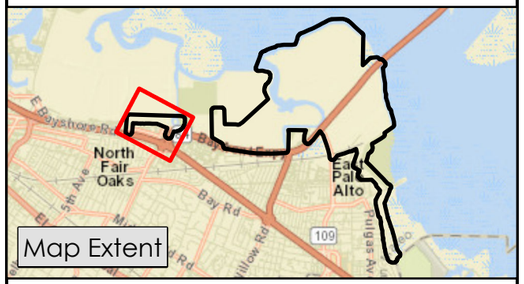
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H. T. HARVEY & ASSOCIATES
Ecological Consultants

Figure 4i. Habitat Map

SAFER Bay Biological Resources Report (3550-05)
April 2024



Primary Biological Resources Study Area (2,016.25 ac)

Habitat

- Culvert/Riprap (4.27 ac)
- Detention Basin/Canal (4.34 ac)
- Intertidal Mudflat (112.29 ac)
- Landscaped/Developed (240.77 ac)
- Managed Pond (1,121.33 ac)
- Muted Tidal Open Water (18.39 ac)
- Non-Tidal/Muted Tidal Northern Coastal Salt Marsh (35.05 ac)
- Ornamental Woodland (Riparian) (0.79 ac)
- Ornamental Woodland (Upland) (3.12 ac)
- Ruderal Levee Slope (57.52 ac)
- Ruderal Upland (111.43 ac)
- Tidal Northern Coastal Salt Marsh (240.92 ac)
- Tidal Open Water (39.08 ac)

N

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Feet

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Photo 1. Tidal Northern Coastal Salt Marsh Habitat within Laumeister Marsh. Note the dense pickleweed interspersed with marsh gumplant found on marsh mounds along tidal channels.

Mosely Tract in the Dumbarton Approach Reach. Smaller areas of this habitat are found at Ravenswood Slough in the Tech Campus Reach and in Flood Slough within the Bedwell Bayfront Park Reach.

Vegetation—Tidal northern coastal salt marsh is a wetland habitat in the Biological Study Area that occurs adjacent to San Francisco Bay and that is fully open to tidal action, without berms, levees, or water control structures that restrict tidal fluctuations. Areas where this biotic habitat type is more prominent include Ravenswood OSP and Faber-Laumeister Marsh. Northern coastal salt marsh habitat is typically dominated by a small number of hydrophytic and herbaceous plant species forming a dense cover. Dominant species in this habitat include forbs such as pickleweed (*Salicornia pacifica*), saltgrass (*Distichlis spicata*), alkali heath (*Frankenia salina*), and cordgrass, including native California cordgrass (*Spartina foliosa*), invasive smooth cordgrass (*Spartina alterniflora*), and hybrids between the two species. Other marsh species include marsh gumplant (*Grindelia stricta* var. *angustifolia*), sickle grass (*Parapholis incurva*), marsh jaumea (*Jaumea carnosa*), barilla plant (*Salsola soda*), dodder (*Cuscuta* sp.) and rabbitsfoot grass (*Polypogon monspeliensis*). The topography in this habitat is low-lying and flat with scattered depressions that may contain ponding water or bare ground with silty clay substrate. Both ponding water and tidal channels are present, with their water levels being affected by the San Francisco Bay tides. These tidal channels on average are 2 ft wide and 6 inches deep. The ponds in these salt marshes on average do not exceed more than 6 inches deep and 200 ft wide. Some areas of the northern coastal salt marsh are disturbed by anthropogenic sources with pedestrian pathways, levees, and trash.

Wildlife—Many of the wildlife species found within tidal northern coastal salt marsh are endemic to San Francisco Bay estuary tidal marshes, including the Alameda song sparrow (*Melospiza melodia pusillula*), San Francisco common yellowthroat (*Geothlypis trichas sinuosa*), salt marsh harvest mouse, and salt marsh wandering shrew (*Sorex vagrans halicoetes*). California Ridgway's rails were formerly found from Humboldt Bay to Morro Bay; however, they experienced severe range contraction in the past 150 years due to predation and habitat loss and are now only found within the San Francisco Bay estuary (Schwarzbach et al. 2003).

Laumeister Marsh, a mature marsh that has never been diked, and Faber Marsh, which was formerly used for salt production but restored to tidal action in 1972, are considered high-quality marshes (Garrity 2003). These marshes have well established dense channel networks, which have been shown to be the landscape features that most positively influence California Ridgway's rail density (Liu et al. 2012). They also contain abundant in-marsh refugia provided by marsh gumplant and saltmarsh baccharis (*Baccharis glutinosa*), which provide cover for the California Ridgway's rail, California black rail, salt marsh harvest mouse, and salt marsh wandering shrew

during particularly high tides when most of the marsh is inundated. As a result, these two marshes support some of the most substantial populations of California Ridgway's rail within the South Bay (Foin et al. 1997). Cordgrass, marsh gumplant, and pickleweed also provide nesting substrates for Alameda song sparrow, California Ridgway's rail, California black rail, and San Francisco common yellowthroat, while marsh gumplant and pickleweed also provide food for salt marsh harvest mouse.

The other large tracts of tidal northern coastal salt marsh found in the Biological Study Area may support some of these species but are of lower quality for various reasons. Ravenswood Slough is located between ponds R1 and R2 to the north and east and ponds R3 and R4 to the south and west. The portion of Ravenswood Slough north of State Route 84 has never been diked from tidal action, and thus it contains mature marsh with ample in-marsh high tide refugia. As a result, Ravenswood Slough supports a moderate-sized population of California Ridgway's Rail (Olofson Environmental [OEI] 2023), good numbers of Alameda song sparrow, and some San Francisco common yellowthroats, and it also likely supports California black rail, salt marsh harvest mouse, and salt marsh wandering shrew. However, Ravenswood Slough is considered a moderate-quality marsh overall due to having a high perimeter-area ratio, which facilitates access to the marsh by mammalian predators from the pond levees surrounding the slough.

Ravenswood OSP was occupied by tidal marsh until the 1950s when it was diked and used for salt production pond until 1981 (MROSD 2023). Tidal action was reintroduced to the pond in 2000, beginning the process of restoration to tidal northern coastal salt marsh to this site (Garrity 2003). Ravenswood Marsh was cut off from tidal action for over 40 years, and as a result the land subsided by approximately 2.3 ft due to the consolidation of subsurface soils and lack of sediment supply from the bay (Google LLC 2023). Consequentially, although this marsh supports moderate numbers of California Ridgway's rails (OEI 2023, referred to as Cooley Landing), Alameda song sparrows, and San Francisco common yellowthroats, and likely salt marsh harvest mice and salt marsh wandering shrews, it lacks significant in-marsh high tide refugia that is critical to providing high-quality habitat for sensitive marsh species.

The Mosely Tract, located between Ravenswood Pond R1, the Dumbarton Bridge, and the San Francisco Bay, is another former tidal northern coastal salt marsh that was diked, in this case for a private duck hunting club. This area was considered for restoration (San Jose Environmental Services Department 2000), but eventually its outboard levee was allowed to breach, which restored tidal action to the site by 2007. As with Ravenswood Marsh, this parcel subsided while diked, and although cordgrass and pickleweed have colonized portions of the marsh plain, the vegetation is not yet as dense as would be found in a mature marsh. As a result, the Mosely Tract contains fragmented tidal northern coastal salt marsh and does not contain much in-marsh high tide refugia, resulting in low habitat quality. This site likely supports only small numbers of Alameda song sparrows and San Francisco common yellowthroats.

Lastly, there is a small parcel of northern coastal salt marsh located on the northwest corner of the Biological Study Area within Flood Slough adjacent to Cargill's managed ponds and Bedwell Bayfront Park. Aside from fragmentation by conversion of surrounding marsh, this marsh does not appear to have been diked or otherwise

altered, and as a result it contains complex channel networks and a large amount of in-marsh high tide refugia. It is connected to a narrow strip of tidal marsh that parallels Greco Island, a large mature marsh managed by the Refuge that supports high numbers of California Ridgway's rails (OEI 2023) and salt marsh harvest mice. This provides a source population and habitat corridor to disperse to the marsh with in the Biological Study Area, and as a result, it supports small numbers of California Ridgway's rails (OEI 2023) and possibly salt marsh harvest mice as well. Due to the high perimeter-area ratio and easy access for mammalian predators to hunt in the marsh from developed areas to the west, this marsh is considered low-quality habitat.

4.2.2 Non-Tidal/Muted Tidal Northern Coastal Salt Marsh

Non-tidal/muted tidal northern coastal salt marsh occupies approximately 35.1 ac of the Biological Study Area (Figures 4a-i, Table 1) and is found in all reaches except North of Bay Road (Figure 3, Photo 2). The largest patch of this habitat is found in the Dumbarton Approach Reach in SFPUC lands north of the Ravenswood OSP; a moderate amount of this habitat is found surrounding muted tidal open water in the Bedwell Bayfront Park and Tech Campus Reaches; and narrow strips are found along a detention basin/canal in the South of Bay Road Reach, between Bayfront Expressway and pond R2 in the Substation and Marsh Restoration Reach; along the edges of ponds R3, R5, and S5, along a detention basin in the Bayfront Expressway Reach, and on the sides of the Bayfront Canal and a narrow managed pond in the Marsh Road Reach. This habitat type also occurs on several small islands in pond SF2 in the Dumbarton Approach Reach (Figures 4a-i).

Vegetation—Non-tidal/muted tidal northern coastal salt marsh is a wetland habitat dominated by some of the same plant species that occur in tidal northern coastal salt marsh, but that is not subject to full tidal action and therefore does not support some of the plant species, such as cordgrass, that dominate fully tidal salt marsh. Dominant species in this non-tidal marsh habitat include forbs such as pickleweed, sickle grass, curly dock (*Rumex cripsus*), brass buttons (*Cotula coronopifolia*), alkali heath, and rabbitsfoot grass. Perennial pepperweed (*Lepidium latifolium*) is present in some areas. In most areas, non-tidal/muted tidal northern coastal marsh is topographically flat. Hydrology in this habitat is influenced by non-tidal hydrology of adjacent aquatic/open water habitats, such as detention basin/channel, muted tidal open water, or managed pond.

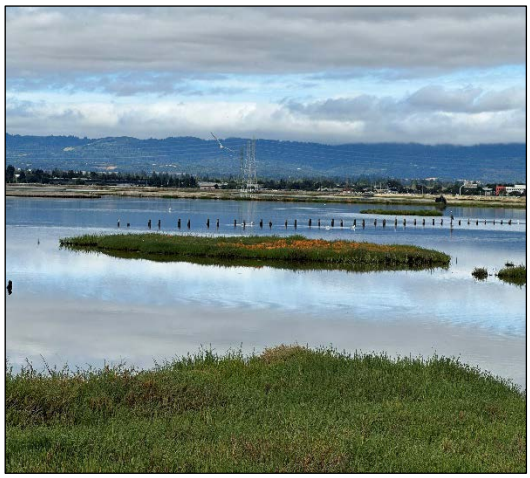


Photo 2. Non-Tidal/Muted Tidal Northern Coastal Salt Marsh Habitat within Pond SF2. Note the Forster's tern breeding colony found on the marsh island.

Wildlife—The non-tidal/muted tidal northern coastal salt marsh present within the Biological Study Area provides habitat for a limited variety of marsh adapted wildlife species. This habitat is of lower quality to San Francisco Bay tidal marsh animals due to the small size of the habitat patches and easy access to many such patches for mammalian predators. The largest areas of this habitat are found in pond SF2, where islands of non-tidal/muted tidal northern coastal salt marsh support a large colony of nesting Forster's terns (Cornell Lab

of Ornithology 2023), and the parcel within SFPUC lands to the north of Ravenswood OSP, which is large enough to potentially support the salt marsh harvest mouse and salt marsh wandering shrew. These areas, as well as the smaller portions of non-tidal/muted tidal northern coastal salt marsh, likely also support nesting Bryant's savannah sparrows (*Passerculus sandwichensis alaudinus*) and San Francisco common yellowthroats, and possibly Alameda song sparrows. Mammals expected to forage in these areas include the gray fox (*Urocyon cinereoargenteus*), raccoon (*Procyon lotor*), red fox (*Vulpes vulpes*), and striped skunk (*Mephitis mephitis*) (Pearl et al. 2023).

4.2.3 Managed Pond



Photo 3. Dry Managed Pond Habitat within former managed Pond R4.

Managed pond habitat is the most extensive habitat type within the Biological Study Area at approximately 1148.3 ac (Figures 4a-i, Table 1). Except for the North of Bay Road and South of Bay Road Reaches, managed ponds are found in all Biological Study Area reaches, including Refuge managed Ravenswood ponds R1, R2, R3, R5, S5, and SF2 (Figures 3, Photo 3). These shallow, artificial ponds are separated from tidal waters of the San Francisco Bay by levees. They were designed to extract salts from bay waters through natural evaporation during the 20th century, most recently by Cargill Inc. The Ravenswood Ponds are now managed by USFWS to support wildlife, with water levels within these ponds managed via various water control structures to allow for seasonal inundation and drying of the ponds. These ponds are part of the SBSPRP, and in recent years, some of these ponds have undergone substantial changes in both configuration and management. Ponds R3, R4, R5, and S5 were recently under construction as part of Phase II actions of the SBSPRP, with work completed in December 2023. R3 is now managed to support breeding western snowy plovers, R4 was formerly a managed pond but is now open to full tidal action, and R5 and S5, which are now connected to each other with the removal of portions of the levee separating them, is managed as a muted tidal pond (SBSPRP 2016).

Managed ponds are also found at Cargill's Redwood City Plant Site, where salt production continued until 2006. Water levels are no longer manipulated in these ponds for salt production purposes, but instead fluctuate seasonally with precipitation.

Vegetation—Depending upon the pond and time of year, managed ponds may include open water of varying depth; seasonally dry, flat, sparsely vegetated salt pannes; or a combination of these two habitats. Open water within high salinity managed ponds are generally free of vegetation, while lower salinity ponds may contain filamentous algae during warmer months. Where present, vegetation in salt pannes include pickleweed, alkali heath, and slenderleaf iceplant (*Mesembryanthemum nodiflorum*).

Wildlife—The Ravenswood Ponds within the Biological Study Area are managed to provide seasonally ponded habitat during the wet season and salt panne habitat during the dry season, conditions suitable for breeding, roosting, and foraging by the western snowy plover. Salt pond surveys conducted by USGS identified SF2 as among the South Bay ponds supporting the highest abundance of shorebird species, primarily due to large numbers of western sandpipers (*Calidris mauri*) and dunlin (*Calidris alpina*) using the pond during high tides (Moskal 2013).

During the wet season, managed ponds provide seasonal shallow-water habitat ideal for foraging by shorebirds and waterfowl, habitat that is particularly important during high tides when intertidal mudflats, the favored foraging habitat of many shorebirds, is flooded. These ponds support invertebrate species such as brine shrimp (*Artemia franciscana*) and brine flies (*Ephydra millbrae*) that serve as prey for waterfowl and shorebirds. Bird species that forage in Managed Ponds include shorebirds such as the American avocet (*Recurvirostra americana*), black-bellied plover (*Pluvialis squatarola*), black-necked stilt (*Himantopus mexicanus*), Canada goose (*Branta canadensis*), dunlin, greater yellowlegs (*Tringa melanoleuca*), least sandpiper (*Calidris minutilla*), marbled godwit (*Limosa fedoa*), western sandpiper, and willet (*Tringa semipalmata*); waterfowl such as the American wigeon (*Mareca americana*), bufflehead (*Bucephala albeola*), common goldeneye (*Bucephala clangula*), green-winged teal (*Anas carolinensis*), northern pintail (*Anas acuta*), northern shoveler (*Spatula clypeata*), and ruddy duck (*Oxyura jamaicensis*); and gulls such as California gull (*Larus californicus*), ring-billed gull (*Larus delawarensis*), and western gull (*Larus occidentalis*) (Moskal 2013).

During the dry season, salt pannes in the Ravenswood Ponds can provide breeding, roosting and foraging habitat for over 25% of the San Francisco Bay western snowy plover breeding population (Pearl et al. 2023). Nesting islands in ponds R1 and SF2 support several breeding seabird colonies, including up to approximately 350 Caspian terns (*Hydroprogne caspia*), 350 Forster's terns (*Sterna forsteri*), 310 elegant terns (*Thalasseus elegans*), and 65 black skimmers (*Rynchops niger*) (Cornell Lab of Ornithology 2023). The Ravenswood Ponds also support moderate numbers of breeding and foraging American avocets, black-necked stilts, California gulls, Canada geese, horned larks (*Eremophila alpestris*), killdeer (*Charadrius vociferus*), mallards (*Anas platyrhynchos*), and Bryant's savannah sparrows (Cornell Lab of Ornithology 2023). Passerines, including the barn swallow (*Hirundo rustica*), black phoebe (*Sayornis nigricans*), and cliff swallow (*Petrochelidon pyrrhonota*), often forage over the ponds for insects, while large numbers of red-necked phalaropes (*Phalaropus lobatus*) forage in ponds R1 and R2 during both spring and fall migration. Transmission power towers located in the ponds provide potential nesting sites for common ravens (*Corvus corax*), osprey (*Pandio haliaetus*), and red-tailed hawks (*Buteo jamaicensis*), and when stick nests of these species are already present, American peregrine falcons (*Falco peregrinus anatum*) may utilize them as well (Pearl et al. 2023). American crows (*Corvus brachyrhynchos*), American kestrels (*Falco sparverius*), common ravens, northern harriers (*Circus hudsonius*), peregrine falcons, red-tailed hawks, and white-tailed kite (*Elanus leucurus*) are commonly sighted avian predators in the ponds (Pearl et al. 2023). Mammals including black-tailed jackrabbit (*Lepus californicus*), gray fox, raccoon, red fox, and striped skunk also frequently forage in the ponds.

Common fish species expected to occur in Ravenswood Ponds R1, R2, and SF2 include the topsmelt (*Atherinops affinis*), threespine stickleback (*Gasterosteus aculeatus*), longjaw mudsucker (*Gillichthys mirabilis*), rainwater killifish (*Lucania parva*), yellowfin goby (*Acanthogobius flavimanus*), and staghorn sculpin (*Leptocottus armatus*) (Carpelan 1957, Lonzarich and Smith 1997). Water control structures in these ponds allow other fish species inhabiting the San Francisco Bay, such as bat ray (*Myliobatis californica*), to occasionally enter these ponds at times when water is entering. However, Ponds R1 and R2 do not provide high-quality habitat for the majority of these fish species due to poor water mixing and high water temperatures, and fish are not expected to linger or make significant use of these ponds. Ponds R3, R5, and S5 have recently constructed direct connections to the bay via water control/conveyance structures and likely support similar fish species as found in R1, R2, and SF2.

Although the Redwood City Plant site is not managed to support wildlife, nevertheless it can support a large amount of migratory and resident wildlife. Thousands of migratory shorebirds, including dunlin, western sandpipers, and least sandpipers, use these ponds as a high tide roost when foraging habitat on intertidal mudflats is unavailable (Cornell Lab of Ornithology 2023). In addition, western snowy plovers have been documented roosting and foraging on these ponds throughout much of the year (Cornell Lab of Ornithology 2023), and may nest in these areas when dry pond bottom is exposed during the breeding season.

4.2.4 Intertidal Mudflat

Intertidal mudflat occupies 85.4 ac of the Biological Study Area (Figures 4a-i, Table 1) and is found in the Substation and Marsh Restoration and Dumbarton Approach on the outboard side of ponds R1 and SF2, Ravenswood Slough, and the Mosely Tract, in the Bayfront Expressway Reach in tidal pond R4, and in the Marsh Road Reach in Flood Slough. (Figures 3).

Vegetation—Intertidal mudflats occur in tidally influenced systems such as northern coastal salt marshes in the Biological Study Area. Intertidal mudflats have no dominant vegetation because they occupy topographic positions that are too low for survival of marsh plants. At low tide, the bare mud is exposed, while at high tide, it is inundated by water. The substrate in mudflats is made up of saturated silty clay. All the mudflats present in the Biological Study Area are connected to the San Francisco Bay and are influenced directly by its tidal influence.

Wildlife—Intertidal mudflats within the Biological Study Area provide high-quality foraging habitat for both migratory and resident shorebirds and waterfowl. When exposed by low tides, intertidal mudflats are the preferred foraging habitat for most shorebird species found in the San Francisco Bay, providing an abundance of various invertebrate prey, and in some cases algae, at or below the surface of the mud. Mudflats provide opportunities for species that forage using a variety of methods, including pecking at the surface, surface tension transport or bill sweeping in shallow water, probing into mud, or biofilm grazing (Mathot et al. 2019). As a result, mudflats support a wide range of shorebirds, with commonly observed species including American avocet, black-bellied plover, black-necked stilt, dunlin, greater yellowlegs, least sandpiper, long-billed curlew (*Numenius americanus*), long-billed dowitcher (*Limnodromus scolopaceus*), marbled godwit, red knot (*Calidris canutus*), semipalmated plover (*Charadrius semipalmatus*), short-billed dowitcher (*Limnodromus griseus*) western sandpiper,

and willet, as well as other waterbirds such as California gull, ring-billed gull, snowy egret, and a variety of ducks (Cornell Lab of Ornithology 2023).

4.2.5 Saline Seasonal Wetland

Saline seasonal wetlands occur within multiple locations in SFPUC lands in the Dumbarton Approach Reach, including in the west, central, and northeastern areas (Figure 3), comprising a total of approximately 16.2 ac (Figures 4a-i, Table 1). This habitat is situated in areas that were historically tidal salt marsh but have since been diked and are no longer tidally influenced. These areas retain high salinity due to their former habitat type, which in turn influences the vegetation and wildlife found within these areas.

Vegetation—The dominant native plant species in saline seasonal wetlands include alkaline forbs such as Pacific pickleweed, saltgrass, beardless wild rye (*Elymus triticoides*), and alkali heath. Other plant species that occur include curly dock (*Rumex crispus*), seaside barley (*Hordeum murinum*), and brass buttons. Due to the historical influence of diking, these saline seasonal wetlands occur in low-lying marginal depressional areas interspersed in ruderal upland grasslands. The substrate in these seasonal wetlands is silty clay and has surface soil cracks and salt crust visible due to ephemeral hydrology. Hydrology in these seasonal wetlands is ephemeral with the water coming from precipitation. Because their hydrological influences are only from rainwater, these saline seasonal wetlands are not tidally influenced. Ponded water was not observed during the May 2023 site visits.

Wildlife—Saline seasonal wetlands can provide habitat for special-status and common wildlife species that rely specifically on the particular features that they provide. During the dry season, the habitat provided by these features is similar to high salt marsh owing to the dominance of dense halophytes in most areas. The dense vegetation provides ample habitat for nesting Bryant's savannah sparrow, while less densely vegetated areas may support nesting horned lark. Larger areas of this habitat, such as the central areas of SFPUC lands, could possibly support breeding salt marsh harvest mice, particularly years with heavier precipitation when adjacent non-tidal saline ponds retain water throughout the dry season. When these wetlands are inundated during the wet season, shorebirds such as greater yellowlegs and willet may forage in these wetlands for invertebrates, while during the dry season great blue herons (*Ardea herodias*) and great egrets (*Ardea alba*) may forage in these areas for California voles (*Microtus californicus*), house mice (*Mus musculus*), and deer mice (*Peromyscus maniculatus*). Mammals such as coyote, gray fox, red fox, and stiped skunk commonly forage in these areas.

4.2.6 Non-Tidal Saline Pond

Non-tidal saline ponds comprise a total of approximately 8.0 ac (Figures 4a-i, Table 1) and are found in several locations in the Dumbarton Approach Reach within SFPUC Lands, including in the southwest, northern, and northeastern areas (Figures 3).

Vegetation—Non-tidal saline ponds are characterized as areas with ponding or areas that seasonally ponded due to their ephemeral hydrology, which is predominantly driven by precipitation. During the site visit, we

observed this habitat as open water in the southwest and some of the northeastern and northern portions of the SFPUC lands; conversely, we observed this habitat as salt panne/bare ground in some of the northern SFPUC lands. No vegetation was observed within the exposed areas of this habitat, likely due to the high soil salinity. This habitat differs from the saline seasonal wetlands only due to its lack of vegetation. These non-tidal saline ponds are bordered by saline seasonal wetland and steep levee slopes with ruderal habitat.

Wildlife—When inundated, non-tidal saline ponds in the Biological Study Area provide shallow-water habitat suitable for foraging by shorebirds and waterfowl during the wet and dry season, like the managed ponds described above. However, due to the limited extent of these areas, relatively few shorebirds use this habitat for foraging compared to more expansive habitats in managed ponds. When dry, American avocet, black-necked stilt, and killdeer may breed in these areas. Mammal species expected to occur in these areas are the same as those found in managed ponds.

The non-tidal saline pond habitats in the Biological Study Area do not support populations of fish species due to a combination of high salinities and lack of a direct connection to the bay that results in seasonal drying of the ponds.

4.2.7 Tidal Open Water

Tidal open water habitat is found throughout the Biological Study Area in all reaches except the Marsh Road and Bayfront Expressway Reaches (Figure 3, Photo 4), collectively totaling approximately 39.1 ac (Figures 4a-i, Table 1). This habitat includes both large areas of open water as well as sloughs and narrow channels within tidal northern coastal salt marsh.



Photo 4. Tidal Open Water Habitat Immediately North of Bay Road. Note the tidal northern coastal salt marsh habitat surrounding the tidal open water channel in the Ravenswood OSP.

Vegetation—Tidal open water is one of the aquatic biotic habitats in the Biological Study Area, consisting of open bay, sloughs, and channels that are often adjacent to tidal marsh habitats. San Francisco Bay averages 12-15 ft in depth within the deepest portions included in the Biological Study Area. Areas considered to be tidal open water are subject to tidal influence and are entirely below the elevations of intertidal mudflats, so they are inundated constantly.

Wildlife—Dominant fish species in fully tidal open water include the northern anchovy (*Engraulis mordax*), shiner perch (*Cymatogaster aggregata*), white croaker (*Genyonemus lineatus*), staghorn sculpin, bay goby (*Lepidogobius lepidus*), plainfin midshipman (*Porichthys notatus*), English sole (*Parophrys vetulus*), cheekspot goby (*Ilypnus gilberti*), and Pacific herring (*Clupea pallasi*). Many of the fish recorded in the South Bay, including the bat ray, leopard shark (*Triakis semifasciata*), northern anchovy, gobies, and others, occur in tidal channels within marshes and/or sloughs at high tide when they are inundated. Thus, these tidal channels are productive foraging habitats for estuarine fish in this system (Harvey 1988).

Tidal channels in the Biological Study Area range in size and depth. The wider, deeper channels located in the Ravenswood OSP, Faber Marsh, and Laumeister Marsh are expected to provide foraging habitat for South Bay fish species. In contrast, the smaller tidal channels located in these areas are too narrow and shallow to support most open-water fish species. However, during high tides and king tide events, fish may enter and potentially forage within the upper portions of these smaller channels.

Bird species that forage along open water areas of tidal channels in the Biological Study Area include great blue herons, great egrets, and snowy egrets, as well as many of the shorebird and waterfowl species that make use of salt pond habitats nearby. However, these species often prefer to forage on nearby mudflats and salt ponds and generally occur along tidal channels in much lower densities.

4.2.8 Muted Tidal Open Water

The muted tidal open water habitat present within the Biological Study Area is a product of anthropogenic change to historical tidal marsh, with levees and water control structures used to restrict the flow of water into these areas. Although these areas are still subject to the rise and fall of the tides, the range of tidal fluctuation is lower than in fully tidal areas. Muted tidal open water habitat is found at three locations within the Biological Study Area, including in the Bedwell Bayfront Park Reach within a man-made pond, in the Tech Campus Reach in three small man-made ponds, and in the Dumbarton Approach Reach in a parcel located between Ravenswood OSP and SFPUC lands (Figure 3). These areas total approximately 18.4 ac (Figures 4a-i, Table 1).

The pond near Bedwell Bayfront Park was converted from tidal marsh to a pond by 1930 with the creation of a landfill to the north (UCSB 2023), and by 1980 a culvert had been installed on Flood Slough to provide muted tidal action. This pond is relatively small and is inundated daily by tides throughout the year.

The two small man-made ponds in the Tech Campus Reach are located between pond R3 and Ravenswood Slough. Both ponds were built as non-tidal ponds in support of salt production between 1965 and 1980 (UCSB 2023), with both eventually becoming occasionally tidally influenced by high tides. In late 2022 the SBSPRP constructed a pilot channel to connect the more southern pond more fully to Ravenswood Slough, which will allow the newly installed water control structure between R3 and the pond to function as intended (B. Pearl, pers. obs.).

The muted tidal open water habitat present between Ravenswood OSP and SFPUC lands was converted from tidal salt marsh between 1941 and 1963 (UCSB 2023) and was once part of a private duck hunting club (San Francisco Estuary Institute 2018). The eastern end of this habitat contains a small culvert on the San Francisco Bay that allows muted tidal action, with areas closest to this culvert most frequently inundated, while areas further west may require stronger tides to receive muted tidal influence.

Vegetation—Minimal vegetation is present in this habitat due to inhospitable soils comprised of Baylands mud and high salt concentrations. The vegetation that sparsely inhabits the perimeter of these habitats consists of pickleweed and barilla plant. The topography in these habitats is flat and low lying with surface soil cracking and salt crust visible. At the time of the site visit there was no ponding present at the parcel located between Ravenswood OSP and SFPUC lands. Historically this area was under a tidal regime; however due to the presence of levees and berms it is currently only influenced by the highest tides and seasonal freshwater ponding. The muted tidal open water present south of Bedwell Bayfront Park experiences regular ponding from tides via a culvert on Flood Slough.

Wildlife—The pond near Bedwell Bayfront Park provides both aquatic and mudflat habitat depending upon tides, and thus provides roosting and foraging habitat for a wide variety of avian species. Commonly sighted species include American avocet, American wigeon, black-necked stilt, Canada goose, canvasback, green-winged teal, least sandpiper, long-billed curlew, mallard, northern shoveler, western sandpiper, and willet (Cornell Lab of Ornithology 2023).

The three ponds between R3 and Ravenswood Slough are very small, and as a result these areas support only a small amount of foraging habitat for American avocet and black-necked stilt broods, double crested cormorants, and great blue herons. With recent construction to create stronger tidal influence in the pond adjacent to the newly installed water control structure connecting R3 to Ravenswood Slough, it may support a small number of larval, juvenile, and adult fish species such as shiner perch, topsmelt, and staghorn sculpin.

The habitat present between Ravenswood Open Space Preserve and SFPUC lands is much more extensive than the other muted tidal open water habitat, and is also less strongly tidally influenced. As a result, this area supports similar species to those found in the pond near Bedwell Bayfront Park but may seasonally support more shorebirds when water levels are lower in portions of the habitat.

4.2.9 Tidal Brackish Marsh

Tidal brackish marsh was once present along major creek mouths in the South Bay, including San Francisquito Creek within the vicinity of the Biological Study Area, but realignment and alteration of flows in creeks have greatly altered the location and extent of this habitat type (San Francisco Estuary Institute 2013). Tidal brackish marsh is limited in extent within the Biological Study Area at approximately 2.3 ac (Figures 4a-i, Table 1). This habitat is present in the Biological Study Area only in one section of Ravenswood Slough within the Tech Campus Reach (Figure 3).

Vegetation—The dominant plant species in the tidal brackish marsh include alkali bulrush (*Bolboschoenus maritimus*), cattails (*Typha sp.*) and pickleweed. Most of the tidal brackish marsh is low lying with silty clay substrate. Near the border of the marsh, there is a gradual slope upwards where the biotic habitat changes to a ruderal levee slope. Due to the marsh being situated in a stormwater management channel, there is concrete lining the bottom of the channel and the silty-clay substrate. The hydrology of the tidal brackish marsh is perennial and influenced by both the stormwater management system and the San Francisco Bay tidal system. The water continuously flows in the channel and has a high turbidity, making the waters gray and opaque during our site visit.

Wildlife—The tidal brackish marsh within the Biological Study Area provides foraging and nesting habitat for avian species including marsh wren (*Cistothorus palustris*), red-winged blackbird (*Agelaius phoeniceus*), San Francisco common yellowthroat, and sora (*Porzana carolina*). Larval, juvenile, and some adult fish species are expected to make use of this area, including species such as arrow goby (*Clevelandia ios*), staghorn sculpin, three-spined stickleback (*Gasterosteus aculeatus*), and yellowfin goby (*Acanthogobius flavimanus*) (Goals Project 1999). This area may also support the salt marsh harvest mouse, as it is dominated by alkali bulrush and pickleweed, both of which are considered primary habitats for salt marsh harvest mice, and is connected to a large extent of tidal northern coastal salt marsh from which salt marsh harvest mice could disperse.

4.2.10 Non-Tidal Brackish Marsh

Non-tidal brackish marsh is the most limited wetland habitat present within the Biological Study Area at 0.5 ac (Figures 4a-i, Table 1) and is found in the South of Bay Road Reach in portions of the O'Connor detention basin adjacent to Faber Marsh (Figure 3).

Vegetation—The dominant vegetation in non-tidal brackish marsh habitat consists of cattails (*Typha* sp.) and alkali bulrush. The cattails in this non-tidal brackish marsh are mature and tall, reaching over 6 ft in height. The hydrology and topography of this marsh is influenced by the detention basin and a stormwater management culvert adjacent to the marsh. The topography is low lying and flat with silty clay substrate. On the western side of the marsh, there is a gradual slope uphill where the ornamental woodland begins to border the marsh. Water, less than 1ft deep, perennially ponds at the border of the marsh and the detention basin. The perennial ponding in the marsh has low turbidity allowing the saturated silty clay substrate to be visible. The brackish marsh is considered non-tidal because it is directly influenced by stormwater management it facilitates from a nearby culvert that drains into the detention basin.

Wildlife—The non-tidal brackish marsh present within portions of the O'Connor detention basin provides foraging habitat for avian species including marsh wren, red-winged blackbird, San Francisco common yellowthroat, and sora (Cornell Lab of Ornithology 2023). All but the sora may also nest within this habitat, although the small size of the habitat limits its quality and the number of pairs that could nest in the area. Due to the shallow water depth found in this habitat for much of the year, limited water circulation, and poor water quality associated with these conditions, it is not expected that this marsh would support any populations of fish species.

4.2.11 Detention Basin/Canal

Detention basin/canal habitat is found in the Runnymede canal and O'Connor detention basin in the South of Bay Road Reach between the Bay Trail and City of East Palo Alto development (Figure 3). The Runnymede storm drain drains approximately 40% of the City of East Palo Alto into the canal through a box culvert outfall and opens to the O'Connor detention basin, where it is eventually flows through the O'Connor Pump Station outfall into San Francisquito Creek. Detention basin/canal habitat is also found in the Bayfront Canal located in the Marsh Road Reach between industrial development and Cargill's managed ponds (Figure 3). The Bayfront Canal and Atherton Channel, which converge with the canal at the east end of the Marsh Road Reach, drain an urban, low-elevation area that includes stormwater runoff from Redwood City, Menlo Park, Atherton, Woodside, and unincorporated San Mateo County. Collectively, the Biological Study Area includes approximately 4.3 ac of detention basin/canal habitat (Figures 4a-i, Table 1).

Vegetation—Detention basin/canal is an aquatic biotic habitat that exists to transport and store stormwater. Dominant species on the margins of the canal includes forbs such as brass buttons and sickle grass; filamentous algae is present in the flowing water of the canal. The topography in the canal is concave with steep engineered banks on the sides of the canal, and the bed is relatively flat and filled with mud. Water in the canal is perennial and spans from 2-15 ft wide and up to 3 ft deep. The overall turbidity of the canal is high due to the silty mud in the bed of the canal. In areas where the turbidity is low, the filamentous algae can be seen rooted in the bed of the canal.

The O'Connor detention basin connected to the canal has no dominant vegetation present due to the inhospitable mud. The topography is low-lying and flat with water in the detention basin flowing slowly based on the muted tidal influence from the channel system. The perennial ponding of the water is shallow, not exceedingly more than 2 ft deep. The substrate in the detention basin is gray silty clay and can be seen due to the low turbidity of the water.

The Bayfront Canal has no dominant vegetation in its perennial waters. On the margins of the canal, dominant vegetation species included pickleweed and fat-hen (*Chenopodium album*). The topography of the canal is primarily low-lying and flat on the southern side but, on the northern side, there is a gradual slope upwards that leads into a bike path and a levee. The perennial tidally influenced water of the canal is of a moderate depth, as it does not exceed more than 5 ft deep. The substrate in the canal is gray silty clay and could only be seen in the margins on the canal due to the high turbidity of the water.

Wildlife—The detention basin/canal present on the site provides aquatic foraging habitat for a small number of species also found in nearby marshes and ponds. In general, these areas provide limited habitat for wildlife due to the high human disturbance from the adjacent trail, narrow dimensions, and seasonally poor water quality created by low water circulation. The largest parcel of this habitat, the O'Connor detention basin, provides foraging habitat for American coot (*Fulica americana*), California gull, Canada goose, gadwall (*Mareca strepera*), mallard, northern shoveler, ring-billed gull, and sora (Cornell Lab of Ornithology 2023). The Bayfront and

Runnymede canals may support occasional foraging gadwall, mallard, or northern shoveler. Few fish are expected in this habitat due to poor water quality and lack of connection to other habitats from which dispersal could occur.

4.2.12 Landscaped/Developed

Landscaped/developed habitat is found throughout all reaches within the Biological Study Area (Figure 3) and comprises 240.8 ac of the Biological Study Area (Figures 4a-i, Table 1). It is a highly modified and anthropogenically influenced habitat, with most of the acreage found on major roads, neighborhoods, and industrial parks, and sometimes within public parks and on levee trails and roads adjacent to managed ponds and marsh habitats.

Vegetation—Landscaped/developed habitat occurs in areas with high human impacts such as parks, residential areas, roads, pedestrian pathways, and parking lots. Landscaped portions are dominated by ornamental turf grass and non-native trees such as London plane tree (*Platanus* × *hispanica*), crape myrtle (*Lagerstroemia indica*), tree of heaven (*Ailanthus altissima*), and smooth leaf elm (*Ulmus minor*). Other dominant plant species in this habitat include nonnative grasses and weedy plant species such as wild oat (*Avena sp.*), ripgut brome (*Bromus diandrus*), cheeseweed (*Malva parviflora*), and wild radish (*Raphanus sativa*). The topography in this habitat is relatively flat due to engineering.

Wildlife—Despite being a highly modified anthropogenic habitat, the vegetation found in landscaped/ developed habitats provide the necessary structure and foraging opportunities to support a wide range of wildlife species. Due to high levels of human disturbance, most species that are found within this habitat are well adapted to urban areas and commonly found throughout the region. Species diversity in this habitat within the Biological Study Area is greatest at Bedwell Bayfront Park and the Ravenswood ponds, where this habitat borders less highly disturbed habitats and thus provides better overall habitat quality.

Avian species recorded in these areas include American crow, American pipit (*Anthus rubescens*), American robin (*Turdus migratorius*), Anna's hummingbird (*Calypte anna*), black phoebe, California scrub-jay (*Aphelocoma californica*), California towhee (*Melozone crissalis*), Canada goose, chestnut-backed chickadee (*Poecile rufescens*), common raven, Cooper's hawk (*Accipiter coopoerii*), dark-eyed junco (*Junco hyemalis*), Eurasian collared dove (*Streptopelia decaocto*), golden-crowned sparrow (*Zonotrichia atricapilla*), house finch (*Haemorhous mexicanus*), house sparrow (*Passer domesticus*), lesser goldfinch (*Spinus psaltria*), mallard, mourning dove (*Zenaida macroura*), northern harrier, red-tailed hawk, rock pigeon, and white-crowned sparrow (*Zonotrichia leucophrys*), (Cornell Lab of Ornithology 2023). Mammals expected to use these areas include California ground squirrel (*Otospermophilus beecheyi*), California vole (*Microtus californicus*), eastern fox squirrel (*Sciurus niger*), eastern gray squirrel (*Sciurus carolinensis*), house mouse (*Mus musculus*), Norway rat (*Rattus norvegicus*), raccoon, red fox, striped skunk, western harvest mouse (*Reithrodontomys megalotis*), and Virginia opossum (*Didelphis virginiana*) (iNaturalist 2023). Reptiles in these areas include the Pacific gopher snake (*Pituophis catenifer catenifer*), southern alligator lizard (*Elgaria multicarinata*), and western fence lizard (*Sceloporus occidentalis*), and amphibians including the Sierran tree frog (*Pseudacris sierra*) (iNaturalist 2023).

4.2.13 Ruderal Levee Slope

Ruderal levee slope habitat is found in all reaches within the Biological Study Area (Figure 3), comprising approximately 57.5 ac (Figures 4a-i, Table 1).

Vegetation—Ruderal levee slopes occur on steep grades bordering aquatic habitats and upland areas in the Biological Study Area. Dominant species in this habitat include nonnative forbs and grasses such as common wild oat (*Avena fatua*), foxtail barely (*Hordeum marinum*), slenderleaf iceplant, black mustard (*Brassicca nigra*), cheeseweed, and wild radish. On the landward facing slopes the vegetation is composed of mainly upland grasses such as ripgut brome and wild oats (*Avena sp.*) and the dominant species listed above. On the leeward facing slopes the vegetation had a gradient of upland and wetland vegetation. On the highest point of the slopes the levee only contains upland vegetation, while on the tow of the slopes wetland vegetation had begun to inhabit due to the marsh's influence. Plants such as alkali heath and pickleweed were more common near the tow of the slope but are never dominant. The topography in this habitat is relatively steep due to engineering and has grades that average around 10%. Areas of the ruderal levee slope contained bare ground due to disturbances from ground squirrels or trail activity that is on top of the levee.

Wildlife—Ruderal levee slope habitat provides a narrow strip of tall and dense vegetation amid habitats that otherwise provide only sparse and low-lying vegetation. As a result, these areas support a moderate amount of roosting and foraging passerine species, including black phoebe, golden-crowned sparrow, horned lark, house finch, lesser goldfinch, savannah sparrow, and white-crowned sparrow. California vole, California ground squirrel, and western harvest mice may forage and nest in these areas, and gopher snakes commonly hunt in these areas.

4.2.14 Ruderal Upland

Ruderal upland habitat is found in all reaches within the Biological Study Area (Figure 3), occupying 111.3 ac of the Biological Study Area (Figures 4a-i, Table 1).

Vegetation—Ruderal upland habitat occurs on flat grades near developed areas in the Biological Study Area. Dominant species in this habitat include nonnative annual grasses such as annual festuca (*Festuca perennis*), seaside barley, and ripgut brome, as well as weedy nonnative forbs such as wild beet (*Beta vulgaris*), cheeseweed, Italian thistle (*Carduus pycnosephalus*), and yellow sweetclover (*Melilotus officinalis*). Most of the ruderal upland is covered with vegetation, leaving no space for bare ground and can reach a height of about 3ft. A dense patch of Chilean Sea Fig (*Carpobrotus chilensis*), a common non-native forb, is in the northeastern portion of the Biological Study Area adjacent to the Ravenswood Open Preserve among the nonnative annual grasses. The topography in this habitat is relatively flat except for mounds of non-native fill that have been dumped due to construction in the past. There are also areas where there has been recent mowing taken place and patches of bare ground and gravel due to construction influences.

Wildlife—Due to similar habitat conditions and vegetation present, wildlife species present in ruderal upland habitat are the same as those found in ruderal levee slope habitat.

4.2.15 Culvert/Riprap

Culvert/Riprap habitat is one of the most limited habitat types present within the Biological Study Area at 4.3 ac (Figures 4a-i, Table 1) and is found in the Bayfront Expressway Reach between ponds R4 and R5 and R3 and S5, in the Bedwell Bayfront Park Reach between pond S5 and Flood Slough, and within the Dumbarton Approach Reach between pond SF2 and the San Francisco Bay (Figure 3, Photo 5).



Photo 5. Culvert/Riprap Habitat on the Outboard Side of Pond SF2 Adjacent to Intertidal Mudflat, Tidal Northern Coastal Salt Marsh, and Tidal Open Water

Vegetation—Culvert/riprap habitat consists of man-made structures that are composed of boulders, rocks, and metal that are found throughout the Biological Study Area near aquatic features. These structures are used to regulate water from stormwater management systems and the San Francisco Bay and to protect levees and berms from tidal erosion and divert water to prevent floods. This habitat does not support any vegetation.

Wildlife—Culvert/riprap provides limited wildlife value due to its small area, impermeable surface, and lack of vegetation. Several avian species, including black oystercatcher (*Haematopus bachmani*) (Photo 5), black-crowned night heron (*Nycticorax nycticorax*), great blue heron, great egret, and snowy egret (*Egretta thula*) may forage or roost on the riprap, while egret, heron, and raptor species may roost on culverts.

4.2.16 Ornamental Woodland (Riparian)

Ornamental woodland (riparian) habitat is found in three locations in the Biological Study Area, including along the western edge of the O'Connor detention basin in the South of Bay Road Reach, adjacent to tidal brackish marsh in Ravenswood Slough within the Tech Campus Reach, and along the southern side of the Bayfront Canal in the Marsh Road Reach (Figure 3). The Biological Study Area includes approximately 0.8 ac of this habitat (Figures 4a-i, Table 1).

Vegetation—Ornamental woodland (riparian) is one of two woodland habitats present on the Biological Study Area. This habitat occurs adjacent to non-tidal and tidal brackish marshes and ruderal levee slopes in the Biological Study Area. Dominant species in this habitat include trees and shrubs such as arroyo willow (*Salix lasiolepis*), coyote brush (*Baccharis pilularis*), toyon (*Heteromeles arbutifolia*), Italian buckthorn (*Rhamnus alaternus*), pine (*Pinus* sp.), English elm, and California sagebrush (*Artemisia californica*) in the overstory. In the understory of the ornamental woodland there are native forbs such as sticky monkeyflower (*Diplacus aurantiacus*) and purple

sage (*Salvia leucophylla*) along with leaf and pine duff in the understories of the ornamental woodlands. The topography has a gradual slope in all habitat areas since it is located upland of marsh areas. This habitat falls under CDFW jurisdiction due to the ornamental trees being rooted below the top of bank.

Wildlife—The ornamental woodland riparian habitat provides structure to support nesting and foraging opportunities for many of the passerines expected to be found in landscaped/developed areas, including Anna's hummingbird, California scrub jay, California towhee, chestnut-backed chickadee, dark-eyed junco, Eurasian collared dove, house finch, lesser goldfinch, and mourning dove. Cooper's hawk and red-shouldered hawk (*Buteo lineautus*) may occasionally hunt within this habitat. Mammals and reptiles found within this habitat are similar to those found within landscaped/developed habitats.

4.2.17 Ornamental Woodland (Upland)

Ornamental woodland (upland) is found in the South of Bay Road Reach southeast of the O'Connor Detention Basin along the San Francisquito Creek Trail and west of the Bay Trail along Laumeister Marsh, in the Tech Campus Reach along the southside of Bayfront Expressway, and in the Marsh Road Reach adjacent to industrial development and the Bayfront Canal (Figure 3). Collectively, this habitat includes approximately 3.1 ac in the Biological Study Area (Figures 4a-i, Table 1).

Vegetation—Ornamental woodland (upland) is one of two woodland habitats present in the Biological Study Area. This habitat occurs adjacent to ornamental woodland (riparian) and ruderal/developed habitats. Ornamental woodland (upland) habitats are characterized by the lack of riparian plant species and the trees being rooted above top of bank. Dominant species in the overstory of this habitat include trees and shrubs such as elm, eucalyptus (*Eucalyptus* sp.) and coyote brush. In the understory of this habitat there is leaf duff along with non-native grasses and forbs such as wild oats, cheeseweed, and perennial pepperweed. The topography in this habitat is has a gradual slope in all ornamental woodland habitat areas since it is located upland of marsh areas.

Wildlife—The wildlife found within ornamental woodland (upland) are the same as those expected to be found within ornamental woodland (riparian) described above.

4.3 Biotic Habitats in Adjacent Areas

Southeast of the southernmost extent of the Biological Study Area is San Francisquito Creek, a freshwater creek that drains an area of approximately 45 square miles in the Santa Cruz Mountains (Rofougaran and Karl 2005). The tidal open water habitat within the creek adjacent to the Biological Study Area is used by migrating Central California Coast Steelhead that spawn in the upper reaches of the watershed (Spence et al. 2012), while northern coastal salt marsh found along this lower reach of the creek provides habitat for the Alameda song sparrow, California black rail, California Ridgway's rail, San Francisco common yellowthroat, salt marsh harvest mouse, and salt marsh wandering shrew.

Immediately south of the mouth of San Francisquito Creek is the Palo Alto Baylands, a 1,940-ac preserve in the City of Palo Alto that includes a mix of tidal northern coastal salt marsh, tidal brackish marsh, non-tidal/muted tidal northern coastal salt marsh, freshwater marsh, managed ponds, tidal open water, riparian woodland, and ruderal upland. The preserve supports some of the highest densities of Ridgway's rails within the South Bay (OEI 2021).

North of pond R4 and Bedwell Bayfront Park in the northwest corner of the Biological Study Area is Greco Island, a mature marsh that is owned and managed by the Refuge. This marsh has never been diked and has been minimally altered, and as such contains well-established high-density channel networks and in-marsh high tide refugia, providing high quality habitat for Ridgway's rails and salt marsh harvest mice.

Section 5. Special-Status Species and Sensitive Habitats

CEQA requires assessment of the effects of a project on species that are protected by state, federal, or local governments as "threatened, rare, or endangered;" such species are typically described as "special-status species." For the purpose of the environmental review for the SAFER Bay Project, special-status species have been defined as described below. Impacts on these species are regulated by some of the federal, state, and local laws and ordinances described in Section 3 above.

For purposes of this analysis, "special-status" plants are considered plant species that meet one or more of the following criteria:

- Listed under the FESA as threatened, endangered, proposed threatened, proposed endangered, or a candidate species.
- Listed under the CESA as threatened, endangered, rare, or a candidate species.
- Listed by CNPS as CRPR 1A, 1B, 2, 3, or 4.

For purposes of this analysis, "special-status" animals are considered animal species that meet one or more of the following criteria:

- Listed under FESA as threatened, endangered, proposed threatened, proposed endangered, or a candidate species.
- Listed under CESA as threatened, endangered, or a candidate threatened or endangered species.
- Designated by CDFW as a California species of special concern.
- Designated in the California Fish and Game Code as fully protected species (fully protected birds are provided in Section 3511, mammals in Section 4700, reptiles and amphibians in Section 5050, and fish in Section 5515).
- Protected by the Marine Mammal Protection Act.

Information concerning threatened, endangered, and other special-status species that potentially occur in the Biological Study Area was collected from several sources and reviewed by H. T. Harvey & Associates biologists as described in Section 2.1 above. Figure 5 depicts CNDDB records of special-status plant species in the general vicinity of the Biological Study Area and Figure 6 depicts CNDDB records of special-status animal species. These generalized maps show areas where special-status species are known to occur or have occurred historically.

Primary Biological Resources Study Area

5-mile Radius

CNDDB Records

Plants

Specific Location

Approximate Location

General Area

Terrestrial Communities

General Area

Northern Coastal Salt Marsh
hairless popcornflower
most beautiful jewelflower
long-styled sand-spurrey
slender-leaved pondweed
arcuate bush-mallow
Northern Coastal Salt Marsh
Northern Coastal Salt Marsh
Point Reyes salty bird's-beak
saline clover
San Francisco owl's-clover
chaparral ragwort
Congdon's tarplant
Northern Coastal Salt Marsh
Point Reyes salty bird's-beak
Contra Costa goldfields
alkali milk-vetch
San Joaquin spearscale
long-styled sand-spurrey
saline clover
Congdon's tarplant
San Francisco collinsia
Serpentine Bunchgrass
Franciscan onion
fragrant fritillary
western leatherwood
Serpentine Bunchgrass
Crystal Springs lessingia
Marin western flax
Crystal Springs lessingia
white-rayed pentachaeta
western leatherwood
Serpentine Bunchgrass
San Mateo thorn-mint
arcuate bush-mallow
coastal marsh milk-vetch
Franciscan onion
woodland woollythreads
chaparral ragwort
Northern Coastal Salt Marsh
Point Reyes salty bird's-beak
Northern Coastal Salt Marsh
Congdon's tarplant
arcuate bush-mallow
Franciscan onion
Franciscan onion
San Francisco collinsia
Franciscan onion
arcuate bush-mallow
western leatherwood
Franciscan onion
fragrant fritillary
Choris' popcornflower
Marin western flax
Serpentine Bunchgrass
white-rayed pentachaeta
western leatherwood
Redwood
bent-flowered fiddleneck
Congdon's tarplant
Point Reyes salty bird's-beak
Northern Coastal Salt Marsh
prostrate vernal pool navarretia
Hoover's button-celery
California seablite
Congdon's tarplant
alkali milk-vetch
Congdon's tarplant
prostrate vernal pool navarretia
lesser saltscale
saline clover
Valley Oak Woodland
Valley Oak Woodland
California seablite
Northern Coastal Salt Marsh
Point Reyes salty bird's-beak
fountain thistle
Franciscan onion
fragrant fritillary
San Mateo thorn-mint
Kings Mountain manzanita
Kings Mountain manzanita
Kings Mountain manzanita
Marin western flax
Marin western flax
slender-leaved pondweed
lost thistle
round-headed Chinese-houses
Hoover's button-celery
alkali milk-vetch
woodland woollythreads
Methuselah's beard lichen
Kings Mountain manzanita
San Francisco collinsia
Hoover's button-celery
Point Reyes salty bird's-beak
alkali milk-vetch
saline clover
Hoover's button-celery
Kings Mountain manzanita
Kings Mountain manzanita
Kings Mountain manzanita
Kings Mountain manzanita
western leatherwood
fragrant fritillary
Congdon's tarplant
Congdon's tarplant
Congdon's tarplant
Congdon's tarplant
Congdon's tarplant
Congdon's tarplant
arcuate bush-mallow
Kings Mountain manzanita
western leatherwood
two-fork clover
western leatherwood
Serpentine Bunchgrass
Jepson's coyote-thistle
western leatherwood
woodland woollythreads
western leatherwood
Franciscan onion
Congdon's tarplant
Kings Mountain manzanita
woodland woollythreads
Kings Mountain manzanita
Kings Mountain manzanita
Kings Mountain manzanita
Kings Mountain manzanita
Kings Mountain manzanita
Kings Mountain manzanita
Choris' popcornflower
arcuate bush-mallow
Kings Mountain manzanita
Hoover's button-celery
robust spineflower

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Miles

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H. T. HARVEY & ASSOCIATES
Ecological Consultants

Figure 5. CNDDB-Mapped Records of Special-Status Plants
SAFER Bay Biological Resources Report (3550-05)
April 2024

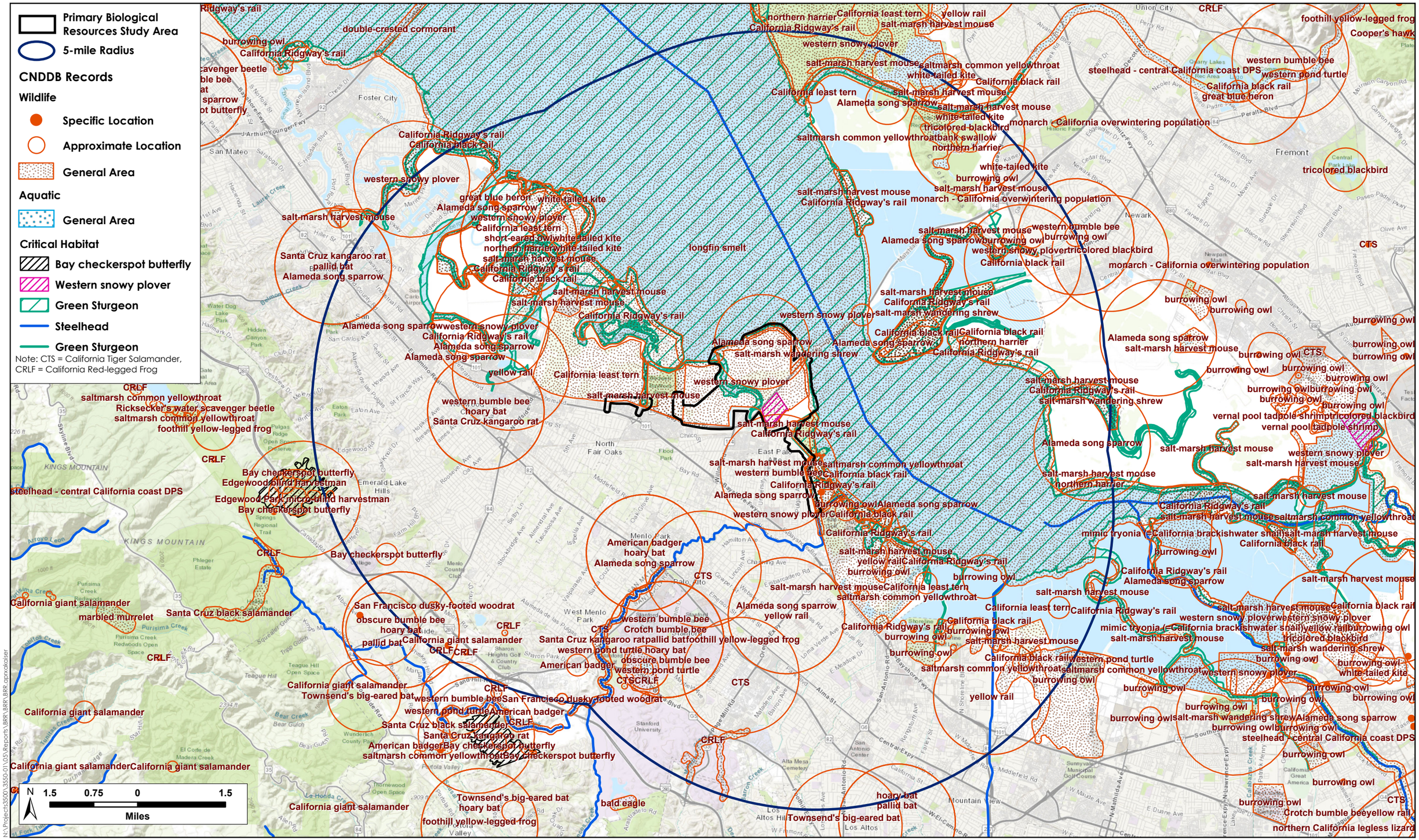


Figure 6. CNDDB-Mapped Records of Special-Status Animals
SAFER Bay Biological Resources Report (3550-05)
April 2024

H. T. HARVEY & ASSOCIATES
Ecological Consultants

5.1 Special-Status Plant Species

A search of all CRPR rank 1, 2, 3, and 4 species identified 63 special-status plant species as having potential to occur within the project vicinity. Although three of these species – alkali milk vetch (*Astragalus tener* var. *tener*), Point Reyes bird's beak (*Cordylanthus maritimus* ssp. *Palustris*), and California seablite (*Suaeda californica*) – occur in other locations in the types of habitats that are present in the Biological Study Area, these species have not been recorded in the project vicinity for decades. While alkali milk vetch and Point Reyes bird's beak cannot be ruled out as potentially occurring (no focused surveys for these species have been conducted in suitable habitat in the Biological Study Area), we consider California seablite to be extirpated from the region; all known remaining populations except one are restoration populations, the locations of all remaining populations are well known, and the species requires active tidal action to colonize previously unknown sites and persist. Due to the absence of high-quality habitat and the lack of any known populations from the vicinity, California seablite is considered absent from the Specific Plan area.

Only one special-status plant species, Congdon's tarplant (*Centromadia parryi* ssp. *Congdonii*), has any potential for occurrence in the Biological Study Area. Congdon's tarplant is a CNPS List 1B.2 plant, with no FESA or CESA status. Congdon's tarplant is known from eight central California coastal counties, including San Mateo County. The species occurs in alkaline soils in valley and foothill grasslands, typically in sumps and disturbed sites where water collects. Congdon's tarplant is often associated with nonnative grassland species, including mustard (*Brassica* spp.) and star-thistle (*Centaurea* spp. The closest record for Congdon's tarplant was a small population of 20-30 collected in 2013 approximately 4 miles southeast of the Biological Study Area in non-native grassland. Suitable habitat for the species is present in the Biological Study Area in saline seasonal wetlands and ruderal levee slope adjacent to wetlands.

All other special-status plant species identified as potentially occurring in the region were determined to be absent from the Biological Study Area and vicinity for at least one of the following reasons: (1) absence of suitable habitat types; (2) lack of specific microhabitat or edaphic requirements, such as serpentine soils; (3) the elevation range of the species is outside of the range of the Biological Study Area; and/or (4) the species is considered extirpated from the project region.

5.2 Special-Status Animal Species

A number of special-status bird and mammal species occur in or in the immediate vicinity of the Biological Study Area. They are the Alameda song sparrow, black skimmer, Bryant's savannah sparrow, California black rail, California Ridgway's rail, northern harrier, San Francisco common yellowthroat, western snowy plover, salt marsh harvest mouse, and salt marsh wandering shrew, all of which may breed on or close to the site. Special-status fish species that may be present in tidal portions of the Biological Study Area include Central California Coast steelhead, green sturgeon, longfin smelt, and Pacific lamprey (*Entosphenus tridentatus*). We address these species below in Table 2 along with several additional special-status animal species that we have evaluated for

Table 2. Special-Status Animal Species, Their Status, and Potential Occurrence in or adjacent to the Biological Study Area

Name	*Status	Habitat	Potential for Occurrence in or Adjacent to the Biological Study Area
Federal or State Endangered, Threatened, or Candidate Species			
Southern green sturgeon (*Acipenser medirostris*)	FT, CSSC	Spawns in large river systems such as the Sacramento River; forages in nearshore oceanic waters, bays, and estuaries.	**Potentially Present—**Green sturgeon are long-lived fish that spend much of their time in marine waters, but forage annually in bay and brackish estuaries and spawn every 2-6 years in cool, deep, and swift flowing rivers with gravel and cobble bottoms (NMFS 2018). Although little is known about this species' use of the lower South Bay, designated critical habitat includes all of the San Francisco Bay and tidally connected waterways up to mean higher high water (NMFS 2009). Thus, this species is considered potentially present. Suitable foraging habitat is present within open water sloughs, tidal channels in marshes, and possibly some managed ponds, within the Biological Study Area.
White sturgeon (*Acipenser transmontanus*)	SC, CSSC	Spawns in large river systems such as the Sacramento River; forages in nearshore oceanic waters, bays, and estuaries.	**Absent as Breeder—**This species occurs in tidal waters of the South San Francisco Bay as well as streams throughout the Biological Study Area. However, this species is not known to spawn within San Francisquito Creek or tidal sloughs within the Program Area. This species may occur in larger and deeper tidal sloughs as an occasional forager.
San Francisco Bay-Delta Longfin smelt (*Spirinchus thaleichthys*)	FP, ST	Spawns in fresh water in the upper end of the Bay; occurs year-round in the South Bay.	**Present—**Longfin smelt are anadromous fish that utilize fresh and brackish waters for spawning. They were recently found to breed in the South Bay in brackish sloughs and restored marshes where California bulrush and alkali bulrush dominated marsh provide suitable spawning habitat (Lewis et al. 2020). Longfin smelt adults and juveniles may also occur in the open bay and in San Francisquito Creek. Suitable habitat is present within tidal channels in marshes, and possibly in some managed ponds, within the Biological Study Area.
Central California coast ESU steelhead (*Oncorhynchus mykiss irideus*)	FT	Cool streams with suitable spawning habitat and conditions allowing migration between spawning and marine habitats.	**Present—**The steelhead is an anadromous form of rainbow trout that migrates upstream from the ocean to spawn. Steelhead in the South Bay usually migrate upstream to spawning areas from late December through early April, with the greatest activity in January through March, when flows are sufficient to allow them to reach suitable habitat in far upstream areas. Spawning occurs between December and June. Steelhead eggs remain in gravel depressions, known as redds, for 1.5 to four months before hatching. After hatching, young of the year steelhead tend to use riffles with cover, while older juveniles use deeper water (such as pools) as rearing habitat, remaining in fresh water for one to four years before migrating to the ocean. This downstream migration

Name	*Status	Habitat	Potential for Occurrence in or Adjacent to the Biological Study Area
			of juveniles generally occurs between February and May. Designated critical habitat for the Central California coast ESU steelhead includes all of the San Francisco Bay up to highest high water, including marsh sloughs and channels, and tributaries with suitable spawning habitat up to the ordinary high water mark, including San Francisquito creek (NMFS 2016). Designated critical habitat is found adjacent to the Biological Study Area in San Francisquito Creek. Steelhead may be found in Project reaches that include tidal open water of the San Francisco Bay, but not in the Bayfront Canal which is not tidal and for which access is blocked by a one-way tide gate. They could also possibly occur in some managed ponds. The species is determined to be present.
Northwestern pond turtle (*Actinemys marmorata*)	FP, CSSC	Permanent or nearly permanent water in a variety of habitats.	**Absent—**The northwestern pond turtle is an aquatic turtle found west of the Sierra Nevada from the Columbia River south to northern Baja, Mexico. This turtle requires some slack or slow water, although it will occur where enough food resources occur in faster moving water; it usually leaves the aquatic site to reproduce, to aestivate, and to over-winter. Typical habitat includes freshwater ponds and backwaters in slow-moving rivers with abundant aerial and aquatic basking sites. Nesting usually occurs in upland areas from March to July, in hard-packed clay soil. Hatchlings disperse from the nest with winter rains. Threats to the northwestern pond turtle include impacts to nesting habitat from agricultural and grazing activities, human development of habitat, and increased predation pressure from native and non-native predators as a result of human-induced landscape changes. There are a number of CNDDB (2023) records of the species from southern San Mateo County and northern Santa Clara County, with the closest record of the species from San Francisquito Creek, near Stanford University, approximately 2.8 mi southwest of the Biological Study Area. This species is not expected to occur in the saltwater habitats of lower San Francisquito Creek adjacent to the Biological Study Area, and otherwise, major roads, highways, and developed areas create impassable barriers to dispersal of this species from known locations west of the Biological Study Area. In addition, no suitable aquatic habitat is present in the Biological Study Area due to brackish and/or saline conditions. Determined to be absent.
Bald eagle (*Haliaeetus leucocephalus*)	SE, SP	Occurs mainly along seacoasts, rivers, and lakes; nests in tall trees or in cliffs, occasionally on	**Absent as Breeder—**Bald eagles occur mainly along seacoasts, rivers and lakes, and nest in tall trees or in cliffs. They feed mostly on fish, but also will take ducks, coots, and other similar waterbirds. Bald eagles are

Name	*Status	Habitat	Potential for Occurrence in or Adjacent to the Biological Study Area
		electrical towers. Feeds mostly on fish.	known to nest (or to have recently nested) in numerous locations in Santa Clara, and San Mateo Counties, mostly near reservoirs (Bousman 2007, CNDDB 2023). This species has occasionally been observed foraging in or near the Biological Study Area, but it would not nest in the Biological Study Area due to lack of suitable trees in which to build a nest.
Western snowy plover (*Charadrius nivosus nivosus*)	FT	Sandy beaches on marine and estuarine shores and salt pannes in Bay saline managed ponds.	**Present—**The western snowy plover nests on sandy beaches and salt pan habitat from southern Washington to Baja California, Mexico. Western snowy plovers are susceptible to nest disturbance and other negative interactions with humans. Much of their nesting habitat has been lost to development and high human use, with over half of all historical breeding across the range no longer used. In addition, synanthropic mesopredators, especially the non-native red fox and common raven, have had dramatic effects on snowy plover nesting success (Neuman et al. 2004, Strong et al. 2021). The species is known to breed and forage at ponds R1, R2, R3, R4, R5, SF2, and S5 at the Ravenswood Complex of the Refuge, located within the Biological Study Area (Pearl et al. 2023). Snowy plovers may occasionally forage on intertidal mudflats adjacent to the Biological Study Area.
California black rail (*Laterallus jamaicensis coturniculus*)	ST, SP	Breeds in fresh, brackish, and tidal salt marsh.	**Present—**The California black rail is a small rail that inhabits tidal salt, brackish, and freshwater marshes. This small bird is very secretive, and is most often seen during high tides when it is forced into high marshes. It is most abundant in tidal marshes with some freshwater input (Evens et al. 1991), nesting primarily in pickleweed-dominated marshes with patches or borders of bulrush sp., often near the mouths of creeks. Black rails build nests in tall grasses or marsh vegetation during spring, and lay about 6 eggs. Nests are usually constructed of pickleweed, and are placed directly on the ground or slightly above ground in vegetation. Black Rails feed on terrestrial insects, aquatic invertebrates, and possibly seeds (Trulio and Evens 2000). Suitable breeding and foraging habitat occurs in Faber Marsh, Laumeister Marsh, Ravenswood Marsh, and Ravenswood Slough, and the species has been recorded at Faber Marsh and Laumeister Marsh in the Biological Study Area (CNDDB 2023).
California Ridgway's rail (*Rallus obsoletus obsoletus*)	FE, SE, SP	Salt marsh habitat dominated by pickleweed and cordgrass (*Spartina* spp.).	**Present—**The California Ridgway's Rail is a secretive marsh bird currently endemic to the marshes of San Francisco Bay. It formerly bred at several other locations, including Humboldt Bay, Elkhorn Slough (Monterey County), and Morro Bay, but is now extirpated from all sites outside of San Francisco Bay. California Ridgway's Rails nest in salt and brackish

Name	*Status	Habitat	Potential for Occurrence in or Adjacent to the Biological Study Area
			marshes along the edge of the bay, and are most abundant in extensive salt marshes and brackish marshes dominated by cordgrass, pickleweed, and marsh gumplant, and containing complex networks of tidal channels (Harvey 1980). Shrubby areas adjacent to or within tidal marshes are important for predator avoidance at high tides. Formerly abundant in tidal salt marshes of the San Francisco Bay, Ridgway's rail populations have greatly declined due to historical loss of habitat, fragmentation and degradation of remaining habitat, and increasing presence of urban adapted predator species (Albertson and Evens 2000). Faber and Laumeister marshes support some of the highest densities of Ridgway's rail in the Bay area, and the species is also found in moderate numbers in Ravenswood Marsh and Ravenswood Slough (OEI 2015).
California least tern (*Sternula antillarum browni*)	FE, SE, SP	Nests along the coast on bare or sparsely vegetated, flat substrates. In the South Bay, nests in salt pannes, islands, and on an old airport runway. Forages for fish in open waters.	**Absent as Breeder—**California least terns are piscivorous migratory birds that nest from Baja California north to the San Francisco Bay and spend winter months in coastal areas off of Mexico and Central America. They nest from April to August, primarily on sandy beaches on the outer coast, but in estuarine habitats such as the San Francisco Bay they utilize a variety of habitats, including former salt ponds and adjacent levees. In recent years there have been a total of six colonies in the San Francisco Bay estuary, with two found in the South Bay at Eden Landing Ecological Reserve and Hayward Regional Shoreline, one found in the Central Bay at Alameda Point, two found in San Pablo Bay at Cullinan Ranch in San Pablo Bay National Wildlife Refuge and the Green Island Unit in Napa-Sonoma Marshes Wildlife Area, and one colony in Suisun Bay at the Montezuma Wetlands (B. Pearl, pers. obs.). Least terns were known to nest at salt evaporation ponds northwest of the Biological Study Area in 1976 and at Outer Bair Island approximately 3 mi to the northwest in some years from 1969–1982 (CNDDB 2023), but they are no longer known to nest at these locations. Least terns are therefore not known to or expected to nest in or adjacent to the Biological Study Area. Least terns forage primarily in managed ponds, tidal sloughs, and over the open San Francisco Bay, and though uncommon, could possibly forage in the Biological Study Area during post-breeding fall dispersal (Cornell Lab of Ornithology 2023).
Tricolored blackbird (*Agelaius tricolor*)	ST	Nests near fresh water in dense emergent vegetation.	**Absent as Breeder—**Tricolored blackbirds typically nest in extensive stands of tall emergent herbaceous vegetation in non-tidal freshwater marshes and ponds, which are not present on or immediately adjacent to the Biological Study Area. This species is not known to nest in tidal

Name	*Status	Habitat	Potential for Occurrence in or Adjacent to the Biological Study Area
			habitats in San Mateo County, and has not been recorded nesting in or near the Biological Study Area (CNDDB 2023, Cornell Lab of Ornithology 2023). However, small numbers of tricolored blackbirds may forage in or near the Biological Study Area (e.g., in grasslands and marsh habitats) during the nonbreeding season.
Salt marsh harvest mouse (*Reithrodontomys raviventris*)	FE, SE, SP	Salt marsh habitat dominated by common pickleweed or alkali bulrush.	**Present—**The salt marsh harvest mouse is a small mouse endemic to salt marshes of San Francisco Bay. These mice are dependent on dense vegetative cover, usually in the form of pickleweed and other salt dependent or salt tolerant vegetation in both tidal and diked salt marshes (Fisler 1965; Shellhammer 1982, 2000a; Shellhammer et al. 1982, 1988). Pickleweed provides more horizontal branches (and therefore more cover) than other halophytic species. Salt marsh harvest mice have been found to utilize a wider variety of habitats than previously thought, including in the south bay in alkali bulrush dominated marsh that is mature and heavily-thatched, and in the north bay in mixed halophytic vegetation where Olney's threesquare bulrush (*Schoenoplectus americanus*) is dominant (H. T. Harvey & Associates 2007, Smith et al. 2014). The salt marsh harvest mouse's current distribution includes salt marshes in San Francisco, San Pablo, and Suisun Bays. The species no longer occurs on the Peninsula north of Coyote Point (Shellhammer 2000a). It historically occurred throughout the Biological Study Area prior to the conversion of large tracts of tidal salt marsh to salt production ponds, agriculture, and/or filled for development. High-quality salt marsh habitat for this species occurs in the Biological Study Area in Faber Marsh and Laumeister Marsh, and suitable habitat also occurs at Ravenswood Marsh and Ravenswood Slough.
Monarch butterfly (*Danaus plexippus*)	FC	Requires milkweeds (*Asclepias* spp.) for egg-laying and larval development, but adults obtain nectar from a wide variety of flowering plants in many habitats. Individuals congregate in winter roosts, primarily in Mexico and in widely scattered locations on the central and southern California coast.	**Present—**The monarch butterfly is a large migratory butterfly that breeds and lays eggs on milkweeds throughout its migration. In California, monarchs overwinter primarily on introduced blue gum eucalyptus (*Eucalyptus globulus*), native Monterey pine (*Pinus radiata*), and native Monterey cypress (*Cupressus macrocarpa*), and less frequently on other native trees such as western sycamore (*Platanus racemosa*), coast redwood (Sequioa *sempervirens*), and coast live oak (*Quercus agrifolia*) (Malcom 2018). Milkweeds were not observed in the Biological Study Area during sites visits, but could occur within detention basin/canal, landscaped/ developed, and ruderal habitats within the Biological Study Area. The species is not known to form winter roosts in the area. The closest known winter roosts are located at Coyote Hills Regional Park

Name	*Status	Habitat	Potential for Occurrence in or Adjacent to the Biological Study Area
			and Ardenwood Historic Farm, located approximately 4.2 and 6.0 miles to the northeast, respectively (CNDDB 2023).
Crotch's bumble bee	SC	Open grassland and scrub habitats with abundant flowers providing nectar and pollen and with subterranean nest sites (such as animal burrows).	**Possibly Present.** Although this species was historically found throughout the southern two-thirds of California, including the Biological Study Area vicinity, population declines and range contractions (25% relative to its historical range) have made this species very scarce in the region (CDFW 2019). Since 2019, however, there have been a number of records of small numbers of individuals from scattered locations in Santa Clara County as close to the Biological Study Area as the Palo Alto Baylands 1.3 miles to the southeast (Bumble Bee Watch 2024, iNaturalist 2024), indicating that the species is still extant in the region. Although the species has not been recorded in San Mateo County in recent years, the Master Plan area does provide high-quality floral resources for foraging in ruderal grasslands and ruderal levee slopes. Therefore, this species could occur in the Biological Study Area.
California Species of Special Concern			
Central Valley Fall-run ESU Chinook Salmon (*Oncorhynchus tshawytscha*)	CSSC	Cool rivers and large streams that reach the ocean and that have shallow, partly shaded pools, riffles, and runs for spawning; adults forage in marine habitats.	**Present—**Chinook salmon are present in tidal open water habitats of the South Bay primarily from late August through October (during the adults' upstream migration) and during the downstream migration of juveniles. Chinook salmon are known to be present in several South Bay streams, including the Guadalupe River and Coyote Creek and associated slough channels, and there is recent evidence to suggest that Chinook salmon historically occurred in the Guadalupe River (Lanman et al. 2021). Suitable spawning habitat is not present in the Study Area, but this species may utilize open water in sloughs and marsh channels for foraging, and could possibly enter some managed ponds
Pacific lamprey (*Entosphenus tridentatus*)	CSSC	Medium- and large-sized, low-gradient cold rivers and streams, with a wide range of habitats (e.g., gravel, low-gradient riffles).	**Present.** Pacific lamprey are anadromous, eel-like fish that parasitize both fish and marine mammals for food. They live in the ocean for up to five years before returning to natal freshwater streams for spawning. This species is known to be present in San Francisquito Creek adjacent to the project footprint, and it may occur in tidal open water habitats adjacent to the project footprint as well (CalFish 2014). Suitable spawning habiat is not present in the Study Area, but this species may utilize open water in sloughs and marsh channels for foraging, and could possibly enter some managed ponds.

Name	*Status	Habitat	Potential for Occurrence in or Adjacent to the Biological Study Area
Golden eagle (*Aquila chrysaetos*)	SP	Breeds on cliffs or in large trees (rarely on electrical towers); forages in open areas.	**Absent as Breeder—**Nests on secluded cliff edges and in large trees. Uncommon breeder in the South Bay due to lack of habitat. No suitable nesting habitat is present in the Study Area, and this species occurs in the Study Area only rarely as a forager at Bedwell Bayfront Park (Cornell Lab of Ornithology 2023).
Black skimmer (*Rynchops nigra*)	CSSC (nesting)	Nests and roosts on bare ground on isolated islands, forages for fish in freshwater, brackish, and marine waters.	**Present—**Black Skimmer is a unique species, with a lower mandible longer than the upper mandible. This extended lower mandible allows these birds to fly over the surface of the water, "skimming" for small fish. Black Skimmers nest primarily on the coasts of the Southeast United States, the Gulf of California, and the Pacific Coast of Baja, California, north to Orange County, with the northernmost nesting sites found in the South San Francisco Bay. Black skimmers nest within the Biological Study Area among other seabird and shorebird colonies on islands in ponds R1 and SF2, although not every year and not simultaneously in both locations (Cornell Lab of Ornithology 2023). The closest colony outside of the Biological Study Area is located approximately 2.6 miles to the southeast.
Alameda song sparrow (*Melospiza melodia pusillula*)	CSSC	Nests in salt marsh, primarily in marsh gumplant and cordgrass along channels.	**Present—**The Alameda song sparrow is one of three subspecies of song sparrow breeding only in salt marsh habitats in the San Francisco Bay Area. Locally it is most abundant in the taller vegetation found along tidal sloughs, including salt marsh cordgrass and marsh gumplant. Populations of the Alameda song sparrow have declined due to the loss of salt marshes around the Bay, although within suitable habitat it is still fairly common. The location of the interface between populations of the Alameda song sparrow and those of the race breeding in freshwater riparian habitats (*M. m. gouldii*) along most creeks is not known due to difficulties in distinguishing individuals of these two races in the field. Alameda song sparrows breed and occur year-round in Faber Marsh, Laumeister Marsh, Ravenswood Marsh, and Ravenswood Slough (CNDDB 2023, Cornell Lab of Ornithology 2023). Individual sparrows may forage along ruderal levee slopes and non-tidal/muted tidal northern coastal salt marsh within the Biological Study Area.
Bryant's savannah sparrow (*Passerculus sandwichensis alaudinus*)	CSSC	Nests in pickleweed dominant salt marsh and adjacent ruderal habitat.	**Present—**Bryant's savannah sparrow in the South San Francisco Bay nest primarily in short pickleweed-dominated portions of diked tidal salt marsh habitat and in adjacent ruderal habitats on levees (Fitton 2008). Suitable nesting habitat occurs in ruderal grasslands, vegetated levee sides, and vegetated pond bottoms found in the Biological Study Area.

Name	*Status	Habitat	Potential for Occurrence in or Adjacent to the Biological Study Area
Burrowing owl (*Athene cunicularia*)	SC, CSSC	Nests and roosts in open grasslands and ruderal habitats with suitable burrows, usually those made by California ground squirrels.	**Absent as Breeder—**Burrowing owls were once common in open habitats in the South Bay, but in recent decades their breeding population has declined as open space has been developed, such that the wintering population in the South Bay is now larger than the breeding population (Trulio et al. 2018). Burrowing owls have been irregularly observed wintering in Ravenswood pond R4 and at Bedwell Bayfront Park (B. Pearl, pers. obs.), and there is one record of burrowing owls breeding at Bedwell Bayfront Park in 2003 (CNDDB 2023, Cornell Lab of Ornithology 2023). Narrow strips of suitable burrowing owl roosting or nesting habitat (i.e., open grasslands and ruderal habitats with ground squirrel burrows) is present within the Biological Study Area. However, the species is not expected to nest here due to the region-wide decline in breeding populations, lack of recent breeding records, and intensive human activity in the existing park.
Northern harrier (*Circus hudsonius*)	CSSC (nesting)	Nests in marshes and moist fields with tall vegetation and sufficient moisture to inhibit accessibility of nest sites to predators. Forages over open areas.	**Present—**This species, which is considered special-status only when breeding, occurs year-round in the Biological Study Area. Suitable nesting and foraging habitat is present at Faber Marsh, Laumeister Marsh, Ravenswood Marsh, and Ravenswood Slough, and the species also forages at ponds R1, R2, R3, R4, R5, S5, and SF2 (Cornell Lab of Ornithology 2023).
Loggerhead shrike (*Lanius ludovicianus*)	CSSC (nesting)	Nests in tall shrubs and dense trees; forages in grasslands, marshes, and ruderal habitats.	**Absent as Breeder—**These predatory songbirds are year-round residents in grassland and scrub habitats in California. Loggerhead shrikes generally build their nests in shrubs and trees in fairly open areas, and nest in spring and early summer. They hunt in open areas, usually from a low perch, such as a fence post or overhead wire. They forage primarily on large insects, lizards, and small mammals, but some individuals also prey on snowy plover chicks and other young shorebirds. This species, which is considered special-status only when breeding, occurs occasionally in the Biological Study Area during migration and winter, but due to declines in Bay Area breeding populations, they are no longer expected to nest there (Cornell Lab of Ornithology 2023). Small numbers of individuals may forage in the ruderal grasslands, managed ponds, and tidal marsh found in the Biological Study Area during migration and winter.
San Francisco common yellowthroat (*Geothlypis trichas sinuosa*)	CSSC	Nests in herbaceous vegetation, usually in wetlands or moist floodplains.	**Present—**The San Francisco common yellowthroat is a small songbird that inhabits emergent vegetation, primarily in fresh and brackish marshes, and associated upland areas in the San Francisco Bay Area. This subspecies (one of approximately 12 subspecies of common

Name	*Status	Habitat	Potential for Occurrence in or Adjacent to the Biological Study Area
			yellowthroat recognized in North America) breeds from mid-March through early August, and pairs frequently raise two clutches per year. Because this subspecies cannot be reliably distinguished in the field from other races that occur in the South Bay as migrants, determination of the presence of Saltmarsh Common Yellowthroats can be achieved only by observation of presence during the summer months when other subspecies are not expected to be present. San Francisco common yellowthroats breed and occur year-round in Faber Marsh, Laumeister Marsh, Ravenswood Marsh, and Ravenswood Slough, and may also be found in non-tidal marsh habitat (CNDDB 2023, Cornell Lab of Ornithology 2023). Individual yellowthroats may forage along vegetated levees within the Biological Study Area.
Yellow warbler (*Setophaga petechia*)	CSSC (nesting)	Nests in riparian woodlands.	**Absent as Breeder—**Yellow warblers are closely associated with riparian areas, regularly nesting in sycamores (*Platanus* sp.), cottonwoods (*Populus* sp.), and willows (Salix sp.), and less often in shrubs and dense undergrowth (Heath 2008). Despite the presence of willows in ornamental woodland (riparian) located west of Faber Marsh, the limited extent of these willows makes them unsuitable for use by yellow warblers, which also do not typically breed along the immediate edge of the baylands. Trees and shrubs in landscaped, riparian, and ruderal areas provide foraging habitat for this species, which occurs in the Biological Study Area as a common spring and fall migrant.
Yellow rail (*Coturnicops noveboracensis*)	CSSC	Nests in freshwater sedge marshes with moist soil or shallow standing water.	**Absent as Breeder—**The yellow rail breeds in California only in the far northeast, and very small numbers of this secretive species winter in coastal and estuarine marshes (Sterling 2008). Multiple individuals have been observed wintering at the Palo Alto Baylands (CNDDB 2023), and individuals may also winter at Faber Marsh, Laumeister Marsh, Ravenswood Marsh, and Ravenswood Slough.
Pallid bat (*Antrozous pallidus*)	CSSC	Forages over many habitats; roosts in caves, rock outcrops, buildings, and hollow trees.	**Absent as Breeder—**Historically, pallid bats were likely present in a number of locations throughout the Biological Study Area, but their populations have declined in recent decades, and the species has been extirpated as a breeder from urban areas close to the Bay. Individuals from more remote colonies could potentially forage in the Biological Study Area in open habitats on rare occasions, but the species is not expected to roost within or near to the Biological Study Area.

Name	*Status	Habitat	Potential for Occurrence in or Adjacent to the Biological Study Area
Townsend's big-eared bat (*Corynorhinus townsendii*)	CSSC	Roosts in caves and mine tunnels, and occasionally in deep crevices in trees such as redwoods or in abandoned buildings, in a variety of habitats. Forages in edge habitats along streams and adjacent to and in a variety of woodland habitats.	**Absent—**No known extant populations of the Townsend's big-eared bat occur in the vicinity of the Biological Study Area, and there is a low probability that the species occurs in the project vicinity at all due to urbanization. Individuals from more remote colonies could potentially forage in the Biological Study Area over open habitats on rare occasions, but the species is not expected to roost within or near to the Biological Study Area.
Western red bat (*Lasiurus blossevillii*)	CSSC	Roosts in foliage in forest or woodlands, especially in or near riparian habitat.	**Absent as Breeder—**Individual western red bats occur in the Biological Study Area vicinity in low numbers as migrants and winter residents, but this species does not breed in the Biological Study Area. They may roost in the foliage of trees virtually anywhere in the Biological Study Area, but are expected to roost primarily in riparian habitats with suitable trees, which are absent from the Biological Study Area. Occasional individuals may forage over the Biological Study Area year-round.
Salt marsh wandering shrew (*Sorex vagrans halicoetes*)	CSSC	Medium to high marsh 6 to 8 ft above sea level with abundant driftwood and common pickleweed.	**Potentially Present—**Formerly more widely distributed in the Bay Area, this small insectivorous mammal is now confined to salt marshes of the South Bay (Findley 1955). Salt marsh wandering shrews occur most often in medium-high wet tidal marsh (6 to 8 feet above sea level), with abundant driftwood and other debris for cover (Shellhammer 2000b). They have also been recorded occasionally in diked marsh. This species is typically found in fairly tall pickleweed, in which these shrews build nests. Individuals may occasionally disperse short distances into ruderal grassland to forage. They breed and give birth during spring, although very little is known regarding the natural history of the species. This species is known in the Biological Study Area vicinity from a record in the outboard marsh of pond R4 at Ravenswood Point (CNDDB 2023). The salt marsh wandering shrew shares similar habitat requirements to the salt marsh harvest mouse and may be found in areas where the salt marsh harvest mouse has been confirmed to be present. High-quality tidal northern coastal salt marsh habitat occurs within the Biological Study Area in Faber Marsh and Laumeister Marsh.
State Fully Protected Species			
White-tailed kite (*Elanus leucurus*)	SP	Nests in tall shrubs and trees; forages in grasslands, marshes, and ruderal habitats.	**Present—**White-tailed kites employ a unique foraging style known as kiting, in which they hover in the air searching for small mammals, birds, lizards, and sometimes insects. They build stick nests in the top of tall bushes and trees located near open foraging areas (Polite 1990). Due to

Name	*Status	Habitat	Potential for Occurrence in or Adjacent to the Biological Study Area
			a lack of suitable trees this species does not nest in the Biological Study Area. White-tailed kites are known to nest in eastern San Mateo County throughout the open areas bordering the San Francisco Bay (Sequoia Audubon Society 2001, Cornel Lab of Ornithology 2023). Large trees in Bedwell Bayfront Park adjacent to the Biological Study Area provide suitable nesting habitat for white-tailed kites, and open areas of managed ponds, ruderal uplands, and tidal/non-tidal marshes provide foraging habitat for this species.
Marine Mammal Protection Act Protected Species			
Harbor seal (*Phoca vitulina*)	MMPA	Widely distributed across the northern hemisphere in coastal waters and on rocky islands, sandy beaches, and mudflats for haul-out sites.	**Absent as breeder—**Some harbor seals live year-round in the San Francisco Bay, foraging for fish, shellfish, and crustaceans. They seek secluded locations for haul out and pupping sites, which in the South Bay include Bair Island and Mowry Slough, approximately 3.0 miles northwest and 4.1 miles east from the Biological Study Area, respectively (Goals Project 1999). Harbor seals from these haul-out sites are expected to forage in tidal waters in the Biological Study Area.
California sea lion (*Zalophus californianus*)	MMPA	Found along the west coast of North America in coastal waters and on beaches, docks, buoys, and jetties for haul-out sites.	**Potentially Present—**California sea lions spend the non-breeding season (May-June) in the San Francisco Bay, foraging for anchovies, herring, surfperch, leopard sharks, shrimp, and crabs (Goals Project 2000). They do not breed in the San Francisco Bay, and only occasional limited breeding occurs in Northern California on Año Nuevo Island and the Farallon Islands. Only three haul-out sites in the San Francisco Bay are known, including Pier 39, Angel Island, and Seal Rock, all located in the Central Bay. California sea lions are rare visitors to the South Bay as individual foragers (iNaturalist 2023); they may forage in tidal waters in the Biological Study Area.

Key to Abbreviations:

Status: Federally Endangered (FE); Federally Threatened (FT); Candidate for Federal Listing (FC); Proposed for Federal Listing (FP); State Endangered (SE); State Threatened (ST); State Fully Protected (SP); Candidate for State Listing (SC);California Species of Special Concern (CSSC); Marine Mammal Protection Act (MMPA).

potential occurrence in the larger Biological Study Area. Table 2 provides the current listing status, species description, and potential for occurrence in the Biological Study Area.

A number of other special-status bird and mammal species can occasionally occur in the Biological Study Area as nonbreeding foragers, but they do not breed or occur in large numbers in the Biological Study Area. These are the bald eagle, burrowing owl, California least tern, golden eagle (*Aquila chrysaetos*), loggerhead shrike (*Lanius ludovicianus*), tricolored blackbird, white-tailed kite, yellow rail (*Coturnicops noveboracensis*), yellow warbler (*Setophaga petechia*), pallid bat (*Antrozous pallidus*), Townsend's big-eared bat (*Corynorhinus townsendii*), western red bat (*Lasiurus blossevillii*), harbor seal (Phoca vitulina), and California sea lion (*Zalophus californianus*).

5.3 Sensitive Natural Communities, Habitats, and Vegetation Alliances

Natural communities have been considered part of the Natural Heritage Conservation triad, along with plants and animals of conservation significance since the state inception of the Natural Heritage Program in 1979. CDFW determines the level of rarity and imperilment of vegetation types and tracks sensitive communities in its Rarefind database (CNDDB 2023). Global rankings (G) of natural communities reflect the overall condition (rarity and endangerment) of a habitat throughout its range, whereas state (S) rankings are a reflection of the condition of a habitat within California. Natural communities are defined using NatureServe's standard heritage program methodology as follows (Faber-Langendoen et al. 2012):

G1/S1: Critically imperiled
G2/S2: Imperiled
G3/S3: Vulnerable.
G4/S4: Apparently secure
G5/S4: Secure

In addition to tracking sensitive natural communities, CDFW also ranks vegetation alliances, defined by repeating patterns of plants across a landscape that reflect climate, soil, water, disturbance, and other environmental factors (CDFW 2023). If an alliance is marked G1-G3, all of the vegetation associations within it will also be of high priority (CDFW 2023). CDFW provides Vegetation Classification and Mapping Program's currently accepted list of vegetation alliances and associations (CDFW 2023).

Impacts on CDFW sensitive natural communities, vegetation alliances/associations, or any such community identified in local or regional plans, policies, and regulations, must be considered and evaluated under CEQA (Title 14, Division 6, Chapter 3, Appendix G of the California Code of Regulations). Aquatic, wetland and riparian habitats are also protected under applicable federal, state, or local regulations, and are generally subject to regulation, protection, or consideration by USACE, RWQCB, CDFW, NMFS, and/or USFWS.

5.3.1 CDFW Sensitive Habitats

A query of sensitive habitats in the CNDDB (2023) identified five sensitive natural communities as occurring within the twelve 7.5-minute USGS quadrangles containing or surrounding the Specific Plan area: (1) northern coastal salt marsh (Rank G3/S3.2 and (2) valley oak woodland (Rank G3/S2.1), (3) Serpentine Bunchgrass (Rank G2/S2.2), (4) North Central Coast Steelhead/Sculpin Stream (Rank GNR/GNR), (5) N. Central Coast California Roach/Stickleback/Steelhead stream (Rank GNR/GNR). Northern coastal salt marsh is characterized by Holland (1986) as occurring along sheltered inland margins of bays, often co-dominated by pickleweed (*Salicornia* spp.), cordgrass, and sometimes saltgrass. This habitat type is present in the Biological Study Area and occurs within the Faber and Laumeister Marshes and Ravenswood OSP in the South of Bay and North of Bay Reaches, respectively; in Ravenswood Slough along the Tech Campus Reach; and Flood Slough along the Bedwell Bayfront and Marsh Road Reaches.

The Biological Study Area supports the following sensitive natural communities:

- Tidal/non-tidal/muted brackish marsh, which corresponds to coastal brackish marsh (Rank X) and is defined as being densely dominated by perennial, emergent, and herbaceous monocots that can reach 2m in height,
- seasonal wetlands, which correspond to vernal marsh (G2/S2.1) and is defined as being dominated by annual herbs and containing standing water following winter rains, but greatly reduced or completely dry by summer.

No additional sensitive natural communities are present in the Biological Study Area.

5.3.2 CDFW Sensitive Vegetation Alliances

Northern coastal salt marsh habitat in the Biological Study Area is dominated by pickleweed and would therefore be characterized as *Sarcocornia pacifica* (*Salicornia depressa*) Herbaceous Alliance (Sawyer et al. 2009). This alliance is ranked as G4/S3, meaning that it is globally secure, but considered vulnerable on a state-wide level, and this alliance is included on CDFW's list of sensitive natural communities (as northern coastal salt marsh, discussed above) (CDFW 2023).

Tidal/non-tidal/muted brackish marshes on site are dominated by cattails and would therefore be characterized as *Typha* (*angustifolia, domingensis, latifolia*) Herbaceous Alliance (Buck-Diaz et al. 2021, Sikes et al. 2021). This alliance is ranked as a G5/S5, meaning that it is secure due to its worldwide abundance.

Saline seasonal wetlands onsite were co-dominated with alkali heath, pickleweed, and saltgrass and would therefore be characterized as *Frankenia salina* Herbaceous Alliance (Keeler-Wolf and Vaghti 2000). This alliance is ranked as G4/S3, meaning that it is globally secure, but considered vulnerable on a state-wide level, and this alliance is included on CDFW's list of sensitive natural communities (as alkali heath marsh, discussed above) (CDFW 2023).

5.3.3 CDFW Riparian Habitat

Section 1602 of the Fish and Game Code establishes jurisdiction over the bed, channel, or bank of any river, stream, or lake. CDFW riparian jurisdiction ends at the outer extent of riparian tree or shrub canopy. Due to its rarity and disproportionately high habitat values and functions to wildlife, CDFW considers riparian habitat to be sensitive. As described above in Section 3.2.3, CDFW would likely claim jurisdiction over areas at, and below, the top of bank lines on either side of the channels and include the dripline on the edge of the mapped ornamental woodland (riparian) in Figure 3.4- (Waters of the U.S./State). Channels that CDFW may consider jurisdictional are Runnymede Canal located north of San Francisquito Creek, Ravenswood Slough, Bayfront Canal, and Flood Slough.

5.3.4 Sensitive Habitats (Waters of the U.S./State)

Wetlands and other waters of the U.S./state occur in the Biological Study Area. The tidal/non-tidal northern coastal marsh salt marsh, tidal/non-tidal brackish marsh and seasonal wetlands mapped in the Biological Study Area would likely be regulated by the USACE as waters of the U. S. and waters of the state by the RWQCB based on the presence of hydrophytic vegetation, direct observations of hydrology (i.e., flowing surface water), and their location between the OHW marks. The channels are considered other waters of the U.S. based on the presence of an OHW mark, regular flow, perennial hydrology in most years, and direct hydrologic connectivity to the San Francisco Bay. The RWQCB may also claim the banks of these creeks, and riparian habitat rooted below top of bank, as waters of the state.

5.3.5 Sensitive Habitats (Essential Fish Habitat)

San Francisco Bay is designated as EFH for the Pacific Coast Salmon, Coastal Pelagics, and Pacific Groundfish FMPs. All tidal aquatic habitats associated with the San Francisco Bay along the project alignment, including managed ponds, are considered EFH under these FMPs, and a number of fish species managed per these FMPs occur in tidal waters in the Biological Study Area.

5.4 Non-Native and Invasive Species

Many nonnative, invasive plant species occur in the Biological Study Area. Species with a "high" invasive rating by the California Invasive Plant Council (Cal-IPC) have the potential to cause severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment, and most are widely distributed ecologically (Cal-IPC 2023). In the Biological Study Area, yellow starthistle (*Centaurea solstitialis*), perennial pepperweed, common wild oat, smooth cordgrass, and red brome (*Bromus rubens*) were observed.

Smooth cordgrass is an invasive species that is listed as having a "high" invasive rating by Cal-IPC. It has the potential to cause severe ecological impacts in the tidal northern coastal saltmarsh and intertidal mudflat habitats in the Biological Study Area. Smooth cordgrass often hybridizes with native California cordgrass (*Spartina foliosa*) and can create large circular patches through its spreading rhizomes (DiTomaso et al. 2013). With the

cordgrass's aggressive reproductive biology, this invasive can colonize open mudflats, affecting foraging habitats for shorebirds (DiTomaso et al. 2013). It can also push out native vegetation in salt marshes. Its presence in the Biological Study Area can threaten all sensitive plant and animal species in wetland habitats. The San Francisco Estuary Invasive Spartina Project (ISP) was established in 2000 to implement a regional program to eradicate invasive Spartina (cordgrass) species. ISP survey and treatment areas include marshes and mudflats found in and adjacent to the Biological Study Area (Rohmer and Kerr 2023).

Five species in the Biological Study Area have a "moderate" rating by Cal-IPC, indicating that they have substantial and apparent-but generally not severe-ecological impacts on physical processes, plant and animal communities, and vegetation structure, and that their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment would be generally dependent upon ecological disturbance (Cal-IPC 2023). The species in the Biological Study Area with a moderate rating include black mustard (*Brassica nigra*), Italian thistle, seaside barley, ripgut brome and dissected geranium (*Geranium dissectum)*.

Species with a "limited" invasive rating by the Cal-IPC indicate that they are invasive by their ecological impact are minor on a statewide level (Cal-IPC 2023). The most common species in the Biological Study Area with a limited rating include brass buttons, rabbitsfoot grass, wild radish, English plantain (*Plantago lanceolata*), and soft brome (*Bromus hordeaceus*).

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Sterling, J. 2008. Yellow Rail (*Coturnicops noveboracensis*) *In* W. D. Shuford and T. Gardali, editors, California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.

Strong, C., K. K. Neumann, J. L. Hutchinson, J. K. Miller, A. L. Clark, L. Chang, et al. 2021. Common raven impacts on nesting western snowy plovers: Integrating management to facilitate species recovery. Human-Wildlife Interactions 15(3):465.

Trulio, L. A., and J. G. Evens. 2000. California black rail. Pages 342–345 *in* P. R. Olofson, editor, Baylands Ecosystem Species and Community Profiles: Life Histories and Environmental Requirements of Key Plants, Fish and Wildlife. San Francisco Bay Area Wetlands Ecosystem Goals Project. San Francisco Bay Regional Water Quality Control Board, Oakland, California.

Trulio, L., D. Chromczak, and P. G. Higgins. 2018. Winter Burrowing Owl Monitoring, 2016-2018: Final Report for the Period February 1, 2016 to March 1, 2018. Unpublished Report.

[UCSB] University of Santa Barbara. 2023. Aerial Photography. <https://www.library.ucsb.edu/geospatial/aerial-photography>. Accessed August.

Appendix BIO2

Special-Status Animal Species Potentially Occurring in the Study Area

TABLE BIO2-1
SPECIAL-STATUS ANIMAL SPECIES POTENTIALLY OCCURRING IN THE STUDY AREA

Name	*Status	Habitat	Potential for Occurrence in or Adjacent to the BSA
Federal or State Endangered, Threatened, or Candidate Species			
Green sturgeon (*Acipenser medirostris*)	FT, CSSC	Spawns in large river systems such as the Sacramento River; forages in nearshore oceanic waters, bays, and estuaries.	**Potentially Present—**Green sturgeon are long-lived fish that spend much of their time in marine waters, but forage annually in bay and brackish estuaries and spawn every 2-6 years in cool, deep, and swift flowing rivers with gravel and cobble bottoms.[1] Although little is known about this species' use of the lower South Bay, designated critical habitat includes all of the San Francisco Bay and tidally connected waterways up to mean higher high water.[2] Thus, this species is considered potentially present. Suitable foraging habitat is present within open water sloughs, tidal channels in marshes, and possibly some managed ponds, within the BSA.
White sturgeon (*Acipenser transmontanus*)	SC, CSSC	Spawns in large river systems such as the Sacramento River; forages in nearshore oceanic waters, bays, and estuaries.	**Absent as Breeder—**This species occurs in tidal waters of the South San Francisco Bay as well as streams throughout the BSA. However, this species is not known to spawn within San Francisquito Creek or tidal sloughs within the Program area. This species may occur in larger and deeper tidal sloughs as an occasional forager.
Longfin smelt (*Spirinchus thaleichthys*)	FP, ST	Spawns in fresh water in the upper end of the Bay; occurs year-round in the South Bay.	**Present—**Longfin smelt are anadromous fish that utilize fresh and brackish waters for spawning. They were recently found to breed in the South Bay in brackish sloughs and restored marshes where California bulrush and alkali bulrush dominated marsh provide suitable spawning habitat.[3] Longfin smelt adults and juveniles may also occur in the open bay and in San Francisquito Creek. Suitable habitat is present within tidal channels in marshes, and possibly in some managed ponds, within the BSA.
Central California coast ESU steelhead (*Oncorhynchus mykiss irideus*)	FT	Cool streams with suitable spawning habitat and conditions allowing migration between spawning and marine habitats.	**Present—**The steelhead is an anadromous form of rainbow trout that migrates upstream from the ocean to spawn. Steelhead in the South Bay usually migrate upstream to spawning areas from late December through early April, with the greatest activity in January through March, when flows are sufficient to allow them to reach suitable habitat in far upstream areas. Spawning occurs between December and June. Steelhead eggs remain in gravel depressions, known as

1 National Marine Fisheries Service (NMFS). 2018. Recovery Plan for the Southern Distinct Population Segment of North American Green Sturgeon. National Marine Fisheries Service, West Coast Region, Sacramento, California.

2 NMFS. 2009. Final rulemaking to designate critical habitat for the threatened southern Distinct Population Segment of North American green sturgeon. Federal Register 74:52300–52351.

3 Lewis, L. S., M. Willmes, A. Barros, P. K. Crain, and J. A. Hobbs. 2020. Newly discovered spawning and recruitment of threatened Longfin Smelt in restored and under explored tidal wetlands. Ecology 101(1):e02868.

Name	*Status	Habitat	Potential for Occurrence in or Adjacent to the BSA
			redds, for 1.5 to four months before hatching. After hatching, young of the year steelhead tend to use riffles with cover, while older juveniles use deeper water (such as pools) as rearing habitat, remaining in fresh water for one to four years before migrating to the ocean. This downstream migration of juveniles generally occurs between February and May. Designated critical habitat for the Central California coast ESU steelhead includes all of the San Francisco Bay up to highest high water, including marsh sloughs and channels, and tributaries with suitable spawning habitat up to the ordinary high water mark, including San Francisquito creek.[4] Designated critical habitat is found adjacent to the BSA in San Francisquito Creek. Steelhead may be found in Project reaches that include tidal open water of the San Francisco Bay, but not in the Bayfront Canal which is not tidal and for which access is blocked by a one-way tide gate. They could also possibly occur in some managed ponds. The species is determined to be present.
Bald eagle (*Haliaeetus leucocephalus*)	SE, SP	Occurs mainly along seacoasts, rivers, and lakes; nests in tall trees or in cliffs, occasionally on electrical towers. Feeds mostly on fish.	**Absent as Breeder—**Bald eagles occur mainly along seacoasts, rivers and lakes, and nest in tall trees or in cliffs. They feed mostly on fish, but also will take ducks, coots, and other similar waterbirds. Bald eagles are known to nest (or to have recently nested) in numerous locations in Santa Clara, and San Mateo Counties, mostly near reservoirs.[5,6] This species has occasionally been observed foraging in or near the BSA, but it would not nest in the BSA due to lack of suitable trees in which to build a nest.
Burrowing owl (*Athene cunicularia*)	SC, CSSC	Nests and roosts in open grasslands and ruderal habitats with suitable burrows, usually those made by California ground squirrels.	**Absent as Breeder—**Burrowing owls were once common in open habitats in the South Bay, but in recent decades their breeding population has declined as open space has been developed, such that the wintering population in the South Bay is now larger than the breeding population.[7] Burrowing owls have been irregularly observed wintering in Ravenswood pond R4 and at Bedwell Bayfront Park (B. Pearl, pers. obs.), and there is one record of burrowing owls breeding at Bedwell Bayfront Park in 2003.[6,15] Narrow strips of suitable burrowing owl roosting or nesting habitat (i.e., open grasslands and ruderal habitats with ground squirrel burrows) is present within the BSA. However, the species is not expected to nest here due to the region-wide decline in breeding

4 NMFS. 2016. Final Coastal Multispecies Recovery Plan. National Marine Fisheries Service, West Coast Region, Santa Rosa, California.

5 Bousman, W. G. 2007. Breeding Bird Atlas of Santa Clara County. Santa Clara Valley Audubon Society, Cupertino, California.

6 California Natural Diversity Database. 2025. Rarefind 5.0. California Department of Fish and Wildlife. <http://www.dfg.ca.gov/biogeodata/cnddb/mapsanddata.asp>. Accessed March 2025.

7 Trulio, L., D. Chromczak, and P. G. Higgins. 2018. Winter Burrowing Owl Monitoring, 2016-2018: Final Report for the Period February 1, 2016 to March 1, 2018. Unpublished Report.

Name	*Status	Habitat	Potential for Occurrence in or Adjacent to the BSA
			populations, lack of recent breeding records, and intensive human activity in the existing park.
Western snowy plover (*Charadrius nivosus nivosus*)	FT	Sandy beaches on marine and estuarine shores and salt pannes in Bay saline managed ponds.	**Present—**The western snowy plover nests on sandy beaches and salt pan habitat from southern Washington to Baja California, Mexico. Western snowy plovers are susceptible to nest disturbance and other negative interactions with humans. Much of their nesting habitat has been lost to development and high human use, with over half of all historical breeding across the range no longer used. In addition, synanthropic mesopredators, especially the non-native red fox and common raven, have had dramatic effects on snowy plover nesting success.[8,9] The species is known to breed and forage at ponds R1, R2, R3, R4, R5, SF2, and S5 at the Ravenswood Complex of the Refuge, located within the BSA.[10] Snowy plovers may occasionally forage on intertidal mudflats adjacent to the BSA.
California black rail (*Laterallus jamaicensis coturniculus*)	ST, SP	Breeds in fresh, brackish, and tidal salt marsh.	**Present—**The California black rail is a small rail that inhabits tidal salt, brackish, and freshwater marshes. This small bird is very secretive, and is most often seen during high tides when it is forced into high marshes. It is most abundant in tidal marshes with some freshwater input (Evens et al. 1991), nesting primarily in pickleweed-dominated marshes with patches or borders of bulrush sp., often near the mouths of creeks. Black rails build nests in tall grasses or marsh vegetation during spring, and lay about 6 eggs. Nests are usually constructed of pickleweed, and are placed directly on the ground or slightly above ground in vegetation. Black Rails feed on terrestrial insects, aquatic invertebrates, and possibly seeds.[11] Suitable breeding and foraging habitat occurs in Faber Marsh, Laumeister Marsh, Ravenswood Marsh, and Ravenswood Slough, and the species has been recorded at Faber Marsh and Laumeister Marsh in the BSA.[6]

8 Neuman, K. K., G. W. Page, L. E. Stenzel, J. C. Warriner, and S. Warriner. 2004. Effect of mammalian predator management on Snowy Plover breeding success. Waterbirds 27(3):257–263.

9 Strong, C., K. K. Neumann, J. L. Hutchinson, J. K. Miller, A. L. Clark, L. Chang, et al. 2021. Common raven impacts on nesting western snowy plovers: Integrating management to facilitate species recovery. Human-Wildlife Interactions 15(3):465.

10 Pearl, B., P. Kaye, and J. Scullen. 2023. Western Snowy Plover Monitoring in the San Francisco Bay 2022 Annual Report. San Francisco Bay Bird Observatory. Milpitas, California.

11 Trulio, L. A., and J. G. Evens. 2000. California black rail. Pages 342–345 *in* P. R. Olofson, editor, Baylands Ecosystem Species and Community Profiles: Life Histories and Environmental Requirements of Key Plants, Fish and Wildlife. San Francisco Bay Area Wetlands Ecosystem Goals Project. San Francisco Bay Regional Water Quality Control Board, Oakland, California.

Name	*Status	Habitat	Potential for Occurrence in or Adjacent to the BSA
California Ridgway's rail (*Rallus obsoletus obsoletus*)	FE, SE, SP	Salt marsh habitat dominated by pickleweed and cordgrass (*Spartina* spp.).	**Present—**The California Ridgway's Rail is a secretive marsh bird currently endemic to the marshes of San Francisco Bay. It formerly bred at several other locations, including Humboldt Bay, Elkhorn Slough (Monterey County), and Morro Bay, but is now extirpated from all sites outside of San Francisco Bay. California Ridgway's Rails nest in salt and brackish marshes along the edge of the bay, and are most abundant in extensive salt marshes and brackish marshes dominated by cordgrass, pickleweed, and marsh gumplant, and containing complex networks of tidal channels.[12] Shrubby areas adjacent to or within tidal marshes are important for predator avoidance at high tides. Formerly abundant in tidal salt marshes of the San Francisco Bay, Ridgway's rail populations have greatly declined due to historical loss of habitat, fragmentation and degradation of remaining habitat, and increasing presence of urban adapted predator species.[13] Faber and Laumeister marshes support some of the highest densities of Ridgway's rail in the Bay area, and the species is also found in moderate numbers in Ravenswood Marsh and Ravenswood Slough.[14]
California least tern (*Sternula antillarum browni*)	FE, SE, SP	Nests along the coast on bare or sparsely vegetated, flat substrates. In the South Bay, nests in salt pannes, islands, and on an old airport runway. Forages for fish in open waters.	**Absent as Breeder—**California least terns are piscivorous migratory birds that nest from Baja California north to the San Francisco Bay and spend winter months in coastal areas off of Mexico and Central America. They nest from April to August, primarily on sandy beaches on the outer coast, but in estuarine habitats such as the San Francisco Bay they utilize a variety of habitats, including former salt ponds and adjacent levees. In recent years there have been a total of six colonies in the San Francisco Bay estuary, with two found in the South Bay at Eden Landing Ecological Reserve and Hayward Regional Shoreline, one found in the Central Bay at Alameda Point, two found in San Pablo Bay at Cullinan Ranch in San Pablo Bay National Wildlife Refuge and the Green Island Unit in Napa-Sonoma Marshes Wildlife Area, and one colony in Suisun Bay at the Montezuma Wetlands (B. Pearl, pers. obs.). Least terns were known to nest at salt evaporation ponds northwest of the BSA in 1976 and at Outer Bair Island approximately 3 mi to the northwest in some years from 1969–1982, but they are no longer known to nest at these locations. Least terns are therefore not known to or expected to nest in or adjacent to the BSA. Least terns forage primarily in managed ponds, tidal sloughs, and over the

12 Harvey, T. E. 1980. A Breeding Season Survey of the California Clapper Rail (*Rallus longirostris obsoletus*) in South San Francisco Bay, California. Final Report, U.S. Fish & Wildlife Service, San Francisco Bay National Wildlife Refuge, Newark, California.

13 Albertson, J. D., and J. G. Evens. 2000. California clapper rail. Pages 332–341 *In* P. R. Olofson, editor, Baylands Ecosystems 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. San Francisco Bay Regional Water Quality Control Board, Oakland, California.

14 Olofson Environmental, Inc. 2015. California Ridgway's Rail Surveys for the San Francisco Estuary Invasive Spartina Project 2015. Prepared for State Coastal Conservancy, San Francisco Estuary Invasive Spartina Project. Oakland, California.

Name	*Status	Habitat	Potential for Occurrence in or Adjacent to the BSA
			open San Francisco Bay, and though uncommon, could possibly forage in the BSA during post-breeding fall dispersal.[15]
Tricolored blackbird (*Agelaius tricolor*)	ST	Nests near fresh water in dense emergent vegetation.	**Absent as Breeder—**Tricolored blackbirds typically nest in extensive stands of tall emergent herbaceous vegetation in non-tidal freshwater marshes and ponds, which are not present on or immediately adjacent to the BSA. This species is not known to nest in tidal habitats in San Mateo County, and has not been recorded nesting in or near the BSA.[6,15] However, small numbers of tricolored blackbirds may forage in or near the BSA (e.g., in grasslands and marsh habitats) during the nonbreeding season.
Salt marsh harvest mouse (*Reithrodontomys raviventris*)	FE, SE, SP	Salt marsh habitat dominated by common pickleweed or alkali bulrush.	**Present—**The salt marsh harvest mouse is a small mouse endemic to salt marshes of San Francisco Bay. These mice are dependent on dense vegetative cover, usually in the form of pickleweed and other salt dependent or salt tolerant vegetation in both tidal and diked salt marshes[16,17,18,19,20]). Pickleweed provides more horizontal branches (and therefore more cover) than other halophytic species. Salt marsh harvest mice have been found to utilize a wider variety of habitats than previously thought, including in the south bay in alkali bulrush dominated marsh that is mature and heavily-thatched, and in the north bay in mixed halophytic vegetation where Olney's threesquare bulrush (*Schoenoplectus americanus*) is dominant.[21,22] The salt marsh harvest mouse's current distribution includes salt marshes in San Francisco, San Pablo, and Suisun Bays. The species no longer occurs on the Peninsula north of Coyote Point.[18] It historically occurred throughout the BSA prior to the conversion of large tracts of tidal salt marsh to salt production ponds,

15 Cornell Lab of Ornithology. 2025. eBird. <http://www.ebird.org/>. Accessed March 2025.

16 Fisler, G. F. 1965. Adaptations and Speciation in Harvest Mice of the Marshes of San Francisco Bay. Dissertation. University of California, Berkeley.

17 Shellhammer, H. S. 1982. *Reithrodontomys raviventris*. Mammalian Species 169:1–3.

18 Shellhammer, H. S. 2000a. Salt marsh harvest mouse, *Reithrodontomys raviventris*. Pages 219–228 *In* P. R. Olofson, editor. Goals Project 2000. Baylands Ecosystem Species and Community Profiles: Life Histories and Environmental Requirements of Key Plants, Fish and Wildlife. San Francisco Bay Area Wetlands Ecosystem Goals Project, Oakland, California. San Francisco Bay Regional Water Quality Control Board.

19 Shellhammer, H. S., R. Jackson, W. Davilla, A. M. Gilroy, H. T. Harvey, and L. Simons. 1982. Habitat preferences of salt marsh harvest mice (*Reithrodontomys raviventris)*. Wasmann Journal of Biology 40(1/2):102–114.

20 Shellhammer, H. S., R. Duke, H. T. Harvey, V. Jennings, V. Johnson, and M. Newcomer. 1988. Salt marsh harvest mice in the diked salt marshes of southern San Francisco Bay. Wasmann Journal of Biology 46(1/2):89–103.

21 H. T. Harvey & Associates. 2007. Marsh Studies in South San Francisco Bay; 2005–2008. California Clapper Rail and Salt Marsh Harvest Mouse Survey Report. Unpublished project report 477-28. H. T. Harvey & Associates, Los Gatos, California.

22 Smith, K. R., L. Barthman-Thompson, W. R. Gould, and K. E. Mabry. 2014. Effects of natural and anthropogenic change on habitat use and movement of endangered salt marsh harvest mice. PLoS ONE 9(10):e108739.

Name	*Status	Habitat	Potential for Occurrence in or Adjacent to the BSA
			agriculture, and/or filled for development. High-quality salt marsh habitat for this species occurs in the BSA in Faber Marsh and Laumeister Marsh, and suitable habitat also occurs at Ravenswood Marsh and Ravenswood Slough.
Monarch butterfly (*Danaus plexippus*)	FPT	Requires milkweeds (*Asclepias* spp.) for egg-laying and larval development, but adults obtain nectar from a wide variety of flowering plants in many habitats. Individuals congregate in winter roosts, primarily in Mexico and in widely scattered locations on the central and southern California coast.	**Present—**The monarch butterfly is a large migratory butterfly that breeds and lays eggs on milkweeds throughout its migration. In California, monarchs overwinter primarily on introduced blue gum eucalyptus (*Eucalyptus globulus*), native Monterey pine (*Pinus radiata*), and native Monterey cypress (*Cupressus macrocarpa*), and less frequently on other native trees such as western sycamore (*Platanus racemosa*), coast redwood (Sequoia *sempervirens*), and coast live oak (*Quercus agrifolia*).[23] Milkweeds were not observed in the BSA during site visits, but could occur within detention basin/canal, landscaped/developed, and ruderal habitats within the BSA. The species is not known to form winter roosts in the area. The closest known winter roosts are located at Coyote Hills Regional Park and Ardenwood Historic Farm, located approximately 4.2 and 6.0 miles to the northeast, respectively, with a small roost of approximately 50 individuals recently identified in redwoods in the North Bayshore area of Mountain View, 4.0 miles to the southeast.[6]
Crotch's bumble bee	SC	Open grassland and scrub habitats with abundant flowers providing nectar and pollen and with subterranean nest sites (such as animal burrows).	**Potentially Present.** Although this species was historically found throughout the southern two-thirds of California, including the BSA vicinity, population declines and range contractions (25% relative to its historical range) have made this species very scarce in the region.[24] Since 2019, however, there have been a number of records of small numbers of individuals from scattered locations in Santa Clara County as close to the BSA as the Palo Alto Baylands 1.3 miles to the southeast,[25,26] indicating that the species is still extant in the region. Although the species has not been recorded in San Mateo County in recent years, the Master Plan area does provide high-quality floral resources for foraging in ruderal grasslands and ruderal levee slopes. Therefore, this species could occur in the BSA.
California Species of Special Concern			
Central Valley fall-run ESU Chinook Salmon	CSSC	Cool rivers and large streams that reach the ocean and that have shallow, partly shaded pools, riffles,	**Present—**Chinook salmon are present in tidal open water habitats of the South Bay primarily from late August through October (during the adults' upstream migration) and during the downstream migration of juveniles. Chinook salmon

23 Malcolm, S. B. 2018. Anthropogenic impacts on mortality and population viability of the monarch butterfly. Annual Review of Entomology. 63: 277-302.

24 California Department of Fish and Wildlife. 2019. Report to the Fish and Game Commission. Evaluation of the petition from the Xerces Society, Defenders of Wildlife, and the Center for Food Safety to list four species of bumble bees as endangered under the California Endangered Species Act. April 4.

25 Bumble Bee Watch. 2025. Bumble Bee Sightings Map. https://www.bumblebeewatch.org/maps/. Accessed March 2025.

26 iNaturalist. 2025. Available from https://www.inaturalist.org. Accessed March 2025.

Name	*Status	Habitat	Potential for Occurrence in or Adjacent to the BSA
(*Oncorhynchus tshawytscha*)		and runs for spawning; adults forage in marine habitats.	are known to be present in several South Bay streams, including the Guadalupe River and Coyote Creek and associated slough channels, and there is recent evidence to suggest that Chinook salmon historically occurred in the Guadalupe River.[27] Suitable spawning habitat is not present in the Study Area, but this species may utilize open water in sloughs and marsh channels for foraging, and could possibly enter some managed ponds
Pacific lamprey (*Entosphenus tridentatus*)	CSSC	Medium- and large-sized, low-gradient cold rivers and streams, with a wide range of habitats (e.g., gravel, low-gradient riffles).	**Present.** Pacific lamprey are anadromous, eel-like fish that parasitize both fish and marine mammals for food. They live in the ocean for up to five years before returning to natal freshwater streams for spawning. This species is known to be present in San Francisquito Creek adjacent to the Project footprint, and it may occur in tidal open water habitats adjacent to the Project footprint as well.[28] Suitable spawning habiat is not present in the Study Area, but this species may utilize open water in sloughs and marsh channels for foraging, and could possibly enter some managed ponds.
Golden eagle (*Aquila chrysaetos*)	SP	Breeds on cliffs or in large trees (rarely on electrical towers); forages in open areas.	**Absent as Breeder—**Nests on secluded cliff edges and in large trees. Uncommon breeder in the South Bay due to lack of habitat. No suitable nesting habitat is present in the Study Area, and this species occurs in the Study Area only rarely as a forager at Bedwell Bayfront Park.[15]
Black skimmer (*Rynchops nigra*)	CSSC (nesting)	Nests and roosts on bare ground on isolated islands, forages for fish in freshwater, brackish, and marine waters.	**Present—**Black Skimmer is a unique species, with a lower mandible longer than the upper mandible. This extended lower mandible allows these birds to fly over the surface of the water, “skimming” for small fish. Black Skimmers nest primarily on the coasts of the Southeast United States, the Gulf of California, and the Pacific Coast of Baja, California, north to Orange County, with the northernmost nesting sites found in the South San Francisco Bay. Black skimmers nest within the BSA among other seabird and shorebird colonies on islands in ponds R1 and SF2, although not every year and not simultaneously in both locations.[15] The closest colony outside of the BSA is located approximately 2.6 miles to the southeast.
Alameda song sparrow (*Melospiza melodia pusillula*)	CSSC	Nests in salt marsh, primarily in marsh gumplant and cordgrass along channels.	**Present—**The Alameda song sparrow is one of three subspecies of song sparrow breeding only in salt marsh habitats in the San Francisco Bay Area. Locally it is most abundant in the taller vegetation found along tidal sloughs, including salt marsh cordgrass and marsh gumplant. Populations of the Alameda song sparrow have declined due to the loss of salt marshes around the Bay, although within suitable habitat it is still fairly common. The location of

[27] Lanman, R. B., L. Hylkema, C. M. Boone, B. Allée, R. O. Castillo, S. A. Moreno, M. F. Flores, U. DaSilva, B. Bingham, and B. M. Kemp. 2021. Ancient DNA Analysis of Archaeological Specimens Extends Chinook Salmon’s Known Historic Range to San Francisco Bay’s Tributaries and Southernmost Watershed. PLOS One 16(4): e0244470.

[28] CalFish. 2014. Fisheries Management Species Page: Pacific Lamprey (*Entosphenus tridentatus*). https://www.calfish.org/fisheriesmanagement/speciespages/pacificlamprey.aspx.

Name	*Status	Habitat	Potential for Occurrence in or Adjacent to the BSA
			the interface between populations of the Alameda song sparrow and those of the race breeding in freshwater riparian habitats (*M. m. gouldii*) along most creeks is not known due to difficulties in distinguishing individuals of these two races in the field. Alameda song sparrows breed and occur year-round in Faber Marsh, Laumeister Marsh, Ravenswood Marsh, and Ravenswood Slough.[6,15] Individual sparrows may forage along ruderal levee slopes and non-tidal/muted tidal northern coastal salt marsh within the BSA.
Bryant's savannah sparrow (*Passerculus sandwichensis alaudinus*)	CSSC	Nests in pickleweed dominant salt marsh and adjacent ruderal habitat.	**Present—**Bryant's savannah sparrow in the South San Francisco Bay nest primarily in short pickleweed-dominated portions of diked tidal salt marsh habitat and in adjacent ruderal habitats on levees.[29] Suitable nesting habitat occurs in ruderal grasslands, vegetated levee sides, and vegetated pond bottoms found in the BSA.
Northern harrier (*Circus hudsonius*)	CSSC (nesting)	Nests in marshes and moist fields with tall vegetation and sufficient moisture to inhibit accessibility of nest sites to predators. Forages over open areas.	**Present—**This species, which is considered special-status only when breeding, occurs year-round in the BSA. Suitable nesting and foraging habitat is present at Faber Marsh, Laumeister Marsh, Ravenswood Marsh, and Ravenswood Slough, and the species also forages at ponds R1, R2, R3, R4, R5, S5, and SF2.[15]
Loggerhead shrike (*Lanius ludovicianus*)	CSSC (nesting)	Nests in tall shrubs and dense trees; forages in grasslands, marshes, and ruderal habitats.	**Absent as Breeder—**These predatory songbirds are year-round residents in grassland and scrub habitats in California. Loggerhead shrikes generally build their nests in shrubs and trees in fairly open areas, and nest in spring and early summer. They hunt in open areas, usually from a low perch, such as a fence post or overhead wire. They forage primarily on large insects, lizards, and small mammals, but some individuals also prey on snowy plover chicks and other young shorebirds. This species, which is considered special-status only when breeding, occurs occasionally in the BSA during migration and winter, but due to declines in Bay Area breeding populations, they are no longer expected to nest there.[15] Small numbers of individuals may forage in the ruderal grasslands, managed ponds, and tidal marsh found in the BSA during migration and winter.
San Francisco common yellowthroat (*Geothlypis trichas sinuosa*)	CSSC	Nests in herbaceous vegetation, usually in wetlands or moist floodplains.	**Present—**The San Francisco common yellowthroat is a small songbird that inhabits emergent vegetation, primarily in fresh and brackish marshes, and associated upland areas in the San Francisco Bay Area. This subspecies (one of approximately 12 subspecies of common yellowthroat recognized in North America) breeds from mid-March through early August, and pairs frequently raise two clutches per year. Because this subspecies cannot be reliably

[29] Fitton, S. D. 2008. Bryant's Savannah Sparrow (*Passerculus sandwichensis alaudinus*) *In* W. D. Shuford and T. Gardali, editors, California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.

Name	*Status	Habitat	Potential for Occurrence in or Adjacent to the BSA
			distinguished in the field from other races that occur in the South Bay as migrants, determination of the presence of Saltmarsh Common Yellowthroats can be achieved only by observation of presence during the summer months when other subspecies are not expected to be present. San Francisco common yellowthroats breed and occur year-round in Faber Marsh, Laumeister Marsh, Ravenswood Marsh, and Ravenswood Slough, and may also be found in non-tidal marsh habitat.[6,15] Individual yellowthroats may forage along vegetated levees within the BSA.
Yellow warbler (*Setophaga petechia*)	CSSC (nesting)	Nests in riparian woodlands.	**Absent as Breeder—**Yellow warblers are closely associated with riparian areas, regularly nesting in sycamores (*Platanus* sp.), cottonwoods (*Populus* sp.), and willows (Salix sp.), and less often in shrubs and dense undergrowth.[30] Despite the presence of willows in ornamental woodland (riparian) located west of Faber Marsh, the limited extent of these willows makes them unsuitable for use by yellow warblers, which also do not typically breed along the immediate edge of the baylands. Trees and shrubs in landscaped, riparian, and ruderal areas provide foraging habitat for this species, which occurs in the BSA as a common spring and fall migrant.
Yellow rail (*Coturnicops noveboracensis*)	CSSC	Nests in freshwater sedge marshes with moist soil or shallow standing water.	**Absent as Breeder—**The yellow rail breeds in California only in the far northeast, and very small numbers of this secretive species winter in coastal and estuarine marshes.[31] Multiple individuals have been observed wintering at the Palo Alto Baylands,[6] and individuals may also winter at Faber Marsh, Laumeister Marsh, Ravenswood Marsh, and Ravenswood Slough.
Pallid bat (*Antrozous pallidus*)	CSSC	Forages over many habitats; roosts in caves, rock outcrops, buildings, and hollow trees.	**Absent as Breeder—**Historically, pallid bats were likely present in a number of locations throughout the BSA, but their populations have declined in recent decades, and the species has been extirpated as a breeder from urban areas close to the Bay. Individuals from more remote colonies could potentially forage in the BSA in open habitats on rare occasions, but the species is not expected to roost within or near the BSA.

[30] Heath, S. 2008. Yellow Warbler (*Setophaga petechia*) *In* W. D. Shuford and T. Gardali, editors, California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.

[31] Sterling, J. 2008. Yellow Rail (*Coturnicops noveboracensis*) *In* W. D. Shuford and T. Gardali, editors, California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.

Name	*Status	Habitat	Potential for Occurrence in or Adjacent to the BSA
Townsend's big-eared bat (*Corynorhinus townsendii*)	CSSC	Roosts in caves and mine tunnels, and occasionally in deep crevices in trees such as redwoods or in abandoned buildings, in a variety of habitats	**Absent as Breeder—**No known extant populations or breeding sites are present in the BSA or vicinity. Occasional individual Townsend's big-eared bats may roost and forage in suitable buildings nearly anywhere in the BSA, but such individuals are expected to occur very infrequently and in small numbers. A maternity roost was known to occur in Woodside approximately 6.0 miles to the south of the BSA, however it has not been observed active since 1954.[6] In 1989, a male was recorded roosting in Portola Valley approximately 7.4 miles from the BSA.[6] This species is not expected to roost near construction areas, but small numbers could forage along riparian areas where ornamental woodland is present.
Western red bat (*Lasiurus blossevillii*)	CSSC	Roosts in foliage in forest or woodlands, especially in or near riparian habitat.	**Absent as Breeder—**Individual western red bats occur in the BSA vicinity in low numbers as migrants and winter residents, but this species does not breed in the BSA. They may roost in the foliage of trees virtually anywhere in the BSA, but are expected to roost primarily in riparian habitats with suitable trees, which are largely absent from the BSA. Occasional individuals may forage over the BSA year-round.
Salt marsh wandering shrew (*Sorex vagrans halicoetes*)	CSSC	Medium to high marsh 6 to 8 feet above sea level with abundant driftwood and common pickleweed.	**Potentially Present—**Formerly more widely distributed in the Bay Area, this small insectivorous mammal is now confined to salt marshes of the South Bay.[32] Salt marsh wandering shrews occur most often in medium-high wet tidal marsh (6 to 8 feet above sea level), with abundant driftwood and other debris for cover.[33] They have also been recorded occasionally in diked marsh. This species is typically found in fairly tall pickleweed, in which these shrews build nests. Individuals may occasionally disperse short distances into ruderal grassland to forage. They breed and give birth during spring, although very little is known regarding the natural history of the species. This species is known in the BSA vicinity from a record in the outboard marsh of pond R4 at Ravenswood Point.[6] The salt marsh wandering shrew shares similar habitat requirements to the salt marsh harvest mouse and may be found in areas where the salt marsh harvest mouse has been confirmed to be present. High-quality tidal northern coastal salt marsh habitat occurs within the BSA in Faber Marsh and Laumeister Marsh.

32 Findley, J. S. 1955. Speciation of the wandering shrew. Occasional Papers of the Museum of Natural History 9:1–68.

33 Shellhammer, H. S. 2000b. Salt marsh wandering shrew, *Sorex vagrans halicoetes*. Pages 231–233 *In* P. R. Olofson, editor. Goals Project 2000. Baylands Ecosystem Species and Community Profiles: Life Histories and Environmental Requirements of Key Plants, Fish and Wildlife. San Francisco Bay Area Wetlands Ecosystem Goals Project, Oakland, California. San Francisco Bay Regional Water Quality Control Board.

Name	*Status	Habitat	Potential for Occurrence in or Adjacent to the BSA
State Fully Protected Species			
White-tailed kite (*Elanus leucurus*)	SP	Nests in tall shrubs and trees; forages in grasslands, marshes, and ruderal habitats.	**Absent as Breeder—**White-tailed kites employ a unique foraging style known as kiting, in which they hover in the air searching for small mammals, birds, lizards, and sometimes insects. They build stick nests in the top of tall bushes and trees located near open foraging areas.[34] Due to a lack of suitable trees this species does not nest in the BSA. White-tailed kites are known to nest in eastern San Mateo County throughout the open areas bordering the San Francisco Bay.[35,15] Large trees in Bedwell Bayfront Park adjacent to the BSA and ornamental woodlands within the BSA provide suitable nesting habitat for white-tailed kites, and open areas of managed ponds, ruderal uplands, seasonal wetlands, and tidal/non-tidal marshes provide foraging habitat for this species.
Marine Mammal Protection Act Protected Species			
Harbor seal (*Phoca vitulina*)	MMPA	Widely distributed across the northern hemisphere in coastal waters and on rocky islands, sandy beaches, and mudflats for haul-out sites.	**Absent as Breeder—**Some harbor seals live year-round in the San Francisco Bay, foraging for fish, shellfish, and crustaceans. They seek secluded locations for haul out and pupping sites, which in the South Bay include Bair Island and Mowry Slough, approximately 3.0 miles northwest and 4.1 miles east from the BSA, respectively.[36] Harbor seals from these haul-out sites are expected to forage in tidal waters in the BSA.
California sea lion (*Zalophus californianus*)	MMPA	Found along the west coast of North America in coastal waters and on beaches, docks, buoys, and jetties for haul-out sites.	**Potentially Present—**California sea lions spend the non-breeding season (May-June) in the San Francisco Bay, foraging for anchovies, herring, surfperch, leopard sharks, shrimp, and crabs.[36] They do not breed in the San Francisco Bay, and only occasional limited breeding occurs in Northern California on Año Nuevo Island and the Farallon Islands. Only three haul-out sites in the San Francisco Bay are known, including Pier 39, Angel Island, and Seal Rock, all located in the Central Bay. California sea lions are rare visitors to the South Bay as individual foragers:[26] they may forage in tidal waters in the BSA.

Key to Status Abbreviations: Federally Endangered (FE); Federally Threatened (FT); Candidate for Federal Listing (FC); Proposed for Federal Listing as Threatened (FPT); State Endangered (SE); State Threatened (ST); Proposed for State Listing (SC); State Fully Protected (SP); California Species of Special Concern (CSSC); Marine Mammal Protection Act (MMPA).

34 Polite, C. 1990. White-tailed Kite (*Elanus leucurus*) *In* D. C. Zeiner, W. F. Laudenslayer, Jr., K. E. Mayer, and M. White, editors, California's Wildlife. Vol. I-III. California Depart. of Fish and Game, Sacramento.

35 Sequioa Audubon Society. 2001. San Mateo County Breeding Bird Atlas. Sequoia Audubon Soc., Woodside, CA.

36 Goals Project. 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, editor. San Francisco Bay Regional Water Quality Control Board, Oakland, California.

Appendix BIO3

Habitat Restoration Basis of Design











H. T. HARVEY & ASSOCIATES
Ecological Consultants
50 years of field notes, exploration, and excellence

SAFER Bay Project
Habitat Restoration Basis of Design

H. T. Harvey Project #3550-05

Prepared for:

Tess Byler
San Francisquito Creek Joint Powers Authority

Prepared by:

H. T. Harvey & Associates

In collaboration with
Environmental Science Associates
and **HDR, Inc.**

February 2025

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Section 1.0 Introduction

This report presents the basis of design for restoration of bayshore habitats as part of The Strategy to Advance Flood Protection, Ecosystem Restoration and Recreation along San Francisco Bay project (SAFER Bay or project). It includes habitat restoration designs at a preliminary level along with the basis of design rationale. This report supplements SAFER Bay's 30% and 10% Construction Plans (HDR 2024a). The following sections provide an overview of the project and report purpose.

1.1 Project Overview

The SAFER Bay project is being implemented by the San Francisquito Creek Joint Powers Authority (SFCJPA). The project is located on the bayshore of the cities of East Palo Alto and Menlo Park, two member Cities of the SFCJPA. The project area extends from San Francisquito Creek at the south end to the Menlo Park-Redwood City border at the northwest end (Figure 1).

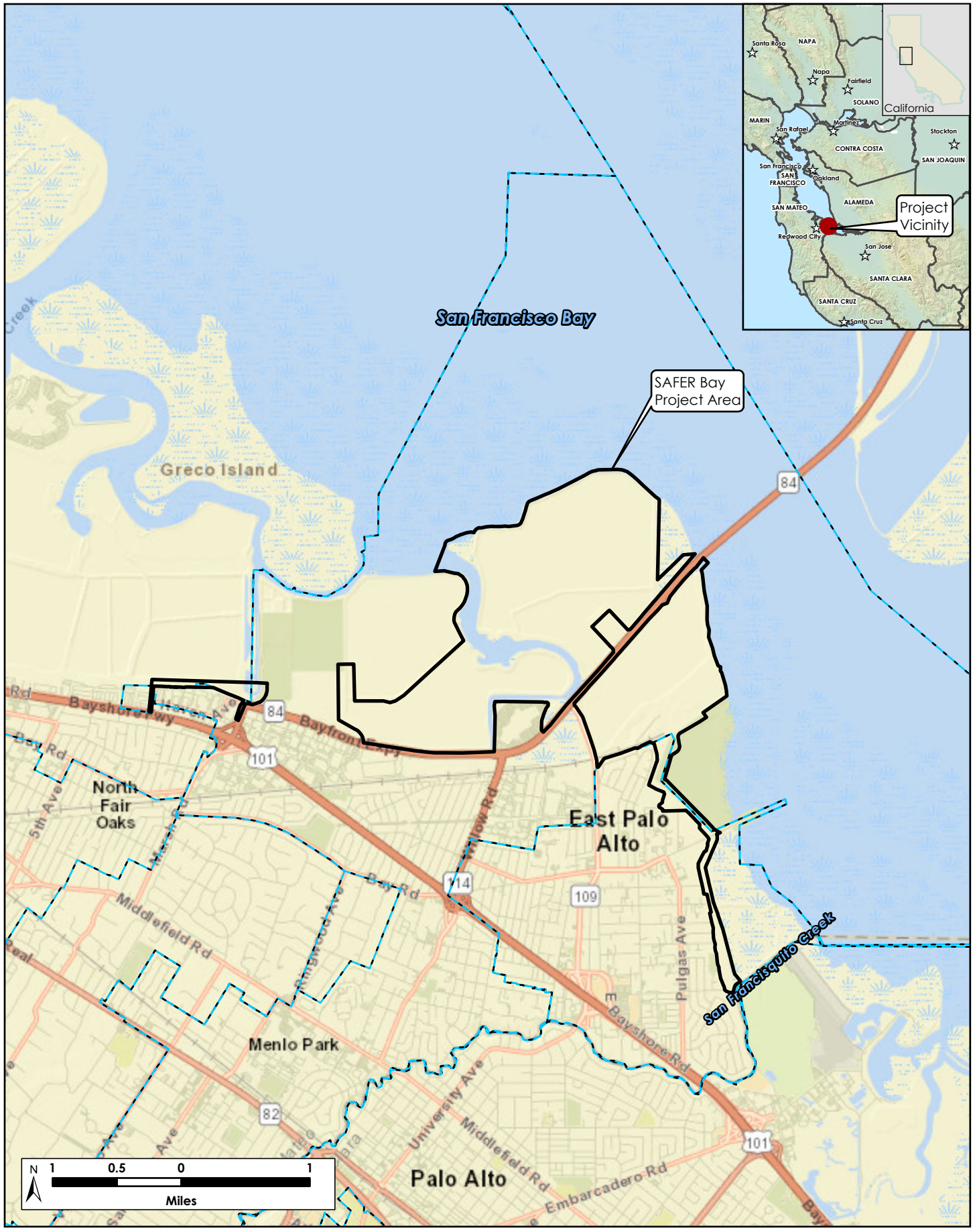
The project's purpose is to protect people, property and infrastructure from coastal/tidal flooding through engineered and natural features that enhance shoreline ecosystems and improve recreational opportunities. Flood protection will be provided by a combination of floodwalls and earthen levees integrated with ecological restoration such as salt marsh-upland transition zone (T-zone) habitat restoration. The project will reduce the risk of flooding within the cities of East Palo Alto and Menlo Park from San Francisco Bay waters, including consideration of up to 3.5 feet of future sea level rise (SLR), and support the communities' objective to be removed from the Federal Emergency Management Agency (FEMA) floodplain.

A key project objective pertinent to habitat restoration is as follows:

- Enable adaptation to our changing climate by implementing flood protection in ways that sustain and restore marsh habitat and enhance and protect habitat for western snowy plover (*Charadrius nivosus nivosus*; WSP), consistent with the South Bay Salt Pond Restoration Project (SBSPRP) and other restoration efforts.

This report is focused on the restoration design elements incorporated into the project to achieve this objective in a manner sufficient to offset the project's unavoidable impacts to regulated wetland and aquatic habitats and associated fish and wildlife species.

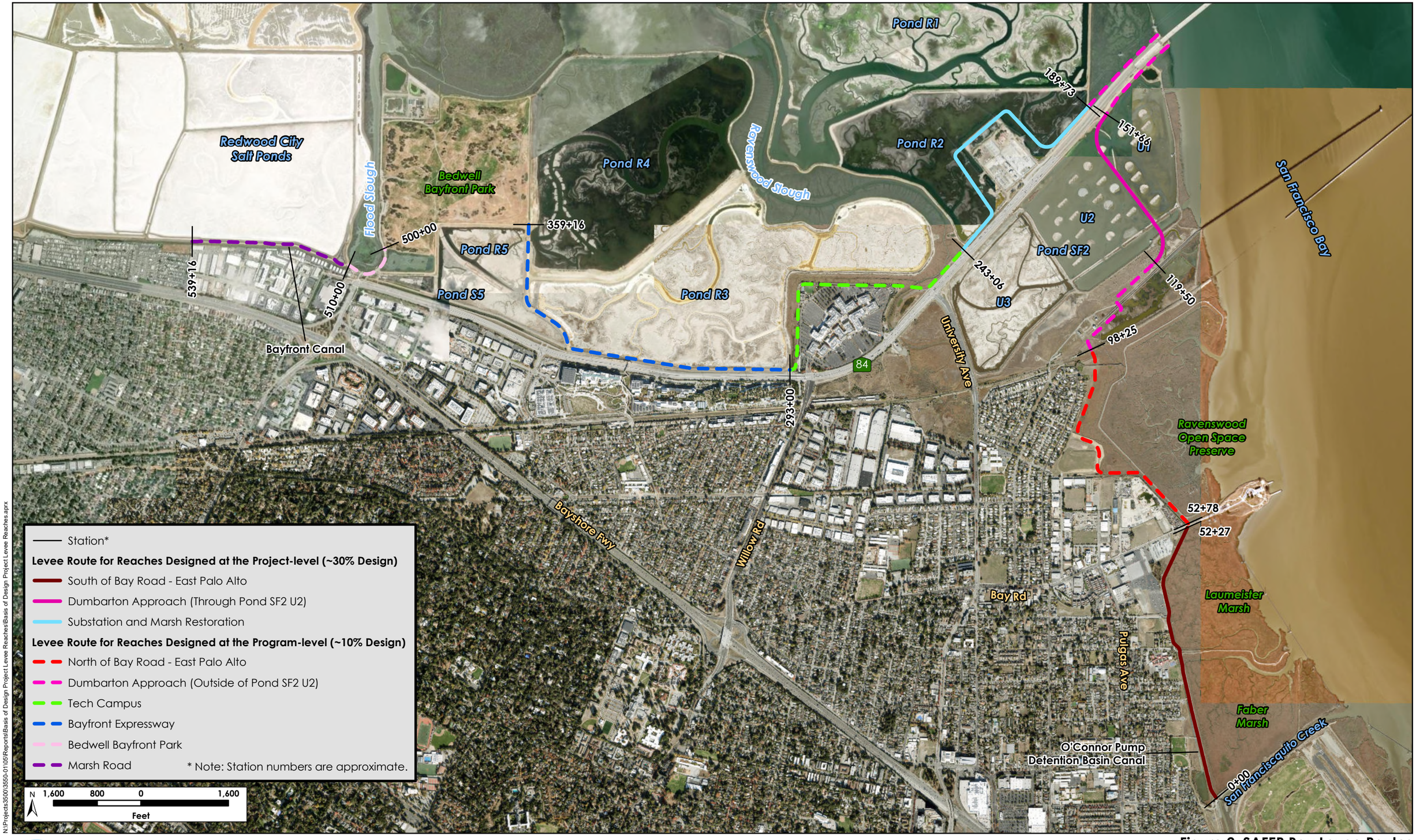
The project is divided into 8 reaches and into project-level versus program-level levee routes for analysis in the project's forthcoming Draft Environmental Impact Report (DEIR) (Figure 2). Construction of the project-level reaches is anticipated to begin as soon as 2028. Construction of the program-level reaches would occur further in the future.



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Figure 1. Vicinity Map
SAFER Bay Project - Ecological Basis of Design for Project Level Reaches (3550-05)
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Figure 2. SAFER Bay Levee Routes
SAFER Bay Project - Ecological Basis of Design for Project Level Reaches (3550-05)
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Project-level and program-level levee routes are shown on Figure 2 and listed below from south to north:

- Project-Level Levee Routes—
    - South of Bay Road – East Palo Alto
    - Dumbarton Approach (portion of levee route through Pond SF2 U2)
    - Substation and Marsh Restoration
- Program-Level Levee Routes—
    - North of Bay Road – East Palo Alto
    - Dumbarton Approach (portion of levee route outside of Pond SF2)
    - Tech Campus
    - Bayfront Expressway
    - Bedwell Bayfront Park
    - Marsh Road

Levees and related flood protection improvements will impact jurisdictional wetland habitats along the bayshore and affect associated special-status wildlife species, including WSP, salt marsh harvest mouse (*Reithrodontomys raviventris*) (SMHM), California Ridgway's rail (*Rallus obsoletus obsoletus*) (CRR), black skimmer (*Rynchops niger*), elegant tern (*Thalasseus elegans*), and the regionally rare Caspian tern (*Hydroprogne caspia*), as well as several fish species. To reduce temporal loss of regulated habitats and associated species impacts, the project's restoration is included in the project-level reaches to be constructed concurrent with the project's initial impacts from levee construction.

1.2 Definition of Habitat Enhancement, Restoration and Creation Terms

The various federal and state regulatory agencies that will assess the adequacy of habitat changes for the SAFER Bay project have slightly different definitions for terms used to describe habitat improvement. In this report, we use the following definitions published by the U.S. Army Corps of Engineers (USACE) South Pacific Division (USACE 2015):

- **Enhancement—**Manipulation of the physical, chemical, or biological characteristics of an aquatic resource to heighten, intensify, or improve a specific aquatic resource function(s). Enhancement results in the gain of selected aquatic resource function(s) but may also lead to a decline in other aquatic resource function(s). Enhancement does not result in a gain in aquatic resource area."
- **Restoration**—Manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former or degraded aquatic resource(s). For the

purpose of tracking net gains in aquatic resource area, restoration is divided into two categories re-establishment and rehabilitation. Rehabilitation results in a gain in aquatic resource function, but does not result in a gain in aquatic resource areas. Re-establishment results in rebuilding a former aquatic resource and results in a gain in aquatic resource area and functions."

- **Creation (Establishment)—**Manipulation of the physical, chemical, or biological characteristics present at an upland site to develop aquatic resources that did not previously exist. Establishment results in a gain in aquatic resource area and functions."

1.3 Report Purpose

H. T. Harvey & Associates' (H. T. Harvey) restoration and wildlife ecologists prepared this report with Environmental Science Associates (ESA) hydrologists to provide the ecological basis of design for all habitat restoration and enhancement elements (hereafter, restoration elements) incorporated into the project. The restoration elements included are designed to both offset project impacts and to enhance the bay shoreline ecosystem in the project area, per the project's purpose. Therefore, the report includes the basis of design for all restoration elements in project-level reaches, as well as the basis of design to establish habitat on earthen flood control levee slopes across all 8 reaches (i.e., along both project-level and program-level levee routes; Figure 2). This report will be used to inform the DEIR's analysis, and later, to provide design information necessary for project permitting and restoration construction documents.

This report does not cover habitat restoration maintenance, monitoring, and adaptive management. These post-construction components will be developed in the project's future Habitat Restoration and Monitoring Plan to be prepared during the state/federal resource agency permitting phase via the San Francisco Bay Restoration Regulatory Integration Team (BRRIT) process.

Section 2.0 Restoration Overview

2.1 Habitat Restoration Plan

The project's primary habitat restoration and enhancement elements are planned in and around the Ravenswood Pond Complex at Ponds R1, R2, R3 and SF2 (Figure 3). The restoration plan was developed by the project team after considering several landscape scale levee route and restoration options, which are documented in *SAFER Bay Project Wetland Habitat and Western Snowy Plover Impacts and Restoration Options Evaluation* (H. T. Harvey 2024). The proposed restoration plan and levee route within the Ravenswood Pond Complex corresponds with Option 1 in that report; the option that was recommended for selection (Figure 3).

The project's restoration plan includes the following habitat restoration elements:

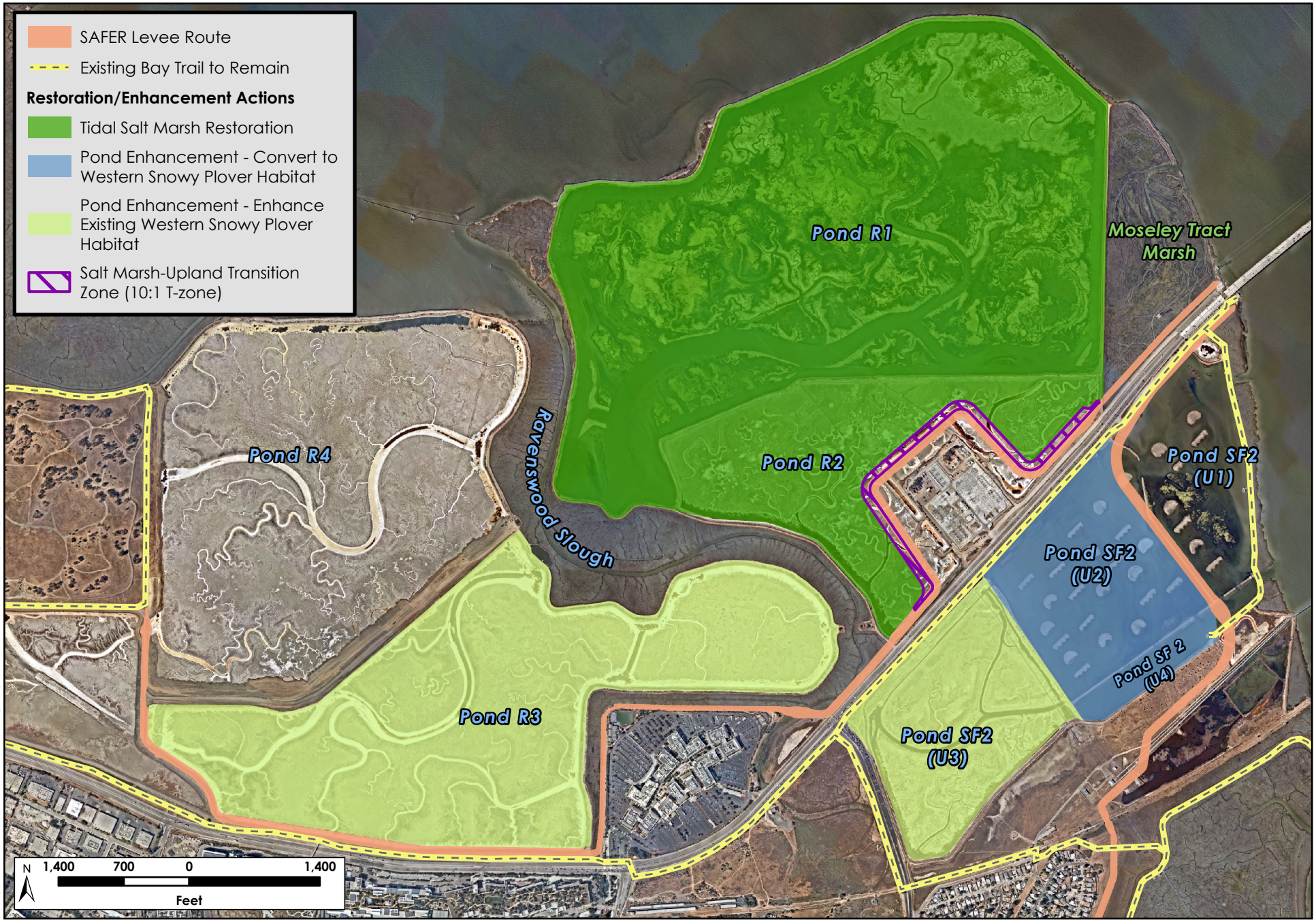
- Large-scale tidal marsh restoration and in-marsh refugia enhancements in Ponds R1 and R2 (Section 3)
- Creation of T-zone habitat in Pond R2 (Section 3)
- Creation of new seabird nesting islands in Pond R1 (Section 3)
- Enhancement of managed ponds for WSP within Ponds R3 and SF2 (Section 4)
- Revegetation of T-zone and grassland habitats on earthen levee slopes (Section 7)
- Tidal marsh channel reconfiguration in Faber Marsh, Laumeister Marsh, Ravenswood Open Space Preserve marsh, and Ravenswood Slough (Section 8)

2.2 Overview of Restoration Goals

This restoration basis of design was developed to meet the following goals:

- Integrate bay shoreline habitat restoration with SAFER Bay's flood protection infrastructure in a mutually beneficial manner.
- Offset permanent and temporary impacts to sensitive biotic habitats and species for the entire project (i.e., both project-level and program-level reaches) sufficiently so that project impacts are less-than-significant with minimal mitigation under the California Environmental Quality Act (CEQA).
- Develop a permittable project by incorporating ample habitat restoration into the project to offset permanent impacts to regulated habitats and species under the jurisdiction of the USACE, U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service, Regional Water Quality Control Board (RWQCB), Bay Conservation and Development Commission (BCDC), and California Department of Fish and Wildlife.

- Restore areas of temporary impact in jurisdictional habitats to equal or better habitat function.
- Design habitat features that are resilient to SLR.
- Revegetate earthen levee slopes to complement adjacent habitat functions in a manner consistent with levee engineering requirements.
- Enhance the bay shoreline ecosystem in ways that align with regional restoration goals. Specially:
    - The SBSPRP restoration plan calls for converting Ponds R1 and R2 from managed ponds to tidal marsh (EDAW et al. 2007), assuming that such restoration is adequately balanced with sufficient managed pond habitat for shorebirds. However, SBSPRP cannot breach Ponds R1 and R2 to restore tidal marsh without providing landward coastal flooding protection. The SAFER project will provide the required coastal flood protection and restore Pond R1 and R2 to tidal marsh in collaboration with SBSPRP.
    - The SBSPRP and the Don Edwards National Wildlife Refuge (Refuge) have identified the goal of maintaining Pond R3 as a managed pond for WSP. The SAFER project furthers this goal by enhancing Pond R3 as managed pond for WSP.
    - The SBSPRP restoration plan includes preservation of SF2 U2 and U3 as managed ponds (EDAW et al. 2007). The SAFER project will convert the U2 and U3 ponds from seabird nesting habitat to WSP breeding/foraging habitat and protect these managed ponds from coastal flooding risk via levee construction. This will be done without adversely affecting the seabird population that currently uses U2 and U3 by creating additional seabird nesting islands in Pond R1 in a manner that is compatible with tidal restoration of Pond R1.
    - San Francisco Bay faces a deficit of naturally occurring sediment necessary to restore and sustain tidal marshes (SFEI 2021). As a result, San Francisco Estuary Institute (SFEI) and BCDC recommends increasing beneficial reuse to offset the sediment deficit (SFEI 2021, BCDC 2024). SAFER Bay will contribute to this regional goal by beneficially reusing bay mud, excavated during construction of its levees, for tidal marsh restoration in Ponds R1 and R2.



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Figure 3. Restoration/Enhancement Actions Proposed in Ponds R1, R2, R3 and SF2
SAFER Bay Project - Ecological Basis of Design for Project Level Reaches (3550-05)
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Section 3.0 Pond R1/R2 Tidal Marsh Restoration Design

3.1 Goals and Design Criteria

SAFER Bay will restore contiguous tidal salt marsh in Ponds R1 and R2. Figure 4 provides an overview of the restoration design in Ponds R1 and R2. The design is based on the following tidal habitat restoration goals:

- Restore high quality tidal salt marsh habitat that includes suitable breeding, foraging, and refugia habitat for CRR, SMHM, and other resident salt marsh species.
- Restore conditions that result in a high rate of natural import of sediment with tides and high rates of sediment accretion to speed vegetated tidal marsh establishment and increase the resilience of the restored tidal marsh to SLR.
- Maximize benefits to fish species in San Franscico Bay.
- Incorporate construction of two seabird nesting islands into Pond R1 restoration plan that are of ample size and quality to offset effects on Caspian tern, elegant tern, and black skimmer from removal of nesting islands at SF2 cell U2.

To achieve these goals, the restoration design includes the following broad criteria:

- Establish a combination of external and internal berm breach locations, ditch blocks, and excavated pilot slough channels to establish fully tidal marsh hydrology in Ponds R1 and R2 in a manner that reoccupies the historic slough channel network.
- Select external berm breaches at locations that minimize impacts to existing tidal salt marsh located in Ravenswood Slough.
- In addition to a primary breach location along Ravenswood Slough, breach Pond R1 to San Francisco Bay to enhance fish access.
- Leave existing pond berms in place where they serve both wind wave erosion dissipation (to help support sediment accretion) and provide high tide refugia habitat.
- Construct high tide refugia berms along existing and constructed slough channels throughout R1 and R2 to provide high quality in-marsh refugia for CRR an SMHM.
- Construct seabird nesting islands in Pond R1 locations where sediment is unlikely to accumulate rapidly around islands, thereby reducing the frequency of sediment excavation.
- Borrow ditches can capture tidal flow at the expense of dendritic slough channel networks and are slower to accumulate sufficient sediment to convert to tidal marsh with SLR. Therefore, convert as

much of the borrow ditches in R1 and R2 to tidal marsh by reusing bay mud generated from levee construction without delaying R1/R2 levee breach.

3.2 Overview

Ponds R1 and R2 were historically part of a large, continuous tidal salt marsh connected to Ravenswood Slough. Both ponds were diked off from tides between 1940 and 1948 for salt production (SFEI 2004). Since diking, the elevation of the surface of the former marsh plain has subsided 2–3 feet from approximately elevation 7 feet NAVD88 (between mean higher high water [MHHW] and mean higher water) to approximately 4–5 feet North American Vertical Datum (NAVD) in the existing condition (approximately 0.5 to 1.5 feet above mean sea level [MSL]) (Table 1). Native tidal marsh vegetation typically recruits at elevations above approximately 1.5 feet above MSL, therefore, most of Pond R1 and R2 are 0.5–1.5 feet lower than the elevation threshold necessary to support tidal marsh vegetation at breach. The restoration plan for Pond R1 and R2 is to reconnect Pond R1's dendritic slough channel network to Ravenswood Slough and reconnect Pond R2 to Pond R1 via internal breaches. These actions will facilitate natural sediment accretion to increase the elevation of the marsh plain in the ponds to support tidal marsh vegetation (Figure 4). In addition to the primary tidal connection at Ravenswood Slough, Pond R1 will be reconnected to San Francisco Bay on the west side to better facilitate fish access to the restored marsh.

Table 1. Tidal Datums at SAFER Bay

Tidal Datum	Feet NAVD88[1] 2031 Projection[2, 3]	Feet NAVD88 2081 Projection[2,3]
Highest astronomical tide	8.99	12.07
High tide line[4]	8.41	11.49
Mean higher high water	7.41	10.49
Mean high water	6.80	9.88
Mean sea level	3.48	6.56
Mean lower low water	-1.20	1.88

[1] NAVD88 = North American Vertical Datum of 1988.

[2] Tidal datums are based on Dumbarton Bridge tidal gauge (Station ID: 9414509) and modified based on Foxgrover et al. 2007.

[3] Tidal datum projections are modified based on California Ocean Protection Council (2024) "intermediate-high" sea level scenario for San Francisco, California.

[4] High tide line is estimated as 1 foot above mean higher high water.

Sediment accretion and natural seed supply will result in vegetation establishment on the marsh plain and along slough channel edges in Ponds R1 and R2, through natural recruitment of marsh plant species including Pacific cordgrass (*Spartina foliosa*), perennial pickleweed (*Salicornia pacifica*) and annual pickleweed (*Salicornia depressa*) over an approximately 10–20-year period after breach (see Section 3.4). Following sediment accretion and plant establishment, the marsh plain will support CRR and SMHM habitat. Both species require access to marsh vegetation above the reach of tides for cover from predators during extreme high tides. High tide refugia should be distributed in patches throughout the interior of the marsh (i.e., in-marsh refugia) and along its upland

perimeter to provide ample, rapid access for CRR and SMHM to refugia during king tide events (H. T. Harvey 2023). In natural tidal salt marshes of the San Francisco Estuary, in-marsh refugia is typically provided by vegetated natural berms that form along the top of slough channel banks. However, the formation of this micro-habitat takes considerable time. Therefore, insufficient in-marsh high-tide refugia habitat will be present in the restored marsh to support these species after the initial establishment of low and mid-elevation marsh plain habitat. Therefore prior to breach, high tide refugia berms will be constructed in Ponds R1 and R2 and seeded with high marsh plant species prior to breach so that sufficient in-marsh refugia is present once the marsh plain revegetates (see Section 3.8). Additionally, in-marsh refugia will be established on the berm between Pond R1 and R2, which will be at an appropriate elevation for high marsh vegetation recruitment following breach. The R1/R2 berm will be separated from the existing Ravenswood Trail by lowering a section of the berm to make terrestrial predator access more difficult during extreme high tides.

The existing bathymetry in Pond R1 retains the natural slough channel system that had conveyed tidal action throughout the historic tidal salt marsh prior to salt pond berm construction. This channel system is a dendritic, sinuous network that provided fundamental support for the productivity, biotic diversity and SLR resilience of the historic tidal marsh. Therefore, our design targets the restoration of full tidal action to this channel network to restore its vital functions including efficient sediment transport and deposition to rapidly build and maintain the marsh plain and naturally elevated slough channel berms that provide high tide refugia habitat. To reconnect the breach locations to the historical slough channel network, a limited number of pilot slough channels will be excavated between the breach locations and the slough channel network (Figure 4).

Ponds R1 and R2 topography was modified through marsh plain excavation to generate the dike/berm surrounding the two ponds by excavating borrow ditches within the ponds adjacent to the berm. The existing borrow ditches, if left unblocked by fill, could capture the tidal prism and become the primary conveyance of tidal waters from the breaches, compromising the goal to restore the historic slough channel network. Therefore, the project's excavated bay mud spoils will be beneficially reused to fill portions of the borrow ditches (i.e., ditch blocks) to direct tidal flows into the pilot slough channels and into the historic slough channel network. This will prevent borrow ditch capture of tidal flows. These bay mud spoils will be primarily sourced from the project's excavation of bay mud from the levee footprints in SF2 and R2.

In addition to establishing ditch blocks, bay mud spoils will be reused to convert a large portion of the borrow ditches from aquatic habitat to tidal marsh. Because of the depth of the borrow ditches, the anticipated trajectory of SLR, and limited sediment supply, these borrow ditches would take a very long time to recover to tidal marsh without sediment addition. Therefore, bay mud from levee construction will be used to fill as much of the borrow ditches as possible given the volume of bay mud available from levee construction prior to pond breaching. Borrow ditches will be filled to approximately MHHW to increase marsh habitat around the site perimeter and thereby connect the marsh plain to adjacent high ground, increasing available high tide refugia and increasing the marsh resilience to SLR.

SAFER Levee Route

Existing Ravenswood Trail (Not Part of Bay Trail)

Retain Trail as a Spur Trail

Decommission Trail, Convert to T-zone Habitat

Existing Internal Pond R1/R2 Berm

Cross Sections

Restoration Features

High Tide Refugia Berm[1]

Seabird Nesting Islands[2]

Salt Marsh-Upland Transition Zone (10H:1V T-zone)[2]

Fill Major Borrow Ditches[3]

Fill to Tidal Marsh Elevation[3]

Excavate Channels

Establish Ditch Blocks[3]

1. Construction using in-situ bay mud and/or pilot channel spoils.
2. Construct using imported terrestrial fill.
3. Construct using bay mud spoils from levee degrade or channel excavation.

Secondary Breach (Remove Trail)

Bayward Channel

Pond R1

Moseley Tract Marsh

Interior Channel at Primary Breach

East Interior Breach

Primary Breach (Remove Trail)

Nesting Island Channels

Ravenswood Slough

Pond R2

PG&E Substation

Construct 10H:1V transition zone

Pond SF2 (U1)

Pond R4

West Interior Breach

Connector Channel at West Interior Breach

84

Pond SF2 (U2)

Pond R3

N 780 390 0 780 Feet

Habitat Cross Sections
A - A' Pond R1/R2 Primary Breach and Channel (Figure 6)
B - B' Pond R1/R2 Borrow Ditch Fill (Figure 7)
C - C' Seabird Nesting Island (Figure 8)
D - D' High Tide Refuge Berm (Figure 9)
E - E' Pond R2 Transition Zone (Figure 10)

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Figure 4. Pond R1/R2 Restoration Plan View
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Finally, a T-zone will be constructed on the bayward side of the SAFER levee in Pond R2 using imported fill (Figure 4). The T-zone will provide high tide refuge habitat in Pond R2, increase the resilience of the marsh to SLR, and restore a relatively rare habitat type at the bay margin. The basis of design for the T-zone is further discussed in Section 3.9.

Table 2 provides a summary of restoration design dimensions. Table 3 provides approximate surface area and earthwork volume estimates for the restoration features. These restoration design features are further discussed in the following sub-sections.

3.3 Breaches and Channels

Ponds R1 and R2 will be breached to San Francisco Bay to restore tidal wetland habitat and tidal exchange of water and sediment. Connecting the project site to the bay will re-establish the historic dendritic tidal channel network and restore tidal inundation to the adjoining remnant marsh plain. The far South Bay has substantial ambient suspended sediment which has led to deposition and conversion of subsided managed wetlands to tidal marsh at multiple nearby locations.

The breaches and channels are sized using hydraulic geometry (Williams et al. 2002), with selected design dimensions between the smaller, likely long-term dimensions based on marsh area and the larger dimensions that would correspond to the initial tidal prism immediately after breaching. The breach and channel dimensions will be refined in the detailed design phase based on the results of hydrodynamic modeling. The channels will be refined to reduce grading, as much as possible, while confirming that the full bayward tide range is conveyed throughout the restoration site interior and that flow velocities are similar to those observed in natural marsh channels (e.g., about 3 feet/second). Design dimensions and side slopes of all breach and channel excavations discussed below are shown in Table 2 and the approximate locations are shown on Figure 4.

Table 2. Design Dimensions for Restoration Features

Feature	Crest/Invert Elevation (Feet NAVD88)	Top Width (Feet)	Side Slope (Horizontal: Vertical)	Notes
Primary breach	-7 invert	300 at MHHW	3:1	Connects R1/R2 to Ravenswood Slough (Figures 4 and 5)
Secondary breach	-2 invert	100	3:1	Connects R1/R2 directly to San Francisco Bay
Bayward channel	1 invert	200	3:1	Widens Ravenswood Slough to Bay
Interior channel at primary breach	-6 invert	250	3:1	Connect primary breach to historical slough channels in R1
Nesting island channels	-5 to -6 (-5 minimum invert)	140–180	3:1	4 feet deep at MLLW to prevent predator access
Interior breach, west	-1.5 invert	100	3:1	Top width at top of berm

Feature	Crest/Invert Elevation (Feet NAVD88)	Top Width (Feet)	Side Slope (Horizontal: Vertical)	Notes
Interior breach, east	1.0 invert	80	3:1	Top width at top of berm
Ditch blocks	9 crest	20	3:1	Slope to marsh plain
Additional borrow ditch fill	Varies	Varies	Varies	Slope from HTL to existing marsh plain (Figure 6)
Nesting islands	10.5 to 11.5 crest	150–380	3:1	Top width excludes steeper slope to grade
High tide refugia berms	8.4–8.9 crest	4–8	1:1	Use material excavated from channel edge to create refugia then seed
R1/R2 berm	NA	NA	NA	Compost amendment and seeding
Decommission existing Ravenswood Trail	NA	NA	NA	Ripping, compost amendment and seeding
10H:1V T-zone	13.5 at connection to levee	80 above MHHW	10:1	To provide 40 feet of refugia above MHHW with 3.5 feet of SLR

Notes: Elevations for features created with fill are provided post-settlement (target elevation). These features will be constructed higher to accommodate settlement. HTL = high tide line; MHHW = mean higher high water; MLLW = mean lower low water; NA = Not applicable; SLR = sea level rise; T-zone = transition zone.

Table 3. Approximate Surface Area and Earthwork Quantities

Feature	Surface Area (Acres)	Volume (Cubic Yards)	Notes
Excavation			
Primary breach	0.89	18,000	
Secondary breach	0.28	2,300	
Bayward channel	7.96	24,000	
Interior channels			
Interior channel at primary breach	4.20	56,000	
Nesting island channels	4.18	31,000	
Interior breach, west	0.21	1,600	
Interior breach, east	0.17	880	
High tide refugia berms	4.29	17,300	Estimated as 30% greater volume than fill required to construct islands to account for consolidation/settlement during construction.
Total excavation	22.18	151,080	
Fill			
Ditch blocks	1.53	19,000	Bay mud reuse from the project excavation or imported upland fill.

Feature	Surface Area (Acres)	Volume (Cubic Yards)	Notes
Borrow ditch fill	Up to 54.4	Up to 430,000	Reuse bay mud from project excavations to fill as much of this area/volume as possible given the quantity of bay mud generated. Not necessary to fill the entire area/volume.
Seabird nesting islands	2.70	35,000	Imported upland fill.
High tide refugia berms	2.86	13,300	Created from material side-cast from associated interior pilot channels.
10H:1V T-zone	11.4	60,200	Imported upland fill. Surface area is T-zone from top of FRM levee to toe of 10H:1V T-zone slope
Total fill	72.9	557,500	

Notes: Fill estimates are neat line and do not account for losses on placement. Losses of wet material may be in the range of 40% to 50%. Topsoil and miscellaneous fill (defined as the top 1 foot of excavated material) not tracked; to be refined in subsequent design. Surplus of material from levee construction may be made up with placement in borrow ditches. T-zone = transition zone.

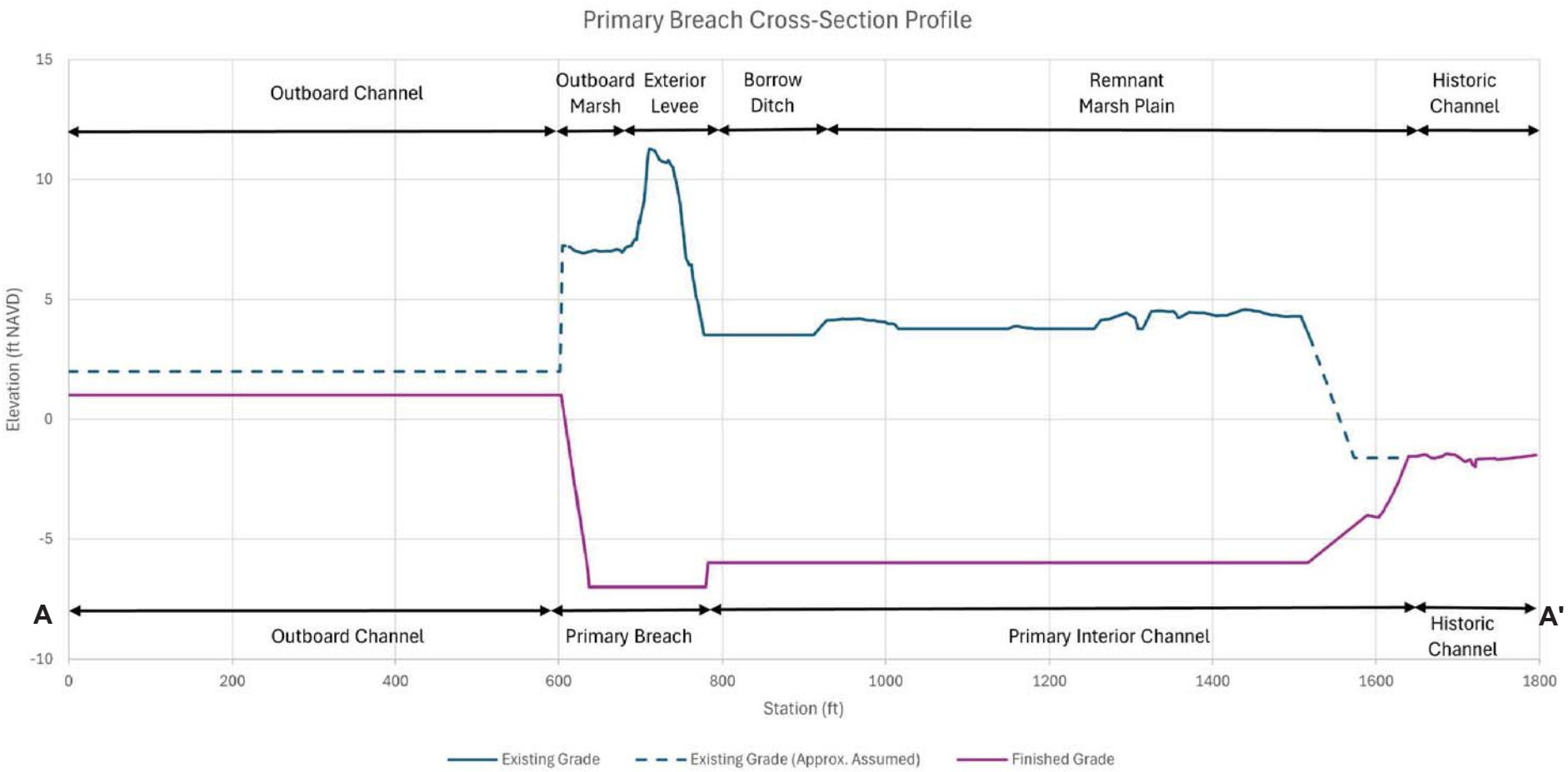
3.3.1 Primary Breach

The primary breach is located near the downstream end of Ravenswood Slough, to reduce impacts to existing marsh along the edge of the slough (Figure 4). Restored tidal flows from the site will tend to scour and enlarge the existing Ravenswood Slough channel. So, by placing the breach nearly at the downstream end of the vegetated portion of the slough, the extent of the post-breach enlargement of the slough and concomitant marsh scour will be reduced. The proposed breach location is relatively close to the primary historic channel within Pond R1, thereby minimizing the extent of new interior channel excavation needed to connect the breach to the historic channel.

The primary breach is intended to convey tidal flows from the western part of Pond R1 and Pond R2, with the drainage area as indicated by the historical tidal channel network. For this drainage area, the tidal prism was estimated from the existing conditions digital elevation model and the tide range in the bay. For this tidal prism and marsh drainage area, hydraulic geometry relationships (Williams et al. 2002) were used to estimate the corresponding channel dimensions. Because the surfaces of the ponds are subsided below natural marsh elevations and yield a larger tidal prism than a mature marsh, the tidal prism-based equations provide a larger channel cross section than the marsh area-based equations. The selected design dimensions are intermediate between these two methods. To accommodate the larger tidal prism anticipated right after breaching, the breach dimensions were set as 40% of difference between the smaller marsh-area-based dimensions and the larger tidal-prism-based dimensions for the channel width and 50% for channel depth (Figure 5).

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Section A-A'



Cross Section Developed by ESA

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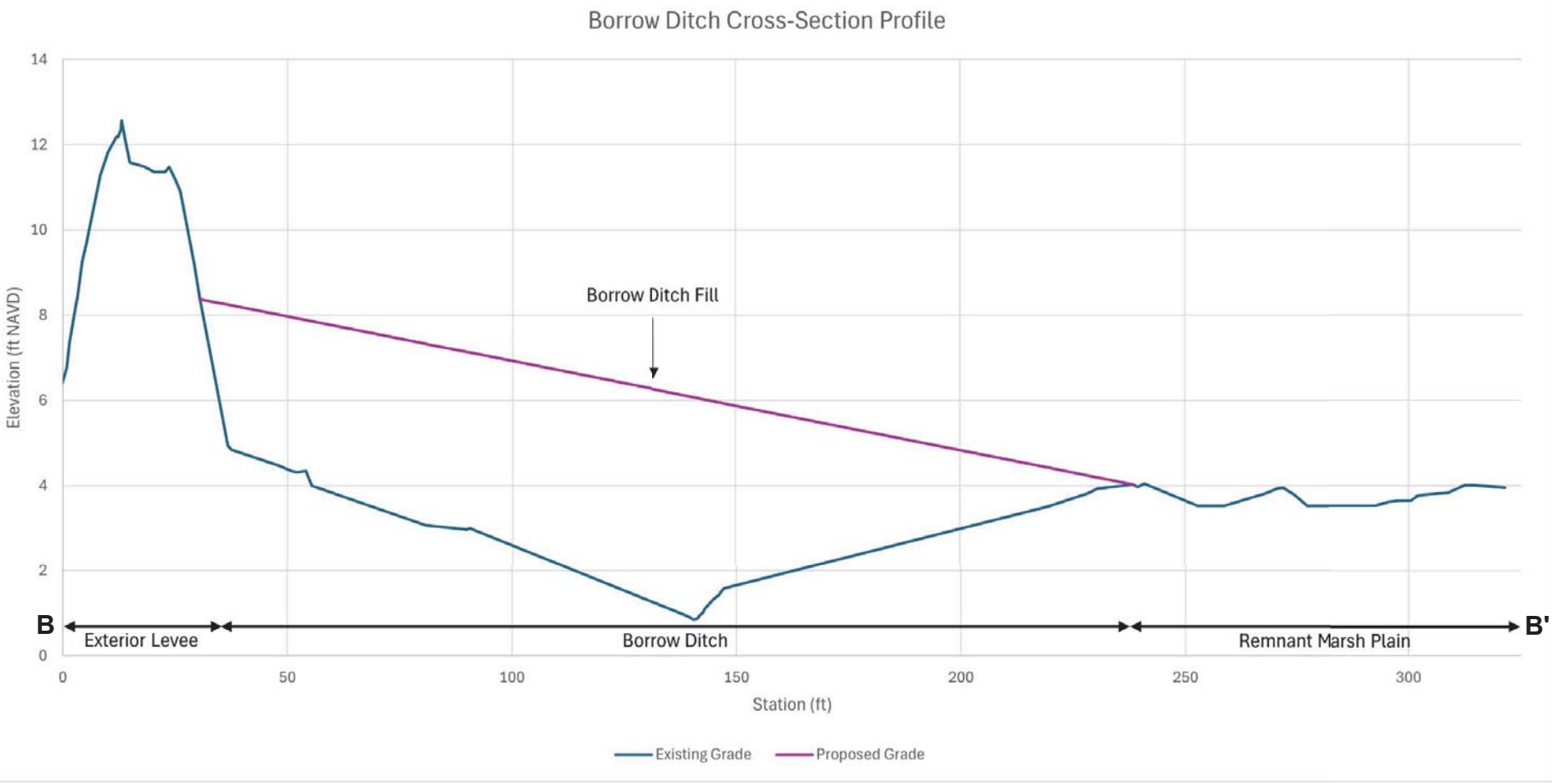
Figure 5. Primary Breach and Channel Typical Section

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Section B - B'



Cross Section Developed by ESA

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Figure 6. R1/R2 Borrow Ditch Fill and Conversion to High Marsh

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3.3.2 Bayward Channel at Primary Breach

A bayward channel is proposed to be excavated through Ravenswood Slough downstream of the primary breach to improve the tidal connection between the site and the Bay (Figures 4 and 5). Construction of such a channel accelerates the timing when the interior of Ponds R1 and R2 achieve full tidal connectivity with the bay which is a design criterion. Another approach would be to let the channel bayward of the primary breach scour on its own in response to restored tidal flows. Some tidal marsh restoration projects have taken this second approach. Eliminating or reducing the constructed size of the bayward channel may avoid direct construction impacts bayward of the breach but may also restrict initial tidal exchange and thereby slow the rate of vegetated marsh establishment. The ability of a smaller, or no, channel to provide full drainage of the site at lower low tides can be further assessed using hydrodynamic modeling during the detailed design phase. For this preliminary design, we assume a constructed bayward channel.

The width of the bayward channel would be set to equal the bottom width at the primary breach. The excavated channel then extends from the breach to where the existing bayward channel dissipates into a distributary fan. The mudflat elevation at this transition is about 1 foot NAVD. This elevation is the assumed channel invert for the full length of the bayward channel.

The footprint for the bayward channel includes a patch of tidal marsh on the west bank of Ravenswood Slough. While the bayward channel could be narrowed in this location to avoid disturbing the marsh, this may limit initial tidal exchange and the marsh may nonetheless scour over time in response to the natural enlargement of the bayward channel.

Pond R4 was recently restored by the SBSPRP and included excavation of a shallow bayward channel. The ongoing evolution and performance of this channel will be considered when refining the restoration design of Ponds R1 and R2.

3.3.3 Secondary Breach

The site will be breached at a secondary location, in the northeast, to provide an additional tidal connection to the Bay (Figure 4). Several of the historic channels drained to the northeast and this breach will provide drainage for the area drained by those channels. The secondary breach also provides an additional access point for fish passage from the Bay to the restored site. Because the Bay just bayward of this breach appears to be subtidal, no bayward channel is anticipated to be needed for this breach.

The secondary breach is located at the northern end of the fringing marsh on the bayward side of the Pond R1 levee. Compared to the erosion potential to the north of this location (as indicated by recently placed riprap along the northern side of the Pond R1 exterior levee), the presence of this marsh suggests the wave energy is lower at the breach location. The wave energy is likely lower because of the levee aspect relative to wave fetch direction and fetch length. In this more sheltered location, the breach will face less erosion pressure, while also avoiding the need to remove a larger area of the fringing marsh.

Sizing for the secondary breach followed the same approach as for the primary breach but used the marsh area and tidal prism for this breach's drainage area in the eastern part of the site.

3.3.4 Interior Channels

Interior channels will be excavated just inside the primary breach to re-connect the breach to the primary historic channel and to isolate bird nesting islands from mammalian predators. Excavation from the channels will provide material to be placed as ditch blocks and borrow ditch fill. The channels will be excavated to depths and widths suitable for providing full tidal exchange to the site.

A small interior channel will also be excavated at the west internal berm breach.

3.3.4.1 Interior Channel at Primary Breach

The interior channel just inside the primary breach will connect the breach to the site's large historic channel and associated channel network. It will also serve as the subtidal channel along the adjacent seabird nesting island. Sizing of this channel followed the same approach as for the primary breach but used the marsh area and tidal prism specific to the area this channel would drain (slightly smaller than for the breach).

3.3.4.2 Seabird Nesting Island Channels

To discourage mammalian predators from accessing the nesting islands (see Section 3.6), these channels will be designed to be subtidal at the lowest astronomical tides. Local mean lower low water (MLLW) at the Dumbarton Bridge is -1.2 feet NAVD, king tide low water is assumed to be about -2.5 feet NAVD, and lowest astronomic tide at the bridge is -3.5 feet NAVD (National Oceanic and Atmospheric Administration 2025). The design elevation for channels around the nesting islands is set to -5 feet NAVD, or about 4 feet below MLLW. This will result in a water depth of about 2.5 feet at king tides, as constructed. The design includes an allowance of up to 1.5 feet of sedimentation. With 1.5 feet of sedimentation, the channel continues to function with a water depth of 1 foot at king tides.

For this invert elevation, hydraulic geometry relationships indicate a corresponding channel top width of 140 feet. With this width in mind, the suggested design dimensions were selected by considering existing bathymetry (such as the widths of the borrow ditch and the channel cut south of the southern nesting island) and the partitioning of restored tidal flows between the redundant channels around the nesting islands. These islands are located near primary breach, such that surrounding channels are likely to convey more flow and therefore encourage long-term resilience of subtidal invert elevations. Preferred channel design dimensions to encourage this geomorphic condition will be developed in the detailed design phase; the dimensions provided in Table 2 and quantities in Table 3 are likely an upper bound. Nesting island and associated channel design will be further studied with hydrodynamic modeling, to check dimensions for channels in this location and/or shifting the location of the islands.

3.3.5 Interior Breaches

An internal berm separates Ponds R1 and R2. To provide tidal connectivity, the interior berm between R1 and R2 will be breached at two historic channel locations, an east breach and a west breach. The internal berm has a typical crest elevation of 9 feet NAVD, about 1.5 feet above MHHW. At this elevation in the tidal frame, the berm crest can serve as a wave break and can provide high tide refugia. As such, the berm crest will not be lowered outside of the breaches. Its surface soil will be treated to encourage vegetation establishment and seeded (see Section 3.8).

3.3.5.1 East Breach

The east interior breach will be located where a large historic channel crosses near the eastern end of the R1/R2 internal berm. Much of the historic marsh area that the channel served has been cut off by fill for the electric power substation and highway. Additional historic marsh area will be filled by the proposed SAFER Bay levee. Since the anticipated channel drainage area that will be restored is smaller than the historic drainage area, the breach dimensions corresponding to the equilibrium marsh area are smaller than the historic channel. To avoid constricting the historic channel, the proposed design is to match the breach width to the channel width south of the berm and match the depth calculated using hydraulic geometry relationships (Williams et al. 2002) for the restored marsh area.

3.3.5.2 West Breach

Historic channels in the western part of Pond R2 drained southwest and into Ravenswood Slough. Reconnecting these historic channels by breaching the external levee directly to Ravenswood Slough would maintain the historic drainage patterns. However, this approach was not selected as it would require cutting through the fringing marsh along Ravenswood Slough and would cause additional downstream scour of tidal marsh habitat in Ravenswood Slough as more tidal flow moves through the slough. To be somewhat consistent with the historic channels in the western part of Pond R2, the west interior breach is sited near the west end of the internal berm, at the downstream end of one of these historic channels. This provides a pathway for the other historic channels in western Pond R2 to drain to the borrow ditch, which would act as a tidal channel, and then flow through the west interior breach to connect to tidal channels in Pond R1. A short interior channel will be excavated to connect the borrow ditch to the west interior breach. Because the borrow ditch is maintained as an active tidal channel, fill will not be prioritized for placement in this part of the ditch. If additional fill areas are desired, fill could be placed along the interior side of the exterior levee, filling part of the Pond R2 borrow ditch cross section while still allowing for drainage.

The western internal breach in the R1/R2 berm is sized with hydraulic geometry relationships to be a function of the marsh area in western Pond R2. The short interior channel connecting this breach to the existing borrow ditch would have the same dimensions as the breach, for the portion of the breach below the remnant marsh plain along the channel's alignment.

3.3.6 Earthwork and Construction Methods

The breaches, external and internal, will be constructed using tracked low ground pressure (LGP) excavators accessing the site via the tops of existing berms. Dump trucks could be used to move excavated material to the borrow ditches.

The bayward channel at Ravenswood Slough will be dredged using floating equipment such as a barge-mounted clamshell dredge. Material will be placed directly into the interior borrow ditches or deposited in a second barge for transport and use in the interior borrow ditches. Use of turbidity curtains may be required for water quality protection, to reduce transport of high turbidity water outside of the construction area.

The proposed large interior channels (nesting island channels), sized to create subtidal moats around the nesting islands, are wider (260 feet) and deeper (9 feet) than those previously constructed in San Francisco Bay and therefore there aren't proven construction methods for this size of channel. Channels this wide and deep will be difficult to construct. Therefore, these channel sizes may be reduced during the detailed design phase to account for cost/constructability while providing an adequate impediment to mammalian predator access to the nesting islands.

It may be possible to excavate the channels in a few ways. For all construction approaches, material excavated from the large channels adjacent to the nesting islands will be used to fill the borrow ditches.

- **Dredging**—This approach would bring in a floating excavator on a barge and load material into a barge or LGP dump trucks for transport. Bringing in a barge would require creation of a temporary earthen lock (or "donut") with associated environmental impacts. However, dredging could be the most straightforward method.
- **Land-Based Excavator**—In this approach, the contractor would create a stable platform (with temporary fill or marsh mats) and use LGP excavators to excavate the channel. LGP excavators and dump trucks could be used to transport material to the borrow ditch disposal areas. A temporary road would be constructed to allow the dump trucks to transport material. The fill and road would be removed after construction of the channel. This approach was used at Sonoma Creek Marsh. This approach has high costs associated with construction of a temporary road for land-based access.
- **Amphibious Excavator**—Use of an amphibious excavator may be possible, though this method would require a means of transferring material for transport. Material transport would not be straightforward. A barge or LGP dump trucks on a temporary road could potentially be used.

As noted above, the proposed channels are wider and deeper than those previously constructed in San Francisco Bay. For reference, the excavated channels (with sidecast mounds) at Pond R4 are 50 feet wide and 4 feet deep (to 2 feet NAVD). The largest channels at Sonoma Creek Marsh using traditional land-based methods (temporary road and LGP excavators) were 60–70 feet wide and 6–7 feet deep. The largest channels excavated at Sonoma Creek Marsh using amphibious excavator were 35 feet wide and 4 feet deep.

3.4 Projected Tidal Marsh Establishment Timeline and SLR Resilience

The remnant marsh plain in Ponds R1 and R2 is subsided and generally too low in elevation to support tidal marsh vegetation once tidal inundation is restored. Over time, estuarine deposition will raise site elevations and if deposition exceeds the rate of SLR, tidal vegetation can establish. ESA conducted an assessment of marsh sedimentation to evaluate the potential for the restored site to convert from tidal mudflat to vegetated marsh over time. Results of the assessment suggest that the sedimentation will be sufficient to raise the marsh plain to support vegetated tidal marsh within 10 to 20 years after breaching and the borrow ditches within 30 to 40 years. Modeling methods and results are described below. Details are provided in Appendix A.

3.4.1 Methods

Sediment accretion in tidal wetlands occurs as a result of the deposition of suspended sediments and the accumulation of organic matter within the bed sediments once vegetation is established. The dynamics of sediment deposition within a tidal estuary setting are influenced by a wide array of factors. For multi-decade computational modeling, full representation of all these processes requires substantial data inputs and computation time. We used an approach that makes simplifying assumptions about the key processes to distill the processes into a net accretion model for bed elevations. This approach, tested at multiple San Francisco Bay restoration sites, has demonstrated its validity and utility over several decades of restoration practice (Orr et al. 2003, Stralberg et al. 2011).

The MARSH98 model was used to estimate long-term sedimentation. The model, developed by ESA, is based on methods from Krone (1985) and estimates changes in bed elevation over time with SLR.

For the Ponds R1 and R2 assessment, the MARSH98 model was applied in two steps:

- First, the model was calibrated by performing a set of model runs to select input parameters that best reproduce observed historic sediment accretion rates at San Francisco Bay tidal marsh restoration sites near the Ravenswood Pond Complex.
- Second, the model was run using the calibrated model parameters to forecast bed elevation evolution and vegetation establishment at R1 and R2 with anticipated SLR from 2030 to 2100.

MARSH98 requires several input parameters, such as tide water levels, organic accretion rate, SLR scenario, and ambient suspended sediment concentration. Most parameters were selected based on available local measurements and typical regional values. The suspended sediment concentration was selected based on results of the calibration.

For the calibration, ESA ran MARSH98 for a range of suspended sediment concentrations. Results were compared to observed rates of bed elevation change at the following restoration sites: SBSPRP Ponds A21 and A6 and Ravenswood Open Space Preserve (Cooley Landing). After comparing the modeled trajectories with observed elevation changes at the reference sites, ESA identified 75 mg/L as a representative suspended

sediment concentration for forecasting accretion within R1 and R2. This value is consistent with measurements of suspended sediment concentrations in the vicinity. We also considered data from the Bair Island restoration. While Bair Island Monitoring Reports had limited data that could be used to quantify sediment accretion at Bair Island, the results generally align with other reference sites investigated (USFWS 2024).

After input parameter selection and calibration, MARSH98 was used to forecast bed elevation evolution and vegetation establishment at Ponds R1 and R2 under the California Ocean Protection Council (2024) intermediate SLR scenario which estimates 3.1 feet of SLR by 2100.

3.4.2 Model Results

The model results are shown in Figure 7 and are based on the following assumptions:

- Site tidally restored in approximately 2030
- California Ocean Protection Council (2024) intermediate SLR scenario
- Suspended sediment concentration of 75 mg/L

Based on these results, the remnant marsh plain is anticipated to experience sufficient accretion to allow for low marsh vegetation establishment in approximately 10–20 years. The borrow ditches, starting lower in elevation, take longer to reach vegetation colonization elevations; approximately 30–40 years. Once established, the vegetated marsh should be self-sustaining through 2100. Since organic accretion was set to zero in the model, actual rates of deposition after vegetation colonizes should be higher than shown in Figure 7. Based on these results, areas of existing marsh are also expected to sustain through 2100.

3.5 Ditch Blocks and Fill of Borrow Ditches

Around the perimeter of Pond R1 and Pond R2, borrow ditches were excavated along the inside of the exterior levee to generate fill for building the levee. These borrow ditches intersect with the historic tidal channel network and could, at least initially, divert flow from the channel network. Ditch blocks will be used to minimize this effect. In addition, excess bay mud from other parts of project construction will be used to fill as much of the borrow ditches as possible given the volume of bay mud available for reuse, accelerating establishment of vegetated marsh.

3.5.1 Ditch Blocks

Ditch blocks will be constructed to encourage flow into the historic interior channel network rather than some flow being diverted into the borrow ditches. The ditch blocks at the primary breach are considered key components for directing flow into the channels around the nesting islands. The ditch blocks associated with the secondary breach are less likely to affect long-term channel geomorphology and may be removed in later design, as discussed below.

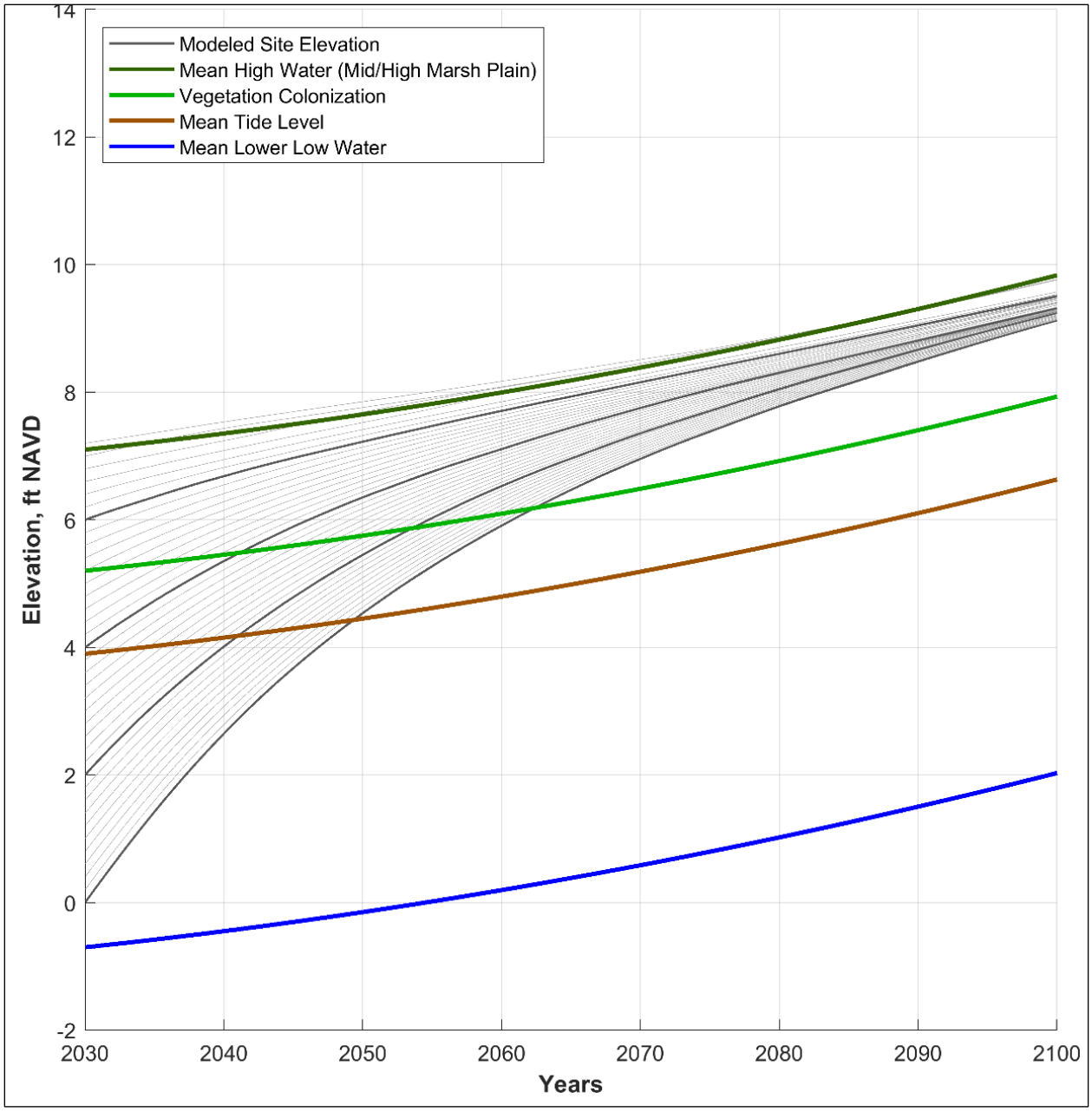


Figure 7. Projected Marsh Accretion in Ponds R1 and R2

At the primary breach, the ditch blocks are located just north of the breach and just south of the southern nesting island channel, to direct flow into the channels surrounding the nesting islands. More flow around the nesting islands increases the likelihood that these channels remain subtidal and discourage mammalian predator access to the islands. At the secondary breach, the ditch blocks are located at the watershed boundary between the primary breach and secondary breach. This allows the borrow ditch to provide drainage for the smaller historic channels that drain to the ditch.

The target long-term crest elevation for the ditch blocks is 9 feet NAVD, about 0.5 feet above spring tides. This is high enough for hydraulic separation at high tide and low enough for high marsh vegetation to establish, creating high tide refugia habitat. An allowance for two feet of settlement of the placed fill for ditch blocks is assumed, based on geotechnical recommendation for nearby segments of the levee (HDR et al. 2016). This allowance should be verified with additional, location-specific geotechnical data and analysis. For constructability, the ditch block fill may require import of drier upland fill.

The northwest part of the Pond R1 borrow ditch is hydraulically isolated between two ditch blocks (the primary breach's north ditch block and the secondary breach's west ditch block). While there is some connectivity to this segment of borrow ditch via smaller historic channels, this connectivity may be insufficient to provide adequate low tide drainage. If the borrow ditch remains unfilled, subsequent design should consider excavation to enlarge and connect one or more historic channels to this northwest borrow ditch segment or elimination of the secondary breach's west ditch block.

3.5.2 Fill of Borrow Ditches

The borrow ditches provide excess conveyance for interior flows and will likely accumulate sediment deposits over time. Filling the borrow ditches could accelerate this process, leading to more rapid establishment of tidal marsh on some fraction of borrow ditch areas.

As discussed in more detail in Section 6.1, the design includes opportunistic use of excess earth (bay mud) generated by the project to fill the ditches. Possible sources of on-site fill are excavation of internal channels, excavation of the bayward channel, and excavation for the levee subgrade in Pond R2 and Pond SF2. Off-site fill from levee construction in other SAFER reaches may be generated, but timing of that excavation may occur after breaching of the restoration site. Placing fill in the borrow ditches after breaching would be more complicated, since the active tidal flushing may limit deposition and the placed fill may readily erode and be carried out to the bay. As such, placing fill in the borrow ditches after breaching may require added barriers to contain placed fill until it consolidates. Additional design considerations include modifying the timing of off-site construction to allow more reuse in borrow ditches and selecting the priority placement locations for borrow ditch fill.

Borrow ditch fill can be placed up to the elevation of the remnant marsh plain (approximately 4 feet NAVD), or if quantities are sufficient and soil consistency allows for sloped placement, up to the high tide line (HTL) (8.4 feet NAVD) on the neighboring levee and then sloping down to meet the remnant marsh plain on the landward side (Figure 6).

Settlement and bulking losses are expected of borrow ditch fill. These factors are variable and dependent on the source material and its water content and will affect final fill volume in the borrow ditches.

3.5.3 Earthwork and Construction Methods

The borrow ditches will be filled with dry material to create the ditch blocks and with any other, mostly wet, material generated from onsite excavation. Material would likely be delivered via the berms by dump truck with LGP excavators used to push the material into the ditches. Since the material would be placed prior to breaching the site, turbidity curtains or other water quality measures are not expected to be required. The borrow ditches may also accept marsh material excavated during levee construction and transported to the restoration site.

3.6 Pond R1 Seabird Colonial Nesting Islands

3.6.1 Goals and Design Criteria

Proposed WSP breeding habitat enhancements (see Section 4) include removal of islands in Pond SF2 cell U2 that are currently used by colonial nesting seabirds, including Caspian terns, elegant terns, and black skimmers. Construction of two nesting islands in Pond R1 is intended to offset the loss of islands currently used by these seabirds. The island design is based on the following design criteria to successfully provide suitable nesting habitat for these species:

- Islands must be surrounded by perennial open water on all sides (i.e., a moat) with a buffer of at least 120 feet from the nearest upland habitat to reduce the ability of mammalian predators to access the islands and prevent human presence from causing disturbance to/abandonment of the colony.
- Since these islands are in a tidal system, they will be overbuilt to accommodate SLR, such that at the highest astronomical tide (HAT) in 2061, the islands continue to provide suitable nesting habitat.
- The collective available nesting area of these islands must be at least equal to, if not greater than, the current amount of nesting area used by these species in SF2 cell U2.
- The island tops should be gently sloped to provide a suitable grade for nesting.
- The islands should be topped with gravel to maintain an open habitat with minimal vegetation for nesting.
- The island slopes will be stable with minimal soil erosion.

Figure 4 shows the location of the islands within Pond R1, while Figure 8 shows a cross-section depicting the design elements.

3.6.2 Overview

Caspian terns, elegant terns, and black skimmers currently breed on three islands within Pond SF2 cell U2, although historically, these species did not nest in this pond. Only Caspian terns and black skimmers sporadically nested in small numbers in other ponds within the Ravenswood Pond Complex (Cornell Lab of Ornithology 2024). In 2010, 30 islands were constructed in Pond SF2 as part of the SBSPRP Phase 1 activities.

The islands were designed and built to provide habitat for numerous breeding and non-breeding bird species throughout the year.

In 2015, three circular islands in cell U2 were modified for a social attraction study lead by U.S. Geological Survey (USGS) and USFWS. The purpose of the study was to establish a Caspian terns colony on the islands by providing more attractive nesting habitat. This work included laying back island slopes to 4H:1V (or less), covering the islands in 0.4 inch diameter crushed rock to a depth of 18 inches, and placing 3 inch diameter rocks along the island perimeter to limit shoreline erosion (Hartman et al. 2019). Prior to the 2015, 2016, and 2017 breeding seasons, Caspian tern decoys and electronic audio playback systems were deployed on these three islands to aid in attracting Caspian terns to form a breeding colony on the islands. The study found that the total number of adults in the colony and maximum number of active nests increased during each successive year. Caspian terns formed dense colonies on Island 21, with 2.58–3.55 nests/square feet of active colony area, but only 0.32–1.61 nests/square feet of total island area. Although two of the islands were used by roosting adults and/or juveniles, and a fourth unenhanced island was also used by roosting adults, only two islands, Island 21 and Island 17, supported nesting. Island 17 supported one nest in 2015; otherwise all nesting activity each year occurred on Island 21. Collectively, this indicates that despite the colony growing during the study, the colony size was not constrained by the size of the islands. Since then, the colony size has continued to increase, reaching a peak of 350 breeding adults in 2023 (Cornell Lab of Ornithology 2024).

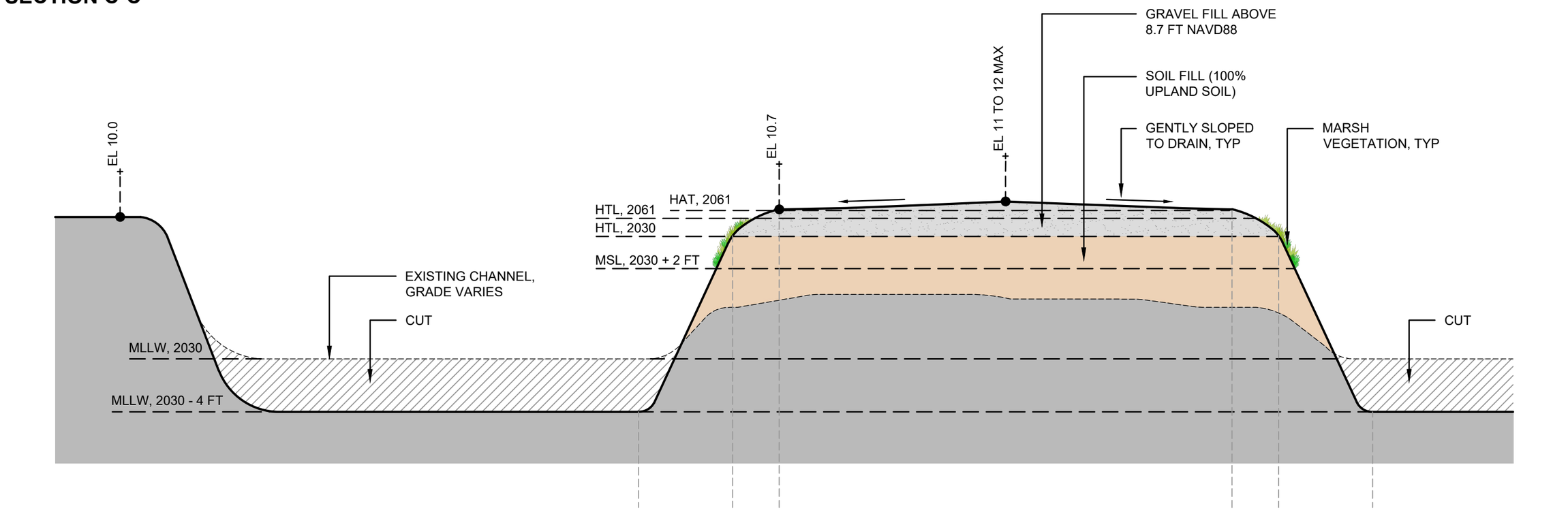
In addition to attracting Caspian terns to nest on the islands, at least 32 black skimmers were attracted to nest on the three enhanced islands in 2017 (Hartman et al. 2019, Cornell Lab of Ornithology 2024). Since then, they have continued to nest on the modified islands in most years, reaching a peak of 68 breeding adults in 2024 (Cornell Lab of Ornithology 2024). In 2019, elegant terns began nesting among the Caspian tern colony on Island 21, and aside from 2021, have nested each year on this island. They reached a peak of 345 breeding adults in 2024 (Cornell Lab of Ornithology 2024).

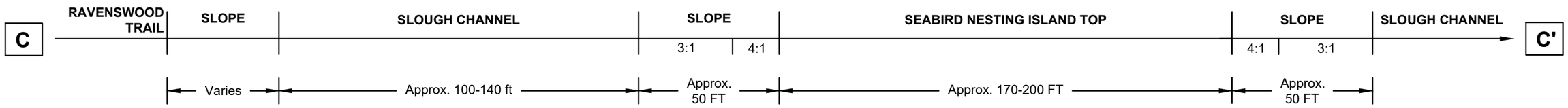
3.6.3 Location, Size, Shape, and SLR Resilience

3.6.3.1 Location

The islands in Pond SF2 are surrounded by open water on all sides, with a minimum distance of 120 feet from the closest land accessible to mammals. This buffer acts as a barrier to mammalian predators that might target seabird adults, eggs, or chicks. To provide similar conditions, two new islands will be constructed in the southwest corner of Pond R1 (Figure 4). The proposed islands will build onto and enhance the function of two existing islands that have previously supported breeding black skimmers and Caspian terns are located (Cornell Lab of Ornithology 2024). This location is at least 120 feet from the nearest pond berm, levee, or tidal marsh and will therefore provide protection from mammalian predators.

SECTION C-C'





NOTES

1. ALL ELEVATIONS AND SLOPE DESIGNATIONS ARE APPROXIMATE AND NOT TO SCALE. SECTION IS VERTICALLY EXAGGERATED FOR VISUAL CLARITY.

2. ALL ELEVATIONS ARE POST-SETTLEMENT. DESIGN OF A CIRCULAR WATERBIRD NESTING ISLAND WITH DIMENSIONS SHOWN RESULTS IN AN ISLAND TOP COVERING PPROXIMATELY 0.5 TO 0.7 ACRES.

TIDAL DATUMS

EL (2061)	EL (2030)	DATUM	
10.5	-	HAT	HIGHEST ASTRONOMICAL TIDE
9.9	8.7	HTL	HIGH TIDE LINE
-	3.9	MSL	MEAN SEA LEVEL
-	-1.1	MLLW	MEAN LOWER LOW WATER
0	0	NAVD88	NORTH AMERICAN VERTICAL DATUM OF 1988

EL	ELEVATION, NAVD88 FEET
H:V	HORIZONTAL:VERTICAL SLOPE RATIO

DRAWING NAME: \\rhtnas\Company Share Folder\Work Products\Active Projects\3550, SAFER BAY\05, EIR Existing Cond\Graphics\Report Figures\Basis of Design\WkngDwg\3550-05_BirdNesting_CrossSection_20250211.dwg

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Figure 8. Seabird Nesting Island Cross Section

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3.6.3.2 Size

Since the three seabird species began nesting in SF2, they have used the three enhanced islands and one unenhanced circular island that collectively total 1.84 acres in size (Cornell Lab of Ornithology 2024). One of these islands, Island 21, has supported the Caspian and elegant tern colony each year, while black skimmers have nested on all three enhanced islands and an adjacent unenhanced circular island, although no more than two of these islands have been used for seabird nesting each year (Cornell Lab of Ornithology 2024). Therefore, creation of two large islands totaling at least 1.84 acres in tidal Pond R1 will accommodate the current size of these three species breeding colonies and will also allow for future colony growth. The total surface area of the gravel covered crests of the two islands will sum to at least 1.84 acres.

3.6.3.3 Shape

Two types of islands were constructed in Pond SF2 by the SBSPRP, including rounded islands with a low island-edge to island-area ratio, and more linear, long and rectangular islands that have a higher island-edge to island-area ratio (Hartman et al. 2019). USGS and USFWS elected to enhance rounded rather than linear islands because their lower island-edge to island-area ratio allows for the formation of circular colonies that are better able to defend themselves from avian predators and don't leave adults, eggs, and chicks at the ends of the colony vulnerable to predation. In addition, the islands were graded to have a slope of 4H:1V or less to provide a relatively gentle slope suitable for nesting. Therefore, the gravel covered crests of the two seabird islands will be round and will have a slope of 4H:1V or less to provide similar benefits to the colonies.

3.6.3.4 SLR Resilience

Since the islands will be constructed in Pond R1, which will be opened to tidal action shortly after their construction, it is important that they are designed to an elevation such that island tops won't be inundated by tides. Therefore, the perimeter of the island tops will be built to an elevation of 10.5 feet NAVD88, which is the projected HAT in 2061. Islands will be built such that this target crest elevation is achieved after soil settlement and consolidation.

Being exposed to tidal action could render the island slopes vulnerable to erosion. USGS and USFWS addressed this issue in Pond SF2 cell U2 by lining the constructed islands with 3 inch diameter rocks (Hartman et al. 2019). Similarly, the islands constructed in Pond R1 will be lined with 3 inch diameter rocks at 5.8 feet, which represents 2 feet above MSL under current conditions.

3.6.4 Nesting Island Channel Design for Mammalian Predator Deterrence

The area surrounding the islands should remain free of mudflats and/or vegetation that could facilitate mammalian predation of nesting seabird adults, eggs, or chicks. This will be accomplished by excavating tidal slough channels between and surrounding both islands. The location of the islands near the main breach will also facilitate maintaining the area surrounding the islands as deep water. One island will be located directly south of the pilot channel excavated to convey water from the breach into the largest historical slough channel

in the pond, while the second island will be located south of this island. Section 3.3.4.2 provides the hydrologic basis of design for the nesting island channels.

3.6.5 Surface Treatment for Island Crests

Caspian terns, elegant terns, and black skimmers prefer nesting areas that are sparsely vegetated, often with sandy or gravel substrates. In 2015, USGS and USFWS treated the three enhanced islands in Pond SF2 with 0.4 inch size crushed rock to a depth of 18 inches to provide preferred nesting conditions (Hartman et al. 2019). Therefore, the crests of the islands will be covered with similar sized gravel to a minimum depth of 18 inches. Gravel cover will extend from the 2030 HTL to the island apex to cover the entire island crest and its 4H:1V slope. This will provide the preferred substrate for nesting and reduce the ability of vegetation to establish on the island.

The San Francisco Bay Bird Observatory (SFBBO) found that nesting islands constructed from bay mud in Pond SF2 formed large cracks in the summer when exposed to consistent warm temperatures (Robinson-Nilsen et al. 2011). These cracks were up to 3 inches wide, and both American avocet (*Recurvirostra americanus*) and WSP chicks were found deceased in them. Thus, semi-precocial seabird chicks could similarly fall into cracks in the islands built in Pond R1. Cracks in islands on Pond SF2 were treated by smoothing with heavy machinery, while similar islands in Pond A16 in the Alviso Complex of the Refuge were constructed with a mix of 50% bay mud and 50% upland fill to prevent cracking. Therefore, the soil fill portion of each island will be constructed from either 100% imported upland soil or a mix of bay mud/imported upland soil that contains at least 50% imported upland soils. The soil fill will be compacted and smoothed with heavy machinery to prevent cracking. The use of imported upland soil will also reduce the amount of soil consolidation relative to bay mud. Approximately 2 feet of settlement was assumed for the volume estimate in Table 3. The amount of consolidation will be determined based on future import soil analysis.

3.6.6 Constraints to Public Access at Seabird Islands

Colonial nesting birds such as Caspian terns, elegant terns, and black skimmers are highly sensitive to human disturbance. Impacts due to human disturbance may include reduced breeding success, reduced likelihood nesting site fidelity, and in some cases, active colony abandonment (Carney and Sydeman 1999). Black skimmers have been shown to flush from nesting colonies at up to 426 feet, while royal terns (*Thalasseus maximus*), a species similar to both Caspian and elegant terns, were found to flush at a distance of 348 feet (Erwin 1989). Notably, both flush distances were observed on beaches where humans and mammalians predators can easily access the colony. Ground-nesting seabirds typically display greater wariness of human disturbance in areas with terrestrial access. Although there is no standard buffer for these species, Pacific Gas and Electric uses a buffer of 300 feet for both Caspian terns and black skimmers. As such, no human activity should be allowed on the R1 berm within 300 feet of the islands during the breeding season.

3.7 Pond R1/R2 Existing Loop Trail Modifications

3.7.1 Existing Loop Trail Modifications

A publicly accessible loop trail (Ravenswood Trail) currently exists on the berm crest around Ponds R1 and R2 (Figure 4). However, the two tidal restoration breaches would remove trail access to the bayshore segment of the loop trail in R1 unless bridges were constructed over the breaches. The option of constructing bridges over the breaches was rejected for the following reasons:

- The bayshore berm at R1 between the two breaches is subjected to high wind wave energy and scour due to its location and orientation relative to the bay's prevailing winds. Wind wave erosion forces will likely increase with SLR. The Refuge has expended considerable effort/cost to maintain this berm segment thus far. High operations and maintenance costs in perpetuity would be necessary to continue to resist wind wave erosion at this location to preserve this trail segment (i.e., via repeated rock rip rap fill in the bay edge for slope protection combined with repeated base rock fill to increase berm heights with SLR).
- The long-term persistence of this berm segment is not necessary to achieve the SAFER Bay project's tidal habitat restoration goals at R1/R2. The berm will be left in place (not removed by the restoration project) to provide short/medium term wind wave protection which will allow sufficient time for vegetated tidal salt marsh to establish within R1.
- As noted above, human activity on the R1 berm should remain at least 300 feet from the constructed seabird islands located adjacent to the berm just south of the primary breach.

Therefore, a substantial portion of the existing trail will be decommissioned between the seabird islands in the southwest corner of R1 and the secondary breach in the northeast corner of R1 (Figure 4). The decommissioned trail segment will be restored to T-zone habitat and allowed to naturally erode over time (see section below). The remainder of the trail will be converted to two spur trail segments as shown in Figure 4.

3.7.2 T-Zone Revegetation of Decommissioned Trail Segments

The decommissioned trail segments shown in Figure 4 will be converted to T-zone habitat along the crest of the R1 berm. T-zone habitat will be dominated by native and non-invasive salt marsh and alkali meadow plant species to provide high tide refugia habitat for tidal marsh wildlife in the restored tidal marsh. The existing trail substrate is highly compacted soil due to vehicle, bicycle, and pedestrian use. Most of the trail consists of terrestrial subsoil fill with low organic matter content imported by the Refuge to raise and stabilize the trail/berm.

No earthwork to alter topography is necessary to achieve the T-zone habitat goals at this location. T-zone habitat will be restored in the berm crest/trail with the following actions:

- Cross-rip to a depth of 1.5 feet to reduce surface soil compaction.

- Amend the upper 0.5 feet of surface soil to achieve at least 2% organic matter content (dry weight basis). Composted organic matter should be homogeneously mixed with surface soil, then the surface lightly compacted with LGP tracked equipment.
- Hydroseed or manually broadcast seed with alkali meadow native seed mix consistent with T-zone habitat shown (See Section 3.9).

3.8 High Tide Refugia Berms

3.8.1 Goals and Design Criteria

Mature tidal salt marshes include generously distributed patches of high marsh along the edges of sinuous slough channel networks. High marsh along slough channels establishes by tides repeatedly depositing sediment resulting in an elevated slough channel edge above the surrounding marsh plain. Native high salt marsh vegetation typically includes gumplant, a subshrub, as well as perennial pickleweed, alkali heath (*Frankenia salina*) saltgrass (*Distichlis spicata*), and other halophytes. Gumplant provides a woody structure that can grow 3–4 feet tall through which pickleweed and saltgrass arbor, creating dense, hummocky vegetation that remains above water during king tide events. Abundant high marsh habitat along dendritic slough channels provides ideal cover for SMHM, CRR and other resident marsh animals from raptors, gulls, ravens, and other species that predate on mice and rail during high tides.

Moreover, high marsh along slough channels provides dispersed high tide refugia habitat for SMHM and CRR across large tidal marshes where they forage (hereafter referred to as in-marsh refugia). For example, in-marsh refugia is relatively abundant and well dispersed throughout Laumeister Marsh, one of the few remaining natural marshes in the South Bay (H. T. Harvey 2023). By contrast, T-zone habitat provides high tide refugia habitat along the landward margin of marshes for these species. SMHM are limited in the distance they can disperse to find refugia cover during high tide events (Smith et al. 2014) and the chance of CRR being predated increases when they have to fly to find refugia at marsh edges during extreme high tide events (Overton et al. 2013). Therefore, high marsh along slough channels in addition to T-zones, are important components of providing sufficient refugia habitat to support the recovery of SMHM and CRR (H. T. Harvey 2023).

Tidal marsh vegetation will establish on the marshplain sufficiently to provide habitat for CRR and SMHM in Pond R1 and R2 within 10–20 years of breaching (Section 3.4). However, based on prior marsh restoration projects in subsided baylands in San Francisco Bay (e.g., at Cooley Marsh, Sonoma Baylands, Bair Islands), it can take many decades for high marsh to develop on its own (Philip Williams & Associates and Faber 2004). Moreover, given anticipated SLR, it's uncertain whether abundant high marsh will ever passively develop through sediment deposition along slough channel edges at Ponds R1/R2. Therefore, the SAFER project will construct a moderate number of high tide refugia berms along slough channel edges in Pond R1 and R2 to provide in-marsh refugia for SMHM, CRR and other resident marsh animals; approximate locations of the high tide refugia berms are shown in Figure 4). In addition, the project will enhance the existing internal berm between Pond R1 and R2, which is already largely at a suitable elevation for high marsh through seeding, to

provide additional in-marsh refugia; the internal R1/R2 berm to be enhanced is shown in Figure 4. We judge that the in-marsh refugia will be most valuable after marsh plain vegetation has established. Given that sea level will rise between the time when the ponds are breached (2031) and the time when the marsh plain will vegetate, the berms have been positioned slightly higher than the optimal elevation for refugia in 2031 to set optimal conditions for high marsh vegetation on the berms once marsh plain vegetation establishes.

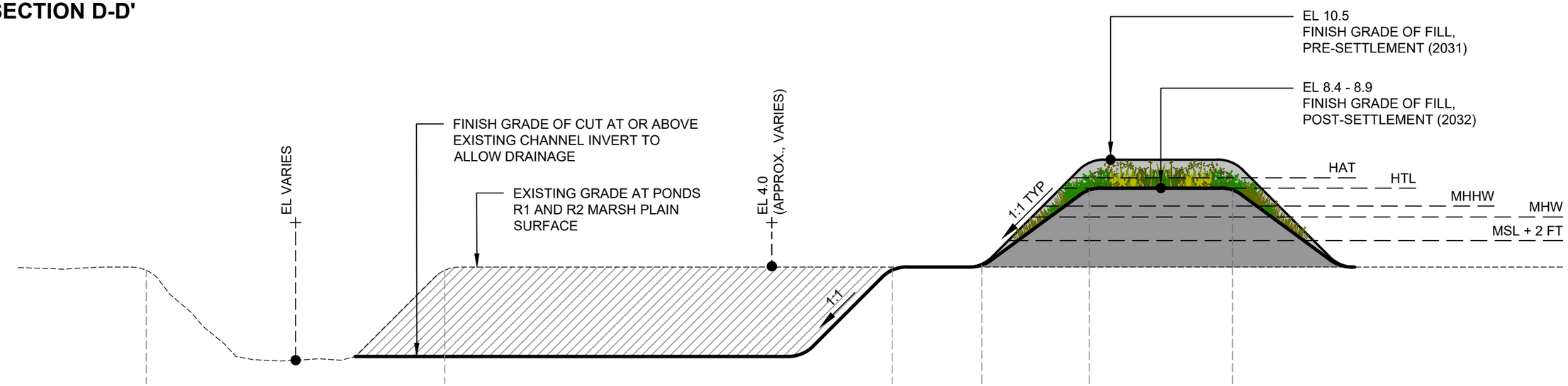
The high tide refugia berms and R1/R2 internal berm enhancement designs are based on the following criteria:

- Provide dense high marsh vegetation adjacent to slough channels at locations distributed across Ponds R1 and R2 to provide high tide refugia habitat for CRR, SMHM and other resident marsh animals.
- High marsh vegetation should extend 1–2 feet above the elevation of king tides starting approximately 5–10 years after breach (i.e., to coincide with the time when the R1/R2 marsh plain has accreted some sediment and begins to naturally vegetate with cordgrass and pickleweed).
- High marsh vegetation on berms should include, at minimum gumplant and pickleweed to provide suitable vegetation structure on islands.
- Refugial berms should be revegetated shortly after construction to avoid creation of cracks on berm tops and to minimize the availability of bare ground which may act as an ecological trap. WSP may be attracted to nest in seemingly suitable breeding habitat that would be periodically overtopped by higher tides, resulting in the failure of nests.

3.8.2 Size, Location, and Construction Approach

Figure 4 provides the approximate locations of the high tide refugia berms to be constructed in Pond R1/R2 and shows the location of the existing internal R1/R2 berm to be enhanced. Figure 9 provides a conceptual cross section of a refugia berm at construction - and after settlement and high marsh vegetation establishment. The berms will be constructed using in-situ bay mud excavated in Pond R1/R2 or with bay mud spoils from pilot slough channel excavation in Pond R1/R2. Most berms will be constructed to be approximately 35 feet long with a base 16–20 feet wide and a top 4–8 feet wide. A subset of berms will be between 160 and 300 feet long (same base and top) as shown in Figure 4. The shorter berms (35 feet) will provide ample refugia habitat to conceal CRR, which could use the berms simultaneously. The longer berms, in addition to providing refugia, are longer to break up wind-waves, thereby improving conditions for sediment accretion and salt marsh seedling establishment on the leeward marsh plain.

SECTION D-D'



D	MARSH PLAIN	EXISTING SLOUGH CHANNEL	CUT: EXPANDED SLOUGH CHANNEL	MARSH PLAIN	FILL: HIGH TIDE REFUGIA BERM			MARSH PLAIN	D'
					Slope	Top of Berm	Slope		
			25 FT max (See Note 2)	Approx. 5 FT	Varies Approx. 6 FT	4 to 8 FT (See Note 1)	Varies Approx. 6 FT		

NOTES

1. WIDTH OF REFUGIA BERM TO BE DETERMINED BY AVAILABLE FILL MATERIAL. CONSTRUCT ISLAND TO THE MAXIMUM WIDTH POSSIBLE WITHIN THE DIMENSIONAL CONSTRAINTS SHOWN ON THIS FIGURE.
2. WIDTH OF CUT VARIES AS REQUIRED TO GENERATE SUFFICIENT FILL MATERIAL TO CONSTRUCT REFUGIA BERM. WIDTH AND DEPTH OF CUT TO NOT EXCEED CONSTRAINTS SHOWN ON THIS FIGURE.

TIDAL DATUMS IN 2031

EL	DATUM	
8.99	HAT	HIGHEST ASTRONOMICAL TIDE
8.41	HTL	HIGH TIDE LINE
7.41	MHHW	MEAN HIGHER HIGH WATER
6.8	MHW	MEAN HIGH WATER
3.48	MSL	MEAN SEA LEVEL
-1.2	MLLW	MEAN LOWER LOW WATER
0	NAVD88	NORTH AMERICAN VERTICAL DATUM OF 1988

EL ELEVATION, NAVD88 FEET
H:V HORIZONTAL:VERTICAL SLOPE RATIO

DRAWING NAME: \\nthnas\Company Share Folder\Work Products\Active Projects\3550, SAFER BAY\05, EIR Existing Cond\Graphics\Report Figures\Basis of Design\WkngDwg\3550-05_HighTideRefugia-CrossSection_20250211.dwg

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Figure 9. High Tide Refugia Berm, Conceptual Cross Section

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Figure 9 shows a typical refugia berm cross section assuming that the berm is constructed using in-situ bay mud excavated from the adjacent slough channel. In cases where bay mud spoils from pilot slough channel construction or levee excavation are used to build the berm, the berm should be situated approximately 5 feet from the existing slough channel edge, rather than the expanded slough channel edge shown in Figure 9. Refugia berms will be constructed with initially steep side slopes (approximately 1H:1V) and with the berm top set to elevation 10.5 feet NAVD88. Side slopes will become slightly less steep with settlement. Based on H. T. Harvey restoration ecologist's monitoring of over 60 refugia berms (or islands) constructed in San Francisco Bay marshes, refugia berms typically settle/consolidate after construction approximately 25–33% of their height at construction (H. T. Harvey 2021a). Therefore, post-settlement, refugia berms are expected to settle to approximately 8.4 to 8.9 feet NAVD88, which corresponds to a berm top between approximately 1.0 to 1.5 feet above MHHW in 2031. At breach, these elevations are appropriate for high marsh vegetation such as pickleweed and gumplant (H. T. Harvey 2021a). High marsh vegetation canopy will extend above the berm top to approximately 10.5–11.5 NAVD88, providing 1.5 to 2.5 feet of vegetation cover above the height of king tides (king tide elevation is estimated as the HAT, approximately 9 feet NAVD in 2031). As sea level rises, the berms will remain positioned to provide high marsh vegetation until MHHW increases to above the height of the berm.

The two proposed breaches in the existing internal R1/R2 berm shown in Figure 4 (East Interior Breach and West Interior Breach) will discourage access by land-based predators to the R1/R2 berm during extreme high tide events. Otherwise, the topography of internal R1/R2 berm will not be modified, as the current elevation is appropriate to establish high marsh vegetation with equivalent resilience to SLR as the high tide refugia berms. Vegetation will be established on the R1/R2 berm as described below.

3.8.3 Seeding Plan

Following earthwork, the tops of high tide refugia berms down to MHHW will be seeded with the seed mix shown in Table 4. Seed application is planned (instead of relying only on natural seed dispersal) because the island tops will be at or above the HTL, making opportunities for seed dispersal and marsh plant seed recruitment potential to the berm tops initially low. Rapid revegetation is necessary to avoid attracting WSP to nest on these berms that would otherwise function as ecological traps when high tides overtop the berm and cause nest failure. To speed up vegetation establishment on the berm top, a native high marsh seed mix will be applied. Seedling germination on island tops will be triggered by a combination of rainfall and bay water, but bay water will need to sustain seedlings through subsequent dry seasons. Therefore, seed will be applied to refugia berms during the same construction season that Pond R1/R2 is breached and between September 1 and November 1 to reduce seed predation and mortality prior to the rainy season. Seed will be applied via manual broadcast seeding on the refugia berms. Seed will be raked into the upper ¼ inch of the refugia berm soil surface according to the seed rates in Table 4.

Similarly, plant recruitment on the existing internal Pond R1/R2 berm top is expected to occur slowly since portions of the berm top are above the HTL. Therefore, the R1/R2 berm top will also be seeded down to MHHW at the same time as seed is applied for high tide refugia berms. The R1/R2 berm was generated by

excavating bay mud decades ago and like other excavated bay mud derived soils in the South Bay, the berm soil is likely acidic and hypersaline (H. T. Harvey 2020). Therefore, topsoil salinity and acidity will be improved via an organic compost amendment to increase seeding germination and establishment rates. Two vertical inches of organic compost amendment will be incorporated into the upper 6 inches of the internal R1/R2 berm soil above MHHW prior to seeding. In addition to diluting soil pH and salinity in the upper 6 inches, organic matter will increase water holding capacity of the soil, water infiltration and soil fertility, which will encourage seed establishment and plant growth. Following incorporation of organic amendment, seed will be applied via hydroseed or manual broadcast seed methods according to the seed rates in Table 4.

Table 4. Seed Mix for High Tide Refugia Berms and Internal R1/R2 Berm

Botanical Name	Common Name	Hydroseed Application Rate (Pounds of Pure Live Seed per Acre)	Broadcast Seed Application Rate (Pounds of Pure Live Seed per Acre)
Frankenia salina	Alkali heath	1.0	0.5
Grindelia stricta	Marsh gumplant	2.5	1.75
Salicornia pacifica	Perennial pickleweed	0.5	0.5

3.9 T-Zone in R2

3.9.1 Goals and Design Criteria

At Pond R2, a 10H:1V T-zone will be constructed between the restored marsh in Pond R2 and the adjacent 3H:1V earthen levee planned for construction through the Substation and Marsh Restoration reach (Figure 4). The T-zone is a distinct type of ecotone habitat located on gentle slopes between tidal salt marsh and adjacent uplands. T-zones were historically abundant along tidal marshes adjacent to lowlands in the San Francisco Bay and broad T-zone habitat previously existed in the South Bay (Beller et al. 2013). Today, the T-zone around San Francisco Bay marshes consists almost entirely of a narrow area between the high marsh and steep artificial levee faces (Collins and Goodman-Collins 2010). The SAFER project provides a rare opportunity to increase the amount of low-gradient T-zone habitat along the Ravenswood Slough marshes. Including restoration of T-zone habitat adjacent to tidal marshes is recommended by several guidance documents including the *Salt Marsh Harvest Mouse and California Clapper Rail Recovery Plan* (USFWS 1984), the *Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California* (USFWS 2013), *Living with a Rising Bay: Vulnerability and Adaptation in San Francisco Bay and on its Shoreline* (BCDC 2011), the *Baylands Ecosystem Habitat Goals* (Monroe et al. 1999), and *The Baylands and Climate Change: What We Can Do* (Goals Project 2015). This is primarily because:

- In the absence of adequate in-marsh high tide refugial habitat, T-zones are essential for the survival and recovery of the SMHM and CRR because they provide refugia from predators during high tides (USFWS 1984, 2013; Shellhammer et al. 2010). T-zones are most critical during extreme high tide events when tidal marshes are inundated, and predation pressure is highest (Overton et al. 2013).

- T-zones foster high plant and animal community diversity and in some parts of the Bay area provide essential habitat for endangered marsh plants, including salt marsh bird's beak (*Chloropyron molle* ssp. *molle*) and California sea blight (*Suaeda californica*) (USFWS 2013, Monroe et al. 1999).
- T-zones increase the habitat diversity and biodiversity (including a higher number of species) of the tidal marsh edge because plant and animal communities overlap along the hydrologic gradient provided within a broad T-zone (Goals Project 2015).
- Broad, gentle T-zones provide accommodation space for the landward transgression of tidal marsh with SLR (BCDC 2011).

Studies have identified specific ecotone elements in T-zones that benefit wildlife. Point Blue Conservation Science (2018) found that grass cover and areas of vertical canopy at least 3 feet tall on T-zones were associated with increased CRR population trends. Similarly, T-zones with at least 15% dense vegetation taller than 1 foot exhibited increased use by the tidal marsh song sparrow (*Melospiza melodia*), a species of special concern. More open T-zone vegetation was found to benefit the Savannah sparrow (*Passerculus sandwichensis*). T-zones wider than 75 feet were associated with positive trends in the adjacent tidal marsh bird population (Point Blue Conservation Science 2018). Based on direct observation of avian predators foraging during king tides, H. T. Harvey's wildlife ecologists judge that a 30-foot-wide T-zone with dense vegetation provides meaningful high tide refugia habitat to protect SMHM and CRR during high-tide predation events.

T-zone construction that requires fill in tidal marshes should consider the benefits of T-zone creation relative to the loss of tidal marsh extent necessary for T-zone creation. In relatively small marshes that already have abundant in-marsh refugia habitat (e.g., Faber Marsh, Laumeister Marsh), H. T. Harvey concluded that broad T-zones should not be constructed at the expense of tidal marsh (H. T. Harvey 2023). T-zone construction at Pond R2 would require fill in existing pond/aquatic habitat along the bayward edge of the SAFER levee. While no existing tidal marsh would be impacted, the T-zone would occupy space that would eventually establish tidal salt marsh after breaching and sediment accretion. Construction of a moderately wide T-zone is warranted at this location, rather than a restored tidal marsh with a narrower T-zone on a 3H:1V levee slope because:

- Ponds R1/R2 are subsided and lack natural in-marsh refugia. Therefore, construction of both a T-zone and in-marsh refugia (see Section 3.8) are recommended to provide adequate refugial habitat for SMHM and CRR in R1/R2.
- The restored marsh in Pond R1/R2 will be extensive (approximately 576 acres). By contrast, approximately 4 acres of area (0.7%) that would otherwise be restored to marsh will be filled for T-zone creation. In our judgment, the loss of a small area of future restored marsh is an appropriate trade-off for the ecological benefits of a T-zone.

Given the above considerations, the T-zone in R2 has the following goals:

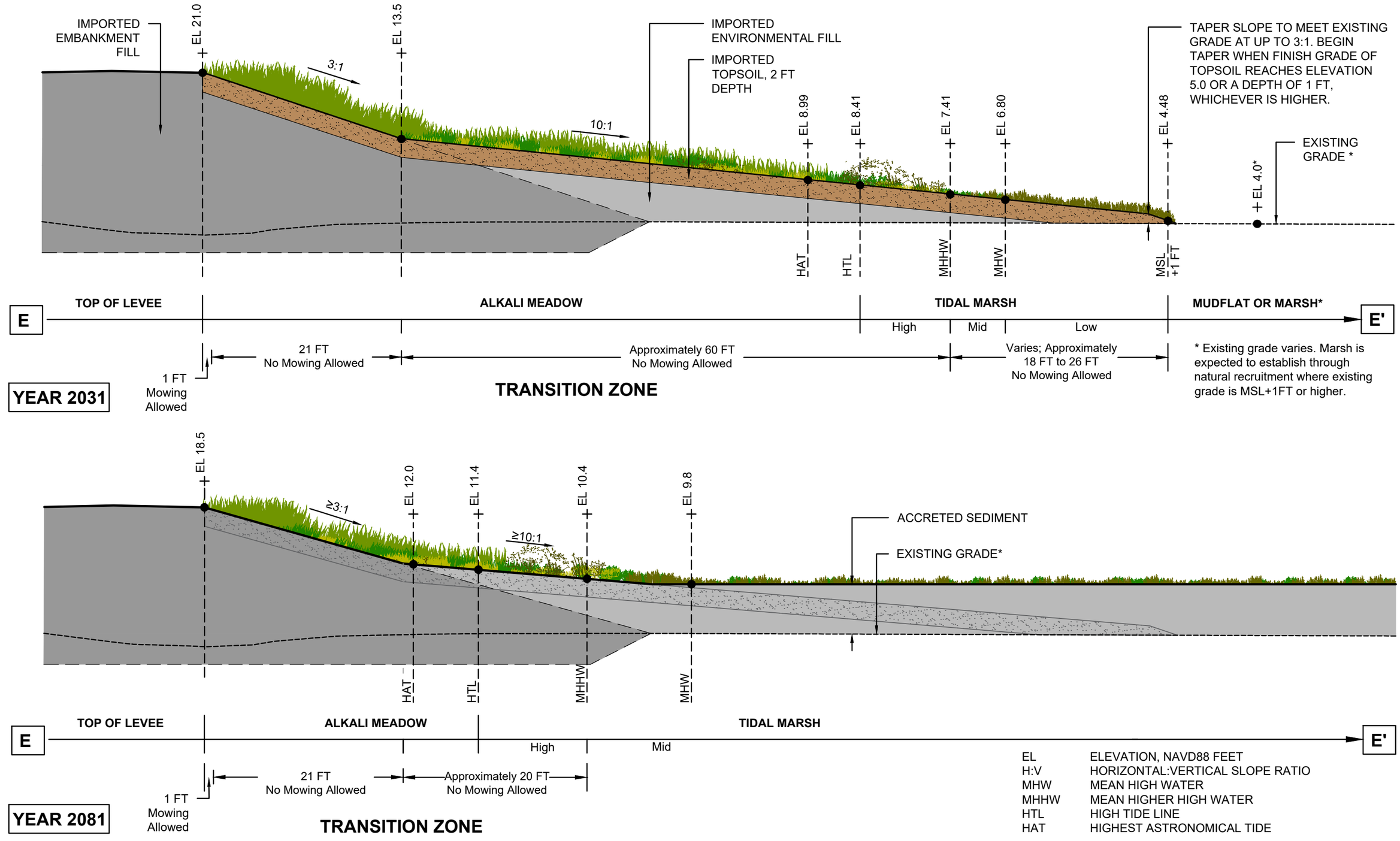
- Minimize conversion of R2 to upland while providing an adequately sized T-zone with suitable high tide refugia cover to benefit SMHM and CRR using the adjacent restored tidal marsh.
- Design a cost-effective T-zone of adequate width and height to provide suitable high tide refugia habitat through the project's design life (to accommodate 3 feet of SLR); given the volume of fill needed for T-zones, this restoration feature is a high-cost item and should be designed to be both ecologically functional and cost-effective.
- Establish a diverse assemblage of flowering plants with varying phenology to benefit pollinators and provide food web support for birds.

The following design criteria are established to meet these goals:

- Construct a 10H:1V T-zone slope to provide at least 30 feet of high-quality T-zone vegetation above the HTL after 3.0 feet of SLR (at breach in 2031 that equates to an approximately 60-foot-wide T-zone).
- Establish dense, native vegetation that includes both substantial area of vegetation patches with vertical canopy at 2–4 feet tall for high tide refugia cover and areas of grassland at least 1 foot tall.
- No shrubs or trees over 5 feet tall to minimize creation of avian predator perches.
- Control invasive plants on the T-zone where vegetation structure is necessary to achieve the habitat high-tide refuge goal.

3.9.2 Ecotone Slope and Earthwork

A cross section showing the slope and target habitats on the T-zone is provided in Figure 10 for Year 2031 (at breach) and Year 2081 with SLR. The T-zone slope will be built following completion of construction of the engineered levee with its 3H:1V slopes. The T-zone slope will be constructed starting at elevation 13.5 feet NAVD88 descending at a 10H:1V slope down to approximately elevation 5 feet NAVD88; which is approximately the lowest elevation for low marsh vegetation establishment. At either elevation 5 feet NAVD88 or when the T-zone slope is 1 foot above the Pond R2 surface (whichever is first), the T-zone slope will transition to a 3H1:1V slope down to meet the existing Pond R2 grade (Figure 10). A 10H:1V slope was selected because it will initially provide an ample area of T-zone (80 feet wide) at breach and will provide 40 feet of T-zone after 3 feet of SLR anticipated by 2081. The T-zone slope will be actively revegetated to provide dense alkali meadow habitat from where the T-zone meets the levee down to the HTL. Tidal salt marsh will be established through a combination of planting, seeding and natural recruitment between MHHW and HTL. Marsh plant recruitment from seed after breach will establish tidal marsh habitat from MHHW down to approximately 1 foot above MSL.



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Figure 10. Year 2031 vs Year 2081 Pond R2 Transition Zone Cross Section

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Imported soil (rather than salvaged bay mud) will be used to construct the upper 2 feet of the T-zone. Salvaged bay mud is not suitable for use in the upper 2 feet of the T-zone because bay mud excavated from saline marshes have high salinity, high boron, and potential for very low pH, making it unsuitable to support the target upland T-zone habitat (H. T. Harvey 2021b). To support dense grassland and alkali meadow habitats (Figure 10), imported fill soil can have a broad range of suitable physical and chemical soil which will make such fill practical and cost-effective for a contractor to source.

The upper 2 feet of fill soil on the T-zone (and the upper 2 foot of fill soil on the levee slope above elevation 13.5 feet NAVD88) will meet the criteria for topsoil (Table 5). At depths below the upper 2 feet of topsoil on the T-zone, no horticultural criteria are necessary for imported environmental fill as T-zone plant roots are expected to root mostly in the upper 2 feet. Additionally, all imported soil will be required to meet contaminant screening criteria to protect sensitive ecological receptors. The Refuge's Master Quality Assurance Project Plan (Master QAPP; USFWS and H. T. Harvey 2024b) provides screening methods for soil contaminants in imported upland soil used in the Refuge's wetland environments, including levee slopes and T-zones. Imported topsoil in Pond R2 (which is within the Refuge) will be required to meet the Wetland Surface Criteria in the Master QAPP. Environmental fill soil will be required to meet the Wetland Surface Criteria in the Master QAPP or Wetland Foundation Criteria with approval from RWQCB and BCDC.

Table 5. Imported Topsoil Criteria for Upper 2 Feet of 10H:1V Transition Zone in Pond R2

Physical Properties	
Particle Size Range	**Percent**
Coarse sand .5–2.0 millimeters	0–85
Silt 0.002–0.05 millimeters	0–85
Clay 0–0.002 millimeters	0–80
Gravel 2–12 millimeters	0–25
Rock 12mm–<3 inches	0–10 by volume
Organic matter	2–5 by dry weight basis
Chemistry[1]	
Salinity	Less than 5.0 deciSiemens per meter
Sodium adsorption	Less than 6.0
Boron	Less than 1.5 ppm
pH of saturated paste	5.5–8
Calcium:Magnesium ratio	greater than 1:1

[1] Additionally, all imported soil (topsoil and subsoil) used to construct this transition zone meet the Wetland Surface Criteria in the Master Quality Assurance Project Plan (USFWS and H. T. Harvey 2024).

3.9.3 Target Habitats

Salt marsh-upland edges lacking fresh groundwater are typically vegetated with dry alkali meadow plant communities above HTL. Mixed coastal scrub also occurs along hillslopes and well-drained soils at the bay

edge (Baye 2008). Native vegetation will be established to meet the goals in the section above. The target plant palette for the T-zone is native species typical of dry alkali meadow plant communities combined with forbs and coastal scrub subshrubs that have been successfully used in T-zone habitat restoration to benefit SMHM and CRR in the SAFER Project area (H. T. Harvey et al. 2025, H. T. Harvey 2025).

Following breach, the lower elevation portion of the T-zone will be naturally colonized by a mix of tidal salt marsh plants, such as Pacific cordgrass, perennial pickleweed, saltgrass and marsh gumplant from MSL +1 foot to HTL. Above the HTL (8.4 feet NAVD88) up to 13.5 feet NAVD88, active revegetation will be implemented to establish native-dominated alkali meadow on the T-zone interspersed with patches of coastal scrub above the highest reach of tides. Alkali meadow will include perennial salt-tolerant, rhizomatous grasses such as saltgrass, creeping wildrye (*Elymus triticoides* var. *Yolo*), and red molate fescue (*Festuca rubra* var. *molate*), and salt-tolerant perennial forbs such as alkali heath, yarrow (*Achillea millefolium),* Menzies' fiddleneck (*Amsinckia menziesii*) and western ragweed (*Ambrosia psilostachya*). The herbaceous vegetation will be interspersed with taller patches of perennial forbs and woody subshrubs such as marsh gumplant, marsh baccharis (*Baccharis glutinosa*), marsh aster (*Symphiotrichum subulatum*), and mugwort (*Artemesia douglasiana*). Coastal scrub patches will be established to increase habitat structure, diversity, and resilience to weed invasion. Coastal scrub patches will be dominated by drought-tolerant, medium statured woody shrubs such as lizard tail (*Eriophyllum staechadifolium)* and sticky monkey flower (*Mimulus aurantiacus*).

3.9.4 Topsoil Preparation

Prior to seeding and planting, the upper 6 inches of topsoil may be amended to meet the horticultural criteria in Table 5. For example, if terrestrial subsoil is imported for use as topsoil, a compost amendment will likely be needed to meet the organic matter requirement; in that case the compost amendment will facilitate formation of soil structure and increase water holding capacity to support robust alkali meadow vegetation. The upper foot of topsoil will be decompacted prior to planting.

3.9.5 Revegetation Timing

Presence of non-native and invasive plants can restrict native plant establishment. Therefore, seeding and planting should occur immediately after T-zone earthwork is complete, regardless of whether Pond R1/R2 is breached concurrently, so that native revegetation occurs prior to substantial weed establishment. This will reduce vegetation maintenance effort and cost.

3.9.6 Irrigation Plan

Container plantings will be watered in at installation. A sprinkler irrigation system or similar method will be used to keep ecotone soils moist during the first winter after seeding to encourage robust seedling recruitment. Irrigation will be used to supplement rainfall and establish T-zone plants during the first 3 years after planting/seeding.

3.9.7 Seeding Plan

Following earthwork and soil preparation, the T-zone from 13.5 feet NAVD88 down to MHHW will be hydroseeded or manually broadcast seeded with the native alkali meadow seed mix shown in Table 6. In the same construction season following this initial seeding, coastal scrub will then be manually broadcast seeded in patches using the seed mix in Table 7. Seeding in patches is designed to limit the broader colonization of the space by these competitive shrubs and thereby foster higher species diversity. The size and density of seeded patches will be determined during a future design phase. Coastal scrub patch seed will be raked into the upper ¼ inch layer of soil. These species germinate readily from seed. Seeding will take place during the timing window and using the methods described in Section 3.8.3.

Table 6. Alkali Meadow Seed Mix

Scientific Name	Common Name	Broadcast Seed Application Rate PLS/ac (lbs)	Hydroseed Seed Application Rate PLS/ac (lbs)	Approximate Maximum Rooting Depth (Inches)[1]	Approximate Maximum Height Above Ground (Inches)[1]
Forbs					
Achillea millefolium	Yarrow	0.5	0.75	9	36
Amsinckia menziesii	Menzies' fiddleneck	0.5	1	6	48
Artemisia douglasiana	Mugwort	0.25	0.75	24	100
Calandrinia menziesii	Red maids	0.5	1	12	12
Castilleja densiflora	Dense flower owls clover	0.5	1	11	16
Collinsia heterophylla	Purple Chinese houses	0.5	1	12	18
Eschscholzia californica	California poppy	1	2	12	24
Lasthenia californica	California goldfields	0.5	1	10	16
Lasthenia glabrata	Yellow rayed goldfields	0.25	0.5	12	24
Layia platyglossa	Tidy tips	0.5	1	6	24
Lupinus bicolor	Miniature lupine	1.5	2.5	24	16
Ranunculus californicus	California buttercup	0.5	1	6	28
Sisyrinchium bellum	Blue eyed grass	0.75	1.5	12	24
Grasses					

Scientific Name	Common Name	Broadcast Seed Application Rate PLS/ac (lbs)	Hydroseed Seed Application Rate PLS/ac (lbs)	Approximate Maximum Rooting Depth (Inches)[1]	Approximate Maximum Height Above Ground (Inches)[1]
Bromus carinatus	California brome	5	7	NA	60
Elymus glaucus	Blue wildrye	5	6	NA	60
Elymus triticoides (var. Yolo)	Creeping wildrye	6	10	NA	48
Festuca microstachys	Small fescue	2.5	3.5	NA	30
Festuca rubra var. molate	Red molate fescue	3	4	NA	24
Hordeum brachyantherum var. salt	Meadow barley	6	8	NA	36
Hordeum depressum	Alkali barley	3	4	NA	24
Stipa pulchra	Purple needlegrass	2	3	NA	40
Total		**40.25**	**60.5**		

Notes: PLS = pure live seed, ac = acres, lbs = pounds, NA = Not Applicable because no variance is required for grasses.

[1] Data on maximum rooting depth and height above ground sourced from the following sources: Calscape 2025, H. T. Harvey 2019, Las Pilitas Nursery 2025, Montalvo et al. 2017, DOI and Santa Monica Mountains National Recreation Area 2025, Foxx and Tierney 1987. No rooting information was available for mugwort, red maids, purple Chinese houses, or miniature lupine; rooting depths based on professional judgement.

Table 7. Coastal Scrub Patch Seed Mix in Transition Zone

Scientific Name	Common Name	Broadcast Seed Application Rate PLS/ac (lbs)	Approximate Maximum Rooting Depth (Inches)[1]
Eriogonum fasciculatum	California buckwheat	2.0	59
Eriophyllum staechadifolium	Lizard tail	1.5	20
Mimulus aurantiacus	Sticky monkey flower	0.2	60
Total		**3.7**	

Notes: PLS = pure live seed, ac = acres, lbs = pounds.

[1] Data on maximum rooting depth sourced from the following sources: California Native Plant Society 2025, Montalvo and Beyers 2010, The Nature Conservancy 2025. No rooting information was available for lizard tail; rooting data provided is for a closely related species, *Eriophyllum confertiflorum*.

3.9.8 Planting Plan

In addition to seed, container plantings in monospecific species patches (Table 8) will be installed throughout the T-zone. The size and density of patches will be determined during a future design stage. Monospecific patches include species that are rhizomatous/stoloniferous (except for marsh gumplant) and typically grow as

dense patches in natural systems. Additionally, because these species form dense patches, this planting design will also reduce the establishment of invasive species. Marsh gumplant is a key component of T-zone vegetation structure and is therefore included in Table 8. The container plants will be installed between November 1 and January 31 to maximize plant exposure to wet conditions during the rainy season.

Table 8. Transition Zone Monospecific Patch Plant Palette

Elevation Range (Feet NAVD88)	Scientific Name	Common Name	On-Center Spacing in Patches (Feet)
9–13	*Ambrosia psilostachya*	Western ragweed	3
9–13	*Baccharis glutinosa*	Marsh baccharis	3
8–10	*Distichlis spicata*	Saltgrass	2
9–13	*Elymus triticoides*	Creeping wildrye	2
8–10	*Frankenia salina*	Alkali heath	3
8–10	*Grindelia stricta*	Marsh gumplant	3
9–13	*Scrophularia californica*	California bee plant	3
9–13	*Symphiotrichum subulatum*	Marsh aster	3

Section 4.0 Pond SF2 WSP Habitat Enhancements

4.1 Goals and Design Criteria

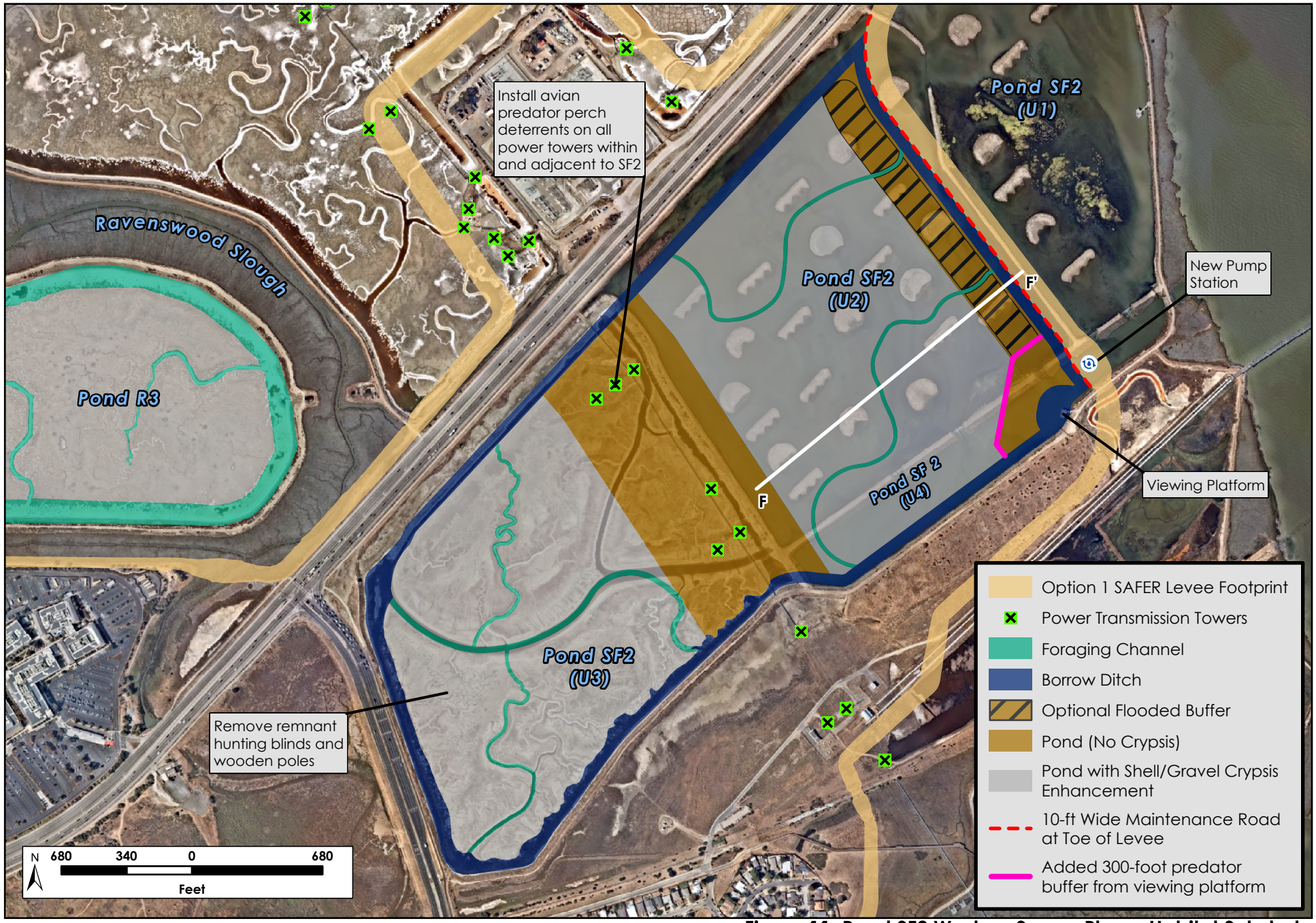
Pond SF2 currently provides WSP nesting, foraging, and roosting habitat in cell U3 (Pearl et al. 2023). The goal of the WSP enhancement design in SF2 is to support a greater number of breeding WSP by increasing the amount of suitable habitat in the pond, implementing several enhancements, and reducing predation pressure. The criteria guiding this WSP habitat enhancement design include:

- Reconfigure cells U2, U3, and U4 into one contiguous pond for WSP habitat.
- Increase crypsis on the pond bottom via deployment of a surface substrate treatment.
- Widen the borrow ditch surrounding the pond bottom to reduce mammalian predator access to the pond bottom.
- Add avian perch deterrents to power towers, where feasible, to reduce the ability of avian predator to perch and hunt from them.
- Increase funding for predator management activities designed to support WSP breeding.

Figure 11 illustrates enhancements needed to improve crypsis and reduce the ability of both avian and mammalian predators to hunt in the ponds. Figure 12 provides a cross-section to further describe vertical and horizontal relationships between the enhancement plan elements for the reconfigured Pond SF2.

4.2 Overview

In 2010, Pond SF2 was reconfigured as part of Phase 1 actions of the SBSPRP. This reconfiguration turned the pond, which had been a single contiguous former salt production pond, into four distinct cells separated by berms and hydraulically connected via a combination of weirs and culverts. The cells were designed to provide three distinct habitats for birds. In two of the cells, U1 and U2, a total of 30 nesting islands were constructed, and the rest of the pond is shallowly flooded to provide foraging and roosting habitat for breeding, migrating, and roosting seabirds, shorebirds, and waterfowl. Water enters the system from the bay via an intake water control structure in U1. One of the cells, U3, is designated by USFWS as critical habitat, and was not significantly modified from pre-project conditions to continue to provide breeding, roosting, and foraging habitat for WSP (USFWS 2012a). The only substantial change that was made to this cell was adding water management via both an intake and discharge weir in the pond. The fourth cell, U4, is managed as deeper water, providing roosting and foraging habitat for waterfowl. This cell also collects water from the other three cells via weirs and culverts and contains a water control structure that discharges to the bay.



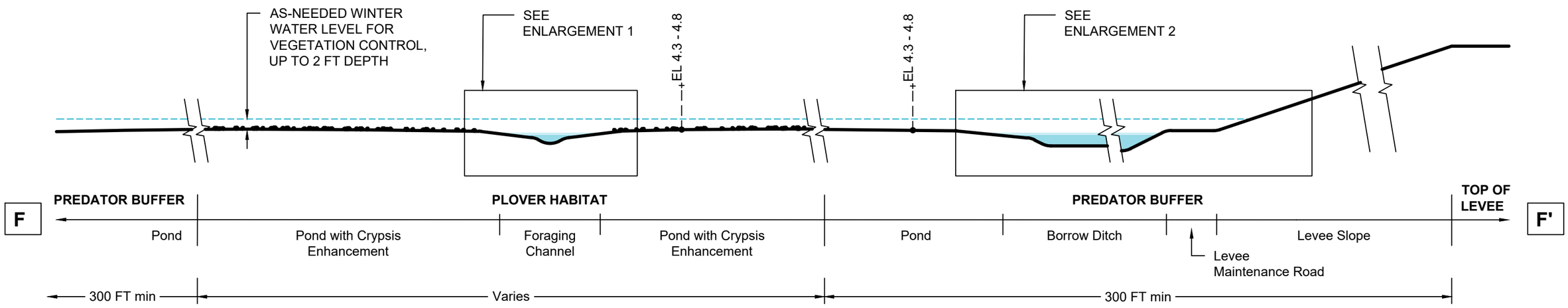
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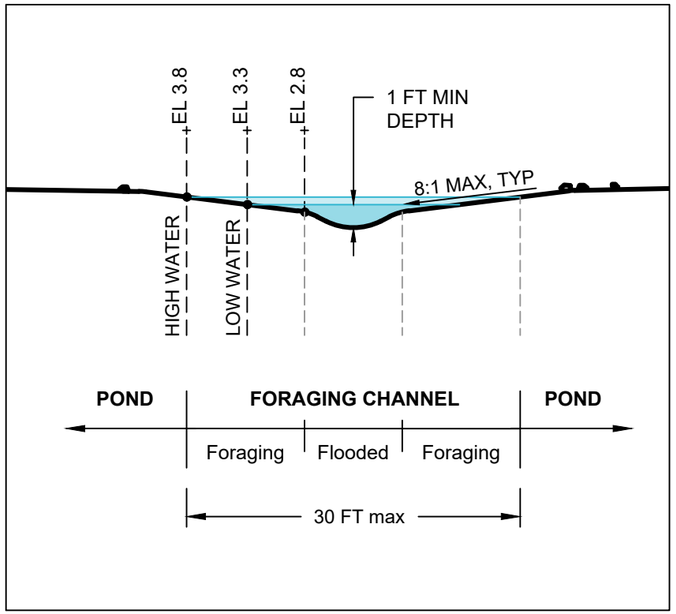
Figure 11. Pond SF2 Western Snowy Plover Habitat Substrate and Predator Deterrent Enhancement Plan

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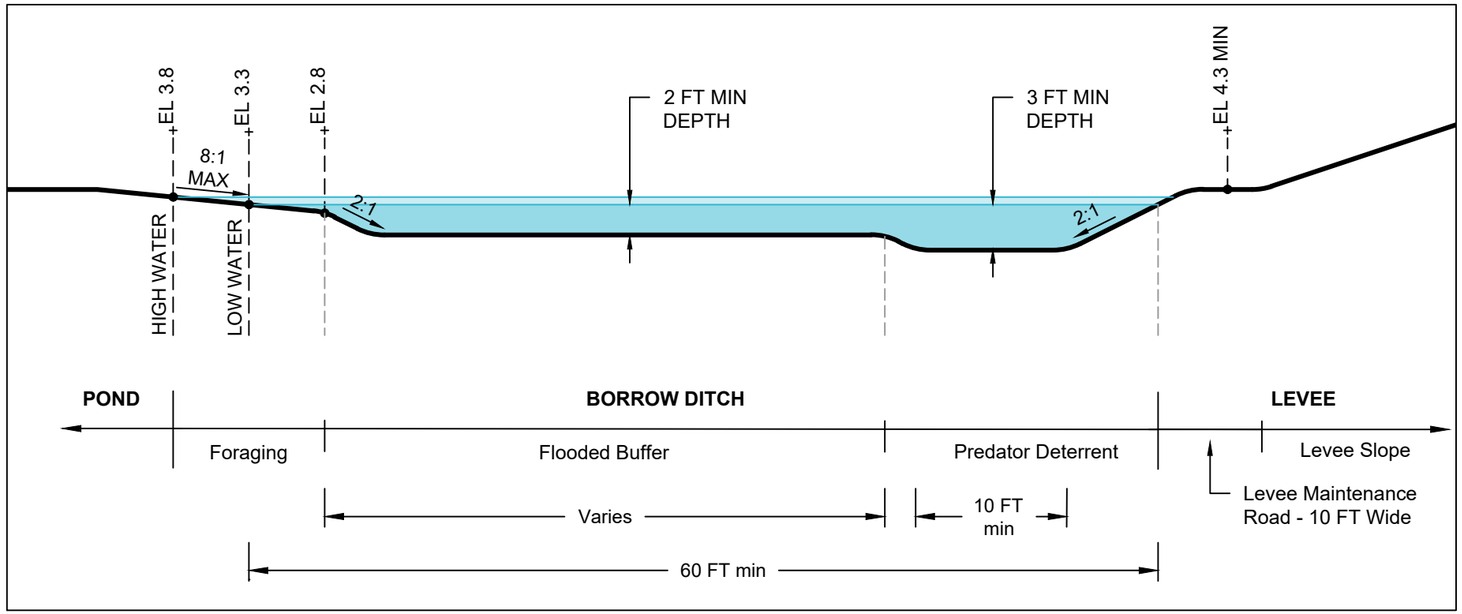
SECTION F-F'



ENLARGEMENT 1



ENLARGEMENT 2



EL ELEVATION, NAVD88 FEET
H:V HORIZONTAL:VERTICAL SLOPE RATIO

Figure 12. Pond SF2 Western Snowy Plover Habitat Enhancement Conceptual Cross Section
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Since reconfiguration, WSP have used cell U3 in varying degrees for breeding, with the amount of nesting inversely correlated to availability of nesting habitat in other ponds in the Ravenswood Complex. In 2021, when a large amount of suitable habitat was available in Ravenswood Ponds R1, R2, R3, and R4, only three WSP nests were documented in cell U3 (Pearl et al. 2022). Conversely, in 2017 when high levels of precipitation resulted in no breeding habitat available in Ponds R1 and R2 and minimal habitat available in Ponds R3 and R4 at the start of the breeding season, cell U3 supported 32 WSP nests (Pearl and Chen 2018). It was hoped that WSP might utilize the nesting islands in cells U2 and U3, and indeed the USGS and USFWS social enhancement project set out several WSP decoys on the islands. However, apart from several nests in 2011 and 2012, WSP have avoided using these areas for breeding, roosting, or foraging (Robinson-Nilsen et al. 2011, Donehower et al. 2013; Pearl and Chen 2018). In addition, although some of the islands are used by breeding birds, and more are used by non-breeding birds, many of the islands remain vacant. With the loss of WSP breeding habitat in Ponds R1 and R2 due to tidal marsh restoration for this project, enhancement of cells U2, U3, and U4 provides an opportunity to adequately offset the loss of WSP habitat and support their recovery. The following sections describe the basis of design for SAFER Bay's proposed WSP habitat enhancements in SF2.

4.3 Earthwork

4.3.1 Berm, Island, and Pond Bottom Grading

The primary component of earthwork in Pond SF2 involves creating contiguous WSP habitat by connecting cells U2, U3, and U4. To accomplish this, the berms separating U2, U3, and U4 will be removed. Soil from the berms will be used to fill the interior borrow ditch west of the berm between U2 and U3 and extend the pond bottom in U4 by approximately 280 feet. The islands in U2 will be graded down to the elevation of the surrounding pond bottom, and soil from the islands will be used to fill pilot channels surrounding the islands. In U3, two low elevation areas will be raised to match the elevation of the surrounding pond bottom. If necessary, excavated bay mud from construction of the SAFER levee between U1 and U2 may be used for fill to accomplish these goals. Grading will include slight crowning to limit ponding.

4.3.2 Borrow Ditch

A 60-foot wide borrow ditch will be excavated around the connected cells U2, U3, and U4 cells to form a continuous channel along the outside of the pond. The borrow ditch will be excavated to a minimum depth of 3 feet relative to the pond bottom for at least 10 feet horizontally from the adjacent upland areas to ensure that the borrow ditch retains enough water to inhibit mammalian predators from crossing. The remaining 50 feet of the borrow ditch will be excavated to a minimum depth of 2 feet to facilitate balancing of earthwork cut and fill on-site. At the viewing platform located in cell U4, the borrow ditch will be widened to 125 feet to prevent human disturbance from impacting breeding WSP. The edge of the pond along the borrow ditch will be laid back to gentle slopes to provide a large viewshed of the surrounding area, resulting in high-quality foraging habitat for WSP. Because a borrow ditch adjacent to the SAFER levee could cause levee instability. Therefore, per FEMA guidelines a 10-foot maintenance road at the pond side toe of the levee will be built in the eastern

side of cell U2 between the levee toe and the borrow ditch. Figure 11 illustrates the location of the excavated borrow ditch and 10-foot maintenance road.

4.3.3 Slough Channel Filling and Excavation

To increase the continuity of WSP habitat in the pond, existing large channels in cell U3 will either be filled or made narrower and shallower. Large slough channels located within 300 feet of the power towers that are in U3 will be filled using excavated material from the construction of the SAFER levee. This will reduce the likelihood of WSP foraging in the interior of the pond within 300 feet of the power towers from where predators may perch and hunt. The slough channels located further west in the pond will be made narrower and shallower using excavated material from the SAFER levee construction.

To increase the amount of high-quality foraging habitat in the pond, several medium-sized slough channels in U3 will be re-routed and connected to the borrow ditch to ensure that they can be recharged with water throughout the breeding season. Other medium-sized slough channels will be filled to create more WSP nesting habitat and facilitate the movement of WSP broods across the pond.

4.4 Surface Substrate Treatment

4.4.1 Oyster Shell Enhancement

Previous studies of oyster shell enhancements deployed at Eden Landing Ecological Reserve in Hayward, California found that WSP preferentially selected to nest in shelled areas over unshelled areas; hatching success for nests in shelled areas may have been improved through increased crypsis provided by the shells; and a large amount of WSP were attracted to nest in shelled areas (Robinson-Nilsen et al. 2009, Donehower et al. 2013, Pearl et al. 2016). The studies did not find that oyster shells increased WSP fledging success, however it is important to note that oyster shells were not spread near wet areas that provide foraging habitat, and thus WSP broods would have to leave the shell enhancement plots to forage. During the initial oyster shell habitat pilot study conducted 2008–2010, oyster shells were spread by hand in 15 1-ha plots to an approximate density of 5–8 shells/m^2, while a large-scale oyster shell enhancement study in 2014 spread oyster shells to a similar density over 20.23 ha by using a leaf blower to blow shells off the back of a tracked crawler carrier. A small amount of oyster shells have been previously spread to a similar density at Pond SF2 cell U3 by SFBBO volunteers in 2010 and 2024.

Figure 11 depicts the area of Pond SF2 over which oyster shells will be spread. Oyster shells will be spread over most of the reconfigured Pond SF2 cells U2, U3, and U3, including up to the edge of the top of bank of both interior foraging channels and borrow ditches, to provide crypsis for WSP at all life stages. Oyster shells will not be spread in the following areas:

- On the slope or trough of interior foraging channels or low-lying areas that may be prone to flooding.
- Within 300 feet of power towers, as they provide perches for raptors and corvids from which to hunt.

- Within 300 feet of the SAFER levee, as it obstructs the viewshed of WSP and inhibits their ability to detect approaching predators and react in a way that reduces predation risk for adults, eggs, or chicks.
- Within 300 feet of public viewing platforms, as they provide perches for raptors and corvids and are a source of disturbance when humans are present.

4.4.2 Gravel Enhancement

Oyster shells used for previous WSP habitat enhancements at Eden Landing were sourced from Drakes Bay Oyster Company in Marin County. Drakes Bay Oyster Company grew oysters for canning, and thus generated a large amount of oyster shells. Drakes Bay Oyster Company has since closed, and since there are no other oyster canning operations within the San Francisco Bay Area, there are no longer ample sources of oyster shell readily available for ecological enhancement. Other potential sources of oyster shell include discarded restaurant oyster shell collection and curing programs, such as Wild Oyster Project, as well as mining of native oyster shell deposits in the South San Francisco Bay by Lind Tug and Barge, Inc. However, it is unclear if these two sources of oyster shell will provide the amount of oyster shell needed to conduct habitat enhancement in Ponds SF2 and R3 when implementation occurs (described in Section 5 below). Therefore, gravel may serve as an alternative medium to enhance WSP crypsis in these ponds. Although gravel has not been used as an enhancement material to improve WSP breeding success in the San Francisco Bay or elsewhere along the Pacific Coast, there is evidence to suggest that it can provide similar benefits as oyster shells. Between 1996–2010, WSP were documented to nest on gravel bars on the Eel River located several miles upstream from the Pacific Ocean. While nesting in this habitat, WSP experienced high rates of both hatching and fledging success, which was attributed to the heterogeneous nature of the rock sizes and colors improving WSP crypsis at all life stages (Colwell et al. 2005). The gravel bars included small pea-sized gravel, egg-sized gravel, and larger cobble approximately the size of an adult WSP. In the San Francisco Bay, WSP have been observed to select nest locations among patches of heterogenous base rock left behind after salt production activities ceased at Eden Landing Ecological Reserve managed ponds (personal observation by Ben Pearl, senior wildlife ecologist, H. T. Harvey, 2019). At Bolinas Lagoon, Point Blue Conservation Science biologists have observed that a mix of gravel and cobble provides crypsis for roosting and foraging WSP (Stenzel pers. comm. 2019). Therefore, although oyster shells are the preferred enhancement material, a heterogeneous mixture of pea-sized gravel (3/8”-3/4”), egg-sized gravel (1”-3”), and cobble (5”-10”) may serve as a suitable replacement if the project is unable to source the amount of oyster shell needed. The same conditions described in Section 4.4.1 Oyster Shell Enhancement would also apply to gravel enhancement.

4.5 Water Level Management

4.5.1 Management during WSP Breeding Season

To provide optimal WSP habitat during the breeding season, water depth within the excavated perimeter borrow ditch in Pond SF2 should be managed within a range of 3–4 feet, as shown in Figure 11. Three feet is the minimum water depth to ensure that the borrow ditch is filled to an appropriate depth to reduce the ability

of mammals to reach WSP habitat. 4 feet is the maximum depth, as this will fill the borrow ditch and interior slough channels to provide foraging habitat but will not flood the pond bottom and place nests at risk.

4.5.2 Pump Station

Water Surface Elevation (WSE) management in the SF2 Pond complex is currently achieved using a gravity weir system. However, the installation of a flood protection levee between ponds U2 and U1 has created a situation where the gravity weir system is no longer the preferred method for managing WSE. This is in part due to the requirement in the requirement in the Urban Levee Design Criteria that "any gravity flowing pipe needs to be provided with a flap gate at the waterside outlet...". In this case, water needs to flow in both directions and not just from the land side of the levee to the water side. The installation of flap gates in this situation is not possible. While the existing weir system will continue to manage the WSE for pond U1, a pumped system will need to be designed for the WSE management of the WSP habitat in ponds U2, U3, and U4. Design details will be finalized through coordination with the Refuge, who are responsible for managing the WSE in this pond complex.

Two options are currently under consideration for long-term WSE management of the SF2 Pond complex. The first option involves installing a permanent pumping system capable of both pumping water into the pond complex behind the levee and pumping water out of the complex. This option has a higher upfront cost and would require ongoing maintenance for the permanent facility. The second option is the use of a portable pump, where a pumping company would be contracted to manage the WSE during the nesting season and for weed management. This option has lower upfront costs and no maintenance obligations, but it requires contracting with a private company for service. During the next phase of design, both options will be discussed with all interested parties, and a preferred option will be selected.

4.5.3 Vegetation Management

WSP require sparsely vegetated habitats for breeding, foraging, and roosting, as they lay nests in a simple scrape in the ground and rely upon an obstructed viewshed to detect approaching predators. A small amount of pickleweed (*Salicornia pacifica*) may be advantageous for WSP by providing additional habitat complexity to increase crypsis, shelter for chicks to hide from predators, and may also provide an additional source of invertebrate prey. However, over time managed former salt production ponds may gradually become heavily vegetated with native pickleweed and/or non-native slenderleaf iceplant (*Mesembryanthemum nodiflorum*) and Russian thistle (*Salsola tragus*), thereby reducing the amount of suitable WSP habitat and reducing their viewshed. Targeted hand removal can be effective in small areas, but vegetation management at the pond scale requires water management.

Land managers at the Refuge and Eden Landing employ two different methods to manage vegetation using water, including salinization and inundation. Salinization involves shallowly flooding the pond with approximately 1–2 inches of water during the fall after all WSP breeding has concluded. If temperatures are warm enough and there is no precipitation for several weeks, evaporation will result in concentration of salinity to levels that vegetation can't grow at. If environmental conditions are not appropriate, inundating the pond to

approximately 2 feet above the pond bottom for an extended amount of time will eliminate vegetation on the pond. Either method may be used to control vegetation on Pond SF2.

4.6 Predator Deterrence

Corvids and raptors are known to perch on and hunt from elevated structures (e.g., power transmission towers, remnant salt production infrastructure, derelict hunting blinds, fences, etc.) within managed ponds and tidal marshes (Pearl et al. 2023). In addition, Common ravens (*Corvus corax*), red-tailed hawks (*Buteo jamaicensis*), peregrine falcons (*Falco peregrinus*) have all been observed nesting on power transmission towers in and adjacent to the Ravenswood Complex. In these circumstances, these species may intensively hunt WSP adults, eggs, and chicks in the Ravenswood Pond Complex to provision incubating mates and nestlings, resulting in low hatching and fledging success for WSP. To reduce these impacts, wood structures have been removed on managed ponds where WSP breed throughout the South San Francisco Bay, including at Ponds R3 and R4. Power transmission towers have been modified with spikes on portions of the towers, but thus far these have proven ineffective in stopping perching.

A small number of remnant salt production infrastructure and derelict hunting blinds remain on Pond SF2 cell U3. These elevated structures will be removed to reduce the ability of avian predators to hunt within the pond. Power transmission towers within and adjacent to Pond SF2 will be treated with spike perching deterrents covering all suitable surfaces and nesting deterrents will be installed where appropriate to prevent nesting attempts by avian predators. Figure 11 identifies the locations of the power transmission towers to be treated in and adjacent to Pond SF2. Pacific Gas & Electric will be consulted to review and approve the perch deterrent installation plan, prior to installation.

4.7 Predator Management

Targeted removal of both avian and mammalian predators is an important component of WSP conservation efforts across the Pacific Coast (Gaines et al. 2020, Marcot and Elbert 2015, Neuman et al. 2004). The Refuge has developed a predator management program that uses a combination of nest removal, trapping, and targeted shooting to reduce avian and mammalian predation pressure on WSP, CRR, and SMHM (USFWS 2012b). Funding for the predator management program is limited, and therefore predator management specialists time at each unit of the Refuge, including the Ravenswood Complex, is limited. The SAFER Bay Project will provide additional funding to support increased predator management efforts in the Ravenswood Complex, increasing the efficacy of this program and allowing for improved WSP hatching and fledging success. The annual amount and duration of funding will be determined during the regulatory permitting process with BRRIT.

4.8 Recreational Trail Access and Existing Wildlife Viewing Platform

Recreational trail access is currently provided along the eastern side of cell U1 and the southeast corner of cell U4. Two viewing platforms constructed by the SBSPRP are located along this trail, including one in cell U1 and another near the terminus of the public trail in cell U4. The SAFER levee alignment bisects the current

public access trail to the U4 wildlife viewing platform but will not alter the location of this viewing platform. Following construction of the SAFER levee between cells U1 and U2, the viewing platform in U4 will be located in the reconfigured cells U2, U3, and U4 west of the SAFER levee. To maintain the existing public access to this viewing platform, the project will construct an American Disabilities Act compliant ramp over the levee to the viewing platform. If U4 were filled to create WSP nesting and foraging habitat too close to the viewing platform, human disturbance on the platform could cause impacts to both WSP nests and foraging broods. To prevent these impacts, U4 will be designed to maintain a 300-foot buffer between suitable WSP habitat and the platform, as shown in Figure 11.

In addition, the platform will be outfitted with coyote rollers to prevent avian perching. This equipment is designed to prevent mammals from traversing fences but has shown to be an effective anti-perching device at Alviso Marina County Park and Palo Alto Baylands Boardwalk. Coyote rollers were also installed at Eden Landing Ecological Reserve Pond E14 as a component of fences installed to reduce mammalian predator access onto WSP breeding habitat (Pearl et al. 2023).

Section 5.0 Pond R3 WSP Habitat Enhancement

5.1 Goals and Design Criteria

Pond R3 already provides WSP nesting, foraging, and roosting habitat. However, the goal of SAFER Bay's enhancement plan is to further improve WSP breeding habitat relative to the existing condition. The design criteria to accomplish this goal are as follows:

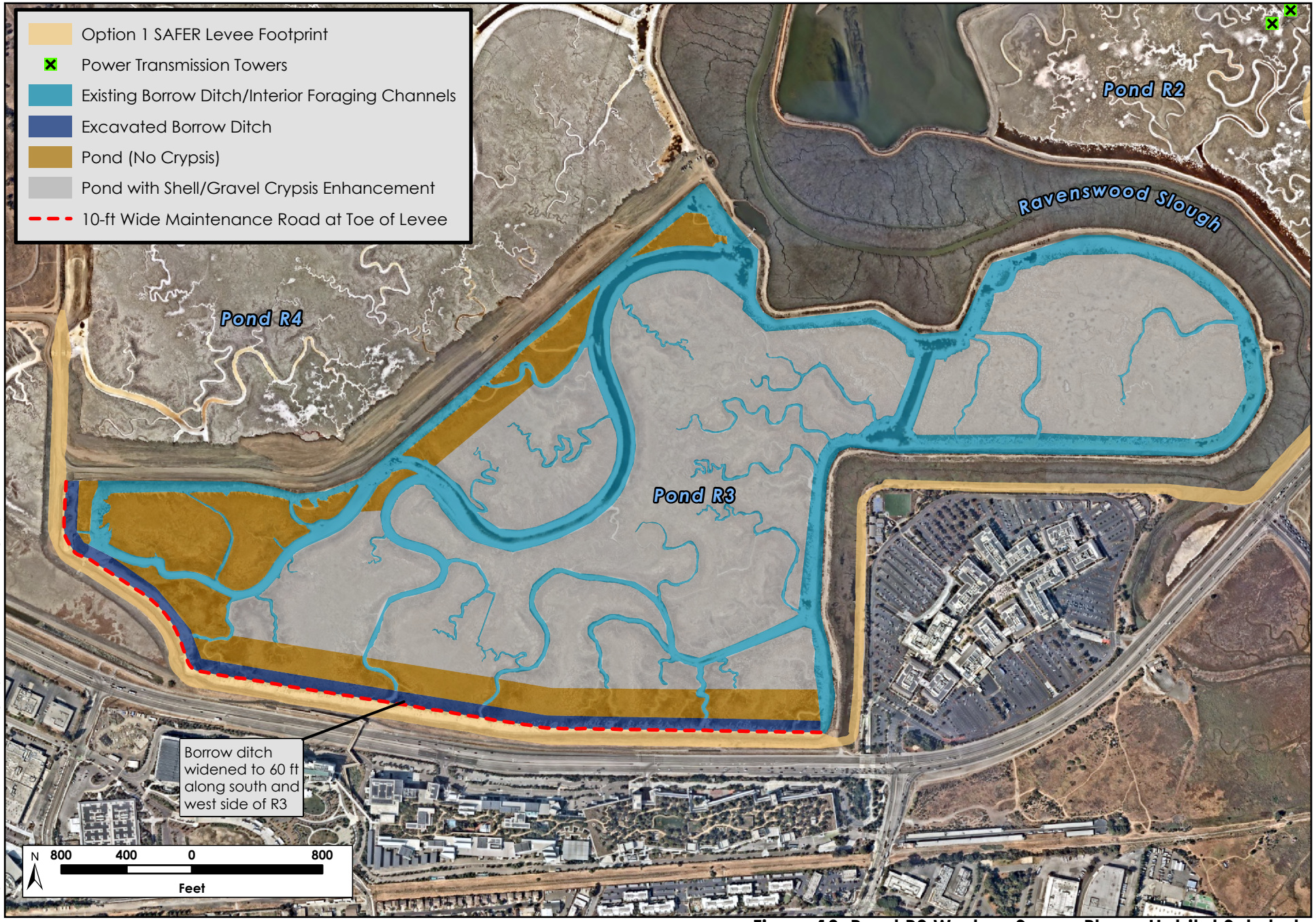
- Increase crypsis on the pond bottom via deployment of a surface substrate treatment.
- Widen the borrow ditch adjacent to the SAFER levee to reduce mammalian predator access to the pond bottom.
- Increase funding for predator management activities in these ponds designed to support WSP breeding.
- Monitor the stability of the berm separating Pond R3 from Ravenswood Slough, and if needed, construct targeted berm repairs to prevent berm breaching to ensure that the pond will provide high quality WSP habitat into the near future.

Figure 13 illustrates the location of crypsis plots and borrow ditch excavation in Pond R3.

5.2 Overview

WSP are known to consistently nest on Pond R3 (Pearl et al. 2023). With the recent breaching of Pond R4 in 2023 as part of SBSPRP Phase 2 actions, which previously supported a large amount of WSP breeding, nesting on Pond R3 increased during the 2024 breeding season (Schwarz pers. comm. 2024), and this pond is expected to remain an important WSP breeding pond moving forward. At Pond R3, WSP have experienced moderate hatching success but poor fledging success in recent years (Pearl et al. 2023, Schwarz et al. 2024), indicating that enhancement of the pond to increase crypsis and increased predator management effort would likely improve chick survival.

Pond R3 previously functioned as a seasonal pond with no water management capabilities, and as such, the amount of WSP nesting habitat in the pond and quality of foraging habitat was highly variable. However, as part of SBSPRP Phase 2 actions two water control structures were built on the pond. One structure is located on the north-central end of the pond on Ravenswood Slough, while the other is in the southwest corner of the pond and connects to Pond R5/S5. These structures will allow the pond to be managed to provide consistent breeding and foraging habitat.



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Figure 13. Pond R3 Western Snowy Plover Habitat Substrate and Predator Deterrent Enhancement Plan

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5.3 Borrow Ditch

Construction of the SAFER levee along the south side of Pond R3 will extend into the borrow ditch located in this area of the pond, and in some cases, onto the pond bottom. As a result, the project will excavate a new 60-foot wide borrow ditch along the pond-ward side of the SAFER levee to prevent easy mammalian access to the pond bottom and facilitate water flow around the borrow ditch and interior slough channels. The borrow ditch will be excavated to ensure that water depth in the borrow ditch can be managed to a depth of at least 3 feet during the WSP breeding season to inhibit mammalian predator access to the pond. This newly excavated borrow ditch segment will be an improvement over the current dimensions of the borrow ditch, which is approximately 28 feet wide in some locations and approximately 1 foot deep. Because a borrow ditch adjacent to the SAFER levee could cause instability, under FEMA guidelines a 10-foot maintenance road at the pond side toe of the levee will be built. Figure 13 illustrates the location of the 10-foot maintenance road and excavated borrow ditch.

5.4 Surface Substrate Treatment

5.4.1 Oyster Shell Enhancement

Oyster shells have not been used on Pond R3 in the past, but as with Pond SF2, WSP would benefit at all life stages from spreading oyster shells across the pond to increase crypsis.

Oyster shells will be spread over most of the Pond R3 to provide crypsis for WSP at all life stages. This includes spreading oyster shells up to the edge of the top of bank of both slough channels and borrow ditches. Oyster shells will not be spread in the following areas to avoid negative effects on WSP:

- On the slope or trough of interior slough channels or low-lying areas that may be prone to flooding.
- Within 300 feet of the SAFER levee, as it obstructs the viewshed of WSP and inhibits their ability to detect approaching predators and react in a way that reduces predation risk for adults, eggs, or chicks.

5.4.2 Gravel Enhancement

See Section 4.4.2.

5.5 Predator Management

See Section 4.7.

5.6 Ravenswood Slough Berm Stability Monitoring

During Phase 2 of the SBSPRP, the All-American Canal between Pond R3 and Pond R4 was filled and raised. Although it is not a FEMA-accredited levee, this berm provides protection against some degree of SLR in Pond

R3, helping to ensure that the pond can be managed to support breeding WSP into the near future. However, the berm along Ravenswood Slough in Pond R3 was not improved during Phase 2 actions. As such, both SLR and high tide events in the future could result in overtopping of this berm, which could in turn impact water management of the pond. Although not imminent, this could eventually lead to inadvertent breaching of the berm between the pond and Ravenswood Slough. Therefore, the SAFER Bay project will include 10 years of annual berm monitoring by a coastal engineer as a component of its post-construction restoration monitoring. The details of this monitoring work and triggers for berm repair, if needed, will be provided in the project's forthcoming Habitat Restoration and Monitoring Plan; a document to be prepared to support the project's BRRIT permitting.

Section 6.0 Beneficial Reuse and Restoration Sequencing

6.1 Beneficial Reuse of Bay Mud from Levee Construction for Habitat Restoration in Ponds R1 and R2

The SAFER Bay levee will be constructed on geotechnically suitable earthen foundations. In most locations, this will require the excavation and disposal of large volumes of bay mud from the levee footprint prior to building the levee with imported engineered fill. Table 9 presents HDR's estimated volumes of bay mud from excavation of the levee foundation (HDR 2024b). Bay mud is horticulturally and geotechnically suitable for tidal marsh restoration in Ponds R1 and R2 below the HTL but not suitable in substantial amounts for reuse in levee construction. Therefore, this restoration plan includes the beneficial reuse of bay mud for tidal marsh restoration. Reusing bay mud on site will benefit the project by furthering restoration goals, reducing project costs, and reducing environmental impacts relative to costly off-site transport and disposal of bay mud from levee construction.

Table 9. Estimated Volume and Timing of Bay Mud Excavated from Levee Construction

Reach/Levee Route	Approximate Volume (Cubic Yards)[1]	Levee Construction Coincides with Bay Mud Reuse in Ponds R1/R2?
Pond SF2/Dumbarton Bridge	46,800	Yes
Substation and Marsh Restoration	191,800	Yes
South of Bay Road	57,000	Unknown
North of Bay Road	116,100	Unknown
Dumbarton Approach	36,800	Unknown
Tech Campus	74,100	Unknown
Bayfront Expressway	65,000	Unknown
Bedwell Bayfront Park and Marsh Road	30,600	Unknown
Total Approximate Volume Available for Beneficial Reuse in Ponds R1/R2	238,600	**Yes**
Approximate Volume with Timing Unknown	379,600	**Unknown**

[1] Volumes from HDR 2024b.

As shown in Table 9, the timing of bay mud production for many of the project reaches relative to the timing of tidal marsh restoration in Pond R1 and R2 is uncertain. Moreover, the volume of bay mud available for reuse is likely to depend on results of ecological contaminant assessments in reaches with known contamination from historical land uses, which have not yet been required or undertaken. Since final beneficial reuse volumes are uncertain, the project has developed a prioritized list of uses for bay mud in Ponds R1 and R2 to prepare the ponds for breaching (Table 9).

As shown in Table 10, the restoration plan can accommodate a range of volumes: from 19,000 cubic yards as the minimum necessary volume to install ditch blocks, to 449,000 cubic yards if all 3 priority uses are achieved. In addition, as described in Section 3 and Figure 4, bay mud will be generated in Pond R1/R2 by excavating breaches and channels. We assume the project will reuse all of that excavated volume on-site to establish ditch blocks and/or fill low areas/borrow ditches in R1/R2 (Table 10). Therefore, we estimate R1/R2 will have capacity to receive at least 315,220 cubic yards of bay mud generated from levee construction (that volume is likely an underestimate, as fill estimates for borrow ditches do not account for losses on placement). That capacity is more than enough to reuse/receive the volume of bay mud expected to be generated by levee construction at Pond SF2/Dumbarton Bridge and Substation and Marsh Restoration Reaches (Table 9). Therefore, there should be ample bay mud volume from the SF2 and R2 levee excavations not only to build the priority level 1 and 2 habitat features, but also to fill a large proportion of the major borrow ditches (priority level 3) (Table 10).

Table 10. Approximate Volume and Priority Use of Beneficial Reuse of Bay Mud in Ponds R1 and R2

Habitat Feature	Location	Approximate Volume (Cubic Yards)	Priority Level[1]	Required to Meet Restoration Goals? and Notes
Establish ditch blocks	Pond R1	19,000	1	Yes, necessary to develop adequate tidal slough channel complexity.
Fill low elevation area in southwest corner of R1 to marsh elevation	Pond R1	107,000	2	No, but recommended to reduce the need for maintenance dredging around nesting islands.
Fill major borrow ditches	Ponds R1 and R2	323,000	3	No, but would result in a larger area of conversion of subtidal channel to vegetated marsh, which would benefit endangered salt marsh harvest mouse and California Ridgway's rail.
Total capacity for bay mud beneficial reuse in R1/R2		449,000		Note: Does not include seabird nesting islands and T-zone because these features will be constructed with imported upland fill. Does not include high tide refuge islands which will be built with bay mud excavated from adjacent historical channels.
Volume of bay mud excavated in pond R1/R2 for breaches and channels to be reused onsite		133,780		Note: does not include excavation of bay mud from historical channels to be used to build high tide refuge islands.
Capacity remaining for bay mud generated from levee construction		315,220		

6.2 Restoration Sequencing in Ravenswood Pond Complex

Construction of restoration features in Ponds R1, R2, R3 and SF2 will be implemented prior to or concurrent with the initial levee construction efforts which impact waters of the U.S./state. This is necessary to reduce the temporal loss of regulated wetland habitat because there will be a lag in vegetated tidal marsh establishment in Ponds R1/R2 after breaching due to the existing subsided ground surfaces in the ponds (See section 3.4). Moreover, restoration construction within these ponds also needs to follow the sequence outlined below to minimize impacts to WSP and seabirds.

Tidal restoration of Pond R1/R2 will result in loss of WSP habitat via conversion of seasonal pond to vegetated marsh habitat. Therefore, enhancements for WSP at Pond R3 and SF2 must occur prior to breaching Pond R1/R2 to ensure that ample WSP breeding and foraging habitat is available in the pond complex in every WSP breeding year. Similarly, nesting seabird islands need to be completed in Pond R1 before impacting seabird nesting islands at SF2 so that seabirds have nesting habitat available in R1 when SF2 islands are removed. The remaining restoration actions should happen either prior to or concurrently with habitat impacts, as listed below.

Prior to, or concurrent with constructing the Dumbarton Approach levee through Pond SF2:

- Complete seabird nesting bird island earthwork in Pond R1 prior to dewatering Pond SF2 U2.
- Reuse bay mud from SF2 levee construction in Ponds R1/R2 for ditch blocks and to fill borrow ditches.

Concurrent with constructing the Substation and Marsh Restoration levee in Pond R2:

- Reuse bay mud from Pond R2 levee construction in Ponds R1 and R2 for restoration features (Table 9).

Prior to breaching Pond R1/R2:

- Complete crypsis substrate installation for WSP at Pond R3.
- Complete grading and crypsis substrate installation for WSP in Pond SF2.
- Complete construction of water management infrastructure in Pond SF2.
- Construct pilot channels and ditch blocks in Pond R1/R2 and Ravenswood Channel.
- Build in-marsh refugia islands in Ponds R1/R2 and seed R1/R2 berm.
- Construct T-zone in Pond R2.
- Revegetate decommissioned portions of Ravenswood Trail around Ponds R1/R2.

Prior to or within the same construction season as initial levee construction impacts to tidal marsh:

- Breach Pond R1/R2

Concurrent with start of impacts to tidal channels from levee construction in Faber Marsh, Laumeister Marsh, Ravenswood Open Space Preserve and Ravenswood Slough:

- Restore on-site tidal channels (see Section 8).

Concurrent with constructing Bayfront Expressway levee along Pond R3:

- Construct excavated borrow ditch to provide predator deterrent in Pond R3.

Section 7.0 Project-Wide Levee Slope Revegetation

7.1 Goals and Design Criteria

The purpose of levee slope revegetation throughout the project area is threefold: to contribute to levee stability, support target wildlife species, and improve visual aesthetics. Special-status wildlife species, particularly CRR and SMHM, use dense and structurally complex vegetation on levee slopes as refugia habitat from predators during very high tide events, when shelter within the marsh is inundated. Therefore, the revegetation design for the levee slopes is based on the following goals:

- Establish vegetative cover to slow runoff and reduce the likelihood of surficial soil erosion.
- Prevent the establishment of deep-rooted vegetation that could compromise levee integrity.
- Accommodate the use of levee slopes by avian and mammalian wildlife, particularly for those that are special-status, while minimizing refugia for predators of special-status wildlife in adjacent marshes and ponds.
- Establish a diversity of native vegetation with low cover of invasive plants that can be maintained with minimal use of herbicide and a reasonable level of overall effort.

To achieve these goals, the restoration design includes the following design criteria for different levee reaches throughout the project area, as shown in Figure 14:

- Establish T-zones comprised of alkali meadow and tidal salt marsh vegetation on 3H:1V levee slopes adjacent to high quality tidal marsh (on levees slopes shown as "Salt Marsh-Upland Transition Zone [3:1 T-zone] on Figure 14). Revegetate 3:1 T-zones with dense, native vegetation that includes both a substantial area of vegetation patches with vertical canopy at least 1 foot above the HTL for high tide refugia cover and areas of grassland at least 1 foot tall to provide high-tide refugia for CRR, SMHM, and other resident salt marsh species.
- Establish grassland transitioning to salt marsh on 3H:1V levee slopes adjacent to managed ponds and tidal marsh areas (on levee slopes shown as "Grassland with Salt Marsh [Non-Tidal] and [Tidal] on Figure 14). CRR use is uncommon in these reaches and therefore levee slopes do not need to provide refugia for CRR. Establish dense grassland on slopes to reduce erosion and maintain a band of salt marsh vegetation below the HTL to provide forage and refugia habitat for SMHM.
- Establish dense grassland habitat on levee slopes adjacent to upland or developed habitats (on levee slopes shown as "Grassland" on Figure 14).
- Establish short stature, moderate density grassland on levee slopes adjacent to managed ponds used as WSP breeding habitat (specifically, along Ponds SF2 U2, Pond R3 and the Redwood City salt ponds

as shown on Figure 14). Limit the levee slope vegetation to short stature, moderate density grassland to reduce the likelihood that the slopes will provide habitat for mammalian predators of WSP.

- Establish the maximum vegetation cover possible to reduce surficial erosion on the levee slopes while meeting habitat goals.
- Control invasive plants in T-zone habitat where vegetation structure is necessary to achieve the habitat structure goal (bullet 1 above).

All levee slopes will be 3H:1V, which was selected by HDR to maintain levee stability and geotechnical support to floodwalls. 3H:1V slopes will allow for substantial enhancement of T-zone habitat function relative to existing conditions along levee routes where T-zones are planned (Figure 14). H. T. Harvey assessed the ecological pros and cons of gentler and wider T-zone slopes adjacent to the project's existing tidal salt marshes in *SAFER Bay Project – High Tide Refugial Habitat Assessment and Resulting Marsh-Upland Transition Zone Configuration Recommendations, North and Slough of Bay Road, East Palo Alto* (H. T. Harvey 2023). This assessment concluded that narrower T-zone slopes (i.e., 3H:1V), if appropriately revegetated, would provide higher net ecological lift compared to gentler/wider slopes (e.g., horizontal levee) due to the high value of these particular tidal marshes which would be lost by construction of wider T-zones (H. T. Harvey 2023).

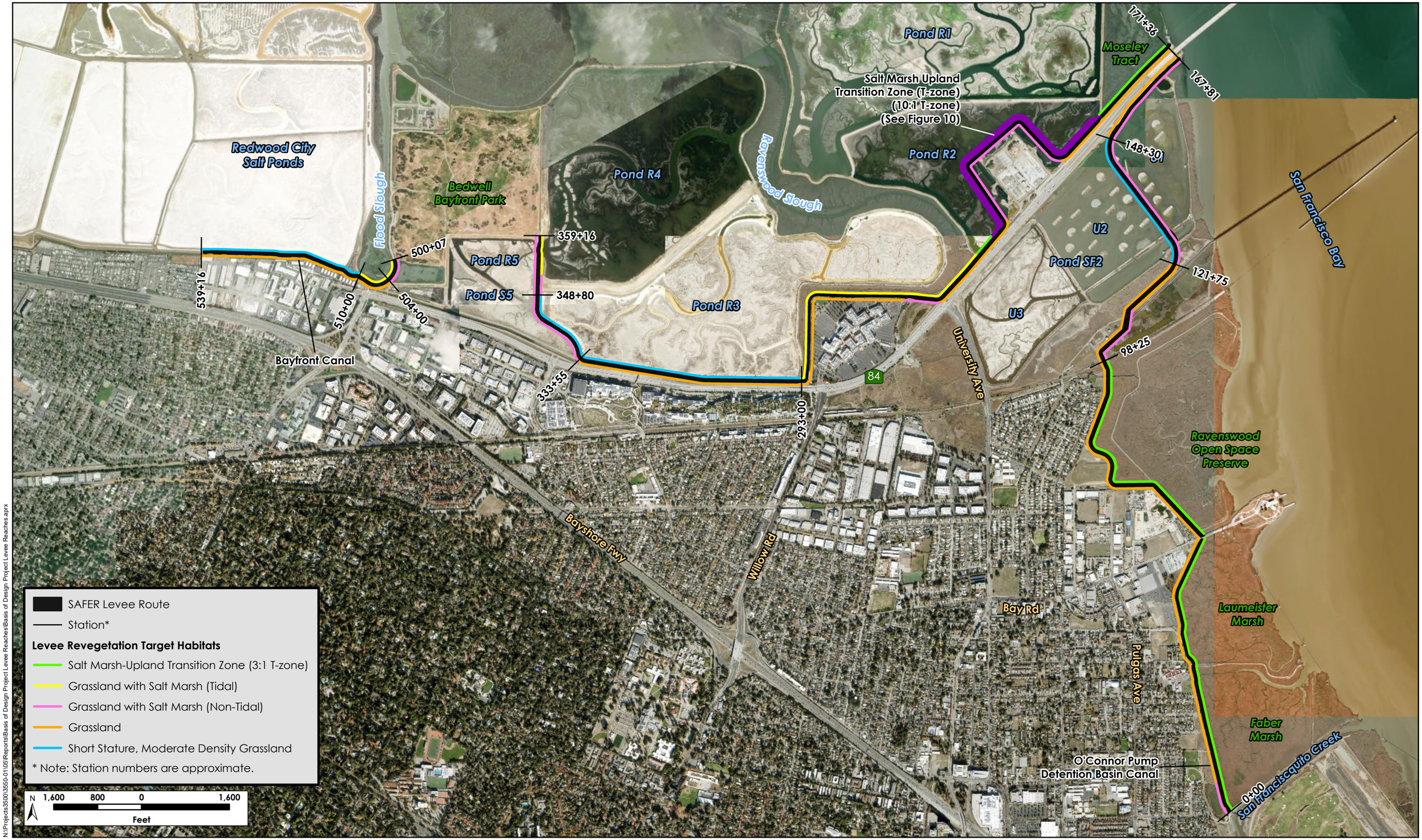
7.2 Target Levee Slope Habitats

Cross sections showing the conceptual revegetation design for each of the target habitats are provided in Figures 15–19.

7.2.1 Salt Marsh-Upland T-Zone

High quality tidal marsh habitat is found throughout the project area, including in Faber, Ravenswood, and Laumeister marshes, and the Mosely tract (Figure 14). T-zone vegetation will be established on levee slopes adjacent to these areas. Restored, high-quality tidal marsh will also be present in Ponds R1 and R2 following project implementation. T-zone habitat within these areas is addressed in Section 3.9.

To provide an adequate rooting depth for the target T-zone vegetation, at least 2 feet of topsoil will be provided on top of embankment fill or environmental fill material used for construction of the levee (Figure 15). The lower areas of the levee (below the HTL) will experience routine inundation by saline tidal waters during high-tide events. Sea spray and variable subsoil conditions will result in alkali soil conditions on the levee slopes above the HTL as well. As described in Section 3.9.2, no horticultural criteria are necessary for imported soil below the upper 2 feet of topsoil, therefore, salts from subsoils may wick up into the deeper portion of the topsoil profile over time.

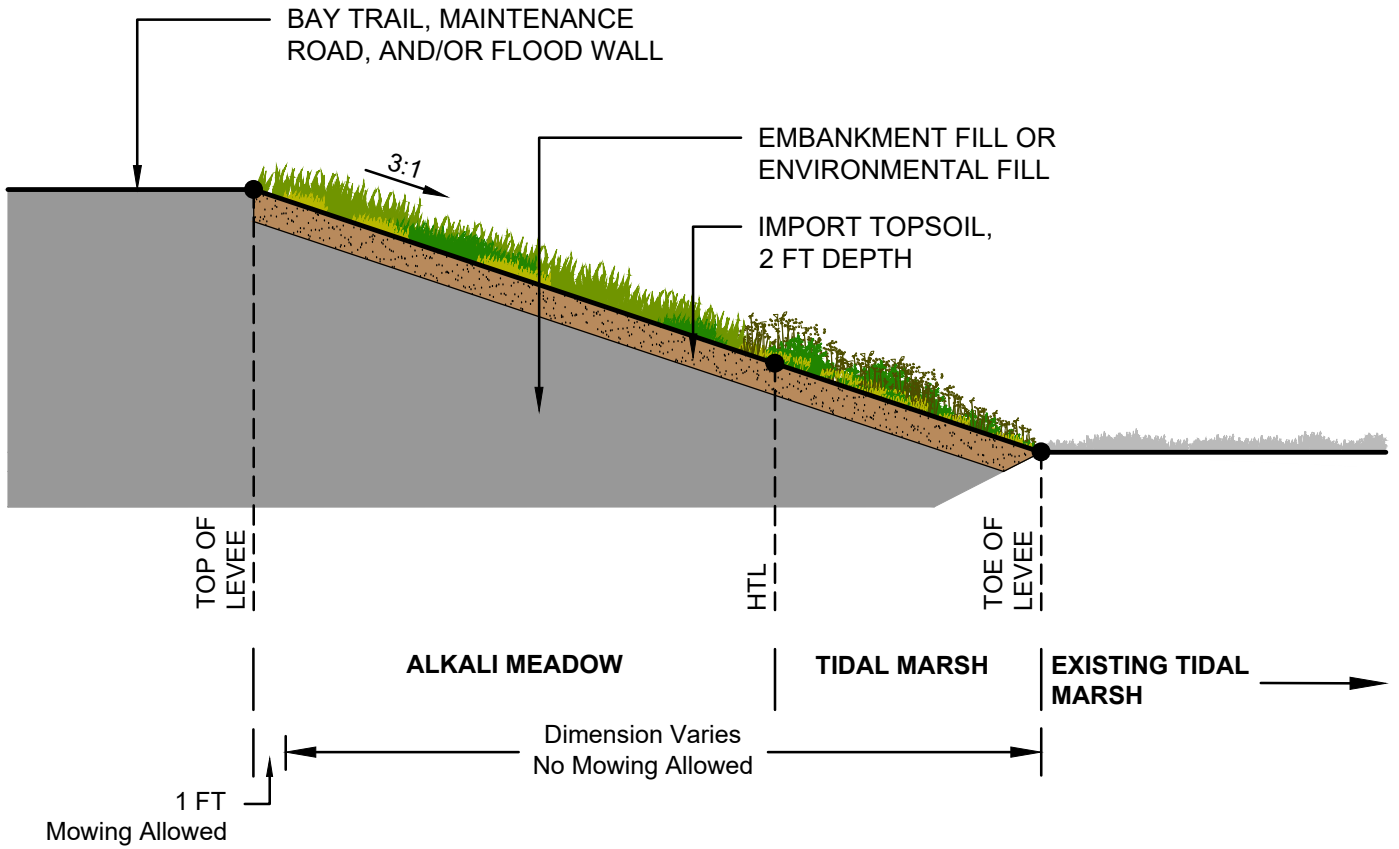


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Figure 14. Levee Slope Target Habitats
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HTL HIGH TIDE LINE
H:V HORIZONTAL:VERTICAL SLOPE RATIO

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Figure 15. Levee Slope Revegetation Cross Section - Salt Marsh-Upland Transition Zone (3:1 T-zone)

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To align with these abiotic conditions and to meet the habitat goals articulated above, levee slopes adjacent to high quality tidal salt marshes will be actively revegetated with alkali meadow habitat, transitioning to tidal marsh below HTL. Alkali meadow habitat will be seeded with a mix of graminoid and forb species that have a range of salinity tolerance, with the expectation that seeded species will "self-sort" by salinity tolerance across the levee slope's salinity gradient and establish a relatively dense vegetation community. Within this seed mix, native annual and perennial grass species will be included such as small fescue (*Festuca microstachys*) and purple needle grass (*Stipa pulchra*). Native forb species with relatively shallow maximum rooting depths such as Menzies' fiddleneck and yarrow will also be included. This vegetation will be interspersed with patches of salt-tolerant, taller native grasses and forbs such as creeping wildrye and western ragweed (*Ambrosia psilostachya*) to create high-tide refugial habitat. These species will stabilize topsoil, compete with woody and invasive species, and provide foraging resources for native pollinators.

Portions of this habitat that are located on environmental fill will be vegetated with coastal scrub patches that are composed of drought-tolerant, medium statured woody subshrubs and forbs such as California buckwheat (*Eriogonum fasciculatum*) and sticky monkey flower which will add vertical structure and plant diversity to the habitat.

At the lower elevations of the levee slopes in these areas, vegetation will transition to tidal marsh habitat. As is described above, these tidal marshes are dominated by marsh plant species such as Pacific cordgrass, perennial pickleweed, and annual pickleweed, with patches of other dominant species such as marsh gumplant, alkali heath, or marsh jaumea. Although these common tidal salt marsh plant species are anticipated to recruit within tidal salt marsh habitat through hydrochloric dispersal (e.g., water facilitated seed and root mass dispersal), species that recruit more slowly, such as saltgrass, will be installed to increase initial plant diversity. Marsh gumplant, a subshrub and one of the tallest native marsh species, is a key element to providing the structural complexity that forms high-quality refugial habitat. This species also provides structural support that other common tidal marsh species can arbor through (i.e., perennial pickleweed). While marsh gumplant is anticipated to establish passively overtime, due to its importance in provision of high tide refugia, marsh gumplant will also be installed from container stock.

Incorporation of taller forbs, particularly subshrub species, is a deviation from USACE's *Guidelines for Landscape Planting and Vegetation Management at Levees, Floodwalls, Embankment dams, and Appurtenant Structures* (USACE Levee Guidelines) (USACE 2019). The rationale for this deviation and the proposed approach to maintaining levee safety while incorporating these species is explained further in Section 7.4.4. Similarly, routine levee mowing (or otherwise trimming e.g. via grazing) to facilitate levee slope inspections are not recommended for T-zone habitats. This is because the structure provided by taller vegetation is a key element of the habitat's ability to function as refugia for sensitive wildlife species. In addition, mowing poses a risk of take of these species. Therefore, the achievement of the T-zone's ecological goals for endangered tidal salt marsh species will require a variance of USACE Levee Guideline's vegetation-related maintenance requirements (USACE 2019; See Section 7.4.4).

7.2.2 Grassland

Dense California annual grassland will be established on levee slopes adjacent to habitats other than high-quality tidal marsh or WSP habitat (Figure 14). Grassland habitat will be established where levee slope vegetation is not required to achieve specific special-status wildlife goals. In most locations, grassland habitat will be established on levee slopes that are adjacent to upland habitats such as developed land and ruderal grassland (Figure 16). In some locations, grassland with non-tidal salt marsh will be established on levee slopes adjacent to existing non-tidal salt marsh, non-tidal aquatic areas (such as seasonal wetlands), and managed ponds (Figure 17). Finally, rather than T-zone habitat, grassland with tidal salt marsh will be established adjacent to tidal marsh habitat in Ravenswood Slough and Flood Slough upslope of tidal salt marsh (Figure 18), due to the low likelihood that CRR will use levee slopes in these locations as high-tide refugia.

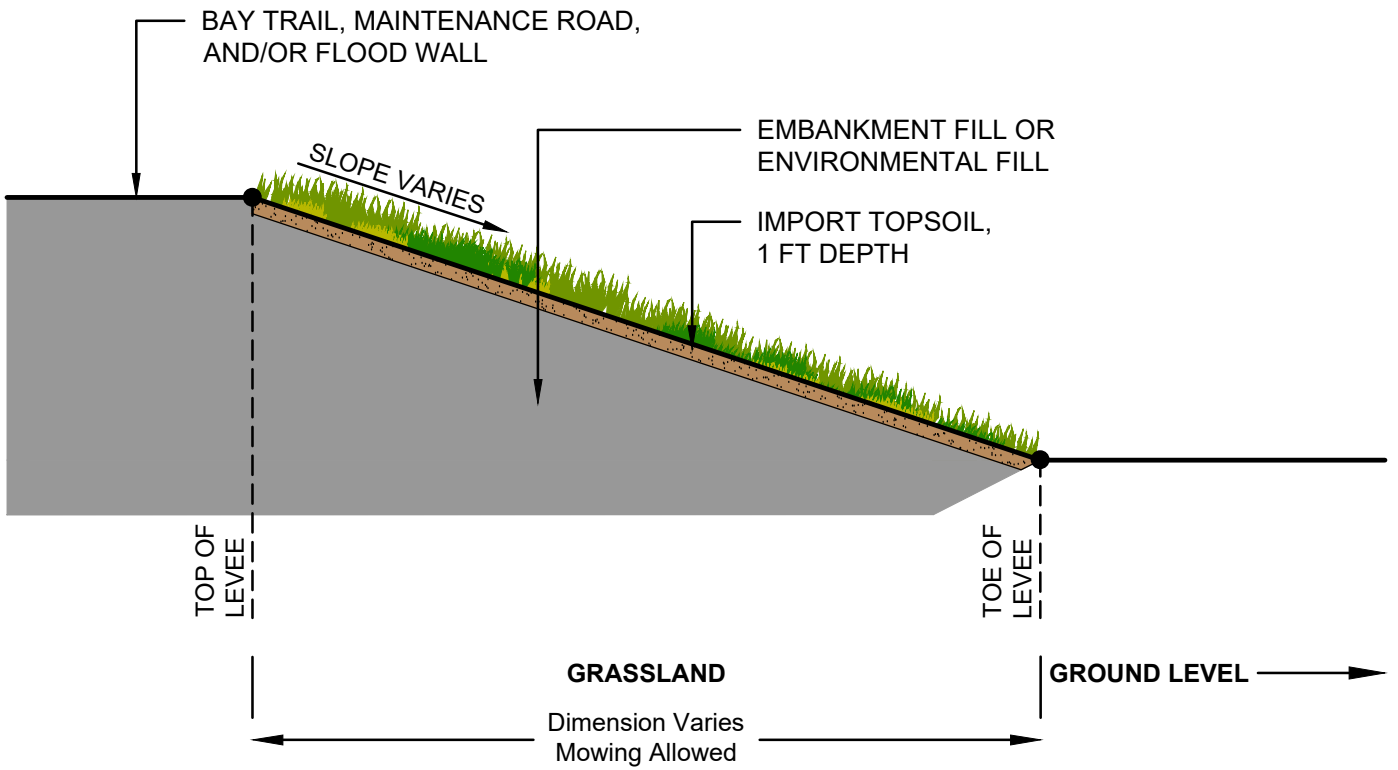
One foot of topsoil will be placed where grassland habitat is proposed for levee slopes to support relatively dense grassland vegetation (Figures 17 and 18). This topsoil depth (opposed to two feet of topsoil placement within the T-zone described above) accommodates the rooting depths of California annual grassland species, which are typically shallower than T-zone species. Where grassland is proposed for levee slopes, active revegetation using native plant species will be used to stabilize topsoil and provide foraging habitat for common pollinators, birds, and small mammals. Grassland levee slope revegetation areas aim to create a densely vegetated habitat that is somewhat resistant to weed invasion, including invasive species, as well as by woody species that may compromise levee integrity. Species selected for revegetation of grassland habitat will be tolerant of low soil salinity, due to the possibility of salts in subsoils (below the 1 foot of topsoil to be placed during construction) or introduced via sea spray. Selected species are also tolerant to annual mowing for levee inspection. To accomplish these goals, grassland habitat will be seeded with a diversity of native herbaceous grass and forb species such as California brome (*Bromus carinatus*), blue-eyed grass (*Sisyrinchium bellum*), and meadow barley (*Hordeum brachyantherum* var. *salt*).

In addition to seeded species, salt marsh vegetation such as perennial pickleweed is anticipated to establish via natural recruitment slightly above (i.e., approximately +2 horizontal feet) and downslope of the ordinary high water (OHW) (Figure 17) or HTL (Figure 18) in areas where aquatic habitats are present at the toe of the slope (Figure 14). This vegetation is likely to be used as forage and shelter for SMHM. To protect these species, mowing in these areas is not recommended. Therefore, a variance of USACE's vegetation-related maintenance requirements will be requested for these habitats (See Section 7.4.4).

7.2.3 Short Stature, Moderate Density Grassland

As described in Sections 4 and 5, habitat enhancements in Pond SF2 and Pond R3 will provide improved nesting, foraging, and roosting habitat for WSP. Redwood City salt ponds also provide WSP habitat. The revegetation approach for levee slopes adjacent to these areas is designed to protect WSP that may use the ponds for nesting, foraging, and roosting. It is also designed to incorporate plant species that are tolerant of low salinity.

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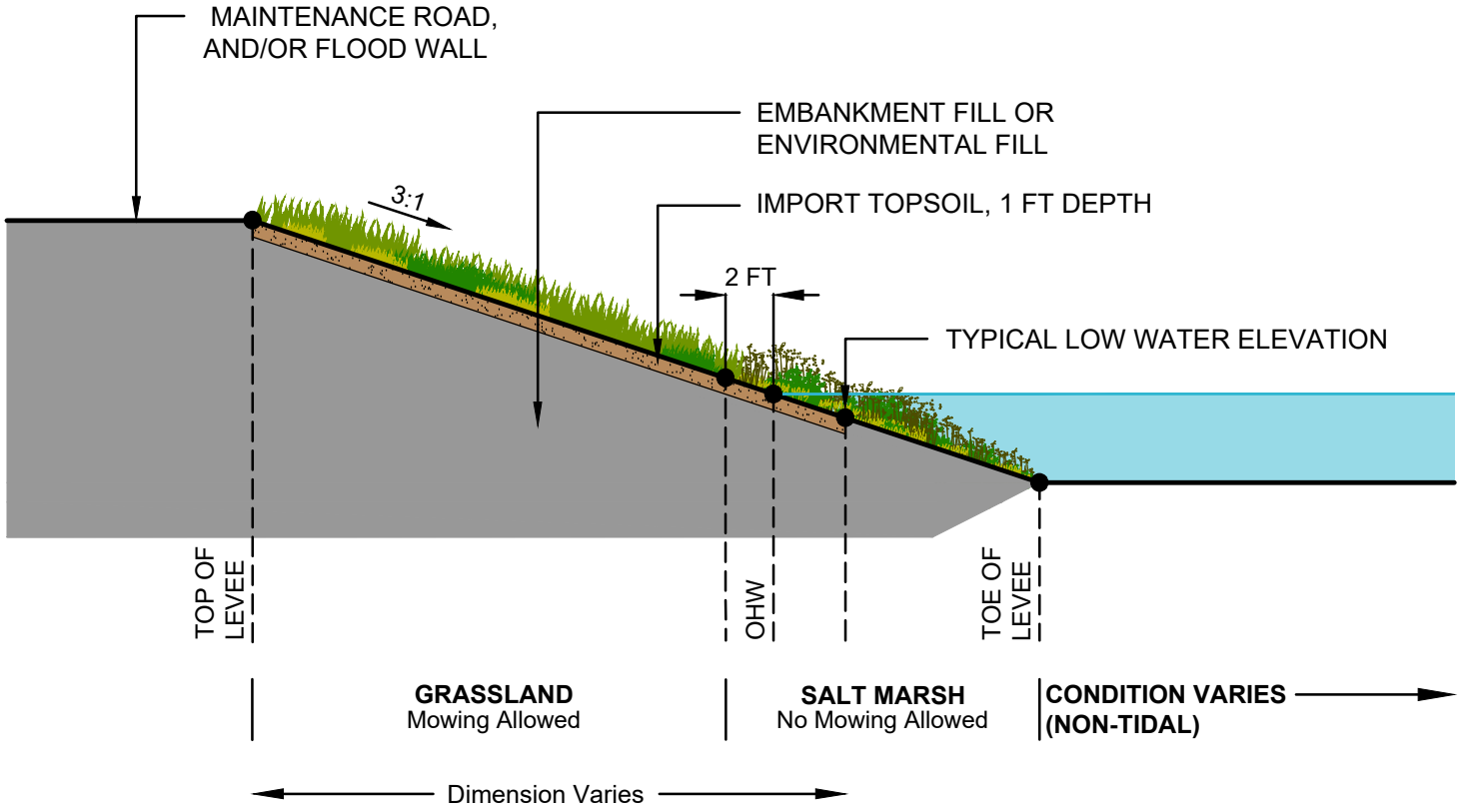
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Figure 16. Levee Slope Revegetation Cross Section - Grassland

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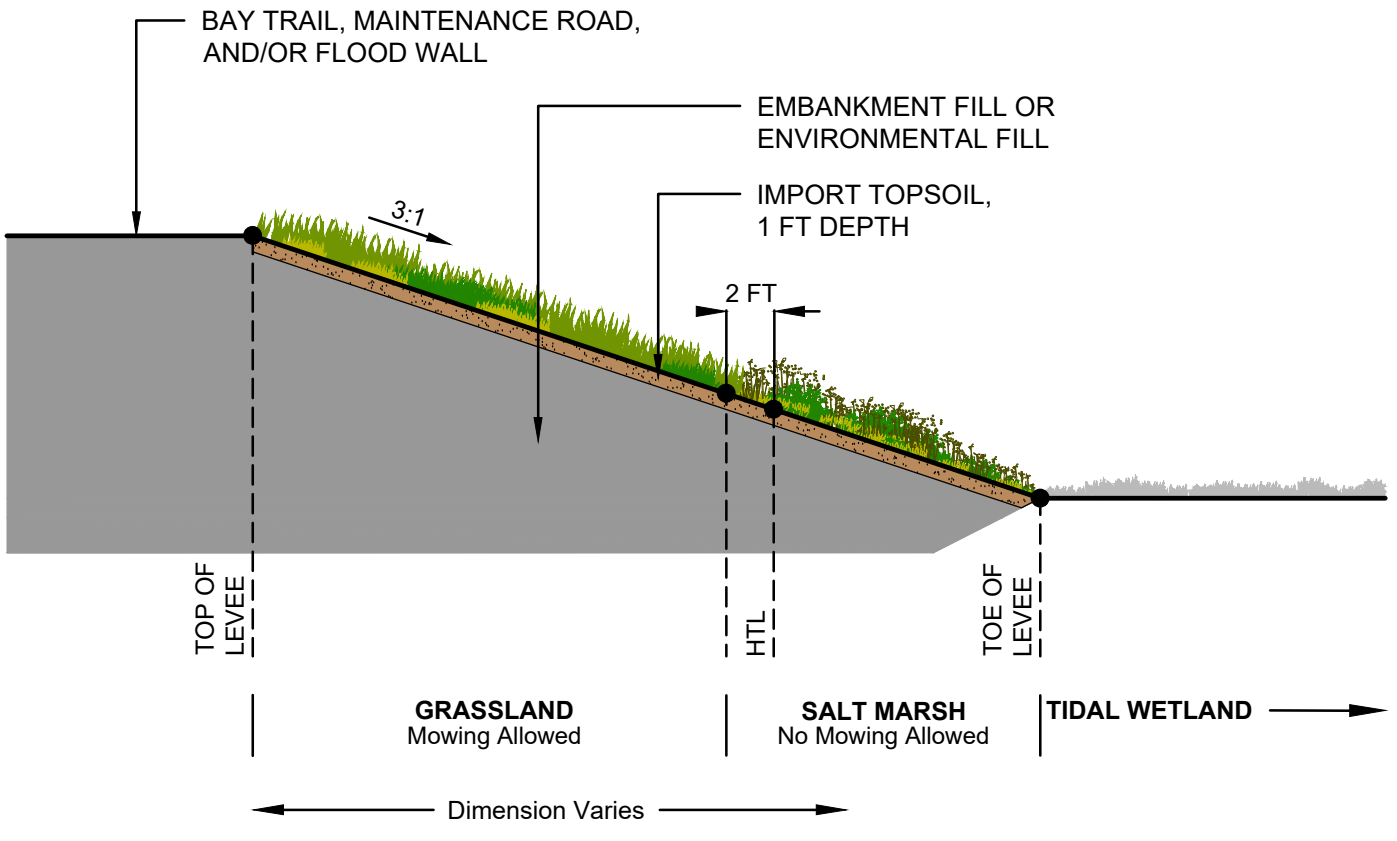


OHW ORDINARY HIGH WATER
H:V HORIZONTAL:VERTICAL SLOPE RATIO

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Figure 17. Levee Slope Revegetation Cross Section - Grassland with Salt Marsh (Non-Tidal)

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HTL HIGH TIDE LINE
H:V HORIZONTAL:VERTICAL SLOPE RATIO

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Figure 18. Levee Slope Revegetation Cross Section - Grassland with Salt Marsh (Tidal)

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Six inches of topsoil will be placed within short stature, moderate density grassland (Figure 19). This shallow topsoil depth will allow for short statured California grassland species to be well-rooted within the habitat and therefore help stabilize topsoil, while supporting its moderately dense vegetation habitat goal (further described below). Throughout the levee slopes within this habitat, subsurface fill may have a diversity of chemical conditions, including salts that may wick up into the lower layer of topsoil. In addition, periodic sea spray from the adjacent ponds may also be a source of salts in these environments. Finally, lower levee slope elevations will be inundated when ponds are flooded.

WSP are vulnerable to predation by mammalian predators that may hide in tall or dense vegetation on the levee slopes. However, vegetation cover is still desirable on these levee slopes to stabilize topsoil and reduce opportunities for woody plant and invasive weed establishment. Therefore, target vegetation in these areas consists of a short stature, moderate density grass and forb vegetation community that typically grows less than 2 feet tall with tolerance for low soil salinity levels and mowing. Species include short statured forbs such as red maids (*Calandrinia menziesii*) and yellow rayed goldfields (*Lasthenia glabrata*) and short statured grasses such as small fescue and alkali barley (*Hordeum depressum*). In addition, below the OHW, salt marsh vegetation is expected to establish via recruitment. Routine mowing (1–2 times per year) for levee inspections in the grassland habitat (both above and below the OHW) will also help to maintain vegetation growth at a low height.

7.3 Soil Preparation

To support the target habitats shown in Figures 15–19 and described in Section 7.2, imported topsoil will meet the physical and chemical soil criteria described in Section 3.9.2 (Table 5). Additionally, all imported soil will be required to meet contaminant screening criteria in the Master QAPP to protect aquatic ecological receptors (USFWS and H. T. Harvey 2024).

Prior to seeding and planting, the upper 12 inches of topsoil will be decompacted within all habitats except for the short statured, moderate density grassland, where 6 inches of topsoil will be decompacted. The upper 6 inches of topsoil will be amended, if necessary, to meet the horticultural criteria in Table 5. For example, a compost amendment will likely be required to meet the organic matter requirements.

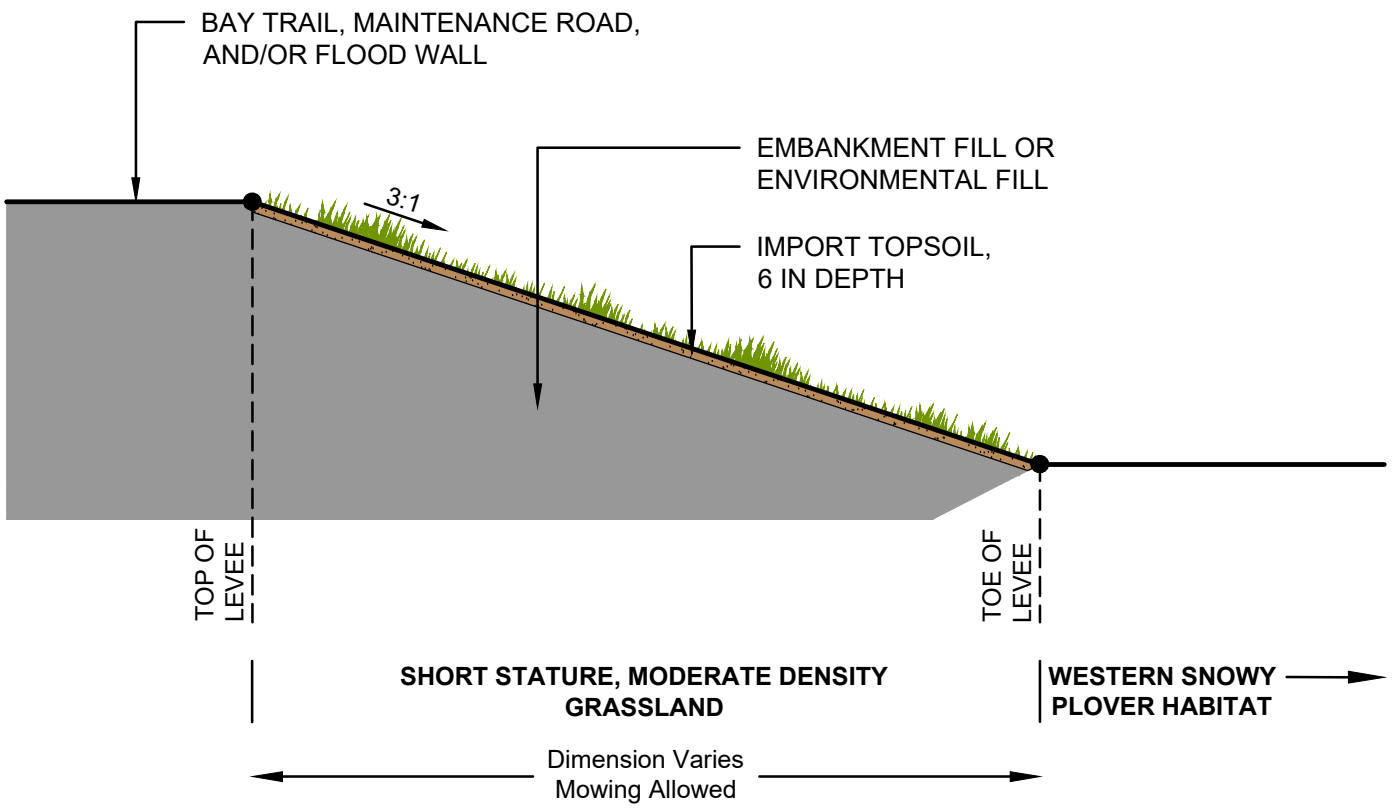
7.4 Revegetation Plan Overview and Timing

Levee slopes will be revegetated via a combination of planting, seeding, and natural recruitment. Seeding and planting should occur immediately after levee slope earthwork to reduce the establishment of non-native and invasive plants, as described in Section 3.9.5. The conceptual approach to revegetation for each levee slope habitat type is described below.

7.4.1 Seeding Plan

Following earthwork and soil preparation, the levee slopes will be seeded during the same timing window and with the same methods as those described for the T-zone (Section 3.8.3).

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Figure 19. Levee Slope Revegetation Cross Section - Short Stature, Moderate Density Grassland

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7.4.1.1 Salt Marsh-Upland T-Zone

Alkali meadow habitat along the levee slope will be seeded (hydroseeded or manually broadcast seeded) from the levee top to MHHW, or the lower extent of topsoil (whichever occurs higher in elevation) (Figure 15) using the alkali meadow seed mix in Table 6. Application rates in Table 6 are relatively high to achieve a dense vegetation community. In addition to native grass species, the seed mix includes native forb species with a maximum rooting depth from approximately 6–24 inches to protect levee integrity (Table 6). The average maximum height of the grass and forb species included in Table 6 is approximately 2.8 feet (Calscape 2025).

In the same construction season following this initial seeding, coastal scrub will then be seeded in patches using the seed mix in Table 7 within the alkali meadow habitat in Faber and Laumeister marshes. The application of the coastal scrub seed mix will be limited to slopes adjacent to these marshes because flood protection is primarily to be provided by a flood wall backfilled with environmental fill. Due to the deep maximum rooting depths (from approximately 20–60 inches) of species in the scrub seed mix, no scrub mix will be applied to T-zones on embankment fill, to avoid affecting levee integrity. Seeding scrub vegetation in patches is designed to limit the broader colonization of the space by these competitive shrubs and forbs and thereby foster higher species diversity. The size and density of seeded scrub patches will be determined during a future design phase. Coastal scrub patch seed will be manually broadcasted and raked into the upper ¼ inch layer of soil. These species germinate readily from seed.

Natural recruitment of common tidal salt marsh plants by seed is anticipated; therefore, no seed mix is presented for tidal marsh habitat. The planting plan for this habitat is described in Section 7.4.2.

7.4.1.2 Grassland

Grassland habitat in areas adjacent to tidal salt marsh will be seeded from the levee top to MHHW, while grassland adjacent to all other habitats will be seeded from the levee top to the lower extent of topsoil (Figures 16–18). Similar to salt marsh-upland T-zone habitat, application rates are relatively high to achieve its dense vegetation habitat goal. The seed mix for this habitat incorporates a variety of native perennial and annual grass and forb species that germinate readily from seed and can generally tolerate seasonal vegetation mowing (Table 11; Calflora 2025). Table 11 also includes forb species with a maximum rooting depth from approximately 6–12 inches to protect levee integrity while providing wildlife benefits such as pollinator habitat, refuge habitat, and a food source for wildlife (U.S. Department of Agriculture 2025).

Table 11. Grassland Seed Mix

Scientific Name	Common Name	Broadcast Seed Application Rate PLS/ac (lbs)	Hydroseed Seed Application Rate PLS/ac (lbs)	Approximate Maximum Rooting Depth (Inches)[1]	Approximate Maximum Height Above Ground (Inches)[1]
Forbs					
Achillea millefolium	Yarrow	0.5	0.75	9	36

Scientific Name	Common Name	Broadcast Seed Application Rate PLS/ac (lbs)	Hydroseed Seed Application Rate PLS/ac (lbs)	Approximate Maximum Rooting Depth (Inches)[1]	Approximate Maximum Height Above Ground (Inches)[1]
Forbs					
Calandrinia menziesii	Red maids	0.5	1	12	12
Eschscholzia californica	California poppy	1	2	12	24
Lasthenia glabrata	Yellow rayed goldfields	0.25	0.5	12	24
Layia platyglossa	Tidy tips	0.5	1	6	24
Sisyrinchium bellum	Blue eyed grass	0.75	1.5	12	24
Grasses					
Bromus carinatus	California brome	5	7	NA	60
Elymus glaucus	Blue wildrye	5	6	NA	60
Elymus triticoides (var. Yolo)	Creeping wildrye	2	3	NA	48
Festuca microstachys	Small fescue	2.5	3.5	NA	30
Festuca rubra var. molate	Red molate fescue	3	4	NA	24
Hordeum brachyantherum var. salt	Meadow barley	3	4	NA	36
Stipa pulchra	Purple needlegrass	2	3	NA	40
Total		**26.0**	**37.25**		

Notes: PLS = pure live seed, ac = acres, lbs = pounds, NA = Not applicable (no variance needed for grasses).

[1] Data on maximum rooting depth and height above ground sourced from the following sources: Calscape 2025, H. T. Harvey 2019, Jepson Herbarium 2025. No rooting information was available for red maids; rooting depth based on professional judgement.

7.4.1.3 Short Stature, Moderate Density Grassland

The seed mix presented in Table 12 will be hydroseeded or manually broadcast seeded within the short stature, moderate density grassland habitat from the levee top to the lower extent of topsoil (Figure 18). The seed mix incorporates short statured forb and grass species that have an average maximum height of approximately 2 feet (with the tallest species having a maximum height of approximately 3 feet) (Calscape 2025). Qualitative observations made by H. T. Harvey restoration ecologists from other similar Bay Area restoration sites indicate that many of these species typically do not exceed 2 feet in height. Additionally, application rates have been reduced compared to other levee slope revegetation areas to achieve a moderate density grassland which will reduce hunting habitat for mammalian predators of WSP. The seed mix includes forb species with a maximum rooting depth from approximately 6–12 inches to protect levee integrity (Table 12).

Table 12. Short Stature, Moderate Density Grassland Seed Mix

Scientific Name	Common Name	Broadcast Seed Application Rate PLS/ac (lbs)	Hydroseed Seed Application Rate PLS/ac (lbs)	Approximate Maximum Rooting Depth (Inches)[1]	Approximate Maximum Height Above Ground (Inches)[1]
Forbs					
Achillea millefolium	Yarrow	0.25	0.5	9	36
Calandrinia menziesii	Red maids	0.25	0.50	12	12
Eschscholzia californica	California poppy	0.5	1	12	24
Lasthenia glabrata	Yellow rayed goldfields	0.25	0.5	12	24
Layia platyglossa	Tidy tips	0.25	0.5	6	24
Sisyrinchium bellum	Blue eyed grass	0.5	1.0	12	24
Grasses					
Festuca microstachys	Small fescue	1.5	3	NA	30
Festuca rubra var. molate	Red molate fescue	2.5	5	NA	24
Hordeum brachyantherum var. salt	Meadow barley	2.5	5	NA	36
Hordeum depressum	Alkali barley	1.5	3	NA	24
Total		**10.0**	**20.0**		

Notes: PLS = pure live seed, ac = acres, lbs = pounds, NA = Not Applicable (no variance needed for grasses).

[1] Data on maximum rooting depth and height above ground sourced from the following sources: Calscape 2025, H. T. Harvey 2019. No rooting information was available for red maids; rooting depth based on professional judgement.

7.4.2 Planting Plan

Container plantings will be installed in monospecific patches throughout the salt marsh-upland T-zone habitat (Table 13). Species selected for container plantings are primarily rhizomatous and/or typically grow as dense monospecific patches in natural systems. Species to be installed within alkali meadow habitat (from 1 horizontal foot from the levee top to the HTL) will add vertical diversity to the landscape which can be used by sensitive wildlife as refuge habitat during high tide events. Additionally, because these species form dense patches, this planting design will also reduce the establishment of invasive species. Downslope of alkali meadow habitat below the HTL, common tidal salt marsh plant species are anticipated to naturally recruit. To augment natural recruitment, saltgrass and marsh gumplant will be installed using the same methods. The forb and subshrub species in Table 13 have a maximum rooting depth from approximately 10–36 inches to protect levee integrity. The size and density of plant patches will be determined during a future design phase. The container plants will be installed between November 1 and January 31 to maximize plant exposure to wet conditions during the rainy season.

Table 13. Alkali Meadow with Tidal Salt Marsh Monospecific Patch Plant Palette

Planting Zone	Scientific Name	Common Name	On-Center Spacing in Patches (Feet)	Approximate Maximum Rooting Depth (Inches)[1]
Below HTL[2]	*Distichlis spicata*	Saltgrass	2	NA
Below HTL	*Grindelia stricta*	Marsh gumplant	3	36
Above HTL[3]	*Ambrosia psilostachya*	Western ragweed	3	10
Above HTL	*Artemisia douglasiana*	California mugwort	2	24
Above HTL	*Baccharis glutinosa*	Marsh baccharis	3	23
Above HTL	*Elymus triticoides*	Creeping wildrye	2	NA
Above HTL	*Eriophyllum staechadifolium*	Lizard tail	3	20
Above HTL	*Frankenia salina*	Alkali heath	3	24

Notes: HTL = high tide line, NA = Not Applicable because no variance is required for grasses.

[1] Data on maximum rooting depth sourced from the following sources: Institute of Agriculture and Natural Resources 2007, The Nature Conservancy 2025, Montalvo and Beyers 2010, H. T. Harvey 2019. No rooting information available for lizard tail; rooting data provided is for a closely related species, *Eriophyllum confertiflorum*. No rooting information was available for mugwort; rooting depth based on professional judgement.

[2] HTL = 8.4 feet NAVD88

[3] The upper limit of this planting zone is 1 horizontal foot from the levee top.

7.4.3 Irrigation Plan

The irrigation plan for the levee slope revegetation habitats will be the same as that for the T-zone plantings described in Section 3.9.6.

7.4.4 Rationale for Deviation from USACE Levee Vegetation Guidelines

As described above, the species composition of the target habitats on the levee slopes differ from the USACE's guidelines for levee vegetation. Specifically, USACE Levee Guidelines call for a vegetation-free zone on the surface of the levee that permits only perennial grasses (USACE 2019). However, the salt marsh habitat that will be established and maintained near the toe of the levee will include native halophytic forbs and woody subshrubs (marsh gumplant) to increase habitat for SMHM, CRR, and other native wildlife. In addition, select non-native, non-invasive forbs will be allowed on the levee slopes. USACE levee vegetation guidelines also call for mowing of vegetation at least one time per year to facilitate inspections. However, to protect refugial habitat for sensitive tidal salt marsh wildlife species (e.g., CRR, SMHM), the T-zone habitat in the project area will not be mowed. The rationale for these deviations from USACE levee guidelines is further described below.

7.4.4.1 Species Selection

Forbs are defined as herbaceous (without significant woody tissue) vascular plants that are not graminoids (i.e., excluding grasses, sedges, rushes). Forbs are a natural component of upland grassland communities in California and provide pollinator habitat. Forb species are expected to continuously and profusely colonize levee slopes via natural recruitment from adjacent existing populations. Therefore, control of forbs in the upland grassland

would require either regular widespread manual removal or intensive herbicide use, in perpetuity. Manual removal would result in ground disturbance, which in turn provides opportunities for soil erosion and promotes invasive plant establishment. In addition, the majority of the project area occurs on property owned and/or managed by the Refuge. The use of herbicides applied on Refuge lands is guided by USFWS and U.S. Department of the Interior (DOI) policies and directives (517 DM 1, 569 FW 1, 524 DM 1, 242 FW 7). It is the policy of the DOI, USFWS headquarters, and USFWS Region 8, that all reasonable steps, including biological, cultural, and mechanical controls, be taken to minimize or, when feasible, eliminate dependence on chemical pest control, including herbicides. Given these directives and policies, control of short statured forbs which do not threaten levee safety do not warrant the use of herbicides and manual removal is contrary to levee safety due to the potential to exacerbate soil erosion. As a result, select native or non-native, non-invasive forbs are included in the target levee slope plant communities. Native forbs are incorporated into the planting and seeding plans, while non-native forbs are anticipated to naturally recruit from surrounding areas.

Alkali meadow habitats also incorporate seeded scrub patches with a small amount of relatively shallow-rooting shrub species. These species have an approximate maximum rooting depth from 20–60 inches (Table 7), provide highly valuable high-tide refugia, and add structural complexity to alkali meadow habitats. Scrub patches are limited to areas where floodwalls are used for flood protection in Faber and Laumeister Marshes, and the T-zone in R2. These areas were chosen for scrub patches because these areas are constructed with environmental fill, rather than embankment fill, due to the presence of the floodwall; therefore, there is substantially more distance between the critical flood protection infrastructure and the woody vegetation. In addition, tidal and non-tidal salt marsh habitats at the toe of levee slopes are anticipated to naturally recruit with marsh gumplant and marsh gumplant will also be planted per Table 13. This species occurs profusely at higher elevations within tidal marshes throughout the region and provides critical high-tide refugia within marshes, as one of the tallest salt marsh species in the tidal salt marsh ecosystem. Because this species is likely to recruit regardless of planting, is highly ecologically valuable, and is limited to the toe of slopes, it is also included despite its woody growth form.

Including a greater diversity of species on levee slopes will facilitate a high density of vegetation, which will substantially reduce weed competition, and therefore will result in less dependence on herbicide use in compliance with DOI/USFWS policy and will avoid unnecessary levee ground surface disturbance. Forbs will occupy available ground space on the levee slopes, which will reduce erosion potential and inhibit spread of invasive plants. In addition, in T-zone habitats forbs and shrubs will substantially increase the quality of refugia habitat for SMHM and CRR. Furthermore, including these species will increase the habitat value of levee slopes for pollinators, reduce the level of effort for vegetation control, and increase the aesthetic value of the levee. Allowable forbs in grassland habitats, where mowing is proposed, are not anticipated to substantially impact the level of effort for annual mowing or require specialized mowing equipment.

Allowable native forbs are described in the revegetation plan above (Tables 6, 11–13). The proposed species are anticipated to have a maximum rooting depth of approximately 6–36 inches. They consist primarily of annual herbaceous species with shallow root systems. Allowable non-native forbs will be those with shallow or

fibrous root systems, such as bur clover (*Medicago polymorpha*) and cut-leaf plantain (*Plantago coronopus*). To meet the levee safety goal, forbs with large taproots will be controlled. Examples of common non-native forbs that should be controlled are presented in Table 14.

Table 14. Examples of Common Species to Control on Levee Slopes

Scientific Name	Common Name	Growth Form	Reason for Control
Atriplex lentiformis	Brewer's salt bush	Shrub	Woody shrub
Atriplex prostrata	Fat-hen	Annual herb	Deep taproot
Atriplex semibaccata	Australian saltbush	Perennial herb	Invasive, deep taproot
Baccharis pilularis	Coyote brush	Shrub	Woody shrub, deep taproot
Brassica nigra	Black mustard	Annual herb	Invasive, deep taproot
Carduus pycnocephalus	Italian thistle	Annual herb	Invasive, deep taproot
Carduus tenuiflorus	Slenderflowered thistle	Annual herb	Invasive, deep taproot
Carpobrotus chilensis	Iceplant	Perennial herb	Invasive
Carpobrotus edulis	Iceplant	Perennial herb	Invasive
Centaurea calcitrapa	Purple starthistle	Annual/ Perennial herb	Invasive, deep taproot
Centaurea solstitialis	Yellow starthistle	Annual herb	Invasive, deep taproot
Cirsium vulgare	Bull thistle	Perennial herb	Invasive, deep taproot
Conium maculatum	Hemlock	Perennial herb	Invasive, deep taproot
Cynara cardunculus	Artichoke thistle	Perennial herb	Invasive, deep taproot
Dittrichia graveolens	Stinkwort	Annual herb	Invasive
Foeniculum vulgare	Fennel	Perennial herb	Invasive, deep taproot
Hirschfeldia incana	Mediterranean hoary mustard	Perennial herb	Invasive, deep taproot
Lepidium latifolium	Perennial pepperweed	Perennial herb	Invasive, deep taproot
Limonium ramosissimum	Algerian sea lavender	Perennial herb	Invasive
Malva parviflora	Cheeseweed	Annual herb	Deep taproot
Mesembryanthemum nodiflorum	Slender leafed ice plant	Annual herb	Invasive
Myoporum laetum	Lollipop tree	Tree/Shrub	Invasive; woody tree/shrub; deep taproot
Plantago lanceolata		Perennial herb	Non-native with deep taproot
Plantago major		Perennial herb	Non-native with deep taproot
Raphanus sativus	Radish	Annual herb	Deep taproot
Rumex crispus	Curly dock	Perennial herb	Deep taproot
Salsola soda	Alkali thistle	Annual herb	Invasive
Salsola tragus	Russian thistle	Annual herb	Deep taproot
Silybum marianum	Milkthistle	Annual/ Perennial herb	Deep taproot

Scientific Name	Common Name	Growth Form	Reason for Control
Spartina alterniflora x *foliosa*	Hybrid Spartina	Gramminoid	Invasive
Tetragonia tetragonioides	New Zealand spinach	Annual herb	Fast growing, highly competitive non-native

7.4.4.2 Mowing for Levee Inspections

As described above, refugial habitat for special-status wildlife species (CRR and SMHM) is a key function of the alkali meadow and salt marsh dominated T-zone habitats throughout the project area. H. T. Harvey wildlife ecologists have previously defined high-quality high tide refugia habitat in the project's T-zones as follows: an area beginning at the marsh HTL that is: (1) at least 20 feet wide, with (2) substantial cover (>25%) of grasses and/or scattered subshrubs, and (3) vegetation predominantly greater than 1 foot tall (H. T. Harvey 2023). Therefore, the basis of design and revegetation plan for salt marsh and alkali meadow habitats incorporates a diversity of vegetation that typically grows to greater than 1 foot tall and, where feasible while protecting levee integrity, shrubs or subshrubs. However, USACE levee vegetation guidelines include regular mowing on levee slopes for visibility of the levee for inspections. Specifically, it recommends that vegetation be mowed to a height of 3–6" any time it reaches a height of 12", or at least once annually. This is in direct conflict with habitat goals in T-zone areas and salt marsh habitat at the toe of slopes. Allowing vegetation to grow to greater than 1 foot in height but mowing annually (in summer) would require 3–6 months for vegetation to recover to suitable height for high tide refugia, leaving an absence of refugia for up to half of the year. In addition, the likelihood of special-status wildlife species being present in these habitats would require wildlife surveys prior to all mowing events. Therefore, we recommend that no mowing be conducted in alkali meadow/T-zone habitats with the exception of mowing ~1-foot wide strip from the top hinge point of the levee, which will prevent overgrowth of trails and maintenance roads (Figure 14). On levee slopes with grassland or short stature, moderate density grassland above salt marsh habitat, it is recommended that mowing occur only to the upper extent of marsh vegetation. In the latter case, this will protect sensitive wildlife species while allowing sufficient mowing to conduct levee inspections.

Section 8.0 Slough Channel Replacement in Existing Faber, Laumeister and Ravenswood Marshes

8.1 Goals

The SAFER Bay levee alignment was designed to avoid impacts to the existing tidal marsh to the extent feasible. However, some levee segments and/or the bayward construction buffer intrude into existing tidal marsh. These intrusions are necessary to avoid conflicts with infrastructure, contamination sites, and/or private land ownership (HDR 2024a).

For some of these intrusions, the levee footprint or the bayward construction buffer necessary for access and dewatering will fill tidal channels that currently provide hydraulic connectivity to marsh areas otherwise unaffected by the levee. Without this hydraulic connectivity, the associated marsh areas would experience altered tidal inundation impairing marsh vegetation and habitat function. To minimize the impacts of filling these channels, replacement tidal channels will be constructed as a first order of work to provide alternative hydraulic connectivity pathways. Impacted channels are identified in Faber Marsh, Laumeister Marsh, Ravenswood Open Space, and Ravenswood Slough.

This section describes how impacted channels are identified, design of the replacement channels and associated high-tide refugia berms, construction methods, the proposed earthwork, and post-construction revegetation.

8.2 Identification of Impacted Tidal Channels

To identify which tidal channels could potentially be impacted by the SAFER Bay levee that warrant replacement with new mitigation channels, tidal channels with the following characteristics are considered impacted:

- Located within the levee footprint or within a 10-foot buffer from the levee toe, as channels this close will be impacted by construction activities (e.g. temporary sheet pile walls for water control, construction equipment working on toe of levee) and will be filled to reduce erosion hazard at levee toe.
- Having channel top width of approximately two feet or greater.
- Providing hydraulic connectivity to a substantial network of tidal channels and/or substantial area of tidal marsh that will not otherwise be impacted by the SAFER levee but could be impacted if tidal exchange is reduced by fill of tidal channels.

Channels smaller than two feet wide are assumed to be small enough and high enough in the tide range that filling these would cause negligible reduction in tidal connectivity to the marsh plain. Any minor effects caused

by filling channels less than two feet wide would be offset by flow over the marsh plain and/or new channels of this size and function developing on their own.

For impacted channels that will be filled by the levee, it may be necessary to fill short segments of the impacted channels that occur just outside of the levee footprint, to reduce the potential for future erosion at the levee toe. Therefore, in addition to the channel underneath the levee, an allowance is assumed for filling a 10-foot channel segment leading up to the levee.

For channels that enter the 10-foot buffer from the levee toe but do not pass under the levee, it will likely be necessary to fill only a short reach of the impacted channel segment with a ditch block to discourage flow. At minimum, ditch blocks approximately 30 feet long and across the impacted channel width should be built at the location closest to the levee toe. In the long term, blocking flow with a ditch block is expected to cause much, if not all, of the impacted channel to fill with sediment and convert from channel to marsh.

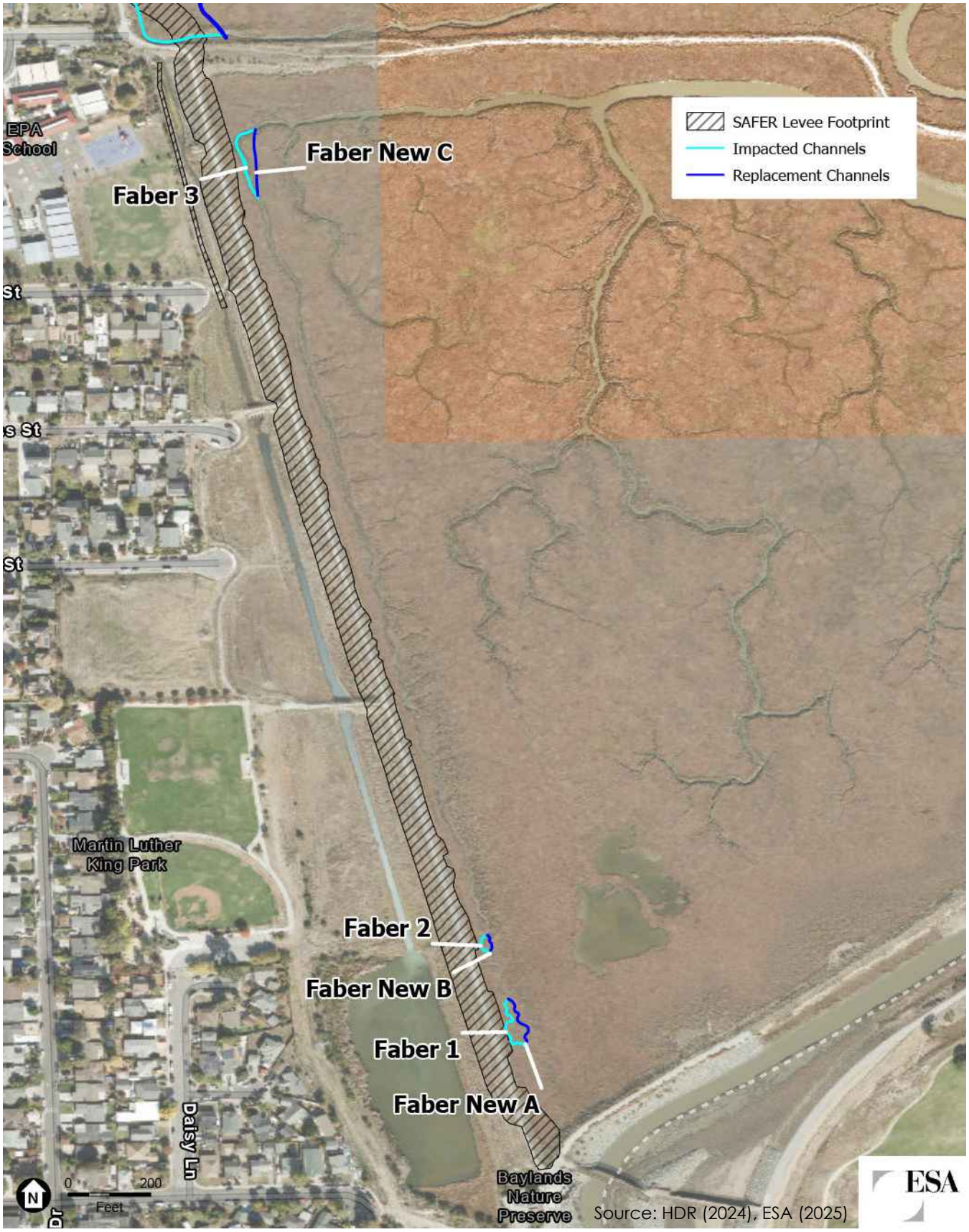
The factors above were considered when reviewing aerial photography of the existing marshes along the entire SAFER Bay alignment. From south to north, the marshes with impacted channels are: Faber Tract (Figure 20), Laumeister Marsh (Figure 21), Ravenswood Open Space Preserve (Figure 22), and Ravenswood Slough (Figure 23).

This assessment provides an upper bound of potential impacts; it may be possible to avoid or reduce some of these impacts during design refinement or with field fitting during construction. For example, where potentially impacted channels are within 10 feet of levee toe but not directly filled by the levee, construction methods may allow for not needing a new channel. However, for purposes of assessing impacts for the DEIR, the maximum extent of potentially impacted channels was identified.

8.3 Design of Replacement Channels

Tidal channels that meet the criteria above for being impacted will be replaced with newly constructed tidal channels. The primary purpose of the replacement channels is to maintain hydraulic connectivity to the adjacent tidal salt marsh during and after construction of the levee. The criteria for design of new tidal channels are as follows:

- Channel alignment
    - Top of bank at least 20 feet from proposed levee toe
    - Use existing channels where possible, enlarging as necessary
    - Similar sinuosity as the impacted channel, where feasible
- Similar width and depth as the impacted channel to allow for similar hydraulic conveyance as the impacted channel

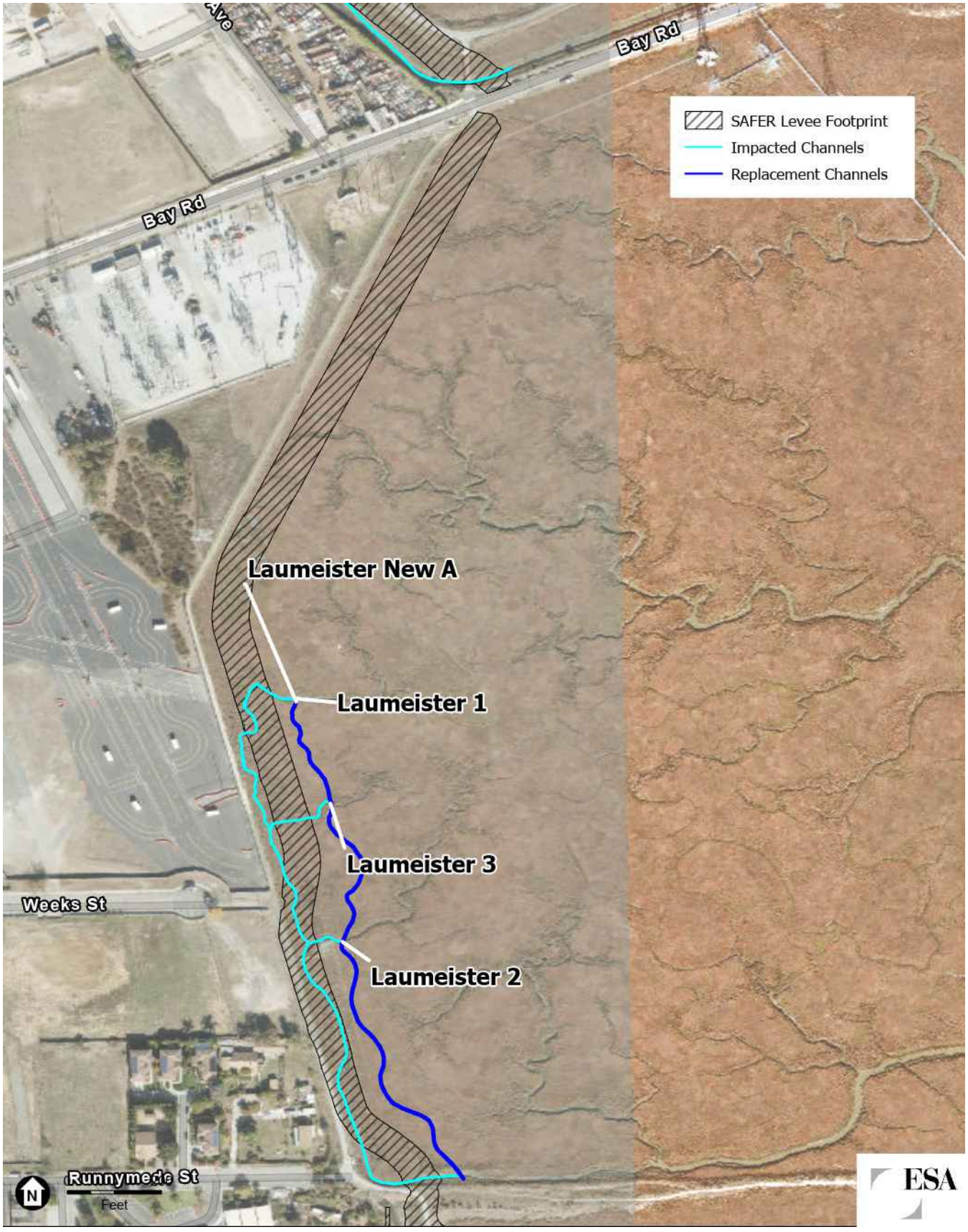


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Figure 20. Impacted and Replacement Tidal Channels in Faber Marsh

SAFER Bay Project - Ecological Basis of Design for Project Level Reaches (3550-05)
February 2025

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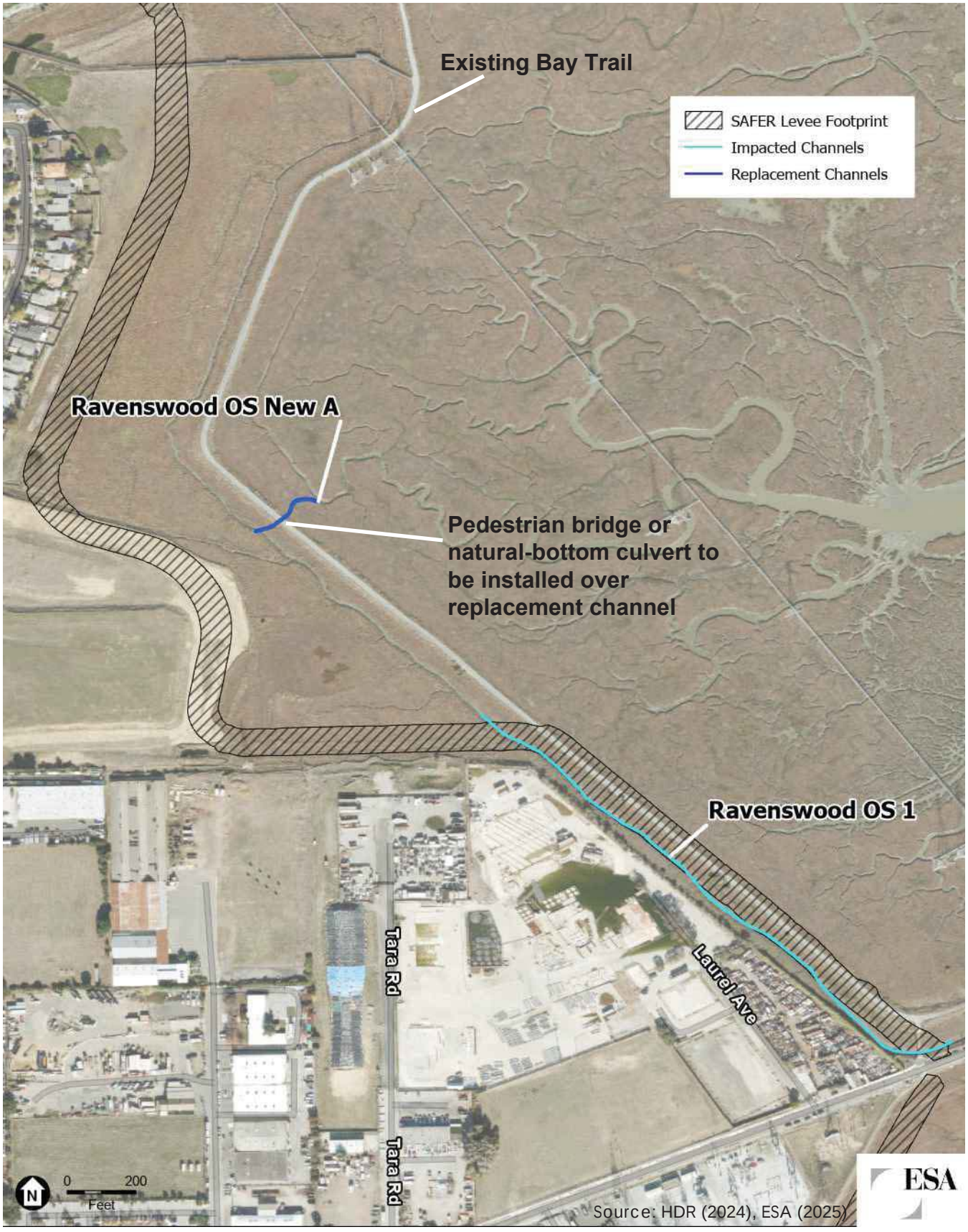


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Figure 21. Impacted and Replacement Tidal Channels in Laumeister Marsh

SAFER Bay Project - Ecological Basis of Design for Project Level Reaches (3550-05)
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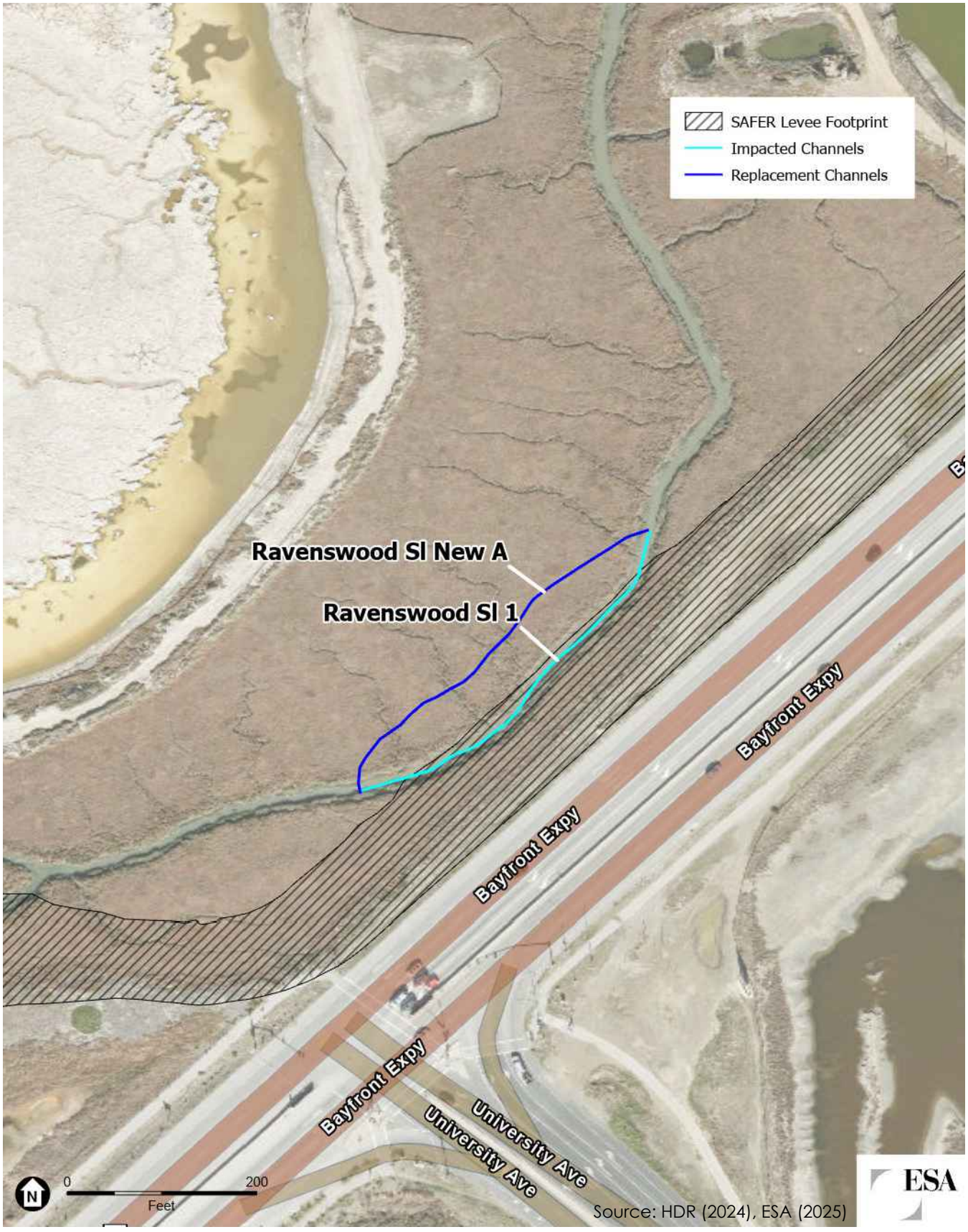
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Figure 22. Impacted and Replacement Tidal Channels in Ravenswood Open Space Preserve

SAFER Bay Project - Ecological Basis of Design for Project Level Reaches (3550-05)

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Figure 23. Impacted and Replacement Tidal Channels in Ravenswood Slough

SAFER Bay Project - Ecological Basis of Design for Project Level Reaches (3550-05)
February 2025

Note that the new channels are intended to provide for continued tidal marsh drainage and do not fully replace the length of impacted channels. The decrease in overall channel length will be offset by the restoration of tidal marsh and associated channels in Pond R1 and Pond R2.

The proposed replacement channels are shown for Faber Tract (Figure 20), Laumeister Marsh (Figure 21), Ravenswood Open Space Preserve (Figure 22), and Ravenswood Slough (Figure 23).

8.4 Design of High-Tide Refugia Berms

The bay mud excavated to construct the new tidal channels will be used to construct high-tide refugia berms along both sides of the replacement channels. Refugia berms mimic berms along natural channels and provide higher elevations for high marsh plant species (e.g., marsh gumplant) and refugia habitat to terrestrial marsh animal species when high tide water levels inundate the marsh plain. This action will offset impacts to existing in-marsh high tide refugia along the tidal channels to be filled.

Before placing the bay mud to create the berms, marsh sod within the berm footprint will be temporarily removed/salvaged, then replanted on the tops of berms to facilitate revegetation. Revegetation is briefly discussed in Section 8.6. Any excess fill generated from channel excavation that is not used to construct berms will either be used to partially fill an impacted channel or hauled off-site.

Crests of the refugia berms will be approximately one foot above the existing marsh plain (after settlement) and no higher than the highest annual tide. The initial allowance for settlement of the berms due to the new fill is assumed to be one foot; this allowance should be refined in later stages of design. The berms will be 10 feet wide at the base, have a target crest width of approximately 4 feet, and a 3:1 side slope to marsh grade. This cross section is approximate and need not be exact. Refugia berms will be offset from the channel edge to avoid de-stabilizing the banks of the newly constructed channels. Ideally, the offset would be approximately 2–5 feet, to encourage drainage of the berms, but may be up to 10 feet if required for bank stability. Refugia berms will be discontinuous to allow pathways for flow over the marsh plain. Berms will extend approximately 50 feet along the channel, with a five-foot gap along the channel profile between berms to allow for over-marsh tidal flow.

8.5 Earthwork

8.5.1 Construction Methods for Impacted Channels, Replacement Channels, and Refugia Berms

Details of construction methods will be left up to the contractor, with construction specifications aimed at minimizing construction impacts to marsh habitat. To estimate the initial construction quantities and potential impacts, we made the following assumptions:

- Excavation of the new channels would occur before levee construction to reduce temporary impacts to marshes, via lack of hydraulic connectivity, during levee construction (which could take 1–2 construction seasons).
- Given the marsh's soft soils, contractors will need to use LGP equipment and with marsh mats, if needed to reduce topographic impacts to existing marsh outside of the new channel and berm footprint. Equipment could include tracked LGP excavators, tracked LGP dump trucks, and/or amphibious excavators. Whichever equipment and methods are used, work outside of the new channels and high-tide refugia berms will not result in any new depressions on the marsh plain, such that after work is completed, the elevation of the marsh plain will equal the pre-existing elevation.
- For filling short reaches of the impacted channels outside of the levee footprint, construction equipment will need to access the channels from the levee toe. Marsh equipment may be used (same as for the new channel excavation) or it may be possible to fill the impacted channels using a long-reach excavator positioned at the levee toe.
- When construction equipment must enter the marsh, construction equipment will be allowed in the following construction corridors within which disturbance may occur. These widths are based on construction specifications at other recent marsh restoration projects (Sonoma Creek and Lower Walnut Creek). The actual disturbance width may be less, such as if small excavation volumes result in fewer berms, if some impacts to channels in the construction buffer area are avoided, or if more specialized equipment is used. These corridors are assumed to be wide enough that construction equipment and/or matting will not traverse existing high-tide refugia vegetation while staying within these buffer distances.
    - For channels less than 10 feet wide, assume a 40-foot wide corridor.
    - For channels 10–20-foot wide, assume a 50-foot wide corridor.
    - For channels 20-foot wide or greater, assume a 100-foot wide corridor.
- Construction equipment will remain entirely within the corridor except for access to and from the channel. Equipment will excavate material ahead of itself and side cast fill to create refugia berms on either side. Access across the marsh will be required at one end of each channel. The allowed access corridor will be the same width as for the associated channel construction.
- Excavation of larger channels may generate more soil than can be placed along the channel to create the berms. In that instance, the excess material will be off-hauled from that particular channel excavation. It may be used to:
    - fill sections of the impacted channels that terminate at the new levee or are deemed too close to the new levee,
    - to create high-tide refugia berms along other replacement channels that still have capacity for additional soil to create refugia berms,

- or off-hauled for reuse at other project locations (e.g., Pond R1 and/or Pond R2) or off-hauled outside the project area.

8.5.2 Channel Excavation and Fill Quantities

Construction excavation and fill quantities have been estimated for impacted channels in Table 15 and for replacement channels in Table 16. The method and accuracy of these quantities are consistent with assessing impacts and construction quantities for CEQA purposes.

The depths of the existing impacted channels have not been surveyed. These channels' depths are estimated from their top widths and hydraulic geometry relationships (Williams et al. 2002). While estimated excavation volumes are based on hydraulic geometry relationships for natural channels, construction of the new replacement channels may require some adaptations. For instance, channel side slopes may need to be less steep, since soil may not be as well consolidated.

The replacement channel in the Ravenswood Open Space Preserve will need to cross the existing Bay Trail embankment. This will require excavating through the embankment for the channel and then constructing a bridge or natural-bottom culvert for the channel, such that trail connectivity can be maintained. The dimensions for this channel are based on hydraulic geometry relationships for the marsh area landward of the embankment that is not already connected to the bay via an existing tidal channel along the north side of the embankment.

Table 15. Impacted Tidal Channel Quantities

Impacted Tidal Channel	Reason Impacted	Length (Feet)	Top Width (Feet)	Surface Area (Acres)	Channel Cross Section Area (square feet)	Fill Volume (Cubic Yard)
Faber 1	Within 10 feet of levee toe	161	3	0.01	4.01	24
Faber 2	Within 10 feet of levee toe	60	3	0.00	4.01	9
Faber 3	Within 10 feet of levee toe	192	6	0.03	10.63	76
Laumeister 1	Underneath levee	1,372	10	0.31	21.82	1,109
Laumeister 2	Partially underneath levee	61	4	0.01	6.01	14
Laumeister 3	Partially underneath levee	125	4	0.01	6.01	28
Ravenswood Open Space Preserve 1	Underneath levee	1,513	20	0.69	57.91	3,245
Ravenswood Slough 1	Underneath levee	390	20	0.18	57.91	836
Totals		**3,874**		**1.25**		**5,340**

Notes:

1. Channel alignments, lengths, and top widths delineated from aerial imagery in Google Earth.
2. Channel cross sectional areas are from hydraulic geometry relationships between top width, tidal prism, and channel depth/cross-sectional area (Williams et al. 2002).

Table 16. Replacement Tidal Channel Quantities

Replacement Tidal Channel	Length (Feet)	Top Width (Feet)	Channel Area (Acres)	Construction Corridor Width (Feet)	Construction Impact Area (Acres)	Channel Cross Section Area (square feet)	Excavated Volume (Cubic Yard)	Refugia Berm Volume (Cubic Yard)	Off-Haul Volume (Cubic Yard)
Faber New A	138	2	0.010	40	0.15	4.01	20	20	-
Faber New B	51	2	0.004	40	0.05	4.01	8	8	-
Faber New C	192	5	0.022	40	0.15	10.6	64	64	-
Laumeister New A	1,141	12	0.26	50	1.31	21.8	922	761	162
Ravenswood Open Space Preserve New A	188	20	0.09	100	0.43	57.9	403	125	278
Ravenswood Slough New A	382	18	0.18	100	0.88	57.9	819	255	565
Totals	**2,062**		**0.56**		**2.96**		**2,237**	**1,233**	**1,004**

Notes:

1. Channel alignments and lengths delineated from aerial imagery in Google Earth.
2. Top width of replacement channel match corresponding impacted channel.
3. Construction corridor width (based on top width of replacement channel and reference construction sites) is inclusive of new channel and construction access.
4. For Faber Tract replacement channels, which do not connect directly to levee toe, an additional 20-foot allowance added to length of access corridor.
5. Channel cross sectional areas are from hydraulic geometry relationships between top width, tidal prism, and cross-sectional area (Williams et al. 2002).
6. Maximum potential refugia berm volume assumes fill in 10-foot wide band on both sides of channel, to depth of 1 foot, and 90% of channel length (to allow for breaks in berms for overmarsh flow). If excavated volume exceeds maximum potential refugia volume, remaining volume will be off-hauled.
7. Losses due to consolidation and/or settlement of excavated material once placed in berm are not included. May range from range 20–25% which would reduce long-term berm dimensions/volume.

8.5.3 Restoration of Temporary Construction Impacts to Tidal Marsh

The new replacement channels will create areas of permanent conversions from marsh to channel. The ditch blocks will be a permanent conversion from channel to marsh. Temporary impacts to tidal marsh will occur within the rest of the construction corridor outside of the new channels, ditch blocks, and refugia berms. Within the temporary impact area and outside of the refugia berm footprints, the tidal marsh plain topography and substrate will be restored to the pre-impact condition immediately following construction of the replacement channels and in-marsh refugia berms. These areas will then be actively revegetated with container plantings of dominant high marsh species to facilitate rapid re-establishment of dense native marsh plain vegetation to ensure that these impacts are temporary.

8.6 Revegetation of In-Marsh High-Tide Refugia Berms

The fill excavated to construct the new tidal channels will be used to construct high-tide refugia berms along the replacement channels. These areas will be revegetated through a combination of salvage and reuse of marsh sod and marsh gumplant container plant installation. Marsh sod will be salvaged from the footprint of new channel excavation prior to channel excavation. Marsh sod is defined as 1 to 4 foot square x 0.5 foot deep blocks of marsh topsoil, with the root mass and above ground vegetation kept alive and intact. The purpose is to recreate the in-marsh refugia habitat that is present in Faber and Laumeister marshes along existing slough channels. A revegetation plan will be developed during preparation of the projects' Habitat Restoration and Monitoring Plan and submitted for BRRIT approval during the BRRIT permitting process.

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Appendix A. Projected Marsh Accretion Modeling

Appendix BIO4

Biological Resources Impacts by Reach

TABLE BIO4-1
IMPACTS ON HABITAT – SOUTH OF BAY ROAD REACH (PROJECT LEVEL)

Jurisdictional Habitat	Habitat Type	Construction-Phase Temporary Impacts Associated with Shoreline Protection Infrastructure (acres)[a]	Permanent Impacts (acres)					
			Shoreline Protection Infrastructure	Operation and Maintenance Access Road	Loss of Tidal Action	Total[a]	Tidal Marsh to Reestablish After 50 Years SLR[b] on Bayward Levee Slope	Net Loss of Wetland and Aquatic Habitats[c]
Open Water	Culvert/Riprap	0.01	0.01	--	--	0.01	--	0.01
	Detention Basin/Canal	0.25	0.03	0.06	--	0.09	--	0.09
	Intertidal Mudflats	--	--	--	--	--	--	--
	Muted Tidal Open Water	--	--	--	--	--	--	--
Managed Pond	Managed Pond	--	--	--	--	--	--	--
Non-tidal wetlands	Saline Seasonal Wetland	0.08	0.35	0.20		0.55	--	0.55
	Non-Tidal Saline Pond	--	--	--	--	--	--	--
	Non-Tidal/Muted Tidal Northern Coastal Salt Marsh	0.08	0.01	0.06	--	0.07	--	0.07
Upland	Landscaped/Developed	0.40	0.70	0.12	--	0.82	--	--
	Ruderal Levee Slope	0.44	0.80	0.21	--	1.01	0.27	--
	Ruderal Upland	3.42	2.12	1.10	--	3.22	--	--
Tidal wetlands	Tidal Northern Coastal Salt Marsh	2.97	3.09	0.55	0.09	3.73	0.78	2.86
	Tidal Open Water	0.17	0.21	0.03	0.02	0.26	0.05	0.19
Total Impacts on Wetland/Aquatic Habitats[d]		**3.56**	**3.69**	**0.91**	**0.11**	**4.72**	**0.83**	**3.51**
Total Impacts		**7.82**	**7.31**	**2.35**	**0.11**	**9.77**	**1.10**	**NA**

Notes:
a. Numbers may not sum due to rounding.
b. SLR=Sea Level Rise
c. Net loss is calculated as follows: (Total Permanent Impacts) – (Tidal Marsh to Reestablish after 50 Years SLR on the Bay Edge) – (Loss of Tidal Action) = Net Loss of Wetland and Aquatic Habitats. This is because tidal marsh to reestablish after 50 years would constitute wetland or aquatic habitat in the long term, and because non-tidal wetlands are expected to persist in the areas assessed as Loss of Tidal Action
d. Open water, managed pond, non-tidal wetlands, and tidal wetlands
Source: H.T. Harvey & Associates 2025

TABLE BIO4-2
IMPACTS ON HABITAT – NORTH OF BAY ROAD REACH (PROGRAM LEVEL)

Jurisdictional Habitat	Habitat Type	Construction-Phase Temporary Impacts Associated with Shoreline Protection Infrastructure (acres)	Permanent Impacts (acres)					
			Shoreline Protection Infrastructure	Operation and Maintenance Road	Loss of Tidal Action	Total[a]	Tidal Marsh to Reestablish After 50 Years SLR[b] on Bay Edge	Net loss of Wetland and Aquatic Habitats[c]
Open Water	Culvert/Riprap	--	--	--	--	--	--	--
	Detention Basin/Canal	0.01	0.01	0.02	--	0.03	--	0.03
	Intertidal Mudflats	--	--	--	--	--	--	--
	Muted Tidal Open Water	--	--	--	--	--	--	--
Managed Pond	Managed Pond	--	--	--	--	--	--	--
Non-tidal wetlands	Saline Seasonal Wetland	--	0.11	0.01	0.02	0.14	--	0.12
	Non-Tidal/Muted Tidal Northern Coastal Salt Marsh	--	--	--	--	--	--	--
Upland	Landscaped/Developed	0.12	0.32	0.01	--	0.34	--	--
	Ornamental Woodland (Riparian)	--	--	--	--	--	--	--
	Ornamental Woodland (Upland)	--	--	--	--	--	--	--
	Ruderal Levee Slope	0.13	0.57	0.01	--	0.58	0.03	--
	Ruderal Upland	0.47	1.94	0.63	--	2.56	0.18	--
Tidal wetlands	Tidal Brackish Marsh	--	--	--	--	--	--	--
	Tidal Northern Coastal Salt Marsh	2.24	4.71	1.20	1.82	7.73	0.82	5.09
	Tidal Open Water	0.10	0.40	0.15	0.11	0.66	0.04	0.52
Total Impacts on Wetland/Aquatic Habitats[d]		**2.35**	**5.22**	**1.38**	**1.95**	**8.56**	**0.85**	**5.54**
Total Impacts		**3.07**	**8.05**	**2.03**	**1.95**	**12.04**	**1.06**	**NA**

Notes:
a. Numbers may not sum due to rounding.
b. SLR = Sea Level Rise
c. Net loss is calculated as follows: (Total Permanent Impacts) – (Tidal Marsh to Reestablish after 50 Years SLR on the Bay Edge) – (Loss of Tidal Action) = Net Loss of Wetland and Aquatic Habitats. This is because tidal marsh to reestablish after 50 years would constitute wetland or aquatic habitat in the long term, and because non-tidal wetlands are expected to persist in the areas assessed as Loss of Tidal Action.
d. Open water, managed pond, non-tidal wetlands, and tidal wetlands.
Source: H.T. Harvey & Associates 2025

TABLE BIO4-3
IMPACTS ON HABITAT – DUMBARTON APPROACH REACH (PROGRAM LEVEL)

Jurisdictional Habitat	Habitat Type	Construction-Phase Temporary Impacts Associated with Shoreline Protection Infrastructure (acres)	Permanent Impacts (acres)					
			Shoreline Protection Infrastructure	Operation and Maintenance Road	Loss of Tidal Action	Total[a]	Tidal Marsh to Reestablish After 50 Years SLR[b] on Bay Edge	Net loss of Wetland and Aquatic Habitats[c]
Open Water	Culvert/Riprap	0.03	0.04	--	--	0.04	--	0.04
	Detention Basin/Canal	--	--	--	--	--	--	--
	Intertidal Mudflats	0.14	--	--	--	--	--	--
	Muted Tidal Open Water	0.13	0.36	0.01	--	0.37	--	0.37
Managed Pond	Managed Pond	0.79	0.83	--	--	0.83	--	0.83
Non-tidal wetlands	Saline Seasonal Wetland	0.02	0.15	0.04	--	0.18	--	0.18
	Non-Tidal/Muted Tidal Northern Coastal Salt Marsh	0.38	1.16	0.09	--	1.25	--	1.25
Upland	Landscaped/Developed	0.81	0.12	0.02	--	0.14	--	--
	Ornamental Woodland (Riparian)	--	--	--	--	--	--	--
	Ornamental Woodland (Upland)	--	--	--	--	--	--	--
	Ruderal Levee Slope	0.06	0.36	0.01	--	0.38	--	--
	Ruderal Upland	2.04	3.37	0.80	--	4.17	--	--
Tidal wetlands	Tidal Brackish Marsh	--	--	--	--	--	--	--
	Tidal Northern Coastal Salt Marsh	2.00	2.67	--	0.80	3.47	0.51	2.16
	Tidal Open Water	0.09	0.47	--	--	0.47	0.16	0.31
Total Impacts on Wetland/Aquatic Habitats[d]		**3.58**	**5.67**	**0.14**	**0.80**	**6.61**	**0.67**	**5.14**
Total Impacts		**6.50**	**9.53**	**0.98**	**0.80**	**11.30**	**0.68**	**NA**

Notes:
a. Numbers may not sum due to rounding.
b. SLR = Sea Level Rise
c. Net loss is calculated as follows: (Total Permanent Impacts) – (Tidal Marsh to Reestablish after 50 Years SLR on the Bay Edge) – (Loss of Tidal Action) = Net Loss of Wetland and Aquatic Habitats. This is because tidal marsh to reestablish after 50 years would constitute wetland or aquatic habitat in the long term, and because non-tidal wetlands are expected to persist in the areas assessed as Loss of Tidal Action.
d. Open water, managed pond, non-tidal wetlands, and tidal wetlands.
Source: H.T. Harvey & Associates 2025

TABLE BIO4-4
IMPACTS ON HABITAT – DUMBARTON APPROACH REACH (PROJECT LEVEL)

Jurisdictional Habitat	Habitat Type	Construction-Phase Temporary Impacts (acres)			Permanent Impacts (acres)			
		Shoreline Protection Infrastructure Construction-Phase Impacts	Managed Pond Enhancement: Regrading in Ponds SF2 and R3	Total[a]	Shoreline Protection Infrastructure	Operation and Maintenance Access Road	Total[a]	Net Loss of Wetland and Aquatic Habitats[b]
Open Water	Culvert/Riprap	--	0.06	0.06	--	--	--	--
	Detention Basin/Canal	--	--	--	--	--	--	--
	Intertidal Mudflats	--	--	--	--	--	--	--
	Muted Tidal Open Water	--	--	--	--	--	--	--
Managed Pond	Managed Pond	2.85	155.47	158.32	5.48	--	5.48	5.48
Non-tidal wetlands	Saline Seasonal Wetland	0.21	--	0.21	0.68	0.06	0.74	0.74
	Non-Tidal Saline Pond	0.11	--	0.11	0.26	0.04	0.30	0.30
	Non-Tidal/Muted Tidal Northern Coastal Salt Marsh	0.08	2.06	2.14	0.36	--	0.36	0.36
Upland	Landscaped/Developed	0.25	--	0.26	0.02	--	0.02	0.02
	Ruderal Levee Slope	0.07	0.97	1.03	0.36	0.02	0.38	0.38
	Ruderal Upland	1.79	7.82	9.61	1.63	0.09	1.72	1.72
Tidal wetlands	Tidal Northern Coastal Salt Marsh	--	--	--	--	--	--	--
	Tidal Open Water	--	--	--	--	--	--	--
Total Impacts on Wetland/Aquatic Habitats[c]		**3.26**	**157.59**	**160.86**	**6.77**	**0.10**	**6.88**	**6.88**
Total Impacts		**5.37**	**166.38**	**171.76**	**8.79**	**0.21**	**8.99**	**NA**

Notes:
a. Numbers may not sum due to rounding.
b. Net loss is calculated as follows: (Total Permanent Impacts) – (Tidal Marsh to Reestablish after 50 Years SLR on the Bay Edge) – (Loss of Tidal Action) = Net Loss of Wetland and Aquatic Habitats. This is because tidal marsh to reestablish after 50 years would constitute wetland or aquatic habitat in the long term, and because non-tidal wetlands are expected to persist in the areas assessed as Loss of Tidal Action
c. Open water, managed pond, non-tidal wetlands, and tidal wetlands
Source: H.T. Harvey & Associates 2025

TABLE BIO4-5
IMPACTS ON HABITAT – SUBSTATION AND MARSH RESTORATION REACH (PROJECT LEVEL)

Jurisdictional Habitat	Habitat Type	Construction-Phase Temporary Impacts (acres)				Permanent Impacts (acres)				
		Shoreline Protection Infrastructure	Fill due to Tidal Habitat Restoration in Ponds R1/R2 (No Change from Wetland/ Aquatic to Upland Type)	Excavation due to Tidal Habitat Restoration in Ponds R1/R2 (No Change from Wetland/ Aquatic to Upland Type)	Total[a]	Shoreline Protection Infrastructure	Fill due to Restoration (Ecotone and Nesting Islands Construction)	Total[a]	Tidal Marsh to Reestablish After 50 Years SLR[b] on Bayward Levee Slope	Net Loss of Wetland and Aquatic Habitats[c]
Open Water	Culvert/Riprap	--	--	0.01	0.01	--	--	--	--	--
	Detention Basin/Canal	--	--	--	--	--	--	--	--	--
	Intertidal Mudflats	--	--	3.10	3.10	--	--	--	--	--
	Muted Tidal Open Water	0.09	--	--	0.09	--	--	--	--	--
Managed Pond	Managed Pond	10.78	47.45	11.99	70.22	5.23	15.17	20.40	7.85	12.54
Non-tidal wetlands	Saline Seasonal Wetland	--	--	--	--	0.03	--	0.03		0.03
	Non-Tidal Saline Pond	--	--	--	--	--	--	--	--	--
	Non-Tidal/Muted Tidal Northern Coastal Salt Marsh	0.17	0.43	0.13	0.74	0.20	--	0.20	--	0.20
Upland	Landscaped/Developed	5.12	0.02	0.13	5.27	0.50	--	0.50	--	--
	Ruderal Levee Slope	0.10	1.15	0.58	1.83	0.44	0.08	0.52	0.01	--
	Ruderal Upland	0.14	0.26	0.17	0.57	0.43	0.19	0.62	--	--
Tidal wetlands	Tidal Northern Coastal Salt Marsh	--	--	1.55	1.55	--	--	--	--	--
	Tidal Open Water	--	--	3.99	3.99	--	--	--	--	--
Total Impacts on Wetland/Aquatic Habitats[d]		**11.04**	**47.89**	**20.76**	**79.69**	**5.47**	**15.17**	**20.63**	**7.85**	**12.77**
Total Impacts		**16.40**	**49.31**	**21.64**	**87.36**	**6.84**	**15.43**	**22.27**	**7.86**	**NA**

Notes:
a. Numbers may not sum due to rounding.
b. SLR=Sea Level Rise
c. Net loss is calculated as follows: (Total Permanent Impacts) – (Tidal Marsh to Reestablish after 50 Years SLR on the Bay Edge) – (Loss of Tidal Action) = Net Loss of Wetland and Aquatic Habitats. This is because tidal marsh to reestablish after 50 years would constitute wetland or aquatic habitat in the long term, and because non-tidal wetlands are expected to persist in the areas assessed as Loss of Tidal Action
d. Open water, managed pond, non-tidal wetlands, and tidal wetlands
Source: H.T. Harvey & Associates 2025

TABLE BIO4-6
IMPACTS ON HABITAT – TECH CAMPUS REACH (PROGRAM LEVEL)

Jurisdictional Habitat	Habitat Type	Construction-Phase Temporary Impacts Associated with Shoreline Protection Infrastructure (acres)	Permanent Impacts (acres)				
			Shoreline Protection Infrastructure	Loss of Tidal Action	Total[a]	Tidal Marsh to Reestablish After 50 Years SLR[b] on Bay Edge	Net loss of Wetland and Aquatic Habitats[c]
Open Water	Culvert/Riprap	--	--	--	--	--	--
	Detention Basin/Canal	--	--	--	--	--	--
	Intertidal Mudflats	--	--	--	--	--	--
	Muted Tidal Open Water	--	--	--	--	--	--
Managed Pond	Managed Pond	0.07	0.04	--	0.04	0.03	--
Non-tidal wetlands	Saline Seasonal Wetland	--	--	--	--	--	--
	Non-Tidal/Muted Tidal Northern Coastal Salt Marsh	0.03	0.04	--	0.04	--	0.03
Upland	Landscaped/Developed	1.81	1.63	--	1.63	--	--
	Ornamental Woodland (Riparian)	0.04	0.02	--	0.02	--	--
	Ornamental Woodland (Upland)	--	--	--	--	--	--
	Ruderal Levee Slope	0.14	1.10	0.01	1.11	0.01	--
	Ruderal Upland	0.49	0.79	--	0.79	--	--
Tidal wetlands	Tidal Brackish Marsh	0.11	0.33	2.00	2.33	0.01	0.32
	Tidal Northern Coastal Salt Marsh	2.95	3.33	0.01	3.34	1.08	2.25
	Tidal Open Water	0.80	0.65	0.16	0.81	0.32	0.32
Total Impacts on Wetland/Aquatic Habitats[d]		**3.96**	**4.39**	**2.17**	**6.56**	**1.45**	**2.92**
Total Impacts		**6.44**	**7.92**	**2.19**	**10.11**	**1.47**	**NA**

Notes:
a. Numbers may not sum due to rounding.
b. SLR = Sea Level Rise
c. Net loss is calculated as follows: (Total Permanent Impacts) – (Tidal Marsh to Reestablish after 50 Years SLR on the Bay Edge) – (Loss of Tidal Action) = Net Loss of Wetland and Aquatic Habitats. This is because tidal marsh to reestablish after 50 years would constitute wetland or aquatic habitat in the long term, and because non-tidal wetlands are expected to persist in the areas assessed as Loss of Tidal Action.
d. Open water, managed pond, non-tidal wetlands, and tidal wetlands.
Source: H.T. Harvey & Associates 2025

TABLE BIO4-7
IMPACTS ON HABITAT – BAYFRONT EXPRESSWAY REACH (PROGRAM LEVEL)

Jurisdictional Habitat	Habitat Type	Construction-Phase Temporary Impacts Associated with Shoreline Protection Infrastructure (acres)	Permanent Impacts (acres)				
			Shoreline Protection Infrastructure	Operation and Maintenance Road	Total[a]	Tidal Marsh to Reestablish After 50 Years SLR[b] on Bay Edge	Net loss of Wetland and Aquatic Habitats[c]
Open Water	Culvert/Riprap	--	0.06	--	0.06	--	0.06
	Detention Basin/Canal	--	--	--	--	--	--
	Intertidal Mudflats	--	--	--	--	--	--
	Muted Tidal Open Water	--	0.01	--	0.01	--	0.01
Managed Pond	Managed Pond	3.44	5.07	--	5.07	--	5.07
Non-tidal wetlands	Saline Seasonal Wetland	--	--	--	--	--	
	Non-Tidal/Muted Tidal Northern Coastal Salt Marsh	0.07	0.54	--	0.54	--	0.54
Upland	Landscaped/Developed	0.67	1.53	0.49	2.02	--	--
	Ornamental Woodland (Riparian)	--	--	--	--	--	--
	Ornamental Woodland (Upland)	--	--	--	--	--	--
	Ruderal Levee Slope	0.80	4.41	0.03	4.43	0.04	--
	Ruderal Upland	0.38	2.34	1.41	3.74	--	--
Tidal wetlands	Tidal Brackish Marsh	--	--	--	--	--	--
	Tidal Northern Coastal Salt Marsh	0.46	0.20	0.02	0.23	0.09	0.14
	Tidal Open Water	0.13	0.10	0.01	0.10	0.09	0.02
Total Impacts on Wetland/Aquatic Habitats[d]		**4.11**	**5.98**	**0.03**	**6.01**	**0.17**	**5.79**
Total Impacts		**5.95**	**14.25**	**1.96**	**16.21**	**0.22**	**NA**

Notes:
a. Numbers may not sum due to rounding.
b. SLR = Sea Level Rise
c. Net loss is calculated as follows: (Total Permanent Impacts) – (Tidal Marsh to Reestablish after 50 Years SLR on the Bay Edge) – (Loss of Tidal Action) = Net Loss of Wetland and Aquatic Habitats. This is because tidal marsh to reestablish after 50 years would constitute wetland or aquatic habitat in the long term, and because non-tidal wetlands are expected to persist in the areas assessed as Loss of Tidal Action.
d. Open water, managed pond, non-tidal wetlands, and tidal wetlands.
Source: H.T. Harvey & Associates 2025

TABLE BIO4-8
IMPACTS ON HABITAT – BAYFRONT EXPRESSWAY REACH (PROJECT LEVEL)

Jurisdictional Habitat	Habitat Type	Construction-Phase Temporary Impacts (acres)		Permanent Impacts (acres)
		Managed Pond Enhancement: Regrading in Ponds SF2 and R3	Total	Total
Open Water	Culvert/Riprap	--	--	--
	Detention Basin/Canal	--	--	--
	Intertidal Mudflats	--	--	--
	Muted Tidal Open Water	--	--	--
Managed Pond	Managed Pond	9.50	9.50	--
Non-tidal wetlands	Saline Seasonal Wetland	--	--	--
	Non-Tidal Saline Pond	--	--	--
	Non-Tidal/Muted Tidal Northern Coastal Salt Marsh	--	--	--
Upland	Landscaped/Developed	--	--	--
	Ruderal Levee Slope	--	--	--
	Ruderal Upland	--	--	--
Tidal wetlands	Tidal Northern Coastal Salt Marsh	--	--	--
	Tidal Open Water	--	--	--
Total Impacts on Wetland/Aquatic Habitats[a]		**9.50**	**9.50**	--
Total Impacts		**9.50**	**9.50**	--

Notes:
a. Open water, managed pond, non-tidal wetlands, and tidal wetlands
Source: H.T. Harvey & Associates 2025

TABLE BIO4-9
IMPACTS ON HABITAT – BEDWELL BAYFRONT PARK REACH (PROGRAM LEVEL)

Jurisdictional Habitat	Habitat Type	Construction-Phase Temporary Impacts Associated with Shoreline Protection Infrastructure (acres)	Permanent Impacts (acres)			
			Shoreline Protection Infrastructure	Total[a]	Tidal Marsh to Reestablish After 50 Years SLR[b] on Bay Edge	Net loss of Wetland and Aquatic Habitats[c]
Open Water	Culvert/Riprap	0.02	0.03	0.03	0.02	0.02
	Detention Basin/Canal	0.08	0.08	0.08	--	0.08
	Intertidal Mudflats	--	--	--	--	--
	Muted Tidal Open Water	0.01	0.01	0.01	--	0.01
Managed Pond	Managed Pond	--	--	--	--	--
Non-tidal wetlands	Saline Seasonal Wetland	--	--	--	--	--
	Non-Tidal/Muted Tidal Northern Coastal Salt Marsh	0.07	0.01	0.01	--	0.01
Upland	Landscaped/Developed	0.39	0.81	0.81	--	--
	Ornamental Woodland (Riparian)	--	--	--	--	--
	Ornamental Woodland (Upland)	--	--	--	--	--
	Ruderal Levee Slope	0.17	0.10	0.10	0.02	--
	Ruderal Upland	0.19	0.40	0.40	0.03	--
Tidal wetlands	Tidal Brackish Marsh	--	--	--	--	--
	Tidal Northern Coastal Salt Marsh	0.10	0.09	0.09	0.05	0.04
	Tidal Open Water	0.16	0.08	0.08	0.04	0.04
Total Impacts on Wetland/Aquatic Habitats[d]		**0.45**	**0.29**	**0.29**	**0.11**	**0.13**
Total Impacts		**1.20**	**1.60**	**1.60**	**0.16**	**NA**

Notes:
a. Numbers may not sum due to rounding.
b. SLR = Sea Level Rise
c. Net loss is calculated as follows: (Total Permanent Impacts) – (Tidal Marsh to Reestablish after 50 Years SLR on the Bay Edge) – (Loss of Tidal Action) = Net Loss of Wetland and Aquatic Habitats. This is because tidal marsh to reestablish after 50 years would constitute wetland or aquatic habitat in the long term, and because non-tidal wetlands are expected to persist in the areas assessed as Loss of Tidal Action.
d. Open water, managed pond, non-tidal wetlands, and tidal wetlands.
Source: H.T. Harvey & Associates 2025

TABLE BIO4-10
IMPACTS ON HABITAT – MARSH ROAD REACH (PROGRAM LEVEL)

Jurisdictional Habitat	Habitat Type	Construction-Phase Temporary Impacts Associated with Shoreline Protection Infrastructure (acres)	Permanent Impacts (acres)		
			Shoreline Protection Infrastructure	Total[a]	Net loss of Wetland and Aquatic Habitats[b]
Open Water	Culvert/Riprap	--	--	--	--
	Detention Basin/Canal	0.16	--	--	--
	Intertidal Mudflats	--	--	--	--
	Muted Tidal Open Water	--	--	--	--
Managed Pond	Managed Pond	1.01	2.16	2.16	2.16
Non-tidal wetlands	Saline Seasonal Wetland	--	--	--	--
	Non-Tidal/Muted Tidal Northern Coastal Salt Marsh	0.10	0.49	0.49	0.49
Upland	Landscaped/Developed	0.02	0.55	0.55	0.55
	Ornamental Woodland (Riparian)	--	--	--	--
	Ornamental Woodland (Upland)	--	--	--	--
	Ruderal Levee Slope	1.26	1.69	1.69	1.69
	Ruderal Upland	0.18	0.57	0.57	0.57
Tidal wetlands	Tidal Brackish Marsh	--	--	--	--
	Tidal Northern Coastal Salt Marsh	--	--	--	--
	Tidal Open Water	--	--	--	--
Total Impacts on Wetland/Aquatic Habitats[c]		**1.27**	**2.65**	**2.65**	**2.65**
Total Impacts		**2.72**	**5.46**	**5.46**	**5.46**

Notes:
a. Numbers may not sum due to rounding.
b. Net loss is calculated as follows: (Total Permanent Impacts) – (Tidal Marsh to Reestablish after 50 Years SLR on the Bay Edge) – (Loss of Tidal Action) = Net Loss of Wetland and Aquatic Habitats. This is because tidal marsh to reestablish after 50 years would constitute wetland or aquatic habitat in the long term, and because non-tidal wetlands are expected to persist in the areas assessed as Loss of Tidal Action.
c. Open water, managed pond, non-tidal wetlands, and tidal wetlands.
Source: H.T. Harvey & Associates 2025

Appendix NOI

Noise Analysis
Supporting Information

Summary

File Name on Meter	831_Data.007.s
File Name on PC	831_0002783-20241206 093445-831_Data.007.ldbin
Serial Number	0002783
Model	Model 831
Firmware Version	2.403
User	Nick Reynoso
Location	ST-1: 230 feet north of Bayshore Villa
Job Description	SAFER Bay
Note	

Measurement

Description	
Start	2024-12-06 09:34:45
Stop	2024-12-06 09:49:46
Duration	00:15:01.0
Run Time	00:15:01.0
Pause	00:00:00.0
Pre-Calibration	2024-12-06 09:33:33
Post-Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting
Peak Weight	Z Weighting
Detector	Slow
Preamplifier	PRM831
Microphone Correction	Off
Integration Method	Linear
OBA Range	Low
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	Z Weighting
OBA Max Spectrum	Bin Max
Gain	0.0 dB
Overload	143.2 dB

	A	**C**	**Z**	
Under Range Peak	75.7	72.7	**77.7**	dB
Under Range Limit	**26.1**	26.3	31.7	dB
Noise Floor	17.0	17.2	22.3	dB

	First	**Second**	**Third**
Instrument Identification			

Results

LA_{eq}	50.0
LAE	79.5

EA	10.017 µPa²h	
LZpeak (max)	2024-12-06 09:49:23	92.1 dB
LASmax	2024-12-06 09:49:00	70.2 dB
LASmin	2024-12-06 09:45:36	43.6 dB
SEA	-99.9 dB	

	Exceedance Counts	Duration
LAS > 65.0 dB	1	3.0 s
LAS > 85.0 dB	0	0.0 s
LZpeak > 135.0 dB	0	0.0 s
LZpeak > 137.0 dB	0	0.0 s
LZpeak > 140.0 dB	0	0.0 s

Community Noise	Ldn	LDay 07:00-22:00	LNight 22:00-07:00	Lden	LDay 07:00-19:00	LEvening 19:00-22:00	LNight 22:00-07:00	
	50.0	50.0	-99.9	50.0	50.0	-99.9	-99.9	dB

LCeq	66.6	dB
LAeq	50.0	dB
LCeq - LAeq	16.6	dB
LAleq	53.3	dB
LAeq	50.0	dB
LAleq - LAeq	3.3	dB

	A		C		Z	
	dB	Time Stamp	dB	Time Stamp	dB	Time Stamp
Leq	50.0		66.6		69.6	
LS(max)	70.2	2024/12/06 9:49:00	71.4	2024/12/06 9:49:24	75.9	2024/12/06 9:49:24
LF(max)	75.5	2024/12/06 9:49:00	78.4	2024/12/06 9:49:23	83.4	2024/12/06 9:49:23
LI(max)	76.7	2024/12/06 9:49:00	82.2	2024/12/06 9:49:23	87.1	2024/12/06 9:49:23
LS(min)	43.6	2024/12/06 9:45:36	62.1	2024/12/06 9:45:39	66.0	2024/12/06 9:45:39
LF(min)	43.0	2024/12/06 9:45:29	60.4	2024/12/06 9:45:38	62.9	2024/12/06 9:44:53
LI(min)	43.3	2024/12/06 9:45:29	63.0	2024/12/06 9:45:38	67.3	2024/12/06 9:45:35
LPeak(max)	86.0	2024/12/06 9:49:00	88.7	2024/12/06 9:49:23	92.1	2024/12/06 9:49:23

Overload Count	0	
Overload Duration	0.0	s
OBA Overload Count	0	
OBA Overload Duration	0.0	s

Statistics

LA 5.00	52.7	dB
LA 10.00	51.2	dB
LA 33.30	49.1	dB
LA 50.00	48.2	dB

LA 66.60	47.4 dB
LA 90.00	45.7 dB

Calibration History

Preamp	Date	dB re. 1V/Pa
PRM831	2024-12-06 09:33:32	-25.69
PRM831	2024-11-07 08:57:49	-25.86
PRM831	2024-10-30 07:25:49	-25.84
PRM831	2024-10-15 11:15:14	-25.85
PRM831	2024-08-12 09:30:42	-25.66
PRM831	2024-08-06 16:17:28	-25.57
PRM831	2024-08-05 15:45:13	-26.02
PRM831	2024-08-05 13:06:26	-26.02

Note: Detailed calibration records are available upon request.

Summary

File Name on Meter	831_Data.008.s
File Name on PC	831_0002783-20241206 095532-831_Data.008.ldbin
Serial Number	0002783
Model	Model 831
Firmware Version	2.403
User	Nick Reynoso
Location	ST-2: 145 feet north of Elan Menlo Park Apartments
Job Description	SAFER Bay
Note	

Measurement

Description	
Start	2024-12-06 09:55:32
Stop	2024-12-06 10:10:33
Duration	00:15:00.5
Run Time	00:15:00.5
Pause	00:00:00.0
Pre-Calibration	2024-12-06 09:33:32
Post-Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting
Peak Weight	Z Weighting
Detector	Slow
Preamplifier	PRM831
Microphone Correction	Off
Integration Method	Linear
OBA Range	Low
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	Z Weighting
OBA Max Spectrum	Bin Max
Gain	0.0 dB
Overload	143.2 dB

	A	**C**	**Z**	
Under Range Peak	75.7	72.7	**77.7**	dB
Under Range Limit	**26.1**	26.3	31.7	dB
Noise Floor	17.0	17.2	22.3	dB

	First	**Second**	**Third**
Instrument Identification			

Results

LA_{eq}	45.2		
LAE	74.7		
EA	3.293	µPa²h	
$LZ_{peak\ (max)}$	2024-12-06 10:06:02	86.4	dB
LAS_{max}	2024-12-06 10:08:06	49.2	dB

LASmin	2024-12-06 10:06:25	42.8	dB
SEA		-99.9	dB

	Exceedance Counts	Duration
LAS > 65.0 dB	0	0.0 s
LAS > 85.0 dB	0	0.0 s
LZpeak > 135.0 dB	0	0.0 s
LZpeak > 137.0 dB	0	0.0 s
LZpeak > 140.0 dB	0	0.0 s

Community Noise	Ldn	LDay 07:00-22:00	LNight 22:00-07:00	Lden	LDay 07:00-19:00	LEvening 19:00-22:00	LNight 22:00-07:00	
	45.2	45.2	-99.9	45.2	45.2	-99.9	-99.9	dB

LCeq	65.0	dB
LAeq	45.2	dB
LCeq - LAeq	19.8	dB
LAIeq	47.0	dB
LAeq	45.2	dB
LAIeq - LAeq	1.8	dB

	A		C		Z	
	dB	Time Stamp	dB	Time Stamp	dB	Time Stamp
Leq	45.2		65.0		68.9	
LS(max)	49.2	2024/12/06 10:08:06	70.0	2024/12/06 10:06:03	74.9	2024/12/06 10:06:03
LF(max)	53.3	2024/12/06 10:02:01	72.1	2024/12/06 10:06:03	77.5	2024/12/06 10:06:02
LI(max)	58.4	2024/12/06 10:02:01	75.3	2024/12/06 10:06:02	80.5	2024/12/06 10:06:02
LS(min)	42.8	2024/12/06 10:06:25	57.5	2024/12/06 9:55:32	63.0	2024/12/06 9:55:32
LF(min)	41.9	2024/12/06 10:06:24	59.2	2024/12/06 9:55:32	63.3	2024/12/06 10:01:52
LI(min)	42.6	2024/12/06 10:06:24	62.6	2024/12/06 9:55:32	67.6	2024/12/06 10:01:30
LPeak(max)	78.2	2024/12/06 10:02:01	83.1	2024/12/06 10:06:02	86.4	2024/12/06 10:06:02

Overload Count	0	
Overload Duration	0.0	s
OBA Overload Count	0	
OBA Overload Duration	0.0	s

Statistics

LA 5.00	47.1	dB
LA 10.00	46.5	dB
LA 33.30	45.3	dB
LA 50.00	44.9	dB
LA 66.60	44.4	dB
LA 90.00	43.8	dB

Calibration History

Preamp	Date	dB re. 1V/Pa
PRM831	2024-12-06 09:33:32	-25.69
PRM831	2024-11-07 08:57:49	-25.86
PRM831	2024-10-30 07:25:49	-25.84
PRM831	2024-10-15 11:15:14	-25.85
PRM831	2024-08-12 09:30:42	-25.66
PRM831	2024-08-06 16:17:28	-25.57
PRM831	2024-08-05 15:45:13	-26.02
PRM831	2024-08-05 13:06:26	-26.02

Note: Detailed calibration records are available upon request.

Summary

File Name on Meter	831_Data.009.s
File Name on PC	831_0002783-20241206 102526-831_Data.009.ldbin
Serial Number	0002783
Model	Model 831
Firmware Version	2.403
User	Nick Reynoso
Location	ST-3: Cul-de-sac of Windermere Avenue, 777 Hamilton Apartments
Job Description	SAFER Bay
Note	

Measurement

Description	
Start	2024-12-06 10:25:26
Stop	2024-12-06 10:40:27
Duration	00:15:00.5
Run Time	00:15:00.5
Pause	00:00:00.0
Pre-Calibration	2024-12-06 09:33:32
Post-Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting
Peak Weight	Z Weighting
Detector	Slow
Preamplifier	PRM831
Microphone Correction	Off
Integration Method	Linear
OBA Range	Low
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	Z Weighting
OBA Max Spectrum	Bin Max
Gain	0.0 dB
Overload	143.2 dB

	A	**C**	**Z**	
Under Range Peak	75.7	72.7	**77.7**	dB
Under Range Limit	**26.1**	26.3	31.7	dB
Noise Floor	17.0	17.2	22.3	dB

	First	**Second**	**Third**
Instrument Identification			

Results

LA_{eq}	56.5		
LAE	86.1		
EA	44.907 µPa²h		
$LZ_{peak\ (max)}$	2024-12-06 10:34:23	98.8	dB
LAS_{max}	2024-12-06 10:25:46	69.0	dB

LASmin	2024-12-06 10:32:25	41.1	dB
SEA		-99.9	dB

	Exceedance Counts	Duration
LAS > 65.0 dB	3	55.2 s
LAS > 85.0 dB	0	0.0 s
LZpeak > 135.0 dB	0	0.0 s
LZpeak > 137.0 dB	0	0.0 s
LZpeak > 140.0 dB	0	0.0 s

Community Noise	Ldn	LDay 07:00-22:00	LNight 22:00-07:00	Lden	LDay 07:00-19:00	LEvening 19:00-22:00	LNight 22:00-07:00	
	56.5	56.5	-99.9	56.5	56.5	-99.9	-99.9	dB

LCeq	65.4	dB
LAeq	56.5	dB
LCeq - LAeq	8.9	dB
LAIeq	57.9	dB
LAeq	56.5	dB
LAIeq - LAeq	1.4	dB

	A		C		Z	
	dB	Time Stamp	dB	Time Stamp	dB	Time Stamp
Leq	56.5		65.4		67.8	
LS(max)	69.0	2024/12/06 10:25:46	78.7	2024/12/06 10:25:44	78.9	2024/12/06 10:25:44
LF(max)	72.0	2024/12/06 10:30:27	82.2	2024/12/06 10:34:23	82.8	2024/12/06 10:34:23
LI(max)	74.6	2024/12/06 10:30:27	87.0	2024/12/06 10:34:23	87.7	2024/12/06 10:34:23
LS(min)	41.1	2024/12/06 10:32:25	56.9	2024/12/06 10:38:18	61.6	2024/12/06 10:38:19
LF(min)	40.2	2024/12/06 10:32:25	54.9	2024/12/06 10:38:18	59.1	2024/12/06 10:35:01
LI(min)	40.7	2024/12/06 10:32:25	58.2	2024/12/06 10:38:10	62.8	2024/12/06 10:38:10
LPeak(max)	94.1	2024/12/06 10:32:38	98.0	2024/12/06 10:34:23	98.8	2024/12/06 10:34:23

Overload Count	0	
Overload Duration	0.0	s
OBA Overload Count	0	
OBA Overload Duration	0.0	s

Statistics

LA 5.00	65.4	dB
LA 10.00	59.6	dB
LA 33.30	50.7	dB
LA 50.00	47.3	dB
LA 66.60	45.2	dB
LA 90.00	42.8	dB

Calibration History

Preamp	Date	dB re. 1V/Pa
PRM831	2024-12-06 09:33:32	-25.69
PRM831	2024-11-07 08:57:49	-25.86
PRM831	2024-10-30 07:25:49	-25.84
PRM831	2024-10-15 11:15:14	-25.85
PRM831	2024-08-12 09:30:42	-25.66
PRM831	2024-08-06 16:17:28	-25.57
PRM831	2024-08-05 15:45:13	-26.02
PRM831	2024-08-05 13:06:26	-26.02

Note: Detailed calibration records available upon request

Summary

File Name on Meter	831_Data.010.s
File Name on PC	831_0002783-20241206 105704-831_Data.010.ldbin
Serial Number	0002783
Model	Model 831
Firmware Version	2.403
User	Nick Reynoso
Location	ST-4: Cul-de-sac of Fordham Street
Job Description	SAFER Bay
Note	

Measurement

Description	
Start	2024-12-06 10:57:04
Stop	2024-12-06 11:12:05
Duration	00:15:00.9
Run Time	00:15:00.9
Pause	00:00:00.0
Pre-Calibration	2024-12-06 09:33:32
Post-Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting
Peak Weight	Z Weighting
Detector	Slow
Preamplifier	PRM831
Microphone Correction	Off
Integration Method	Linear
OBA Range	Low
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	Z Weighting
OBA Max Spectrum	Bin Max
Gain	0.0 dB
Overload	143.2 dB

	A	**C**	**Z**	
Under Range Peak	75.7	72.7	**77.7**	dB
Under Range Limit	**26.1**	26.3	31.7	dB
Noise Floor	17.0	17.2	22.3	dB

	First	**Second**	**Third**
Instrument Identification			

Results

LA_{eq}	59.3		
LAE	88.9		
EA	85.864 µPa²h		
$LZ_{peak\ (max)}$	2024-12-06 11:09:36	93.6	dB
LAS_{max}	2024-12-06 11:09:36	75.4	dB

LASmin	2024-12-06 11:11:57	41.2 dB
SEA	-99.9	dB

	Exceedance Counts	Duration
LAS > 65.0 dB	5	65.8 s
LAS > 85.0 dB	0	0.0 s
LZpeak > 135.0 dB	0	0.0 s
LZpeak > 137.0 dB	0	0.0 s
LZpeak > 140.0 dB	0	0.0 s

Community Noise	Ldn	LDay 07:00-22:00	LNight 22:00-07:00	Lden	LDay 07:00-19:00	LEvening 19:00-22:00	LNight 22:00-07:00	
	59.3	59.3	-99.9	59.3	59.3	-99.9	-99.9	dB

LCeq	69.1	dB
LAeq	59.3	dB
LCeq - LAeq	9.8	dB
LAIeq	60.3	dB
LAeq	59.3	dB
LAIeq - LAeq	1.0	dB

	A		C		Z	
	dB	Time Stamp	dB	Time Stamp	dB	Time Stamp
Leq	59.3		69.1		70.6	
LS(max)	75.4	2024/12/06 11:09:36	83.2	2024/12/06 11:09:36	83.3	2024/12/06 11:09:36
LF(max)	77.3	2024/12/06 11:09:36	83.7	2024/12/06 11:09:36	83.8	2024/12/06 11:09:35
LI(max)	78.2	2024/12/06 11:09:36	84.0	2024/12/06 11:09:36	84.2	2024/12/06 10:57:10
LS(min)	41.2	2024/12/06 11:11:57	58.5	2024/12/06 11:11:50	63.0	2024/12/06 11:11:50
LF(min)	40.1	2024/12/06 11:11:56	56.9	2024/12/06 11:11:50	60.8	2024/12/06 11:11:30
LI(min)	40.6	2024/12/06 11:11:56	59.3	2024/12/06 11:11:27	63.6	2024/12/06 11:11:50
LPeak(max)	88.3	2024/12/06 11:09:36	93.0	2024/12/06 11:09:36	93.6	2024/12/06 11:09:36

Overload Count	0	
Overload Duration	0.0	s
OBA Overload Count	0	
OBA Overload Duration	0.0	s

Statistics

LA 5.00	66.5	dB
LA 10.00	62.2	dB
LA 33.30	54.0	dB
LA 50.00	51.0	dB
LA 66.60	48.6	dB
LA 90.00	45.0	dB

Calibration History

Preamp	Date	dB re. 1V/Pa
PRM831	2024-12-06 09:33:32	-25.69
PRM831	2024-11-07 08:57:49	-25.86
PRM831	2024-10-30 07:25:49	-25.84
PRM831	2024-10-15 11:15:14	-25.85
PRM831	2024-08-12 09:30:42	-25.66
PRM831	2024-08-06 16:17:28	-25.57
PRM831	2024-08-05 15:45:13	-26.02
PRM831	2024-08-05 13:06:26	-26.02

Note: Detailed calibration records available upon request.

Summary

File Name on Meter	831_Data.011.s
File Name on PC	831_0002783-20241206 112230-831_Data.011.ldbin
Serial Number	0002783
Model	Model 831
Firmware Version	2.403
User	Nick Reynoso
Location	ST-5: ST-5 Cul-de-sac of Runnymede Street
Job Description	SAFER Bay
Note	

Measurement

Description	
Start	2024-12-06 11:22:30
Stop	2024-12-06 11:37:32
Duration	00:15:02.2
Run Time	00:15:02.2
Pause	00:00:00.0
Pre-Calibration	2024-12-06 09:33:32
Post-Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting
Peak Weight	Z Weighting
Detector	Slow
Preamplifier	PRM831
Microphone Correction	Off
Integration Method	Linear
OBA Range	Low
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	Z Weighting
OBA Max Spectrum	Bin Max
Gain	0.0 dB
Overload	143.2 dB

	A	**C**	**Z**	
Under Range Peak	75.7	72.7	**77.7**	dB
Under Range Limit	**26.1**	26.3	31.7	dB
Noise Floor	17.0	17.2	22.3	dB

	First	**Second**	**Third**
Instrument Identification			

Results

LA_{eq}	58.5		
LAE	88.0		
EA	70.880 µPa²h		
$LZ_{peak\ (max)}$	2024-12-06 11:29:15	90.4	dB
LAS_{max}	2024-12-06 11:36:15	70.1	dB

LASmin	2024-12-06 11:27:26	39.1 dB
SEA	-99.9 dB	

	Exceedance Counts	Duration
LAS > 65.0 dB	8	79.7 s
LAS > 85.0 dB	0	0.0 s
LZpeak > 135.0 dB	0	0.0 s
LZpeak > 137.0 dB	0	0.0 s
LZpeak > 140.0 dB	0	0.0 s

Community Noise	**Ldn**	**LDay 07:00-22:00**	**LNight 22:00-07:00**	**Lden**	**LDay 07:00-19:00**	**LEvening 19:00-22:00**	**LNight 22:00-07:00**	
	58.5	58.5	-99.9	58.5	58.5	-99.9	-99.9	dB

LCeq	70.5	dB
LAeq	58.5	dB
LCeq - LAeq	12.0	dB
LAIeq	59.7	dB
LAeq	58.5	dB
LAIeq - LAeq	1.2	dB

	A		**C**		**Z**	
	dB	**Time Stamp**	**dB**	**Time Stamp**	**dB**	**Time Stamp**
Leq	58.5		70.5		71.6	
LS(max)	70.1	2024/12/06 11:36:15	80.6	2024/12/06 11:30:55	81.1	2024/12/06 11:30:55
LF(max)	71.4	2024/12/06 11:36:14	82.6	2024/12/06 11:30:54	83.1	2024/12/06 11:30:54
LI(max)	72.4	2024/12/06 11:36:14	83.3	2024/12/06 11:30:54	84.6	2024/12/06 11:29:16
LS(min)	39.1	2024/12/06 11:27:26	58.6	2024/12/06 11:27:22	62.6	2024/12/06 11:27:22
LF(min)	37.1	2024/12/06 11:27:25	56.5	2024/12/06 11:27:21	60.6	2024/12/06 11:31:58
LI(min)	39.6	2024/12/06 11:27:26	59.0	2024/12/06 11:27:22	64.3	2024/12/06 11:27:21
LPeak(max)	86.0	2024/12/06 11:36:13	89.6	2024/12/06 11:30:52	90.4	2024/12/06 11:29:15

Overload Count	0	
Overload Duration	0.0	s
OBA Overload Count	0	
OBA Overload Duration	0.0	s

Statistics

LA 5.00	65.4	dB
LA 10.00	63.5	dB
LA 33.30	57.2	dB
LA 50.00	52.4	dB
LA 66.60	47.4	dB
LA 90.00	43.5	dB

Calibration History

Preamp	Date	dB re. 1V/Pa
PRM831	2024-12-06 09:33:32	-25.69
PRM831	2024-11-07 08:57:49	-25.86
PRM831	2024-10-30 07:25:49	-25.84
PRM831	2024-10-15 11:15:14	-25.85
PRM831	2024-08-12 09:30:42	-25.66
PRM831	2024-08-06 16:17:28	-25.57
PRM831	2024-08-05 15:45:13	-26.02
PRM831	2024-08-05 13:06:26	-26.02

Note: Detailed calibration records available upon request.

Summary

File Name on Meter	831_Data.012.s
File Name on PC	831_0002783-20241206 114449-831_Data.012.ldbin
Serial Number	0002783
Model	Model 831
Firmware Version	2.403
User	Nick Reynoso
Location	ST-6: Cul-de-sac of O' Connor Street
Job Description	SAFER Bay
Note	

Measurement

Description	
Start	2024-12-06 11:44:49
Stop	2024-12-06 11:59:56
Duration	00:15:00.5
Run Time	00:15:00.5
Pause	00:00:00.0
Pre-Calibration	2024-12-06 09:33:32
Post-Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting
Peak Weight	Z Weighting
Detector	Slow
Preamplifier	PRM831
Microphone Correction	Off
Integration Method	Linear
OBA Range	Low
OBA Bandwidth	1/1 and 1/3
OBA Frequency Weighting	Z Weighting
OBA Max Spectrum	Bin Max
Gain	0.0 dB
Overload	143.2 dB

	A	**C**	**Z**	
Under Range Peak	75.7	72.7	**77.7**	dB
Under Range Limit	**26.1**	26.3	31.7	dB
Noise Floor	17.0	17.2	22.3	dB

	First	**Second**	**Third**
Instrument Identification			

Results

LA_{eq}	52.5		
LAE	82.1		
EA	17.995 µPa²h		
$LZ_{peak\ (max)}$	2024-12-06 11:49:24	87.5	dB
LAS_{max}	2024-12-06 11:47:05	64.9	dB

LASmin	2024-12-06 11:59:43	38.4 dB
SEA	-99.9 dB	

	Exceedance Counts	Duration
LAS > 65.0 dB	0	0.0 s
LAS > 85.0 dB	0	0.0 s
LZpeak > 135.0 dB	0	0.0 s
LZpeak > 137.0 dB	0	0.0 s
LZpeak > 140.0 dB	0	0.0 s

Community Noise	Ldn	LDay 07:00-22:00	LNight 22:00-07:00	Lden	LDay 07:00-19:00	LEvening 19:00-22:00	LNight 22:00-07:00	
	52.5	52.5	-99.9	52.5	52.5	-99.9	-99.9	dB

LCeq	66.0	dB
LAeq	52.5	dB
LCeq - LAeq	13.5	dB
LAIeq	54.1	dB
LAeq	52.5	dB
LAIeq - LAeq	1.5	dB

	A		C		Z	
	dB	Time Stamp	dB	Time Stamp	dB	Time Stamp
Leq	52.5		66.0		69.0	
LS(max)	64.9	2024/12/06 11:47:05	75.5	2024/12/06 11:45:07	76.6	2024/12/06 11:48:51
LF(max)	68.3	2024/12/06 11:47:05	76.8	2024/12/06 11:50:50	82.1	2024/12/06 11:49:24
LI(max)	69.5	2024/12/06 11:47:05	78.7	2024/12/06 11:50:50	84.8	2024/12/06 11:49:24
LS(min)	38.4	2024/12/06 11:59:43	57.2	2024/12/06 11:54:48	61.7	2024/12/06 11:55:21
LF(min)	37.4	2024/12/06 11:59:07	54.9	2024/12/06 11:55:15	59.4	2024/12/06 11:55:20
LI(min)	37.7	2024/12/06 11:59:07	58.3	2024/12/06 11:54:48	62.8	2024/12/06 11:55:18
LPeak(max)	81.5	2024/12/06 11:47:05	84.3	2024/12/06 11:50:48	87.5	2024/12/06 11:49:24

Overload Count	0	
Overload Duration	0.0	s
OBA Overload Count	0	
OBA Overload Duration	0.0	s

Statistics

LA 5.00	59.0	dB
LA 10.00	57.2	dB
LA 33.30	49.9	dB
LA 50.00	46.6	dB
LA 66.60	43.4	dB
LA 90.00	40.7	dB

Calibration History

Preamp	Date	dB re. 1V/Pa
PRM831	2024-12-06 09:33:32	-25.69
PRM831	2024-11-07 08:57:49	-25.86
PRM831	2024-10-30 07:25:49	-25.84
PRM831	2024-10-15 11:15:14	-25.85
PRM831	2024-08-12 09:30:42	-25.66
PRM831	2024-08-06 16:17:28	-25.57
PRM831	2024-08-05 15:45:13	-26.02
PRM831	2024-08-05 13:06:26	-26.02

Note: Detailed calibration records available upon request.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/12/2025
Case Description: South of Bay Road Reach - Pile Driving

---- Receptor #1 ----

		Baselines (dBA)		
Description	**Land Use**	**Daytime**	**Evening**	**Night**
Runnymede Street Residences	Residential	55	55	50

			Equipment			
			Spec	Actual	Receptor	Estimated
		Impact	Lmax	Lmax	Distance	Shielding
Description		**Device**	**Usage(%)**	**(dBA)**	**(dBA)**	**(feet)**	**(dBA)**
Vibratory Pile Driver		No	20		100.8	45	0
Gradall		No	40		83.4	45	0

Results

Calculated (dBA)

Equipment		***Lmax**	**Leq**
Vibratory Pile Driver		101.7	94.7
Gradall		84.3	80.3
	Total	**101.7**	**94.9**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/12/2025
Case Description: South of Bay Road Reach - Demolition

		Baselines (dBA)		
Description	**Land Use**	**Daytime**	**Evening**	**Night**
Runnymede Street Residences	Residential	55	55	50

			Equipment			
			Spec	Actual	Receptor	Estimated
	Impact		Lmax	Lmax	Distance	Shielding
Description	**Device**	**Usage(%)**	**(dBA)**	**(dBA)**	**(feet)**	**(dBA)**
All Other Equipment > 5 HP	No	50	85		60	0
Grader	No	40	85		60	0

		Calculated (dBA)	
Equipment		***Lmax**	**Leq**
All Other Equipment > 5 HP		83.4	80.4
Grader		83.4	79.4
	Total	**83.4**	**83**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/12/2025
Case Description: South of Bay Road Reach - Grading

		Baselines (dBA)		
Description	**Land Use**	**Daytime**	**Evening**	**Night**
Runnymede Street Residences	Residential	55	55	50

			Equipment Spec	Actual	Receptor	Estimated
	Impact		**Lmax**	**Lmax**	**Distance**	**Shielding**
Description	**Device**	**Usage(%)**	**(dBA)**	**(dBA)**	**(feet)**	**(dBA)**
Tractor	No	40	84		60	0
Grader	No	40	85		60	0

		Calculated (dBA)	
Equipment		***Lmax**	**Leq**
Tractor		82.4	78.4
Grader		83.4	79.4
	Total	**83.4**	**82**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/12/2025
Case Description: North of Bay Road Reach - Demolition

		Baselines (dBA)		
Description	**Land Use**	**Daytime**	**Evening**	**Night**
Illinois Street Residences	Residential	55	55	50

			Equipment			
			Spec	Actual	Receptor	Estimated
	Impact		Lmax	Lmax	Distance	Shielding
Description	**Device**	**Usage(%)**	**(dBA)**	**(dBA)**	**(feet)**	**(dBA)**
All Other Equipment > 5 HP	No	50	85		90	0
Tractor	No	40	84		90	0

Calculated (dBA)

Equipment		***Lmax**	**Leq**
All Other Equipment > 5 HP		79.9	76.9
Tractor		78.9	74.9
	Total	**79.9**	**79**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/12/2025
Case Description: North of Bay Road Reach - Grading

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Illinois Street Residences	Residential	55	55	50

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Tractor	No	40	84		90	0
Grader	No	40	85		90	0

Results

Calculated (dBA)

Equipment		*Lmax	Leq
Tractor		78.9	74.9
Grader		79.9	75.9
	Total	**79.9**	**78.5**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/12/2025
Case Description: Dumbarton Approach Reach - Site Preparation

		Baselines (dBA)		
Description	**Land Use**	**Daytime**	**Evening**	**Night**
Fordham Street Residences	Residential	55	55	50

			Equipment			
			Spec	Actual	Receptor	Estimated
	Impact		Lmax	Lmax	Distance	Shielding
Description	**Device**	**Usage(%)**	**(dBA)**	**(dBA)**	**(feet)**	**(dBA)**
Tractor	No	40	84		530	0
Gradall	No	40		83.4	530	0

Results

Calculated (dBA)

Equipment	***Lmax**	**Leq**
Tractor	63.5	59.5
Gradall	62.9	58.9
Total	**63.5**	**62.2**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/12/2025
Case Description: Dumbarton Approach Reach - Grading

		Baselines (dBA)		
Description	**Land Use**	**Daytime**	**Evening**	**Night**
Fordham Street Residences	Residential	55	55	50

			Equipment			
			Spec	Actual	Receptor	Estimated
	Impact		Lmax	Lmax	Distance	Shielding
Description	**Device**	**Usage(%)**	**(dBA)**	**(dBA)**	**(feet)**	**(dBA)**
Grader	No	40	85		530	0
Tractor	No	40	84		530	0

Results

Calculated (dBA)

Equipment	***Lmax**	**Leq**
Grader	64.5	60.5
Tractor	63.5	59.5
Total	**64.5**	**63.1**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/12/2025
Case Description: Dumbarton Approach Reach - Closeout

		Baselines (dBA)		
Description	**Land Use**	**Daytime**	**Evening**	**Night**
Fordham Street Residences	Residential	55	55	50

			Equipment			
			Spec	Actual	Receptor	Estimated
	Impact		Lmax	Lmax	Distance	Shielding
Description	**Device**	**Usage(%)**	**(dBA)**	**(dBA)**	**(feet)**	**(dBA)**
All Other Equipment > 5 HP	No	50	85		530	0
Tractor	No	40	84		530	0

Results

Calculated (dBA)

Equipment	***Lmax**	**Leq**
All Other Equipment > 5 HP	64.5	61.5
Tractor	63.5	59.5
Total	**64.5**	**63.6**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/12/2025
Case Description: Tech Camous Reach - Grading

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
777 Hamilton Apartments	Residential	55	55	50

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Grader	No	40	85		960	0
Impact Pile Driver	Yes	20		101.3	960	0

Calculated (dBA)

Equipment		*Lmax	Leq
Grader		59.3	55.4
Impact Pile Driver		75.6	68.6
	Total	**75.6**	**68.8**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/12/2025
Case Description: Tech Camous Reach - Closeout

		Baselines (dBA)		
Description	**Land Use**	**Daytime**	**Evening**	**Night**
777 Hamilton Apartments	Residential	55	55	50

			Equipment			
	Impact		**Spec Lmax**	**Actual Lmax**	**Receptor Distance**	**Estimated Shielding**
Description	**Device**	**Usage(%)**	**(dBA)**	**(dBA)**	**(feet)**	**(dBA)**
All Other Equipment > 5 HP	No	50	85		960	0
Gradall	No	40		83.4	960	0

Results

Calculated (dBA)

Equipment		***Lmax**	**Leq**
All Other Equipment > 5 HP		59.3	56.3
Gradall		57.7	53.8
	Total	**59.3**	**58.2**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/12/2025
Case Description: Bayfront Expressway Reach - Grading

		Baselines (dBA)		
Description	**Land Use**	**Daytime**	**Evening**	**Night**
777 Hamilton Apartments	Residential	55	55	50

			Equipment			
			Spec	Actual	Receptor	Estimated
	Impact		Lmax	Lmax	Distance	Shielding
Description	**Device**	**Usage(%)**	**(dBA)**	**(dBA)**	**(feet)**	**(dBA)**
Tractor	No	40	84		840	0
Grader	No	40	85		840	0

Results

Calculated (dBA)

Equipment	***Lmax**	**Leq**
Tractor	59.5	55.5
Grader	60.5	56.5
Total	**60.5**	**59.1**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/12/2025
Case Description: Bayfront Expressway Reach - Closeout

		Baselines (dBA)		
Description	**Land Use**	**Daytime**	**Evening**	**Night**
777 Hamilton Apartments	Residential	55	55	50

			Equipment			
			Spec	Actual	Receptor	Estimated
	Impact		Lmax	Lmax	Distance	Shielding
Description	**Device**	**Usage(%)**	**(dBA)**	**(dBA)**	**(feet)**	**(dBA)**
All Other Equipment > 5 HP	No	50	85		840	0
Gradall	No	40		83.4	840	0

Results

Calculated (dBA)

Equipment	***Lmax**	**Leq**
All Other Equipment > 5 HP	60.5	57.5
Gradall	58.9	54.9
Total	**60.5**	**59.4**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/12/2025
Case Description: Bedwell Bayfront Park Reach - Pile Driving

		Baselines (dBA)		
Description	**Land Use**	**Daytime**	**Evening**	**Night**
Elan Menlo Park Apartments	Residential	55	55	50

			Equipment			
			Spec	Actual	Receptor	Estimated
	Impact		Lmax	Lmax	Distance	Shielding
Description	**Device**	**Usage(%)**	**(dBA)**	**(dBA)**	**(feet)**	**(dBA)**
Impact Pile Driver	Yes	20		101.3	740	0
Tractor	No	40	84		740	0

Results

Calculated (dBA)

Equipment	***Lmax**	**Leq**
Impact Pile Driver	77.9	70.9
Tractor	60.6	56.6
Total	**77.9**	**71**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/12/2025
Case Description: Bedwell Bayfront Park Reach - Grading_Structural Sections

		Baselines (dBA)		
Description	**Land Use**	**Daytime**	**Evening**	**Night**
Anton Menlo Apartments	Residential	55	55	50

			Equipment			
			Spec	Actual	Receptor	Estimated
	Impact		Lmax	Lmax	Distance	Shielding
Description	**Device**	**Usage(%)**	**(dBA)**	**(dBA)**	**(feet)**	**(dBA)**
Grader	No	40	85		600	0
Tractor	No	40	84		600	0

Results

Calculated (dBA)

Equipment	***Lmax**	**Leq**
Grader	63.4	59.4
Tractor	62.4	58.4
Total	**63.4**	**62**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/15/2025
Case Description: Marsh Road Reach - Grading

---- Receptor #1 ----

		Baselines (dBA)		
Description	**Land Use**	**Daytime**	**Evening**	**Night**
Bayshore Villa	Residential	55	55	50

			Equipment			
			Spec	Actual	Receptor	Estimated
	Impact		Lmax	Lmax	Distance	Shielding
Description	**Device**	**Usage(%)**	**(dBA)**	**(dBA)**	**(feet)**	**(dBA)**
Grader	No	40	85		220	0
Tractor	No	40	84		220	0

Results

Calculated (dBA)

Equipment	***Lmax**	**Leq**
Grader	72.1	68.2
Tractor	71.1	67.2
Total	**72.1**	**70.7**

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

		Baselines (dBA)		
Description	**Land Use**	**Daytime**	**Evening**	**Night**
Anton Menlo Apartments	Residential	45	45	45

			Equipment			
			Spec	Actual	Receptor	Estimated
	Impact		Lmax	Lmax	Distance	Shielding
Description	**Device**	**Usage(%)**	**(dBA)**	**(dBA)**	**(feet)**	**(dBA)**
Grader	No	40	85		150	0
Tractor	No	40	84		150	0

Results

Calculated (dBA)

Equipment	***Lmax**	**Leq**
Grader	75.5	71.5
Tractor	74.5	70.5
Total	**75.5**	**74**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/15/2025
Case Description: Marsh Road Reach - Closeout

---- Receptor #1 ----

		Baselines (dBA)		
Description	**Land Use**	**Daytime**	**Evening**	**Night**
Bayshore Villa	Residential	55	55	50

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Gradall	No	40		83.4	220	0
All Other Equipment > 5 HP	No	50	85		220	0

Results

Calculated (dBA)

Equipment	*Lmax	Leq
Gradall	70.5	66.6
All Other Equipment > 5 HP	72.1	69.1
Total	**72.1**	**71**

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

		Baselines (dBA)		
Description	**Land Use**	**Daytime**	**Evening**	**Night**
Anton Menlo Apartments	Residential	45	45	45

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Gradall	No	40		83.4	150	0
All Other Equipment > 5 HP	No	50	85		150	0

Results

Calculated (dBA)

Equipment	*Lmax	Leq
Gradall	73.9	69.9
All Other Equipment > 5 HP	75.5	72.4
Total	**75.5**	**74.4**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 9/15/2025
Case Description: Habitat Restoration Grading

---- Receptor #1 ----

		Baselines (dBA)		
Description	**Land Use**	**Daytime**	**Evening**	**Night**
Tulane Avenue Residences	Residential	59	59	50

			Equipment			
			Spec	Actual	Receptor	Estimated
	Impact		Lmax	Lmax	Distance	Shielding
Description	**Device**	**Usage(%)**	**(dBA)**	**(dBA)**	**(feet)**	**(dBA)**
Excavator	No	40		80.7	340	0
Tractor	No	40	84		340	0

Results

Calculated (dBA)

Equipment	***Lmax**	**Leq**
Excavator	64.1	60.1
Tractor	67.3	63.4
Total	**67.3**	**65**

*Calculated Lmax is the Loudest value.

---- Receptor #2 ----

		Baselines (dBA)		
Description	**Land Use**	**Daytime**	**Evening**	**Night**
777 Hamilton Apartments	Residential	57	57	50

			Equipment			
			Spec	Actual	Receptor	Estimated
	Impact		Lmax	Lmax	Distance	Shielding
Description	**Device**	**Usage(%)**	**(dBA)**	**(dBA)**	**(feet)**	**(dBA)**
Excavator	No	40		80.7	900	0
Tractor	No	40	84		900	0

Results

Calculated (dBA)

Equipment	***Lmax**	**Leq**
Excavator	55.6	51.6
Tractor	58.9	54.9
Total	**58.9**	**56.6**

*Calculated Lmax is the Loudest value.

SAFER BAY Project

Noise Level Addition (Ambient Plus Construction Noise)

South of Bay Road Reach

Pile Driving of Sheet Piles

	Added	Existing
Noise Source	95.0	59.0
LOG	3162277660.2	794328.2
Adding Noise Sources	95.0	dBA
Change in noise level	36.0	dBA

Demolition

	Added	Existing
Noise Source	83.0	59.0
LOG	199526231.5	794328.2
Adding Noise Sources	83.0	dBA
Change in noise level	24.0	dBA

Grading

	Added	Existing
Noise Source	82.0	59.0
LOG	158489319.2	794328.2
Adding Noise Sources	82.0	dBA
Change in noise level	23.0	dBA

North of Bay Road Reach

Demolition

	Added	Existing
Noise Source	79.0	59.0
LOG	79432823.5	794328.2
Adding Noise Sources	79.0	dBA
Change in noise level	20.0	dBA

Grading

	Added	Existing
Noise Source	79.0	59.0
LOG	79432823.5	794328.2
Adding Noise Sources	79.0	dBA
Change in noise level	20.0	dBA

Dumbarton Approach Reach

Site Preparation

	Added	Existing
Noise Source	62.0	59.0
LOG	1584893.2	794328.2
Adding Noise Sources	63.8	dBA
Change in noise level	4.8	dBA

Grading

	Added	Existing
Noise Source	63.0	59.0
LOG	1995262.3	794328.2
Adding Noise Sources	64.5	dBA
Change in noise level	5.5	dBA

Closeout

	Added	Existing
Noise Source	64.0	59.0
LOG	2511886.4	794328.2
Adding Noise Sources	65.2	dBA
Change in noise level	6.2	dBA

Tech Campus Reach

Grading

	Added	Existing
Noise Source	69.0	57.0
LOG	7943282.3	501187.2
Adding Noise Sources	69.3	dBA
Change in noise level	12.3	dBA

Closeout

	Added	Existing
Noise Source	58.0	57.0
LOG	630957.3	501187.2
Adding Noise Sources	60.5	dBA
Change in noise level	3.5	dBA

Bayfront Expressway Reach

Grading

	Added	Existing
Noise Source	59.0	57.0
LOG	794328.2	501187.2
Adding Noise Sources	61.1	dBA
Change in noise level	4.1	dBA

Closeout

	Added	Existing
Noise Source	59.0	57.0
LOG	794328.2	501187.2
Adding Noise Sources	61.1	dBA
Change in noise level	4.1	dBA

Bedwell Bayfront Park Reach

Pile Driving for the Bridge

	Added	Existing
Noise Source	71.0	45.0
LOG	12589254.1	31622.8
Adding Noise Sources	71.0	dBA
Change in noise level	26.0	dBA

Grading/Structural Sections

	Added	Existing
Noise Source	74.0	45.0
LOG	25118864.3	31622.8
Adding Noise Sources	74.0	dBA
Change in noise level	29.0	dBA

Marsh Road Reach

Grading

	Added	Existing
Noise Source	71.0	50.0
LOG	12589254.1	100000.0
Adding Noise Sources	71.0	dBA
Change in noise level	21.0	dBA

Closeout

	Added	Existing
Noise Source	71.0	50.0
LOG	12589254.1	100000.0
Adding Noise Sources	71.0	dBA
Change in noise level	21.0	dBA

Appendix ALT

Alternatives Analysis Supporting Information





Legend

- Reach 1, Option 1
- Reach 2, Option 1
- Reach 3, Option 1
- Reach 4, Option 2
- Reach 5, Option 1
- Reach 7, Option 2
- Reach 8, Option 2
- Reach 9, Option 1

N

0 2,000 Feet

1 inch = 2,000 feet

SAFER Bay

Feasibility Report
Low Cost
Alternative

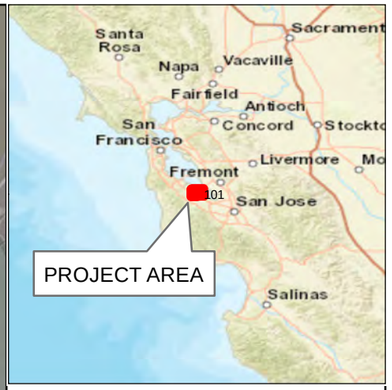
Figure 31

Data Sources: Base Map-ESRI Maps and Data 2014;
All other data - HDR 2014

Datum: NAD83 California State Plane, Zone 3 US ft

JUNE 2016





Legend

- Reach 1, Option 2
- Reach 2, Option 1
- Reach 3, Option 1
- Reach 4, Option 2
- Reach 5, Option 4
- Reach 7, Option 2
- Reach 8, Option 2
- Reach 9, Option 1

N

0 2,000 Feet

1 inch = 2,000 feet

SAFER Bay

Feasibility Report
Restoration
Alternative

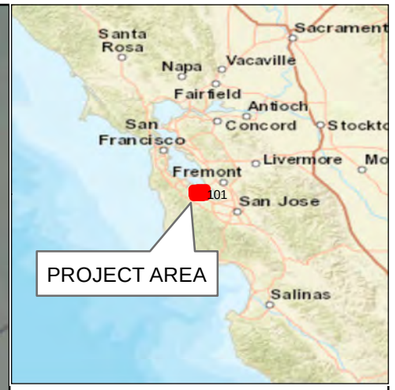
Figure 32

Data Sources: Base Map-ESRI Maps and Data 2014;
All other data - HDR 2014

Datum: NAD83 California State Plane, Zone 3 US ft

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Dumbarton Bridge



Legend

- Reach 1, Option 2
- Reach 2, Option 1
- Reach 3, Option 1
- Reach 4, Option 2
- Reach 5, Option 4
- Reach 7, Option 2
- Reach 8, Option 2
- Reach 9, Option 1

N

0 2,000 Feet

1 inch = 2,000 feet

SAFER Bay

Feasibility Report
Recreation
Alternative

Figure 33

Data Sources: Base Map-ESRI Maps and Data 2014;
All other data - HDR 2014

Datum: NAD83 California State Plane, Zone 3 US ft

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FIGURE 13. PLAN VIEW SCHEMATIC FOR ALTERNATIVE 2 – PROTECT IN PLACE



FIGURE 17. PLAN VIEW SCHEMATIC FOR ALTERNATIVE 3, OPTION 1 – RAISE THE ROAD



FIGURE 19. PLAN VIEW SCHEMATIC FOR ALTERNATIVE 3, OPTION 2– RAISE THE ROAD